H. N. WHITTELSEY.

VAPORIZER.

APPLICATION FILED OCT. 12, 1914.

1,243,647. Patented Oct. 16, 1917.

Fig. 1.

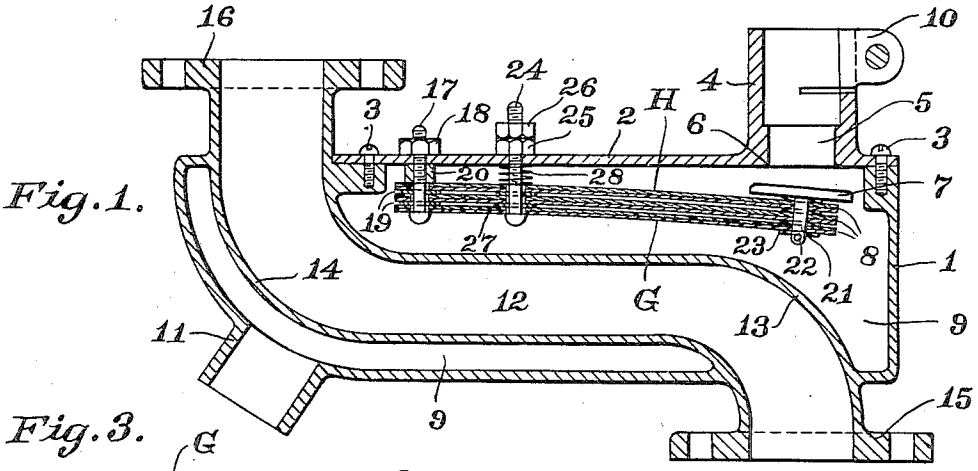


Fig. 3.

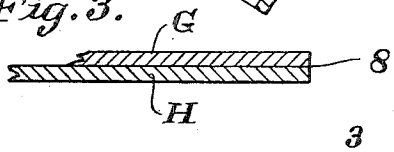
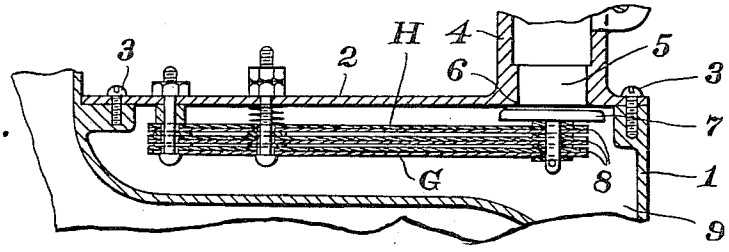


Fig. 2.



WITNESSES:

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VAPORIZER.

1,243,647. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed October 12, 1914. Serial No. 866,266.

To all whom it may concern:

Be it known that I, HENRY NEWTON WHITTELSEY, a citizen of the United States, and a resident of Greenwich, county of Fairfield, State of Connecticut, have invented certain new and useful Improvements in Vaporizers, of which the following is a specification, accompanied by drawings.

In my copending applications, Serial Nos. 861,554, 863,375 and 864,579, I have disclosed different forms of liquid fuel heaters, for heating the fuel supplied to the carbureting or vaporizing apparatus, or supplied direct to the cylinder of an internal combustion engine.

The present invention, on the other hand, relates to a device for vaporizing the liquid fuel globules in suspension in a gaseous mixture such as oftentimes comes from a carbureter or other mixing device. The invention relates more particularly to automatic control of the heat in the heat chamber, from which source the heat for the vaporization is drawn.

The apparatus is particularly applicable in the use of heavy gasolenes, at low atmospheric temperatures, and kerosenes, alcohol, etc., as fuel for internal combustion engines.

I employ the heat of the exhaust gases as this heat is immediately available on starting the engine irrespective of the atmospheric temperature. Where either the circulating water or hot air is employed for such a purpose it requires a material time to get sufficient heat for vaporization, often from fifteen to thirty minutes or more in a low atmospheric temperature. Of course, in the use of the kerosenes, the circulating water cannot be raised to a sufficiently high temperature to effect material vaporization.

Heretofore it has been difficult to properly control the heat of the exhaust gases in a heat chamber during the varying ranges of power of the engine and under varying atmospheric conditions, particularly in motor vehicle work. Interconnected valves have been used with some success in so far as correcting for the variations of power of the engine, but such means lack all semblance of control under different atmospheric temperatures. As the quantity of exhaust gas required at 20° F. atmospheric temperature may be twice that required at 35° F. in the use of a heavy gasolene, and on starting a motor vehicle on a cold morning twice the amount of exhaust may be required that would be sufficient after operating for half an hour, the advantage is quite evident, of an automatic control of the exhaust gases in the heat chamber for maintaining a substantially constant temperature irrespective of variations of operation or atmospheric temperature.

I prefer to employ thermostatic means, subject to the heat of the heat chamber, so constructed and contained as to regulate the quantity of exhaust gases entering the heat chamber, and previously set for maintaining substantially a predetermined temperature, and acting to admit more gas if the temperature falls below and less gas if the temperature rises above, the predetermined temperature setting. Thus I control the heat of the heat chamber automatically and within relatively narrow limits without any manual operation of valves or any attention of the operator irrespective of the operation of the engine or variation of atmospheric temperatures. The device therefore has a broad utility, and is more accurate in the supply of the right amount of heat for the vaporization purpose than possible with any manual control.

Moreover, the invention is illustrated in a simple form, economical to manufacture, and enduring in nature. As illustrated, it is to be installed between the carbureter or fuel and air supply device, and the intake connection or manifold of the engine. However, the intake engine connection itself or manifold may be made to constitute such a vaporizer in which a heat chamber with such an automatic heat control means is provided.

The mixture passage, as illustrated, permits relatively large heating surface, and the tortuous turning of the stream of mixture effectually causes the liquid globules in suspension to impinge on the outer heating surface of each bend, thus vaporizing such globules and obviating the possibility of such globules passing through the device in the center of the stream of the mixture. It is desirable in such apparatus to vaporize the liquid and at the same time to raise the temperature of the gaseous mixture as a whole as little as possible. It is advantageous also for assembling, inspection and cleaning in such a device, to have the auto-

matic control attached to a removable cover for the heat chamber.

Suitable forms of the device are illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of one form of the device;

Fig. 2 is a similar view partly broken away showing some of the parts in a different position; and

Fig. 3 is an enlarged detail broken view of one of the thermostatic strips.

Referring to the drawings, and more particularly to Figs. 1, 2 and 3, a form of the device is illustrated, in which 1 represents a suitable casing, of some suitable metal, such as a bronze composition. The casing 1 as shown may be provided with the removable cover 2, adapted to be secured to the casing as by means of the screws or other fastening devices 3. In this instance the cover is shown provided with the neck 4, forming the inlet port 5, having the valve seat 6, for the valve 7, which as shown is carried by thermostatic members 8, subject to the influence of the heat in the heat chamber 9 of the case 1. The neck 4 may be provided with the clamp 10 for a connection to the exhaust pipe of the internal combustion engine. The outlet 11 of the casing, forms the outlet for exhaust gases from the heat chamber and may also be connected to the exhaust pipe.

The casing 1 is provided with the vaporizing chamber or mixture passage 12 extending therethrough, and heated by the heat in the heat chamber 9. This mixture passage 12, as shown, is of relatively large cross section, and is preferably constructed with the bends or shoulders 13 and 14, so that the liquid globules come into intimate contact with the heated surfaces. The casing 1 at the ends of the mixture passage 12, is provided with flanges 15 and 16 or other suitable means, affording provision for connecting the device in the gaseous mixture supply line of the internal combustion engine.

I prefer to make the thermostatic members of two thin strips of solid substances having materially different expansion properties under the action of applied heat, such substances being rolled or riveted together, and I have had good success with two metals, a brass for the high expanding substance and a nickel or a nickel-iron alloy for the low expanding substance, forming the thermostatic members or strips. When two such substances are secured together, with reference to their length, the difference in their expansion and contraction due to varying degrees of temperature causes one to bend in the form of varying arcs of circles, while the other forms the chords. This changing form is very sensitive to changes in temperature, particularly when the strips are rolled or riveted together throughout their length, for then innumerable small arcs and chords are formed, which accentuates the bending.

Fig. 3 illustrates a portion of such a thermostatic member 8, in which G is the high expanding metal and H is the low expanding metal. The three members shown in Figs. 1 and 2, each have the low expanding metal H toward the cover 2 and the high expanding metal G toward the bottom of the casing 1.

The strips 8, of which a single one could be used if desired, are held at one end to the cover 2 by means of the screw bolt 17 having the nut 18. Washers 19 separate the strips, and a spacing sleeve 20 is inserted over the bolt 17 between the strips and the cover 2. The other end of the strips carries the valve 7 and as shown the shank 21 of the valve extends through the strips and is held to the strips by the pin 22. Suitable washers 23 separate the strips, and separate the valve and pin 22 from the strips.

An adjustable supporting connection is also provided for the strips, which may be in the form of a screw bolt 24 passing through the strips intermediate their length and secured to the cover 2 by the nut 25 and jam nut 26. Separating washers are arranged between the strips and a coiled spring arranged over the bolt 24, bears at one end on the strips and at the other end on the cover 2. By adjusting the bolt 24, by means of the nuts 25 and 26, the valve 7 may be set to open and close at predetermined temperatures, at will.

In Fig. 1 the valve 7 is open, and the thermostatic members 8 are shown curved, which would be their normal position, until a sufficient degree of heat was obtained in the heat chamber 9 to cause the members 8 to tend to straighten out and close the valve 7, as shown in Fig. 2.

The thermostatic members 8, the valve 7 and connecting and coöperating parts for the automatic control or thermostatic control, may as a whole be considered a thermostat, and I have illustrated one preferred form of thermostat, it being understood that others may be used if desired.

In the operation of the device, the thermostatic members 8 bend more or less in accordance with variations in the temperature of the heat chamber, and thus retard or admit greater flow of the exhaust gases, so that the temperature for vaporization is maintained within narrow limits, and the mixture passage 12 is not permitted to get too hot or too cool.

The device may be installed at any angle or upside down without deranging the parts or interfering with the operation, and this is due to the manner in which the thermostat

is contained in the heat chamber, as described; the spring 28, provides means for holding the automatic control snug, irrespective of the position of installation.

I prefer a plurality of thermostatic strips as they are advantageous in providing relative powerful movement of the valve, but the invention is not restricted to the use of a plurality.

The valve 7, may be omitted if desired, and the thermostatic strips directly seat on the valve seat. However, the valve is advantageous in preventing the direct impact of the hot exhaust gases on the sensitive thermostatic strips.

Obviously, other forms of the invention may be devised, including other thermostatic means.

I claim and desire to obtain by Letters Patent the following:

A device for vaporizing liquid fuel globules in suspension in a gaseous mixture, comprising a casing having inlet and outlet ports to permit the flow of exhaust gases through the casing, a vaporizing chamber in the casing with inlet and outlet means, a plurality of thermostatic strips loosely secured at one end within the casing, supported by an adjustable bolt between the ends, and free to move to and from the inlet port at the other end, a disk valve for the inlet port carried by the movable ends of said strips, whereby the valve is actuated by the bending of the strips due to variations of temperature in said casing, and a spring for the adjustable bolt whereby the thermostatic strips remain in position irrespective the angle of installation of the device.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRY NEWTON WHITTELSEY,

Witnesses:
HERBERT G. OGDEN,
K. G. LE ARD.