W. F. LITTLE.

ELECTRIC VAPOR HEATER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JAN. 23, 1919.

1,344,303. **Patented June 22, 1920.**

Fig. 1

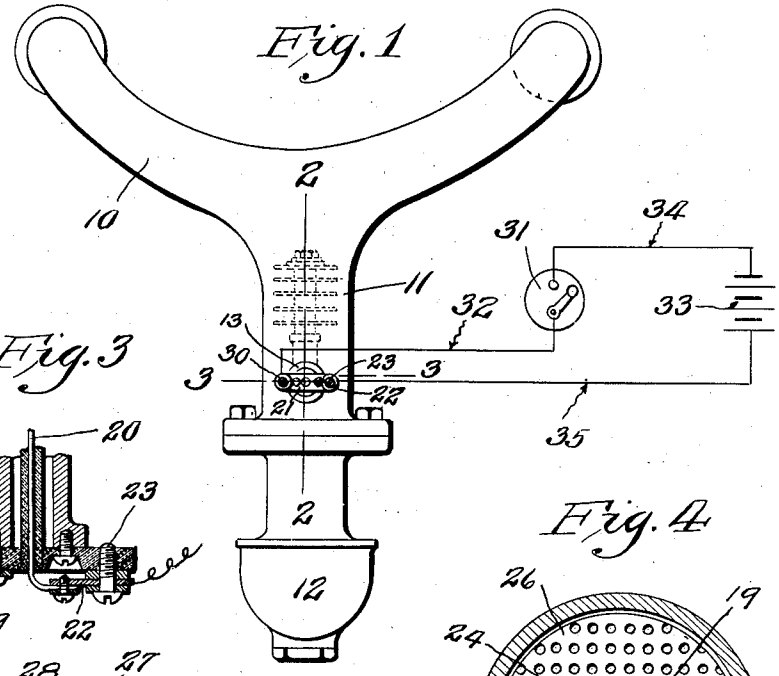


Fig. 3

Fig. 4

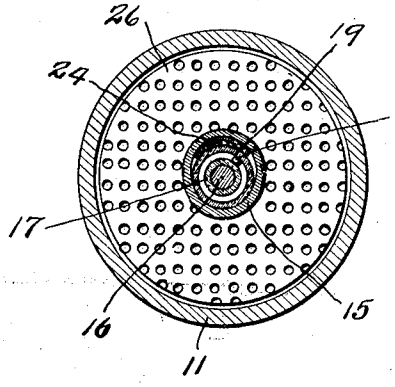


Fig. 2

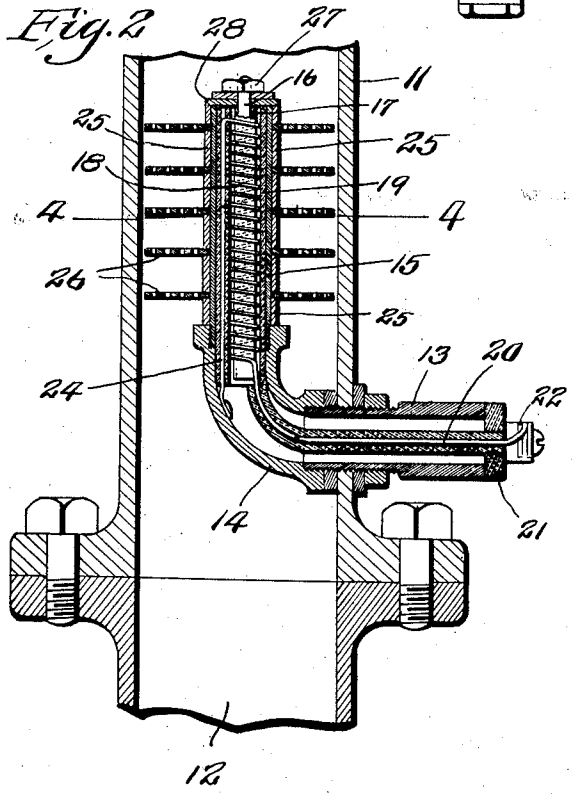
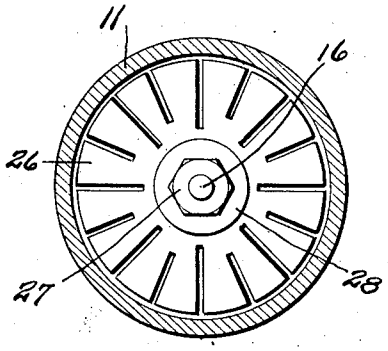


Fig. 5



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UNITED STATES PATENT OFFICE.

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ELECTRIC VAPOR-HEATER FOR INTERNAL-COMBUSTION ENGINES.

1,344,303. Specification of Letters Patent. Patented June 22, 1920.

Application filed January 23, 1919. Serial No. 272,698.

To all whom it may concern:

Be it known that I, WILLIAM F. LITTLE, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Electric Vapor-Heaters for Internal-Combustion Engines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates generally to internal combustion engines and more particularly to means for heating the combustible vapor prior to its passage into and through the intake manifold associated with the cylinders of the engine, the principal object of my invention being to provide a relatively simple and inexpensive electric heater which is located directly in the path of travel of the combustible vapor from the carbureter to the intake manifold, and which heater receives electric current from a suitable source, preferably the storage battery, which provides the necessary energy for starting the motor or engine, and said heating device being very economical in point of current consumption and very efficient in performing its intended functions, namely, the heating of the combustible vapor prior to its delivery to the engine cylinders.

It will be understood that internal combustion engines when cold, do not start readily by reason of the fact that the vapor entering the cold cylinders is chilled, in some instances, to the point of condensation; consequently, said vapor is extremely slow in igniting, and I propose to overcome these objections by heating the vapor as it passes into and through the intake manifold with the result that the heated vapor, which ignites readily, is delivered into the engine cylinders.

A further object of my invention is to provide a device which, in addition to heating the vapor prior to its passage into the engine, will perform the functions of an auxiliary mixing device, that is, it will simultaneously heat the vapor and further, mix the air with the vaporized liquid hydrocarbon after the same have been mixed and combined in the usual carbureter associated with the engine.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevational view of an intake manifold of the type usually associated with internal combustion engines and showing my improved vapor heating device applied thereto, and also showing the carbureter associated with said intake manifold and the electrical connections to said heating device.

Fig. 2 is an enlarged vertical section taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged horizontal section taken approximately on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged horizontal section taken approximately on the line 4—4 of Fig. 2.

Fig. 5 is a horizontal section similar to Fig. 4 and showing a modified form of one of the heating disks forming a part of the device.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates the main body portion of the intake manifold usually associated with internal combustion engines, said manifold being provided with a vertically disposed tubular leg 11, the lower end of the latter being directly connected to a carbureter 12.

As shown in the accompanying drawings, my vapor heating device is located in the vertical leg 11 of the manifold, although, in some instances, and with certain types of carbureters, said heating device can be located in the tubular portion of the carbureter which leads from the mixing chamber to the leg 11 of the manifold.

The heating device as herein illustrated, includes a relatively short tubular member 13 which is seated in the lower portion of the leg 11 and arranged in the chamber within said leg and secured to the inner end of said tubular member 13 is a tubular elbow 14. Seated in the upper end of this elbow is the lower end of a vertically disposed tube 15, preferably of metal, and said tube being axially disposed within said tubular leg 11. Axially disposed within this tube 15 is a rod 16, preferably of metal, and upon

which is disposed a layer 17 of mica or analogous insulating material. Wound upon this layer of insulating material is a heating coil 18 and inclosing same is a layer 19 of mica or analogous material. This heating coil is preferably formed of nichrome resistance wire which is obtainable in the open market and particularly designed for the heating coils of various electrical devices, and one end of said coil is connected by an insulated wire 20, the same leading downward through elbow 14 and through tubular member 13.

Secured in any suitable manner to the outer end of tubular member 13 is a small plate 21 of insulating material, and wire 20 leads through this and is connected to a contact plate 22, the latter being secured to one end of plate 21 by a screw or binding post 23. Leading from the end of the coil 18 opposite the end to which wire 20 is connected is a conductor 24 which leads downwardly through tube 15 outside the layer 17 of insulation and the end of this conductor is secured in any suitable manner to elbow 14. This conductor 24 is insulated from tube 15 in any suitable manner.

Arranged on tube 15 is a series of relatively short spacing sleeves 25 and interposed between these sleeves are horizontally disposed disks 26, the edges of which lie immediately adjacent to the inner face of the wall of tubular leg 11. These disks may be perforated as illustrated in Fig. 4 or they may be provided with radially disposed slots, as illustrated in Fig. 5, and said disks, together with the spacing sleeves 25, are retained in assembled position upon tube 15 by any suitable means, preferably a nut 27 which is screw-seated on the upper end of rod 16 and engaging a washer 28, the latter bearing on top of the upper one of the spacing sleeves 25.

Positioned on the front face of plate 21 and on the end opposite the end on which plate 22 is positioned, is a contact plate 29, the same being electrically connected to tube 13 and seated in said plate is a screw or binding post 30. Leading from this screw or binding post 30 to an ordinary switch 31 is a conductor 32 and leading from said switch to a suitable source of electrical energy, for instance, the storage battery 33 which is usually carried on motor vehicles for ignition and lighting purposes, is a conductor 34. Leading from the other side of this storage battery to screw or binding post 23 is a conductor 35.

In the use of my improved vapor heater, the switch 31 is closed just prior to the starting of the engine, and as said switch is closed, current from battery 33 or other source of electrical energy will pass through conductor 35, contact member 22, and conductor 20 to the heating coil 18 which, as heretofore stated, is formed of special resistance wire, and from said coil the current passes back to the battery through conductor 24, elbow 14, tubular member 13, contact plate 29 which is electrically connected to said member 13, and from thence through conductor 32, closed switch 31, and conductor 34. As soon as the current is thus turned on through the coil 18, the latter will in a relatively short period of time become heated to a relatively high degree and the heat radiating therefrom will quickly heat the metal members surrounding the heating coil and likewise the disks 26 which occupy a position in tubular member 11. The engine is now started and the combustible mixture drawn from the carbureter 12 through the intake manifold into the combustion chambers of the engine will necessarily pass through the apertures or slots in the disks 26 and through the relatively short spaces or chambers between said disks and in so doing, the combustible vapor will be simultaneously heated and mixed, which action obviously materially increases the combustibility of the vapor and the latter in this condition will be drawn into the combustion chamber of the engine and will readily ignite as the sparks are produced by the usual sparking means. As soon as the engine has thus been started, the switch 31 can be manipulated to open the circuit to the heating coil, thereby cutting out the relatively small amount of current required to heat the resistance coil in the device, although, as experiments have proven, improved results can be obtained by permitting the heating coil to perform its normal functions while the engine is in operation. By so doing, it will be understood that the combustible mixture is preheated prior to its entrance into the engine cylinder. It has been demonstrated that a preheated mixture gives much more efficiency than non-heated mixture taken directly from the carbureter.

A vapor heating device of my improved construction is relatively simple, is very economical in the consumption of electric current, can be readily applied to practically all forms of carbureters and intake manifolds, and said device is very efficient in use inasmuch as it simultaneously performs the functions of a heater and a mixer for the combustible vapor passing into the combustion chambers of an internal combustion engine.

The device may be made in various shapes and designs other than those herein shown and described, the particular shape and size of the device depending on the particular form of carbureter and intake manifold with which the device is associated. In certain forms of carbureters the device can be located in the outlet passageway therefrom

or where this outlet passageway is relatively short, the device can be located in the intake end of the inlet manifold or the heater may be located in a specially formed container or housing and which latter is located between the carbureter and the intake manifold.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved vapor heating device can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. The combination with a tubular connection for conducting combustible vapor to an internal combustion engine, of a supporting member axially disposed within said tubular member, a plurality of perforated disks mounted on said supporting member and spaced apart, the diameter of said disks being substantially equal to the internal diameter of the tubular member so that practically all of the vapor passing through said tubular member is caused to pass through the perforations in said disks, and means for electrically heating said supporting member and disks.

2. The combination with a tubular member for conducting combustible vapor to an internal combustion engine, of a tubular supporting member axially disposed within the passageway through said tubular member, an electric heating coil arranged within and insulated from said tubular supporting member, and a plurality of perforated disks arranged upon said tubular member, the diameters of said disks being substantially the same as the internal diameter of the vapor conducting member whereby practically all of the vapor passing through said conducting member is caused to pass through the perforations in said disks.

In testimony whereof I hereunto affix my signature this 20th day of January, 1919.

WILLIAM F. LITTLE.