Nov. 20, 1923. 1,474,359

W. W. GRANT

FUEL MIXTURE HEATING AND VAPORIZING DEVICE

Filed May 3, 1921

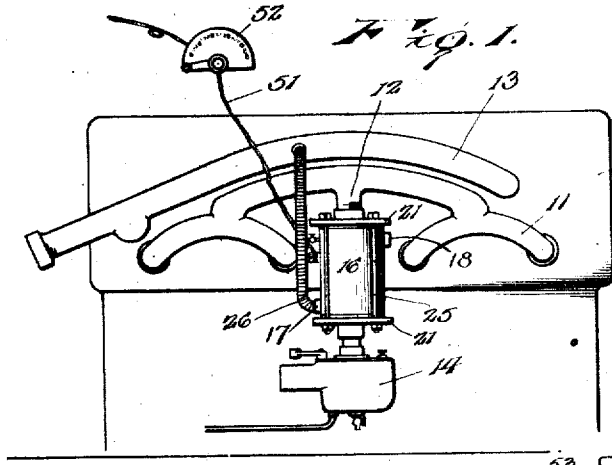


Fig. 1.

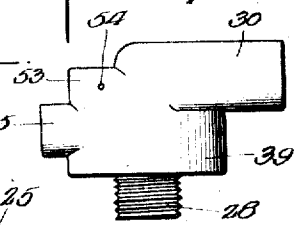


Fig. 3.

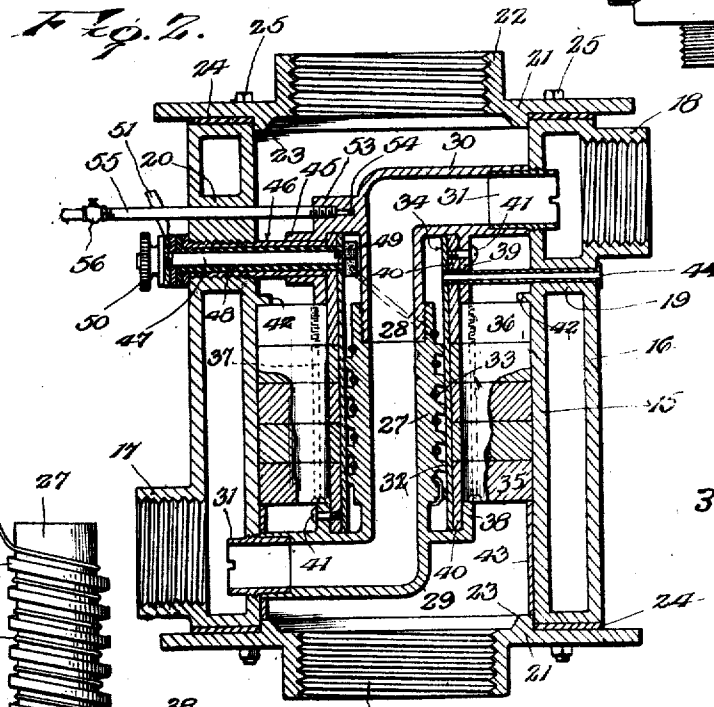
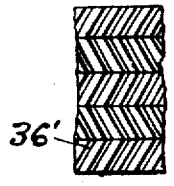


Fig. 5.



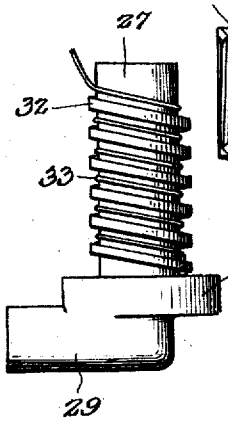


Fig. 4.

Inventor

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By Lacy & Lacy, Attorneys.

Patented Nov. 20, 1923. 1,474,359

UNITED STATES PATENT OFFICE.

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FUEL-MIXTURE HEATING AND VAPORIZING DEVICE.

Application filed May 3, 1921. Serial No. 466,613.

To all whom it may concern:

Be it known that I, WILLIAM WALLACE GRANT, citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Fuel-Mixture Heating and Vaporizing Devices, of which the following is a specification.

This invention relates to an improved fuel mixture heating and vaporizing device of the general character illustrated in my pending application for a similar invention filed November 27, 1920, Serial No. 426,708.

The salient object of the present invention resides in the provision of a device employing baffles for heating the fuel mixture, wherein heat will be supplied to the baffles by a heating medium flowing around the baffles and wherein heat will further be supplied to the baffles by a heating medium flowing centrally through the baffles.

A further object of the invention is to provide a device employing, in conjunction with the features previously noted, a resistor for heating the baffles.

A still further object of the invention is to provide a device wherein the core about which the resistor is wound will also provide a conductor for a heating medium and wherein the baffles will also be assembled around said core.

And the invention has as a still further object to provide a device which may be employed in connection with internal combustion engines of practically any design.

Other and incidental objects will appear hereinafter.

In the drawing:

Figure 1 is a fragmentary side elevation showing my improved device in connection with an internal combustion engine of conventional design,

Figure 2 is an enlarged vertical section taken medially through the device,

Figure 3 is a detail side elevation showing one section of the heat conducting core employed,

Figure 4 is a detail side elevation showing the other section of said core, and

Figure 5 is a fragmentary plan view particularly showing the slots in the baffles employed.

Referring now more particularly to the drawing, I have, for convenience, shown my improved device in connection with an internal combustion engine 10 of conventional design. The intake manifold of the engine is indicated at 11, this manifold being provided with an inlet nipple 12. The exhaust manifold is indicated at 13 while the engine carbureter is indicated at 14.

In carrying the invention into effect, I employ a tubular shell 15 and surrounding the shell is a jacket 16 provided with inlet and outlet nipples 17 and 18 respectively, preferably located near opposite ends of the jacket. The jacket is closed at its ends and extending between the jacket and shell are webs 19 and 20. Closing the shell at its ends are heads 21 overhanging the jacket and provided axially of the shell with nipples 22. These heads are preferably formed with flanges 23 snugly fitting within the shell and lying against the heads are suitable gaskets 24. Extending between the heads exteriorly of the shell is a plurality of tie rods 25 which may be freely fitted through one of the heads and threaded through the other, the tie rods being also preferably equipped with nuts so as to lock the tie rods against accidental displacement. The tie rods will thus serve to securely clamp the heads in position and, as will now be noted, the nipple of the uppermost head is threaded upon the nipple 12 of the intake manifold 11 of the engine while the outlet of the carbureter 14 is threaded into the nipple of the other of said heads, the device being thus interposed between the carbureter and the manifold. Leading from the exhaust manifold 13 to the nipple 17 of the jacket 16 of the device, is a pipe 26 for conducting exhaust gases from the engine into the jacket. However, when preferred, a liquid heating medium may be directed into the jacket.

Arranged axially of the shell 15 is a tubular heat conducting core which is formed of mating sections 27 and 28 respectively, having threaded connection at their meeting ends. The section 27 is formed with an elbow 29 extending to the wall of the shell opposite the nipple 17 while the section 28 is provided with a similar elbow 30 extending to the wall of the shell opposite the nipple 18, and threaded through the shell are coupling sleeves 31 fitting into the elbows, the elbows being preferably counter-bored to accommodate said sleeves so that the sleeves will provide closed joints between the sleeves and the elbows.

At their outer ends, said sleeves are notched to accommodate a screw driver so that said sleeves may be readily adjusted, the sleeves being accessible, of course, through the nipples 17 and 18 and while in the present instance, I have shown said sleeves as opening into the jacket 16, still, if preferred, the sleeves may be elongated to extend through said nipples. Formed on the section 27 of the core is a helical spacing rib 32, the core being provided between the turns of said rib with a surface groove and wrapped around the core to lie in said groove is a resistance element 33 suitably insulated from the core. Near one end, the rib 32 is provided with a suitable opening therethrough and, as particularly shown in Figure 2, one end of the resistance element is inserted through this opening and thus grounded to the core. The opposite end of said element is, as will presently be explained, connected to a binding post. Snugly surrounding the spacing rib 32 and spaced thereby from the core, is a sleeve 34 and surrounding said sleeve is a plurality of mating baffles snugly but removably fitting within the shell, the end baffles being indicated, for convenience, at 35 and 36 respectively. These baffles coact with the shell for centering the core with respect to the shell. The baffles also, of course, removably fit upon the sleeve and extending longitudinally through the baffles is a plurality of tie rods 37 binding the baffles tightly together, the rods being provided at their outer ends with heads countersunk in the baffle 35 and having threaded engagement at their inner ends with the baffle 36. Formed on the section 27 of the core at the inner end of the elbow 29, is an annular collar 38 and formed on the section 28 is a similar collar 39, the baffles 35 and 36 abutting these collars. The sleeve 34 extends into the collars 37 and 39 and, as will now be observed, the baffles 35 and 36 are provided with hubs 40 snugly fitting within the collars, locking screws 41 being engaged through the collars and said hubs for connecting the baffles with the core. As suggested in Figure 2, the baffles are provided with registering slots 36′ therethrough, these baffles being similar to the baffles shown in my prior application referred to so that fuel mixture emerging from the carbureter outlet will flow through the shell and through the baffles to the intake manifold 11 of the engine. The sleeve 34 is provided so as to obviate the possibility of any of the fuel mixture finding its way between the baffles to come in contact with the resistance element 33, thus preventing fouling of said element. Formed on the shell at its inner side is a plurality of suitably spaced radial stop lugs 42 engaged by the baffle 36, these lugs being provided for locating the baffles within the shell, and interposed between the baffle 35 and the head 21 at the adjacent end of the shell is a spacing ring 43 coacting with the flange 23 of said head. This ring is, of course, apertured to accommodate the elbow 29 of the section 27 of the core so that the baffles will be clamped between said ring and the lugs 42. Extending through the web 19 connecting the shell and jacket is a vent pipe 44 threaded at its inner end portion through the collar 39 of the section 28 of the core, through the hub of the baffle 36 and through the sleeve 34, this pipe establishing communication between the interior of the sleeve and the outer air.

Formed on the collar 39 of the section 28 of the core is a nipple 45 and extending freely through said nipple is a tube 46 threaded through the web 20 connecting the jacket and shell and flanged at its outer end to overlie the jacket. Extending through this tube is a binding post 47; projecting into the sleeve 34 and insulating the post with respect to the tube as well as with respect to the sleeve and the hub of the baffle 36, is a dielectric bushing 48. At its inner end, the binding post carries a nut 49 coated with a suitable insulating material or otherwise insulated from the sleeve 34 and adjacent parts and, as will now be observed, one end of the resistance element 33 is suitably engaged with this nut for connecting the resistance element with the binding post as previously intimated. At its outer end portion the binding post carries suitable washers and threaded upon the post is a binding nut 50 engaging with a circuit wire 51 leading from any approved source of electrical energy. Preferably a rheostat, as conventionally illustrated at 52, is interposed in the circuit. Formed on the elbow 30 of the section 28 of the core at the base of the nipple 45, is a boss 53 having a T-shaped passage 54 therein opening through opposite sides of the boss and fitting through the web 20 is a pipe 55 threaded at its inner end into the boss to communicate with said passage. Interposed in the pipe is a suitable valve 56.

As will now be readily understood in view of the preceding description, when the circuit through the wire 51 is closed, the resistance element 33 will be heated for heating the sleeve 34 and consequently the baffles so that the fuel mixture, as it is drawn through the shell 15 from the carbureter 14, will be heated and vaporized by said baffles. Accordingly, the engine may be readily started Hence, when the baffles are so heated, the electric current to the resistance element may be cut off and the engine started, whereupon heated exhaust gases in the exhaust manifold 13 will flow through the pipe 26 within the jacket 16 around the shell for heating the shell as well as increasing the temperature of the baffles so that

the fuel mixture flowing through the shell will be heated in corresponding increased degree. Coincidently, the heated exhaust gases will also flow through the core of the resistance element for heating said core as well as heating the baffles centrally. The temperature of the baffles will thus be further raised for correspondingly heating the fuel mixture with increased efficiency. The pipe 55 is provided in order that, when desired, a decarbonizing fluid may be introduced into the shell to be taken up by the fuel mixture and thence drawn into the engine cylinders for cleaning the combustion chambers of the cylinders. I accordingly provide a highly efficient construction for the purpose set forth and while I have shown and described the preferred embodiment of the invention still, as may be perceived, various minor changes or modifications may be made therein, while, of course, the specific shape of the device may, in the installation of the invention, be changed to meet the varying requirements of practical use. I, therefore, reserve the right to all such changes or variations as may fall within the spirit of the appended claims.

Having thus described the invention, what is claimed as new is:

1. A fuel heating and vaporizing device including a shell, a jacket surrounding the shell, a tubular core extending through the shell in communication with the jacket, a resistance element carried by and insulated from the core, a sleeve surrounding the core overlying said element, and baffles surrounding said sleeve.

2. A fuel heating and vaporizing device including a shell, a tubular core extending through the shell and adapted to conduct a heating medium, the core being provided with a spacing rib, a sleeve surrounding the core and spaced therefrom by said rib, a resistance element wrapped around and insulated from the core within said sleeve, and baffles surrounding the sleeve within the shell.

3. A fuel heating and vaporizing device including a shell, a tubular core extending through the shell and adapted to conduct a heating medium, the core being provided with a spacing rib, a sleeve surrounding the core and spaced therefrom by said rib, a resistance element wrapped around and insulated from the core within said sleeve, and baffles surrounding the sleeve within the shell, the core being formed of detachably connected sections.

4. In a fuel mixture vaporizing and heating device, the combination of a fuel mixture passage, means within said passage for dividing the fuel mixture into a number of relatively thin separated sheets, and fluid means extending through said dividing means for heating said dividing means.

5. In a fuel mixture vaporizing and heating device, the combination of a fuel mixture passage, means within said passage for dividing a fuel mixture into a number of relatively thin separated sheets, and fluid and electric means surrounded by said dividing means for heating the dividing means.

6. A fuel heating and vaporizing device including a shell, a binding post projecting through the wall thereof, a tubular core extending within the shell and adapted to conduct a heating medium, a resistance element surrounding the core and connected to said binding post, and heads carried by the shell at its ends.

7. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage but out of communication therewith for conducting a heating medium within the passage, means connecting said conduit with the wall of the shell, and heat generating means within the passage exterior to said conduit.

8. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage but out of communication therewith for conducting a heating medium within the passage, means connecting said conduit with the wall of the shell, and heat generating means mounted on and surrounding said conduit within the passage.

9. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage, but out of communication therewith for conducting a heating medium within the passage, means connecting said conduit with the wall of the shell opening through said wall, heat generating means within the passage exterior to said conduit, and means for heating the shell exteriorly.

10. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage out of communication therewith, a heating jacket surrounding the shell, and means connecting said conduit at its ends with the wall of the shell opening through said wall into the jacket.

11. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, a conduit extending within said passage but out of communication therewith for conducting a heating medium within the passage, baffles extending radially of the conduit transversely of said passage, and heat generating means associated with said baffles within the passage.

12. A fuel heating and vaporizing device

including a shell defining an internal fuel mixture passage, an individual conduit extending into said passage but out of communication therewith for conducting a heating medium within the passage, means connecting said conduit at its ends with the wall of the shell, and radial baffles surrounding said conduit.

13. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, superposed abutting baffles within said passage, a conduit extending through the baffles within said passage but out of communication therewith for conducting a heating medium within the passage, and heat generating means associated with said baffles within the passage exterior to said conduit.

14. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, a conduit extending within said passage but out of communcation therewith for conducting a heating medium within the passage, baffles extending radially of the conduit transversely of the passage touching the wall of the shell, heat generating means associated with said baffles within the passage exterior to said conduit, and a heating jacket surrounding the shell in communication with said conduit.

15. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage but out of communication therewith for conducting a heating medium within the passage, means connecting said conduit with the wall of the shell, and sleeves extending through the wall of the shell connecting said conduit at its ends with the shell.

16. A fuel heating and vaporizing device including a shell defining an internal fuel mixture passage, an individual conduit extending within said passage but out of communication therewith for conducting a heating medium within the passage, and means connecting said conduit with the wall of the shell, the conduit being formed of detachably connected sections.

17. A fuel mixture heating and vaporizing device including a shell defining an internal fuel mixture passage, a conduit extending within said passage for conducting a heating medium within the passage and provided with a boss having an opening entering the passage, and a pipe extending through said shell and connected to said boss to communicate with said opening whereby a decarbonizing fluid may be introduced into the passage through said pipe.

18. In a fuel mixture heating and vaporizing device, the combination of a jacketed shell defining a fuel mixture passage, a conduit extending within said passage for the conduct of heat through and heating of the passage, a chamber formed upon the conduit communicating with the fuel mixture passage, and a pipe passing through the shell and leading to said chamber for delivery thereto of decarbonizing material to be vaporized in said chamber and thereupon discharged into the fuel mixture passage as vapor.

19. In a fuel mixture heating and vaporizing device, a jacketed shell defining a fuel mixture passage, a conduit communicating with the jacket of the shell for the conduct of heat through the fuel mixture passage, baffles fitting snugly in said passage surrounding the conduit and having a multiplicity of narrow radial registering slots therein forming continuous channels extending longitudinally of the passage whereby said baffles will divide a fuel charge flowing through said passage into a multiplicity of thin, separated individual sheets corresponding in number to the number of said channeled passages, and a resistance element located between said baffles and the conduit.

In testimony whereof I affix my signature.

WILLIAM WALLACE GRANT. [L. S.]