July 24, 1923. 1,463,133

W. W. GRANT

FUEL MIXTURE HEATING AND VAPORIZING DEVICE

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Fig. 1.

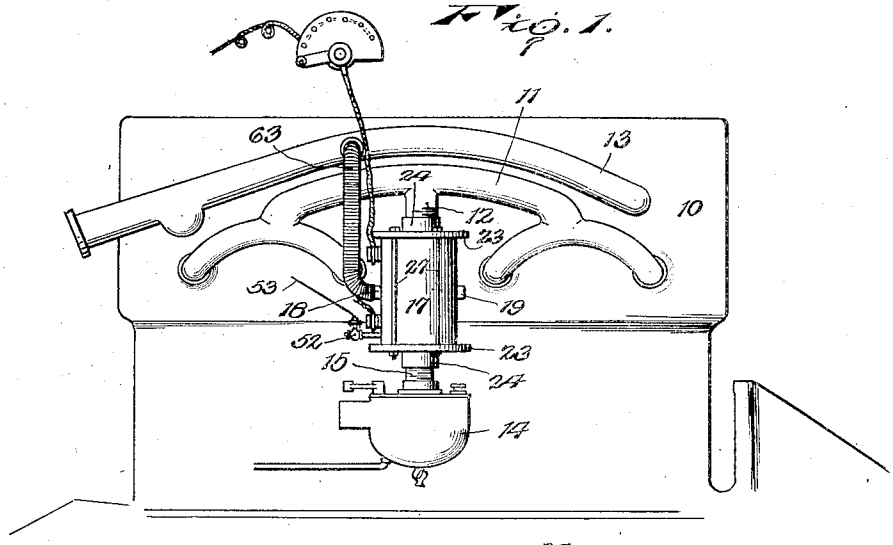
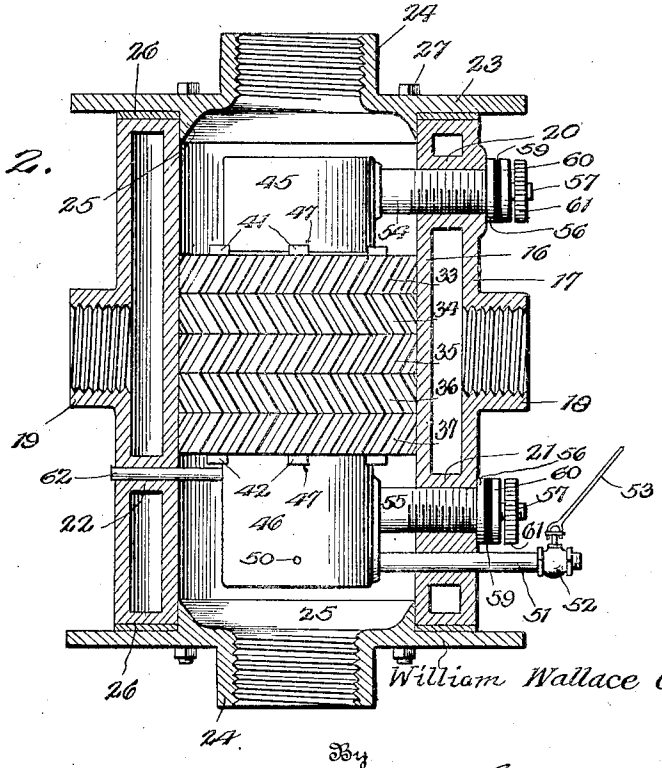


Fig. 2.



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By

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Fig. 3.

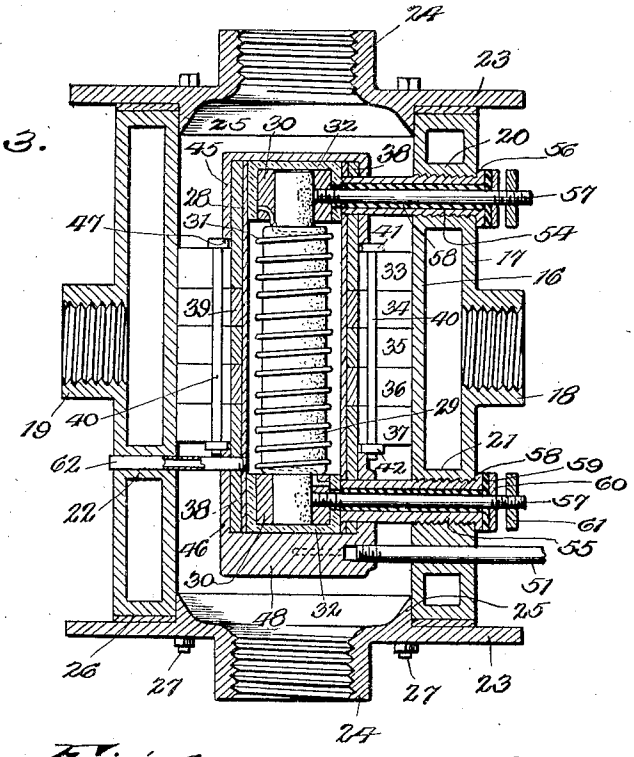


Fig. 6.

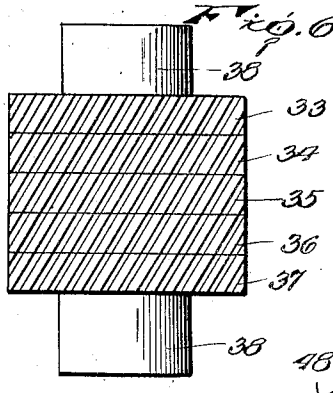


Fig. 4.

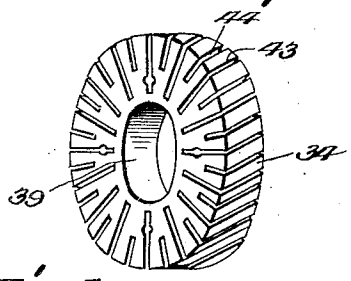
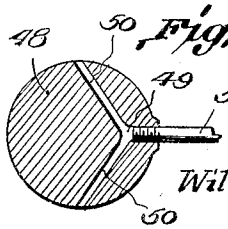


Fig. 5.



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Patented July 24, 1923. 1,463,133

UNITED STATES PATENT OFFICE.

WILLIAM WALLACE GRANT, OF BROOKLYN, NEW YORK; HELEN M. W. GRANT ADMINISTRATRIX OF SAID WILLIAM WALLACE GRANT, DECEASED.

FUEL-MIXTURE HEATING AND VAPORIZING DEVICE.

Application filed November 27, 1920. Serial No. 426,706.

To all whom it may concern:

Be it known that I, WILLIAM WALLACE GRANT, a 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 for internal combustion engines and has as one of its principal objects to provide a device which may be readily employed in connection with an engine of substantially any conventional design and which will effectively operate to heat fuel mixture flowing therethrough from the carbureter of the engine to the engine cylinders.

A further object of the invention is to provide a device wherein a decarbonizing fluid may be introduced into the fuel mixture flowing through the device.

Another important object of the invention is to provide a device wherein fuel mixture flowing therethrough will be divided into thin sheets and, so divided, subjected to the influence of heated metallic surfaces whereby substantially all of the fuel mixture will be thoroughly heated.

A still further object of the invention in this connection is to provide a device employing heated baffles wherein the fuel mixture will be caused to flow through said baffles, and wherein the baffles will be so formed that the fuel mixture flowing therethrough will be divided into relatively thin sheets, as indicated in the object foregoing.

And the invention has as a still further object to provide a device wherein the baffles will cooperate to define tortuous passages therethrough so that the fuel mixture flowing through said passages will be agitated and the atoms thereof thoroughly comingled and wherein certain of the baffles may be reversed so that helical passages will be defined through the baffles.

Other and incidental objects will appear hereinafter.

In the drawings:

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

Figure 2 is a vertical sectional view taken medially through the device, the heater casing and baffles employed being shown in elevation,

Figure 3 is a vertical sectional view particularly showing the mounting of the resistance element employed,

Figure 4 is a perspective view showing one of the baffles in detail,

Figure 5 is a fragmentary transverse sectional view taken through one of the end caps of the heater casing, and

Figure 6 is an elevation showing the baffles assembled in a manner slightly different from that shown in Figures 2 and 3.

Referring now more particularly to the drawings I have, in order to clearly bring out the construction, mounting and operation of my improved device, shown the invention 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 a depending nipple 12. The engine exhaust manifold is indicated at 13 while the carbureter of the engine is indicated at 14, this carbureter being formed with a vertical outlet 15. In carrying the invention into effect, I employ a cylindrical shell or conductor 16 which is surrounded by a jacket 17 and formed on the jacket, preferably at opposite sides thereof, are nipples 18 and 19 respectively, while between the jacket and shell at suitable points are webs 20, 21 and 22. Closing the shell at its ends are heads 23 having nipples 24 lying axially of the shell and formed on said heads are flanges 25 snugly fitting within the shell. Preferably, gaskets 26 are arranged between the heads and the ends of the shell to form closed joints therebetween. As shown in Figures 2 and 3, the heads overhang the jacket 17 and fitting through the overhanging portions of said heads are tie rods 27 clamping the heads in position. Preferably, the tie rods extend loosely through one of the heads and are threaded through the other, nuts being applied to said rods for locking the rods against displacement. As will now be observed upon reference to Figure 1, the nipple upon the uppermost of the heads is connected with the nipple 12 of the intake manifold while the outlet 15 of the carbureter is connected with the nipple upon the lowermost of said heads. The device is thus operatively interposed between the carbureter and manifold.

Mounted within the shell 16 axially thereof is a cylindrical casing 28 and mounted axially in said casing is a cylindrical insulator 29. This insulator may be of porcelain or other approved material and is provided with reduced end portions. Snugly fitting the end portions of the insulator are metallic collars 30 tapped to receive threaded ends of binding posts and wrapped about the insulator between said collars is a resistance element 31, the ends of which are, as particularly shown in Figure 3, passed through the collars and electrically connected therewith. Surrounding the collars and centering said collars as well as the insulator with respect to the casing, are insulating caps 32 of suitable dielectric material filling the casing at its ends. Removably fitted upon the casing is a plurality of annular metallic baffles which, for convenience, have been indicated at 33, 34, 35, 36 and 37 respectively. The baffles 33 and 37 are substantially identical while the baffles 34, 35 and 36 are substantially identical. The baffles 33 and 37 are arranged at the end portions of the casing and are formed with elongated tubular hubs 38 snugly surrounding the casing. The baffles 34, 35 and 36, which are confined between the baffles 33 and 37, are formed with hubs 39 terminating flush with the side faces of said baffles and mating with each other as well as with the hubs 38. Extending through all of said baffles are tie bolts 40 provided at corresponding ends thereof with heads 41 while upon the opposite end portions of said bolts are threaded nuts 42 which may be adjusted for clamping the baffles in assembled relation. As shown in detail in Figure 4, the baffles are formed with oblique slots 43 and between said slots with oblique notches 44. Preferably, the slots and notches open through the peripheries of the baffles and, as shown in detail in Figure 2, the slots and notches of the baffles register to define zig zag or tortuous passages through the assembled baffles. Preferably, the baffles are of a diameter to snugly fit within the shell so that said baffles will cooperate with the wall of the shell for centering and sustaining the casing 28 with respect thereto. Fitting over the projecting end portion of the hub of the baffle 33 is a metallic cap 45 closing the casing at its upper end and fitting over the projecting portion of the hub of the baffle 37 is a cap 46 closing the casing at its lower end. As will be observed, these caps are provided at their inner ends with notches 47 which receive the heads 41 and nuts 42 of the tie bolts for locking said bolts as well as the nuts against rotation. As best shown in Figure 3, the cap 46 is formed with a thickened end wall 48 in which is formed, as shown in detail in Figure 5, a passage 49' from which lead, in opposite directions, laterally directed branch passages 50 opening into the shell. Freely fitting through the web 21 of the shell is a pipe 51 which, at its inner end, is threaded into the passage 49. This type is designed to have communication with an appropriate vessel containing a suitable decarbonizing fluid and interposed in said pipe is a valve 52 from which leads a control rod 53 manually operable for opening and closing the valve.

Threaded through the web 20 of the shell to project at its inner end through the cap 45, the hub of the baffle 33, and through the casing 28, is a tubular post 54 and threaded through the web 21 of said shell to project at its inner end through the cap 46, the hub of the baffle 37 and into the casing, is a similar post 55. If preferred, the posts may be freely fitted through the webs 20 and 21 and threaded through the wall of the casing, and, as will be perceived, these posts will serve to sustain the casing within the shell, the posts being provided at their outer ends with heads 56 abutting the jacket 17. Extending freely through the posts 54 and 55 are binding posts 57, the inner end portions of which have threaded engagement with the collars 30 and project into suitable sockets in the end portions of the insulator 29. Surrounding the binding posts within the posts 54 and 55 are insulating sleeves 58 while upon the outer end portions of the binding posts are insulating washers 59. Overlying said washers are metallic washers 60 and confronting these washers are nuts 61 threaded upon the posts. As shown in Figure 1, circuit wires are connected by means of the nuts 61, with the binding posts 57, current being supplied from the battery or other suitable source of electrical energy and preferably, a rheostat is, as also suggested in Figure 1, included in the circuit. Freely fitting through the web 22 of the shell and threaded at its inner end through the wall of the casing 28, is a vent pipe 62 adapted to accommodate expansion of air within the casing. If found feasible, this pipe may, however, be eliminated. Extending from the exhaust manifold 13 of the engine and connected to the nipple 18 of the jacket 17 is a pipe 63. If desired, a suitable discharge pipe may be connected to the nipple 19.

As will now be readily understood in view of the preceding description, when the engine is started, fuel mixture will be drawn from the carbureter 14 through the shell 16 and manifold 11 into the engine cylinders. Consequently, by closing the circuit through the resistance element 31, the casing 28, as well as the baffles surrounding said casing, will be heated so that the fuel mixture, as it flows through the shell will be heated by said baffles. As will, of course, be clear, the fuel mixture will, of necessity, travel through the

tortuous passages formed by the slots 43 and notches 44 of the baffles. The fuel mixture will accordingly be agitated and the atoms thereof thoroughly comingled incident to the flow of the mixture through the baffles. Further, in this connection, it is to be noted that the baffles will serve to divide the mixture up into a multiplicity of relatively thin sheets. In thus dividing the fuel mixture up into sheets, the heat of the baffles will permeate each sheet so that all of the mixture will be thoroughly heated. Such uniform and thorough heating of the mixture will, of course, serve to vaporize any particles of liquid fuel in the mixture as well as increase the combustibility thereof. A portion of the exhaust gases from the engine will, of course, flow through the pipe 63 within the jacket 17 around the shell. Consequently, after the engine has been started, the flow of current through the resistance element may be cut off, the shell as well as the baffles then being heated by the heat from said exhaust gases. In the present instance, I have shown the jacket as connected with the exhaust manifold of the engine. However, if preferred, water from the engine radiator or other source may be circulated through the jacket for heating the shell. When desired, the valve 52 may be opened for introducing a decarbonizing fluid within the shell. Upon entering the shell, the fluid will be taken up and carried through the shell by the fuel mixture flowing therethrough so as to be ultimately introduced into the engine cylinders. Accordingly, collection of carbon within the cylinders may be easily maintained at a minimum.

As previously noted, the baffles are removably fitted upon the casing 28 and while I prefer to arrange the baffles upon said casing so that the baffles will define tortuous passages therethrough, as previously described, still attention is now directed to the fact that the baffles 34 and 36 may, as shown in Figure 6, be reversed side for side when the several baffles will cooperate to form helical passages therethrough. By arranging the baffles to form zig zag passages, the fuel mixture will be caused to change its direction of flow abruptly and pound against the side walls of said passages to be accordingly mixed and agitated. On the other hand, when the baffles are arranged to define helical passages, a swirling motion will be imparted to the fuel mixture in its flow through the shell for homogenizing the mixture. I accordingly provide a highly effective construction for the purpose set forth and while I have shown and described the preferred embodiment of the invention still, as will be perceived, various minor changes or modifications may be made therein. I, therefore, reserve the right to all such changes as may fall within the spirit of the appended claims.

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

1. A fuel mixture heating and vaporizing device comprising an individual heating unit adapted to be interposed in an engine fuel mixture supply line to form a continuation thereof and including a casing, means interiorly of the casing for heating said casing, means exteriorly of the casing whereby the casing may be heated, and a shell surrounding the casing for conducting a fuel mixture over and around the casing in contact therewith.

2. A fuel mixture heating and vaporizing device including a casing, means interiorly of the casing for heating said casing, a shell surrounding the casing for conducting a fuel mixture over and around the casing in contact therewith, and a heating jacket surrounding said shell.

3. In a device of the character described, the combination of a shell, a casing disposed within the shell, a resistance element housed within the casing, and means venting the casing.

4. In a device of the character described, the combination of a shell, a casing disposed within the shell, a resistance element housed within the casing, and a pipe leading from the casing through the shell venting the casing.

5. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, and abutting baffles carried by the casing mating to define continuous passages therethrough.

6. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, and abutting baffles carried by the casing mating to define continuous passages therethrough, certain of said baffles being reversible side for side for varying the contour of said passages.

7. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, and baffles projecting from the casing mating to define zig zag passages through the baffles.

8. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, and baffles projecting from the casing mating to define zig zag passages through the baffles, certain of the baffles being reversible side for side whereby to define helical passages through the baffles.

9. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, baffles surrounding the casing, and means clamping the baffles in assembled relation.

10. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, baffles surrounding the casing, means clamping the baffles in assembled relation, and means locking the first means.

11. A fuel mixture heating and vaporizing device including a casing, baffles surrounding the casing, and bolts extending through the baffles clamping the baffles in assembled relation.

12. A fuel mixture heating and vaporizing device including a casing, baffles surrounding the casing, bolts extending through the baffles clamping the baffles in assembled relation, and caps closing the casing and provided with notches receiving the heads and nuts of said bolts whereby to lock the bolts and nuts against rotation.

13. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, a shell surrounding the casing, and means for introducing a decarbonizing fluid into the shell.

14. A fuel mixture heating and vaporizing device including a casing, a resistance element therein, caps closing the casing at its ends, a shell surrounding the casing, one of the caps being provided with passages opening into the shell, and a pipe extending through the shell in communication with said passages whereby a decarbonizing fluid may be introduced into the shell.

15. A fuel mixture heating and vaporizing device including a casing, an insulator therein, collars carried by said insulator, a resistance element carried by the insulator and connected to said collars, insulating caps surrounding the collars and supporting the insulator with respect to the casing, and binding posts extending into the casing and electrically connected to said collars.

16. A fuel mixture heating and vaporizing device including a shell, a heating jacket surrounding the shell and provided with ports whereby a liquid heating medium may be circulated through the jacket, heads closing the shell at its ends, a resistance element mounted within the shell, and slotted baffles interposed between the resistance element and the shell, the slots forming continuous passages through the baffle.

17. In a device of the character described, the combination with a resistance element, and a surrounding casing enclosing said element, of a shell surrounding the casing, and a heating jacket surrounding said shell.

In testimony whereof I affix my signature.

WILLIAM WALLACE GRANT. [L. S.]