A. G. BRIDGFORD AND S. B. BOLTON.

MANIFOLD HEATER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED DEC. 27, 1921.

1,427,059.

Patented Aug. 22, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

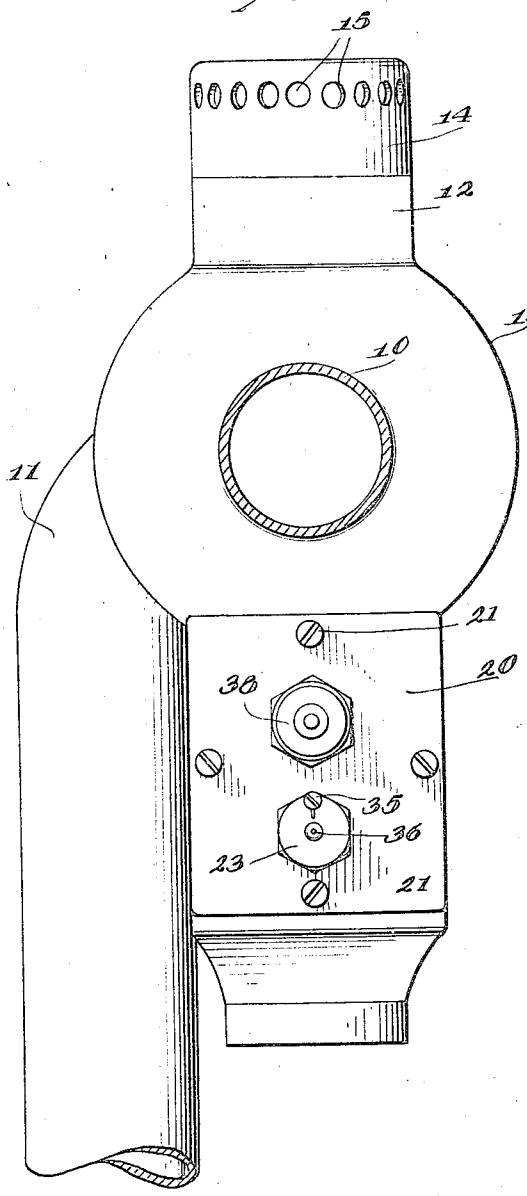

Fig. 2.

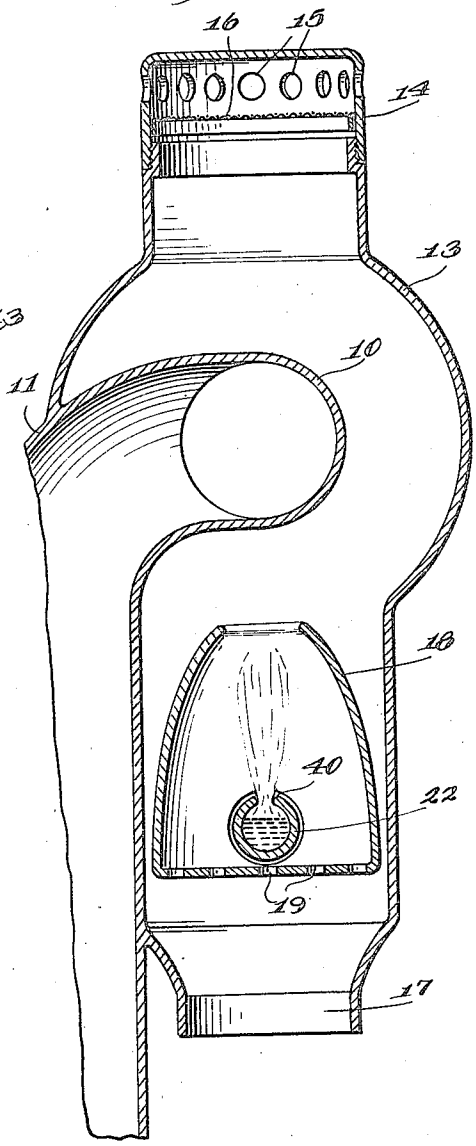

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Fig. 3.

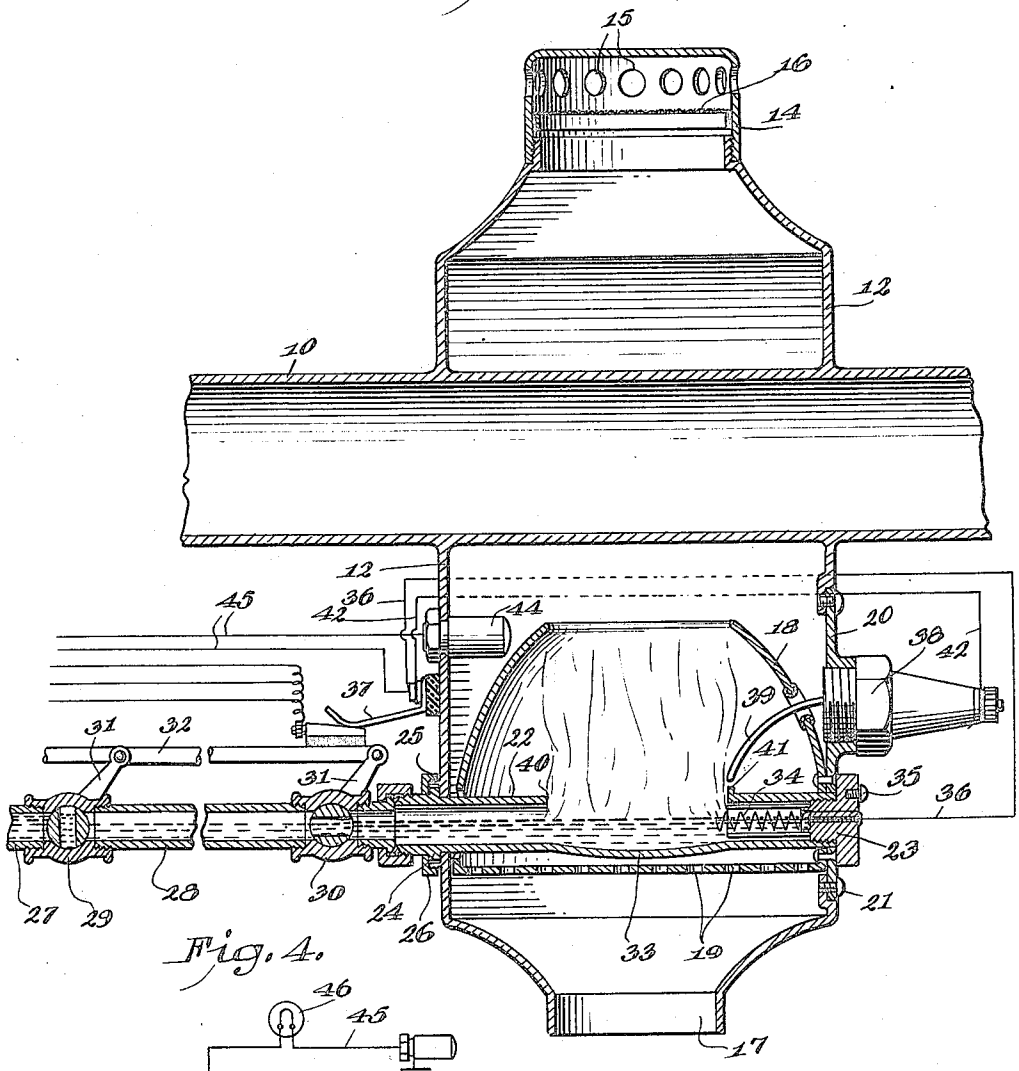
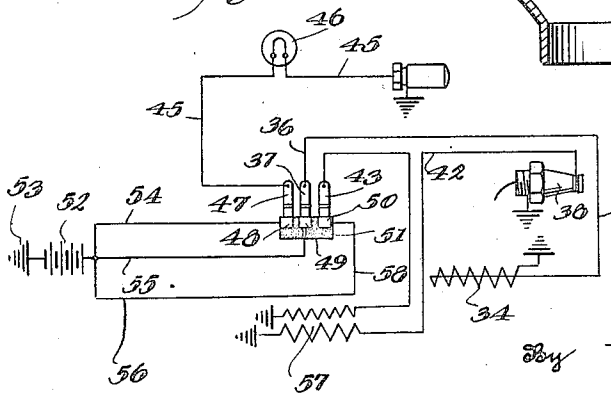


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MANIFOLD HEATER FOR INTERNAL-COMBUSTION ENGINES.

1,427,059. Specification of Letters Patent. Patented Aug. 22, 1922.

Application filed December 27, 1921. Serial No. 525,103.

To all whom it may concern:

Be it known that we, ARCHIE G. BRIDGFORD and SIDNEY B. BOLTON, citizens of the United States, residing, respectively, at Aledo, in the county of Mercer and State of Illinois, have invented certain new and useful Improvements in Manifold Heaters for Internal-Combustion Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to internal combustion engines, and more particularly to a device for initially heating the intake manifold and facilitating the starting of the engine.

An object of the present invention is to utilize the fuel of the engine to heat the intake manifold of an internal combustion engine in order that the gas in the manifold may be properly and completely vaporized before entering the firing chambers of the engine.

Another object is the provision of a burner and admitting a predetermined charge of fuel into the burner, and the vaporizing of a portion of this fuel by coming in contact with electrically generated heat. The balance of the charge of fuel is lighted by the ignition of the vaporized fuel by an electric current of the usual high tension.

The subject matter of our present invention relates to certain features illustrated and described but not claimed in our copending application, Ser. No. 514023, filed Nov. 9, 1921, and entitled Manifold heaters for internal combustion engines.

This device for assisting in starting gas engines is particularly adapted to the starting of engines in cold weather.

A further object of the present invention is to provide an improved heater which may be controlled and ignited from the instrument board or other place of control of the internal combustion engine; which consumes the usual fuel of the engine; and which may be started and lighted from the source of current supply for the ignition of the engine.

A still further object of the invention is to provide a manifold heater of this type which is of relatively simple and compact construction, which comprises but few parts, and which is so constructed that the various parts may be easily separated to admit access to the interior of the heater.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Fig. 1, is an end elevation of the heater as applied to a manifold.

Fig. 2, is a transverse section taken through the same.

Fig. 3, is a longitudinal vertical section taken through the heater and manifold.

Fig. 4, is a diagrammatic view, illustrating the wiring for distributing the source of electrical current.

Referring to the drawings, 10 designates a manifold of any suitable type provided with the depending branch or intake portion 11, adapted to be connected to the outlet to a carbureter. At the juncture of the parts 10 and 11 of the manifold, is mounted a heater casing 12. The casing 12 may be mounted in any suitable manner upon the manifold, and may even be integral therewith as shown. The casing 12 is provided with a cylindrical or drum portion 13 which is substantially concentric to the main portion 10 of the manifold, and which provides a divided channel connecting the upper and lower portions of the heater casing. A cap 14 is removably mounted on the upper end of the casing 12, and has vent openings 15 in the upper lateral portion thereof, a safety screen 16 being mounted in the cap 14 below the openings 15 to arrest the passage of sparks and flame through the top of the cap.

The lower end of the casing 12 has an air inlet 17 in the contracted bottom thereof for admitting cold air in a restricted stream to the interior of the casing 12 where the air is permitted to expand when heated. Above the air inlet 17 is a cone or deflector 18 in the form of a receptacle having openings 19 in the bottom thereof, through which the air may rise. The walls of the receptacle 18 converging at their upper ends to provide an elongated relatively narrow slot through which the flame is adapted to pass. The receptacle 18 is carried upon the

inner side of an end plate 20 which is mounted in one end wall of the casing 12, detachably held thereto, by screws 21 or the like. The closed end of the casing 12 is provided with a burner tube 22, which projects through the end wall of the casing and longitudinally therein, and fits into an opening formed through the plate 20 for holding the burner tube rigidly in place. The burner tube is held to the plate 20 by a screw plug 23 which is threaded into the open end of the burner tube, and which has a flanged head over-lapping the plate 20 to bind thereagainst, and to bind against the end of the tube. The burner tube 20 is provided with an external flange 24, which is arranged to fit in a boss or socket 25, which is formed upon the exterior wall of the casing 12. The boss 25 is exteriorly threaded to receive a binding nut 26 thereover, and the nut is adapted to work against the flange 24 for binding the burner tube in the casing. Fuel is conducted to the burner tube through a supply pipe 27, and the latter is provided with a measuring section 28 located between a pair of valves 29 and 30, the stems 31 of which are connected together by an operating rod 32. The valves 29 and 30 are so positioned that when one valve is open, the other valve is closed, and the stems 31 are so connected to the rod 32 as to alternately shift these valves into open and closed positions. The burner tube 22 is arched downwardly, as at 33 to form a basin into which the fuel is adapted to drain from the opposite ends of the tube; thus insuring the complete consumption of each charge of fuel admitted to the tube.

For the purpose of initially heating and vaporizing the fuel in the burner tube 22, an electric resistance or heating coil 34 is mounted upon the inner end of the plug 23, and projects into the outer end of the tube 22. One end of the heating coil 34 is grounded in the casing 12 through the set screw 35 which is carried by the plug 23 and beneath the head of which one end of the coil 34 is clamped. The other end of the coil 34 terminates in the wire 36, which leads to a contact 37 mounted on a suitable support, such as upon the end of the casing 12. The plate 20 carries a spark plug 38 which has an electrode 39, which extends into proximity to the burner tube 22, at a point immediately above the latter, and the burner tube has a slot or opening 40 extending immediately over the basin 33, and which terminates at one end in a projection 41, forming a second electrode, and which approaches the electrode 39. The electrode 39 is connected through the barrel of the plug 38 in the usual manner to a wire 42 which extends to the grounded secondary winding of a transformer 57.

If desired, a thermostatic switch 44 may be secured through the wall of the casing 12, and grounded at one side therein. The switch 44 has a wire 45 leading therefrom and through the telltale lamp 46, and thence to a fixed contact 47 which is located in proximity to the contacts 37 and 43. These contacts are preferably arranged in a horizontal row, and are of resilient or spring structure so as to slidably engage the conductors 48, 49, and 50 of an insulating block 51, which is mounted on the rod 32. Shifting of the rod brings the conductors and the contacts into engagement with each other to close the circuits and also separates the conductors from the contacts to break the circuits. As shown in Fig. 4, 52 illustrates the usual battery of a motor vehicle, which is grounded, as at 53 and which at its other side is connected by wires 54 and 55 to the conductors 48 and 49 respectively. The battery 52 has a third wire 56 which leads to the conductor 50, and the contact 43 of the latter is connected to the primary of the transformer 57, which primary is grounded.

In operation, the rod 32 is operated from any suitable convenient point to open the valve 29, and close the valve 30. During such operation the pipe section 28 is filled with fuel. The rod 32 is now moved in an opposite direction or inwardly to open the valve 30, and close the valve 29, whereupon a charge of fuel is admitted to the burner 22. As the rod 32 is moved inwardly or toward the casing 12, the contacts 37, 43, and 47 are closed in their respective circuits with the battery 52, and the heating coil 34 is energized and caused to heat and evaporate the liquid fuel in the burner tube 22. At the same time, the transformer 57 produces the high tension current at the electrodes 39 and 41 and causes a spark to bridge the gap at the slot 40 of the burner tube. This causes the ignition of the vapors generated by the heat coil 34.

When the telltale light 46 is used, the heat generated within the casing 12 operates the switch 44 when the heat rises to a predetermined temperature, and closes the circuit through the wire 45 and lamp 46 to actuate the latter, and impart a visual indication of the time when the desired temperature is reached. As soon as the light 46 is actuated, the rod 32 may then be shifted into an opposite position so as to break all of the circuits and to recharge the tube section 28 for subsequent use.

What is claimed is:

1. In a manifold heater, a casing for enclosing the manifold and having openings in its top and bottom, and at one end, a cover plate for said end, a burner tube mounted on said cover plate adapted to project into the casing for heating fuel therein, and igniting means carried by the cover plate ar-

ranged to project over the burner tube for igniting vapor produced by heating fuel.

2. In a manifold heater, a casing adapted to enclose a manifold, a burner tube projecting from one end into the lower portion of the casing, means for feeding liquid fuel to the burner tube, a removable plate closing the other end of the casing, heating means carried by the plate and projecting into the burner tube for vaporizing fuel therein, ignition means carried by the plate and arranged over the burner tube for igniting vaporized fuel, and a deflector casing carried by the plate and fitting over the tube to concentrate the flame when the vapor is ignited.

3. In a manifold heater, a casing adapted to enclose the manifold, a burner tube projecting into one end of the casing, a cover plate closing the other end of the casing, a plug carried by the cover plate for detachable engagement in the inner end of the burner tube to close the same and hold the burner tube in place, a heating coil carried by said plug and projecting into the burner tube for vaporizing the fuel therein, and an ignition plug carried by the plate and projecting over the outlet of said burner tube to ignite the vaporized fuel.

4. In a manifold heater, a casing adapted to enclose the manifold of an internal combustion engine, a burner tube mounted in the lower part of the casing, a valved connection between the burner tube and the source of fuel supply of the engine for charging the tube with a predetermined quantity of fuel, heating means in the burner tube for vaporizing the fuel, igniting means arranged above the outlet of the burner tube for igniting the vapor issuing therefrom, a signal device for indicating the heating of the interior of the casing, and connections between the heater, the igniting means and the indicator, and the ignition circuit of the engine for vaporizing and igniting the fuel and indicating the proper heating of the casing, whereby the operations may be discontinued.

5. In a manifold heater, a casing adapted to enclose a manifold, a burner tube arranged longitudinally in the casing and having a burner slot in its upper side, and a depressed portion beneath the burned slot providing a basin into which the fuel of the tube may collect, a heating unit in the burner tube at one side of the casing for vaporizing the fuel therein, sparking means in the casing above the slot in the burner tube for igniting gas issuing therefrom, and a single means controlling the delivery of fuel to the tube, and the energizing of said heating unit and sparking means.

6. In a manifold heater, a casing adapted to be arranged about a manifold, a burner tube arranged in the lower end of the casing, means for supporting one end of the tube in an end wall of the casing, said other end wall of the casing having an opening therethrough, a cover plate for said opening, a plug carried by the cover plate adapted for binding engagement in the burner tube for holding the same to the plate, heating means carried by the plug adapted to project into the tube, and igniting means carried by the plate and projecting into the casing for igniting the vapor rising from the burner tube.

7. In a manifold heater, a casing adapted to surround a manifold, a burner tube extending across the lower portion of the casing, a cone slidably fitting over the tube and rising above the same, a plug projecting into the burner tube and having a heating element thereon for vaporizing fuel in the tube, igniting means in the casing projecting into the cone above the burner tube, and a removable plate carried by the casing for supporting said plug and said igniting means.

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