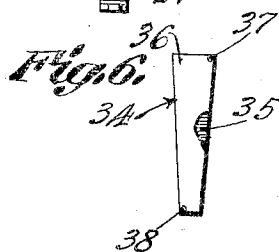
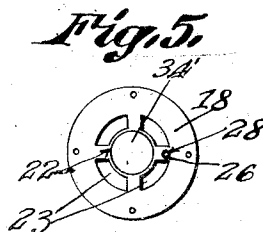
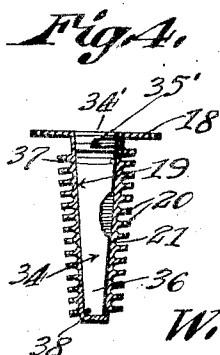
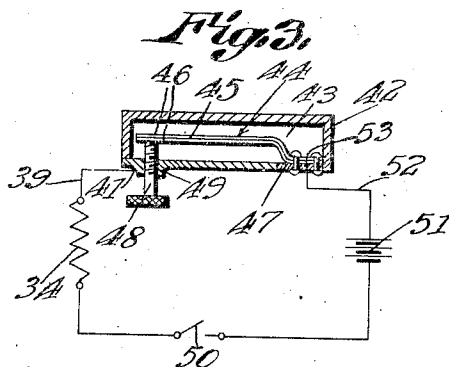
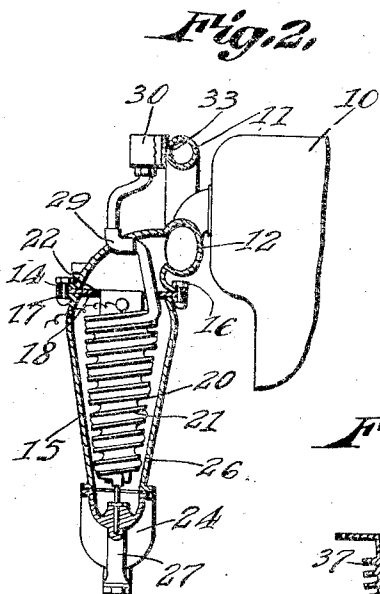
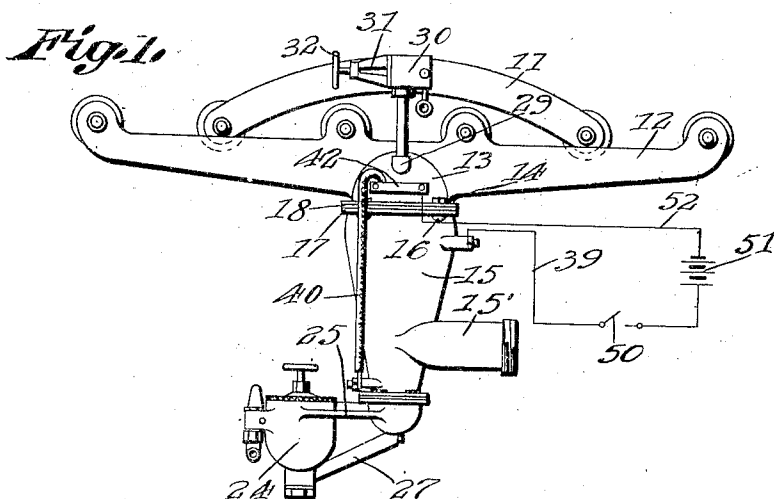


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HYDROCARBON VAPORIZER.
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1,320,787.

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2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-VAPORIZER.

1,320,787.

Specification of Letters Patent.

Patented Nov. 4, 1919.

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To all whom it may concern:

Be it known that I, WILLIAM W. McELRATH, Jr., a citizen of the United States, and a resident of East Radford, in the county of Montgomery and State of Virginia, have invented new and useful Improvements in Hydrocarbon-Vaporizers, of which the following is a specification.

My invention relates to improvements in hydrocarbon vaporizers for pre-heating gaseous fuels used particularly in connection with internal combustion engines.

An important object of the invention is to provide in a device of the above named character a means which will make possible the using of heavy hydro-carbon liquids which are commonly employed as a fuel.

A further object of the invention is to provide in a device of the above mentioned character a means whereby the gases entering the explosion chamber of the internal combustion engine may be maintained at a uniform temperature.

A further object of the invention is to provide in a device of the above mentioned character a means by which the liquid in its course of travel into the combustion chamber of the internal combustion engine will be vaporized to a point of complete density within a tubular coil, and manifold before it enters the combustion chamber of an internal combustion engine for explosion.

A further object of the invention is to provide a device of the above mentioned character, which is simple in construction, inexpensive to manufacture, durable, and reliable in operation.

Other objects and advantages of the invention will be apparent to those skilled in the art during the course of the following description taken in connection with the accompanying drawings.

In the accompanying drawings, forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a device embodying the preferred form of my invention.

Fig. 2 is a vertical transverse section view of Fig. 1.

Fig. 3 is a side elevation of a thermostat showing the same connected in circuit with a resistance unit and a source of electrical energy,

Fig. 4 is a central vertical transverse section view of a core,

Fig. 5 is a top plan view of Fig. 4,

Fig. 6 is a side elevation of a heating resistance unit,

Fig. 7 is a side elevation of a device embodying the modified form of my invention, and,

Fig. 8 is a vertical transverse section view of the same.

In the drawings, attention being called to Figs. 1 to 6 inclusive wherein is shown a preferred form of my invention, the numeral 10 indicates an internal combustion engine having an intake manifold 11 and an exhaust manifold 12 connected thereto by any suitable means. To the exhaust manifold 12 there is connected a deflector 13 communicating with the interior of the exhaust manifold 12 and provided with a flange 14 to which is connected a resistance unit bowl 15 by means of bolts or the like 16 passed through a flange 17 carried thereby. This bowl is provided with a nipple 15' adapted for connection to a suitable pipe, not shown, the pipe being preferably of the conventional type used in conveying exhaust gases from an internal combustion engine to a desired distance or remote point. Between the flanges 14 and 17 there is confined a plate 18 carrying a hollow core 19 which is provided with a spiral flange 20 a groove 21 extending throughout the length of the same. The plate 18 is provided centrally with an opening 22 registering with the opening of the core 19. The plate 18 is further provided with a plurality of arcuate-shaped openings 23 which connect the interior of the bowl 15 with the interior of the deflector 13. As shown in Fig. 2, the core 19 extends downwardly into the bowl 15 substantially throughout the length of the same. To the bottom of the bowl 15 there is connected a carbureter bowl 24 by means of a suitable bracket 25. This carbureter bowl is maintained in communication with a coil tube 26 by means of a suitable pipe 27. The coil tube 26 is carried within the groove 21 of the flange 20 and has its upper end extending upwardly through an opening 28 provided by the plate 18 has its upper end extending upwardly through the deflector 13 as shown at 29 and is connected to an air mixing chamber 30 carried by the intake manifold 11 as

clearly shown in Figs. 1 and 2. The air mixing chamber 30 is provided with a slot 31 the width of which is adapted to be varied by means of a hand-wheel 32 for adjusting or varying the supply of air from the exterior to the interior of the chamber 30. The chamber 30 is maintained in communication with the intake manifold 11 by means of a passage 33 clearly shown in Fig. 2. Within the core 19 there is fitted a suitable electrical resistance unit indicated as a whole by the numeral 34. This electrical resistance unit is retained within the core 19 by means of a screw plug 34' arranged within the core and having screw-thread engagement with the same as shown at 35' and comprises a coil of resistance wire 35 embedded in a suitable refractory material 36. The coil of wire 35 has its ends terminating as shown at 37 and 38, the end 37 having suitable connection with a conductor 39 while the end 38 is connected by any suitable means to a conductor 40 which in turn is grounded as diagrammatically shown at 41 in Fig. 3. Upon the deflector 13 there is imposed a casing 42 the interior of which is separated from the interior of the deflector 13 by means of a wall 43. Within the casing 42 there is disposed a thermostat 44 which comprises an arm 45 composed of two strips of material 46 having different coefficients of expansion. One end of the thermostat arm 45 is connected to a suitable insulation 47 by means of screws or the like as shown while the free end of the arm 45 is arranged for contact with a thumb screw 48 having screw-thread engagement with the casing 42 as shown at 49. A switch 50 is interposed within the conductor 39. This switch may be located at any convenient and remote point to the thermostat 44. A suitable source of electrical energy 51 is connected to the conductor 39 and the source of electrical energy is in turn connected with a conductor 52 having connection with the thermostat 45 as shown at 53.

In considering Figs. 7 and 8 wherein is shown a modified form of my invention, the numeral 54 indicates an exhaust pipe having arranged therein an intake manifold 55. This intake manifold is connected to an air mixing chamber 56 by means of a passage 57. The air mixing chamber 56 in this instance is somewhat similar to that indicated by the numeral 30 as shown in Figs. 1 and 2. It differs, however, in that a portion of the same projects into the closure 58 which is identical with that indicated by the numeral 13 and hereinbefore described. To the deflector 58 is connected a resistance unit bowl 59 identical with that indicated by the numeral 15 and hereinbefore described in connection with the preferred form of my invention as shown in Figs. 1

and 6 inclusive. It will be noted however, that the upper end of the tube 26 instead of being passed through the wall of the deflector 58 is connected directly to the air mixing chamber 56 within the deflector.

It will be noted from the drawings that the remainder of the modified form of my invention is constructed in accordance with the preferred form hereinbefore described, like numerals being employed to designate similar elements in all of the figures shown in the accompanying drawings.

In use, the operation of the preferred form of my invention is as follows: Immediately prior to starting the internal combustion engine with which my device is adapted to be used the switch 50 is closed, whereupon electrical energy is supplied to the resistance unit 34, assuming of course, that the thermostat arm 45 is contacting with the thumb screw 48 as clearly shown in Fig. 3. When the electrical energy is thus supplied to the resistance unit 34 heat will be generated due to the resistance formed by the coil 35. This heat will be conducted throughout the core 19 and into the coil of pipe 26 whereupon the fuel supplied thereto from the carbureter bowl 24 will be heated and volatilized, the vapor passing upwardly through the pipe and into the air mixing chamber 30 whereupon air is drawn into the chamber and mixed with the vapor when the engine is brought into operation. After the engine has been started the charge, subsequent to its ignition within the cylinders of the engine is directed into the exhaust manifold 12 in the usual manner and is conveyed therefrom into the bowl 15 passing around the tube 26, the exhaust gases being transmitted from the bowl 15 through the nipple 15'. Heat, from the exhaust gases traveling thus through the bowl 15, is transmitted to the coil 26 and conducted throughout the bowl 15. When the bowl has become heated sufficiently the arm 45 of the thermostat 44 will move out of engagement with the thumb screw 48 whereupon the electrical circuit supplying electrical energy to the electrical resistance unit 34 is broken. Should the temperature of the bowl 15 for any reason diminish sufficiently to permit the thermostat arm 45 to come into contact with the thumb screw 48 the circuit, assuming that the switch 50 is closed, will be established and heat will be generated by the heat resistance unit 34 as hereinbefore described to heat the fuel in its course of travel through the pipe 26 to maintain a constant efficiency in the operation of the engine with which my device is particularly adapted to be used.

In considering the operation of the modified form of my invention as shown in Figs. 7 and 8 it need only be said that the fuel is injected into the mixing chamber 56 carried within the exhaust manifold 54 and is there

again heated by the exhaust gases before it enters the intake manifold 55 which is confined within the exhaust manifold 54 and is in turn heated by the exhaust gases traveling through the exhaust manifold.

It is to be understood that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim as new and desire to secure and protect by Letters Patent of the United States, is:

1. A device of the character described comprising an intake manifold, an exhaust manifold, a deflector carried by and communicating with the exhaust manifold, a resistance unit bowl carried by said deflector, a plate having its edge confined between the deflector and resistance unit bowl, a hollow core secured centrally to said plate and extending into said bowl, a liquid fuel supply pipe carried by said core in communication with said intake manifold, an electrical resistance unit confined within said core, means for supplying electric energy

to said resistance unit to heat the fuel of said liquid fuel supply pipe, and automatic means for controlling the supply of electrical energy to said resistance unit.

2. A device of the character described comprising an intake manifold, an exhaust manifold, a deflector carried by and communicating with the exhaust manifold, a resistance unit bowl carried by said deflector, a plate having its edge confined between the deflector and resistance unit bowl, a hollow core secured centrally to said plate and extending into said bowl, a spiral flange carried by said core, said flange being provided with a groove throughout its length, an electrical resistance unit confined within said core, a liquid fuel supply pipe arranged within said groove and communicating with said intake manifold, means for supplying electric energy to said resistance unit, automatic means for controlling the supply of electrical energy to said resistance unit, said automatic means including a thermostat having electrical connection with the resistance unit and influenced in its movement by the heat of the exhaust gases.

WILLIAM W. McELRATH, Jr.