

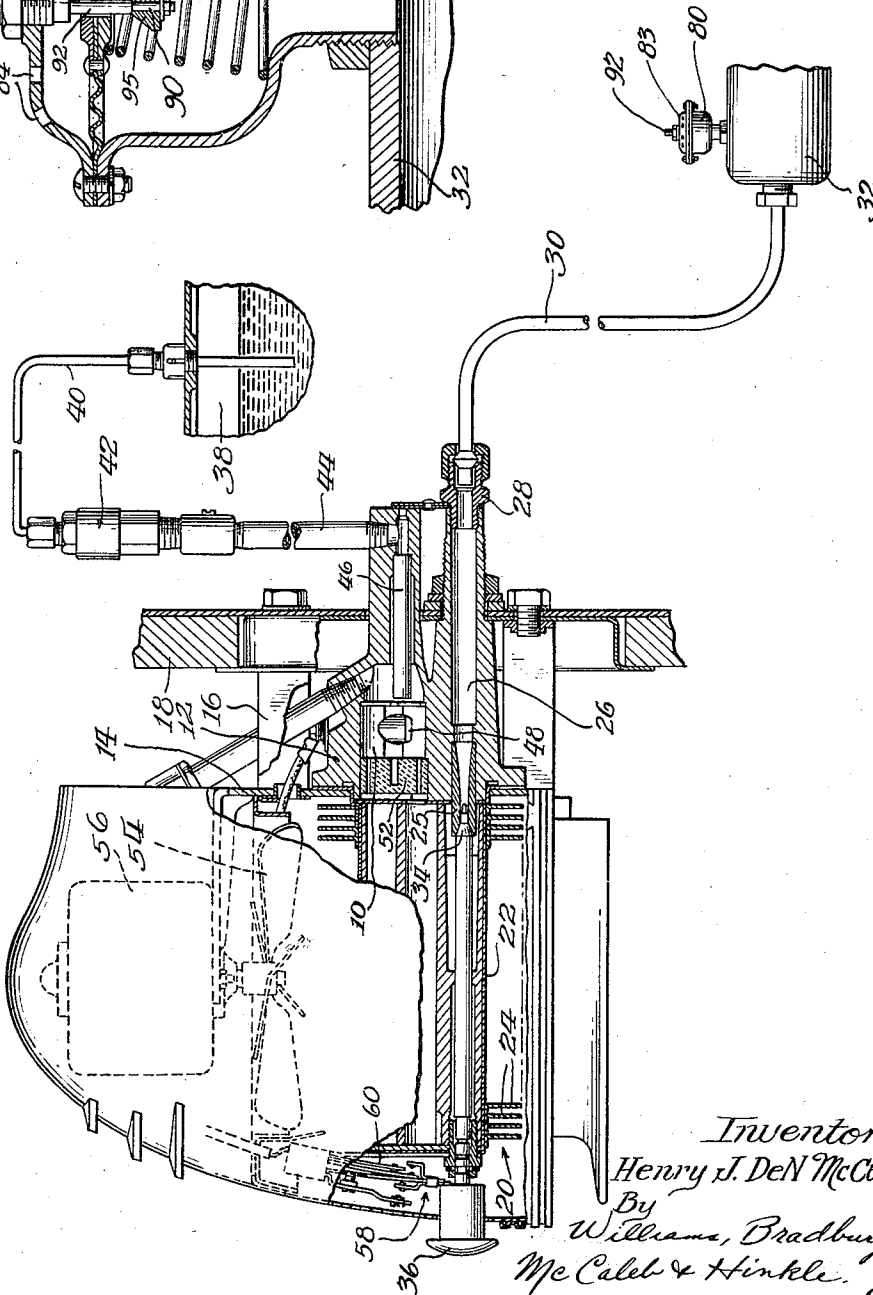
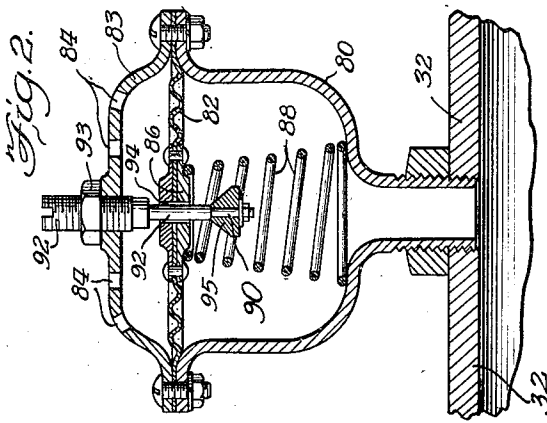
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## AUTOMOBILE HEATER

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## UNITED STATES PATENT OFFICE

2,290,151

## AUTOMOBILE HEATER

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5 Claims. (Cl. 237—12.3)

My invention relates generally to automobile heaters, and more particularly to heaters of the internal combustion type. The present invention is an improvement on the heater shown in my prior applications, Serial No. 61,213, filed January 28, 1936, and Serial Nos. 120,523 and 120,524, filed January 14, 1937, and is a division of my copending application Serial No. 183,598, filed January 6, 1938.

In using an automobile heater of the internal combustion type upon an automobile, the gases of combustion from the heater are drawn into the intake manifold of the automobile engine. Compensation for this additional supply of gases to the intake manifold may easily be made by regulating the engine carburetor so as slightly to increase the idling speed of the engine. Of course this difficulty is encountered relatively infrequently, and only when the carburetor is very delicately adjusted to the needs of the engine.

In accordance with my invention, I provide means, controlled incidental to the operation of the heater, for securing more uniform idling and normal operation of the engine irrespective of whether or not the heater is in operation. Such means may assume many different forms, but is disclosed herein as controlled by the degree of intake manifold vacuum.

It is thus an object of my invention to provide an improved form of automobile heater having means for securing uniform operation of the engine irrespective of whether or not the heater is operating.

It is a further object of my invention to provide automatic means, under the control of the intake manifold vacuum, for admitting a restricted amount of air to the intake manifold of the engine during the periods in which the heater is in operation.

Other objects will appear from the following description, reference being had to the accompanying drawing, in which:

Fig. 1 is a fragmentary central longitudinal sectional view of a heater shown installed upon an automobile and including an intake manifold vacuum responsive valve for admitting air to the intake manifold of the engine; and

Fig. 2 is a central vertical sectional view of the air-admitting valve.

The heater comprises generally a combustion chamber 10 formed in a casting 12 which is secured to a back plate 14. The latter is connected by brackets 16 to the dash 18 of the vehicle. A radiator 20 is secured to the combustion chamber casting 12 and is surrounded by a shell 22 over which heat radiating fins 24 are secured. Within the radiator 20 is a circuitous passageway which terminates adjacent a nozzle 25 which forms means for compensating for changes in the

degree of vacuum in the intake manifold. This nozzle communicates with a passageway 26 in the casting 12 to which a fitting 28 is connected, the latter being connected by a conduit 30 with the intake manifold 32 of the engine. A valve 34 is engageable with the mouth of the nozzle 25 and is operable by means of a control button 36. Liquid fuel is supplied to the heater from a reservoir 38, which may be either the float bowl of the engine carburetor or a separate auxiliary reservoir for liquid fuel. The fuel is drawn from the reservoir 38 through a conduit 40 to a carbureting device 42 where the fuel is mixed with the proper amount of air to form a combustible mixture which is fed to the combustion chamber.

At the side of the combustion chamber 10 is located an igniter chamber which communicates with the combustion chamber through a large port 48. The igniter is preferably a coil of high resistance wire which may be electrically heated to incandescence and thereby ignite the mixture of liquid fuel and air passing through the combustion chamber. The combustion chamber is partially closed by a slightly porous refractory re-igniter plug 52 which has passageways extending therethrough for the flow of the products of combustion.

The air from the passenger compartment of the vehicle is circulated past the heat radiating fins 24 by means of a fan 54 driven by a motor 56. A suitable switch mechanism 58 is mounted adjacent the end of the radiator 20 and is arranged to be controlled by the button 36 and by a strip of thermostatic bimetal 60 which is in heat conducting relationship with the radiator. This switch mechanism and its method of operation is more fully disclosed and claimed in my aforesaid application, Serial No. 120,524. It will suffice here to say that the switch is operable when the control button is pulled outwardly to open the valve 34, to close a circuit connecting the igniter with a source of current, and is operated thereafter by the thermostatic bimetal strip 60 to open the igniter circuit and to close a circuit connecting the fan motor 56 with the source of current. When the control button 36 is pushed inwardly, the valve 34 is closed and the circuits supplying both the fan motor and the igniter are opened.

As thus far described, the heater is disclosed in my aforesaid applications. The improvement of the present invention relates particularly to the provision of means for admitting additional air to the intake manifold of the engine whenever the heater is in operation. This means comprises a suitable valve housing 80 which is threaded into the intake manifold 32. The upper end of the housing 80 is closed by a flexible diaphragm 82, the edges of the diaphragm being clamped to the rim of the housing 80 by means

of a cap 83 having apertures 84 therein. The diaphragm 82 has a valve seat member 86 riveted or otherwise secured thereto at its center. The diaphragm is normally held in its upper position, as shown in Fig. 2, by a conical compression coil spring 88. A valve stem 92 having a reduced diameter portion 90 is threaded in the cap 83, being locked in adjusted position by a nut 93. A valve 95 cooperable with the valve seat 86 is secured at the lower end of the reduced diameter portion 90 of the stem. The annular passageway 94 between the reduced diameter portion 90 of the stem and the valve seat 86 is of relatively small cross sectional area, in the order of .003 of a square inch. The spring 88 is of such strength that the diaphragm will be drawn downwardly to bring the valve seat 86 against the valve 95 only when the intake manifold vacuum is relatively great, as when the engine is idling. During other periods, a restricted amount of air will flow through the passageway 94 and intake manifold 32, and thereby improve the operation of the engine.

When the heater is in operation, the intake manifold vacuum is slightly reduced, so that the diaphragm will be forced upwardly by the spring 88, and thereby raise the valve seat 86 from contact with the valve 95, thus providing an additional supply of air for the automobile engine, which is effective to improve the performance of the engine at idling speeds.

In operation the valve 86-95 admits a predetermined proportion of air from the atmosphere to the intake manifold whenever the heater is in operation, and thereby improves the performance of the engine by assuring a more uniform supply of fuel and air mixture thereto. The admission of the auxiliary supply of air to the intake manifold takes place automatically whenever the heater is in operation, since the admission of gases to the intake manifold from the heater tends to reduce the intake manifold vacuum. While air is admitted to the intake manifold whenever the vacuum is low, the effect upon the mixture is slight except at idling speeds, because the port 94 is of relatively small cross-sectional area, and admits a relatively small quantity of air when the throttle is open.

The valve housing 80 is preferably connected to the intake manifold at a point close to the connection of the conduit 30 thereto, so that it will respond rapidly to changes in vacuum caused by the flow of gases from the latter conduit.

While I have shown and described a preferred embodiment of my invention, it will be readily understood by those skilled in the art that variations may be made in the construction disclosed without departing from the basic features of my invention. I therefore do not wish to be limited to the precise construction disclosed, but wish to include within the scope of my invention all such modifications and variations which will readily suggest themselves to those skilled in the art.

What I claim as new and desire to secure by United States Letters Patent is:

1. A device for improving the idling performance of engines of automotive vehicles which are equipped with internal combustion type heaters, comprising a hollow body member connected to and having its interior communicating with the intake manifold of the engine, a diaphragm closing the end of said body member, said diaphragm having an opening therein, resilient means for moving said diaphragm outwardly, and a valve

closing the opening in said diaphragm when the latter is moved inwardly under the influence of a reduction of pressure in the intake manifold, said diaphragm being adapted to move away from said valve and permit the flow of atmospheric air through the aperture therein whenever the degree of pressure in the intake manifold exceeds a predetermined maximum value.

2. In a device of the class described, the combination of a cup-like element having a part connecting the interior of the cup with the intake manifold of an automobile engine, a centrally apertured flexible diaphragm, an apertured cover securing the peripheral edge of said diaphragm of the rim of said element, a stem adjustably secured to said cover and projecting freely through the aperture in said diaphragm, a valve secured to the inner end of said stem and arranged to close the aperture in said diaphragm when the central portion of the latter is flexed inwardly, and a spring normally holding said diaphragm away from said valve.

3. In a system in which an internal combustion type of heater is connected to have the products of combustion of the heater drawn into the intake manifold of the engine, means for compensating for the dilution of the charge in the intake manifold by such products of combustion comprising, a hollow element connected to the intake manifold, an apertured flexible diaphragm forming one wall of said element, an apertured cap secured over said diaphragm, a stem adjustably secured to said cap and having a portion of reduced diameter projecting through the aperture in said diaphragm, a valve of larger diameter than the aperture in said diaphragm and secured to the inner end of the reduced diameter portion of said stem, said valve being operable to close the aperture in said diaphragm when the latter is flexed inwardly with respect to said element due to a reduction of the pressure therein, and a spring opposing such inward movement of said diaphragm.

4. In a device of the class described, the combination of a cup connected to the intake manifold of an automobile engine, an apertured flexible diaphragm secured to the rim of said cup, an apertured cover over said diaphragm, a stem adjustably secured to said cover and projecting freely through the aperture in said diaphragm, a valve seat member secured to said diaphragm around the aperture therein, a valve on the inner end of said stem and arranged to engage said valve seat member when the central portion of the latter is flexed inwardly, and resilient means holding said seat member away from said valve.

5. In an installation comprising an internal combustion engine having a manifold for supplying a combustible mixture to said engine, a combustion heater discharging into said manifold, means for operating said heater at will during the operation of said engine, said installation being characterized by the provision of a valve for bleeding air into said manifold only when said engine and heater are operating, said valve comprising a diaphragm having an opening there-through, a stationary valve member for closing said opening when said diaphragm is in one position, a spring for urging said diaphragm away from said one position, and conduit means connecting said manifold and diaphragm so that operation of said heater results in movement of said diaphragm away from said valve member.

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