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E. R. GODWARD
VAPORIZER

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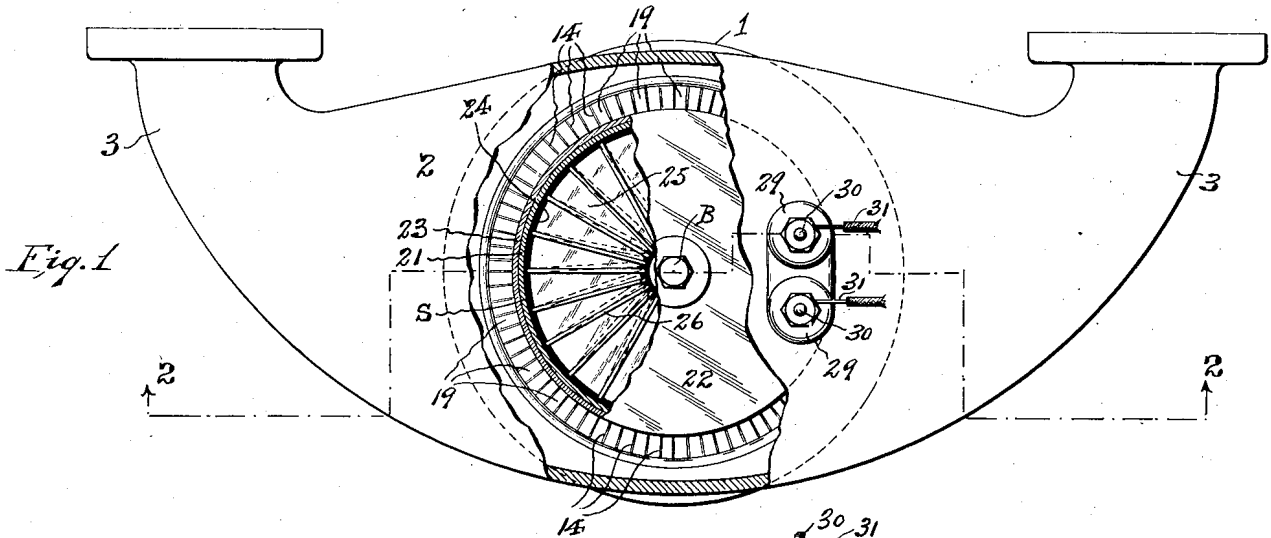


Fig. 1

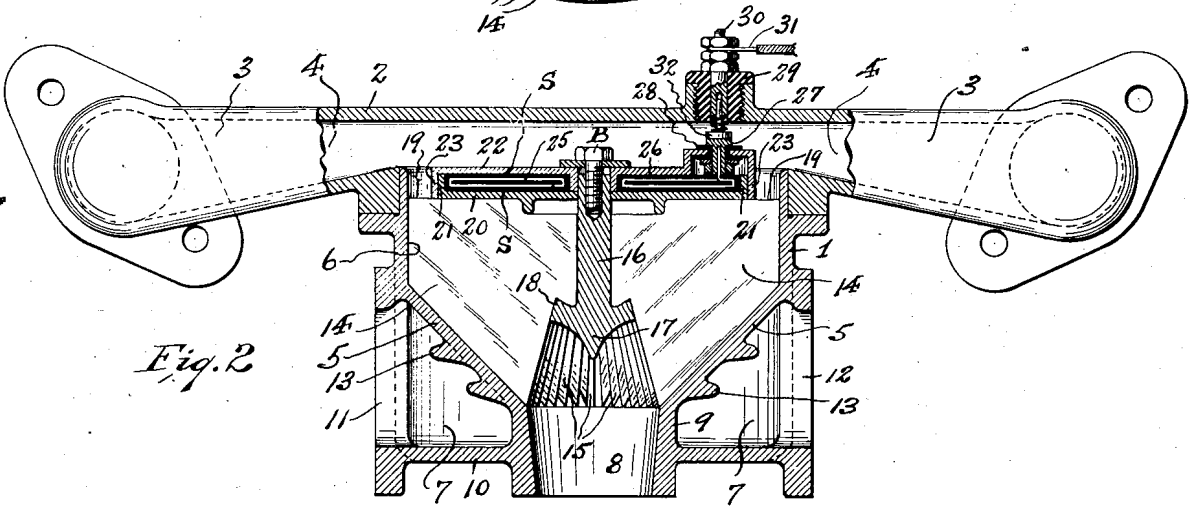


Fig. 2

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VAPORIZER.

Application filed June 11, 1927. Serial No. 198,115.

The present invention relates to improvements in vaporizers of the general type disclosed in my prior United States Letters Patent #1,490,919, and in my copending applications for patents Serial No. 64,476 filed October 23rd, 1925, and Serial No. 143,332 filed October 22nd, 1926.

In the use of vaporizers made according to and operating according to the methods as respectively disclosed in my above identified earlier patent and in my said patent applications when utilizing the same to vaporize heavy hydrocarbon fuel mixtures, such as an atomized mixture of low grade hydrocarbon oil and air, full vaporizing efficiency is not attained when starting from cold condition, until, by a preliminary period of operation, the apparatus has become heated sufficiently to assure adequate transfer of heat to the surface providing plates in the vaporizer chamber. As a consequence, before supplying heavy hydrocarbon fuel mixtures to the vaporizer, it has been heretofore necessary to operate the same from initial cold condition with a relatively high grade or highly volatile hydrocarbon fuel mixture, such as carburetted gasoline, until such time as the heat derived from engine exhaust has sufficiently raised the temperature of the apparatus and has assured transfer of heat for conduction to and through the surface providing plates adequate to be employed for continued running. This necessity is objectionable both because it requires provision of two supplies of fuel as well as means rendering it possible to switch from one kind of fuel to the other during operation. It is the object of the present invention to provide a novel arrangement and relation of electrical preheating means in combination with the surface providing plates of the vaporizer, whereby initial heat derived independently of engine exhaust may be both before and on starting the vaporizer from cold condition, supplied to the vaporizer plates, preferably in the vicinity of the vaporizer discharge passages, so that immediate vaporizing effect upon heavy hydrocarbon fuel mixtures may be attained on starting with such kind of fuel, and therefore, necessity for a preliminary period of operation with fuel of high volatility may be dispensed with.

Other objects of the present invention, not at this time more particularly enumerated,

will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a top plan view of the vaporizer equipped with the novel preheating means in combination with the surface providing plates according to this invention certain parts being broken away to show interior construction and arrangement; and Figure 2 is a transverse vertical section of the same, taken on line 2—2 in said Figure 1.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring now to said drawings, the reference character 1 indicates a casing or pot having an open upper end normally closed by a cover member 2 of suitable shape and provided with suitable discharge members 3 furnishing outlets 4 for the vaporized fuel mixture to be delivered to an internal combustion engine.

The interior of the casing or pot 1, in the preferred form thereof, is subdivided by an inverted conical bottom plate or partition 5 to provide above the same an upper vaporizing chamber 6 and a lower heater chamber 7. The fuel mixture intake 8, which leads centrally into the lower end of the vaporizing chamber 6, is formed by a centrally located throat member 9 which rises through the interior of the heater chamber 6 to extend intermediate the outer bottom wall 10 of said casing or pot to the interior bottom plate or partition 5.

The casing or pot 1 is provided at opposite sides with inlet and outlet passages 11 and 12 leading into and out of the heater chamber 7, 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 heater chamber 7, so as to transfer heat to the bottom wall of said vaporizing chamber 6 formed by the conical bottom plate or partition 5 during normal operation of the vaporizer in serving a vaporized fuel mixture to an internal combustion engine, as fully explained in my aforesaid patent and patent applications. Annular fins 13 may be provided on the underside of the bottom plate or partition 5, or other suitable

means associated with the latter, to increase the heat absorption capacity and conduction efficiency thereof.

Disposed within the vaporizing chamber 6 are a multiplicity of radially disposed upstanding plates 14, the lower ends of which are shaped to conform to and contact with said bottom plate or partition 5. Said plates are so spaced apart as to provide a multiplicity of radial and laterally extending passages 15 opening at the lower portions of their inner ends into communication with said fuel mixture intake 8, and extending laterally and upwardly from the fuel mixture intake 8. The upper portions of the inner vertical edges of the plates 14 converge upon a central core or shank 16 having at its lower extremity an enlarged inverted conical deflector member 17. The upper periphery of said conical deflector member 17 is provided with an annular upstanding shoulder 18, the upper inner end portions of said plates 14 being shaped to engage over said shoulder 18 in interlocked supported relation thereto. The upper extremity of the core or shank 16 extends through a combined top-plate and preheater device, the detail structure of which will be presently set forth. This top-plate engages with the upper end of said plates 14, so as to close the major portion of the upper ends of said passages 15, and the same is of less diameter than the inside diameter of the vaporizing chamber 6, thus leaving the outer portions of the upper ends of the passages 15 open, and thereby providing discharge mouths or exists 19, which communicate with the interior of the cover member 2 and its outlets 4. The assembled deflector member, cover and top-plate are secured together by a bolt and washer B, or in any other suitable manner.

In preferred form said combined top-plate and preheater comprises a lower plate 20 having an upstanding peripheral flange 21 and an upper plate 22 having a depending peripheral flange 23, whereby one plate may telescopically fit over the other to provide an enclosed interior space or chamber 24 intermediate said plates. Arranged on a suitable carrier core 25 is an electric heating coil 26 of any suitable specific construction adapted for enclosed disposition within the space or chamber 24 intermediate said plates 20 and 22. Said heating coil 26 is electrically insulated from contact with said plates by interposed insulation material S of any desired and suitable character, as e. g. mica, while nevertheless the developed heat of said coil during operation thereof may be transferred to and through the plates 20 and 22, and especially through the lower plate 20 to the radial vaporizer plates 14 and the interior of the vaporizer passages 15. The terminals of said coil 26 are respectively connected with external contact members 27 mounted in but insulated

from the wall of said upper plate 22 by electrical insulation material 28, as indicated more especially in Figure 2 of the drawings. Mounted in connection with the upper wall of said cover member 2, and suitably insulated therefrom by electrical insulation 29 are binding posts 30 to receive connection of circuit wires 31 for delivering electric current from a suitable source of supply. The inner ends of said binding posts are provided with spring pressed contact buttons 32 to engage the stationary contacts 27 of the coil 26, when said cover member 2 is secured in operative assembled relation to the casing or pot 1, so that electric current may be circulated through the said coil 26 when desired.

In the use of my novel vaporizer in connection with internal combustion engines and when functioning with low grade or heavy hydrocarbon fuel mixtures, owing to the relatively low volatility of such fuel, it has been heretofore necessary to start from cold condition with high volatile fuel, such as gasolene, and then after operation of the engine has continued for a time, with attendant supply of hot exhaust gases to the heating chamber 7, so that a proper transfer of heat to the vaporizer plates 14 is attained; the supply gasolene fuel is discontinued and the use of heavier fuel begun. For reasons already above mentioned, this practice is not altogether satisfactory, the desideratum being to provide means whereby starting with the heavy fuel may be facilitated without necessity of initially employing lighter fuels. I have solved the problem by providing the novel electrical preheater means in combination with the top-plate of the vaporizer chamber as above described. When starting the engine and vaporizer from cold condition, I may, preliminary to operation, supply electric current to the heating coil 26. The heat thus generated is transferred through the walls of the plates 20 and 22 to warm up the interior of the vaporizer and its plates 14, and raise the temperature of the air within the vaporizer passages. After such preliminary warming the engine is started, and the comparatively heavy fuel mixture is drawn into the vaporizer chamber for movement through the vaporizer passages 15 and in contact with the plates 14. The heat transferred from the combined top-plate and preheater is conducted to and through the plates 14, and the whole great area of the plates, especially adjacent to the outlets 19 of the passages 15, is supplied with heat adequate to assure an initial functioning of the vaporizer to the end that most of the fuel constituents are at once vaporized, as they film over the said great area of heated plate surfaces characteristic of my vaporizer apparatus and method, and consequently there is immediately delivered to the engine cylinders a vaporized fuel mixture for combustion therein.

By locating the heating coil 26 in combination with the vaporizer top-plate, the preliminary heat is distributed to best advantage to the plates and in the path of the streams of fuel mixture, and so that the fuel mixture is assured of contact with the heated surfaces both of the vaporizer plates as well as of the top-plate itself, before it can escape through the exists 19 and thence through the outlets 4 leading to the engine cylinders. It will also be apparent that the great area of thus preheated plates 14 tend to cause the fuel mixture contacting therewith to spread out in films, so that not only is vaporization thereof more efficiently attained, but a time element is introduced whereby the raw fuel has opportunity for vaporizing treatment before it can escape to the engine cylinders.

It will be understood that the supply of electric current to the heating coil 26 may be discontinued, as soon as the engine has operated for a sufficient length of time to assure, by the delivery of hot exhaust gases to the heating chamber 7 and bottom plate 5, the normal running heat transfer conditions with respect to the vaporizer plates 14 which is characteristic of my vaporizer apparatus and method as heretofore fully explained in my above referred to issued patent and copending patent applications. It will be obvious that the control of electric current delivery to the heating coil 26 may be attained either manually or automatically by any suitable form of thermostatic control switch operative on the development of predetermined normal running heat conditions within the vaporizer, which latter arrangement is well within the ability of those skilled in electrical arts to provide.

I am aware that some changes may be made in the general construction and arrangement of the electrical preheating means above set forth, as well as in the details of the construction of the same without departing from the scope of the instant invention. It is, therefore, to be understood that the specific disclosure of this application is to be considered as illustrative and not in a limiting sense.

Having thus described my present invention, I claim:—

1. In a vaporizer including a chamber containing a multiplicity of comparatively narrow fuel mixture passages bounded by thin metallic vertical walls adapted to receive and conduct heat transferred thereto, means for transferring heat to said walls for upward

conduction therethrough during normal running conditions, a top-plate means in contact with said walls, and an electric heating means associated with said top-plate means to serve as a preheater under cold starting conditions, and means for connecting said heating means in an electric circuit.

2. In a vaporizer including a fuel mixture receiving element having vertical partitions forming outlet passages, a bottom plate engaging the lower ends of said partitions, means for supplying heat under normal running conditions to said bottom plate for transfer to and upward conduction through said partitions and the passages bounded thereby in a direction opposite to the natural gravitation of fuel within said passages and on said partition surfaces, a top-plate means engaging the upper ends of said partitions to partially close the upper ends of said passages, and an electric heating coil within said top-plate means to serve as a preheater supplying heat under cold starting conditions to said top-plate means for transfer to and downward conduction through said partitions and passages bounded thereby, and means for connecting said heating coil in an electric circuit.

3. A vaporizing device, comprising a casing providing a vaporizing chamber having a central carburetted fuel mixture intake leading into the bottom and vaporized fuel mixture outlet means leading from the upper portion thereof; a multiplicity of radial vertically disposed plates engaged with the bottom of said chamber to provide a multiplicity of radial passages having their inner ends communicating with said intake; a top-plate device of less diameter than the internal diameter of said vaporizing chamber engaging the upper ends of said plates but so as to provide passage discharge mouths beyond the periphery of said top-plate device, means for supplying heat to the bottom of said chamber for conduction to the lower ends of and upwardly through said plates during normal running conditions; and electric heating means within said top-plate device to supply preliminary starting heat for conduction to the upper ends of and downwardly through said plates; and means for connecting said heating means in an electric circuit.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 1st day of June, 1927.

ERNEST R. GODWARD.