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MANIFOLD HEAT VALVE CONTROL

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FIG. 1.

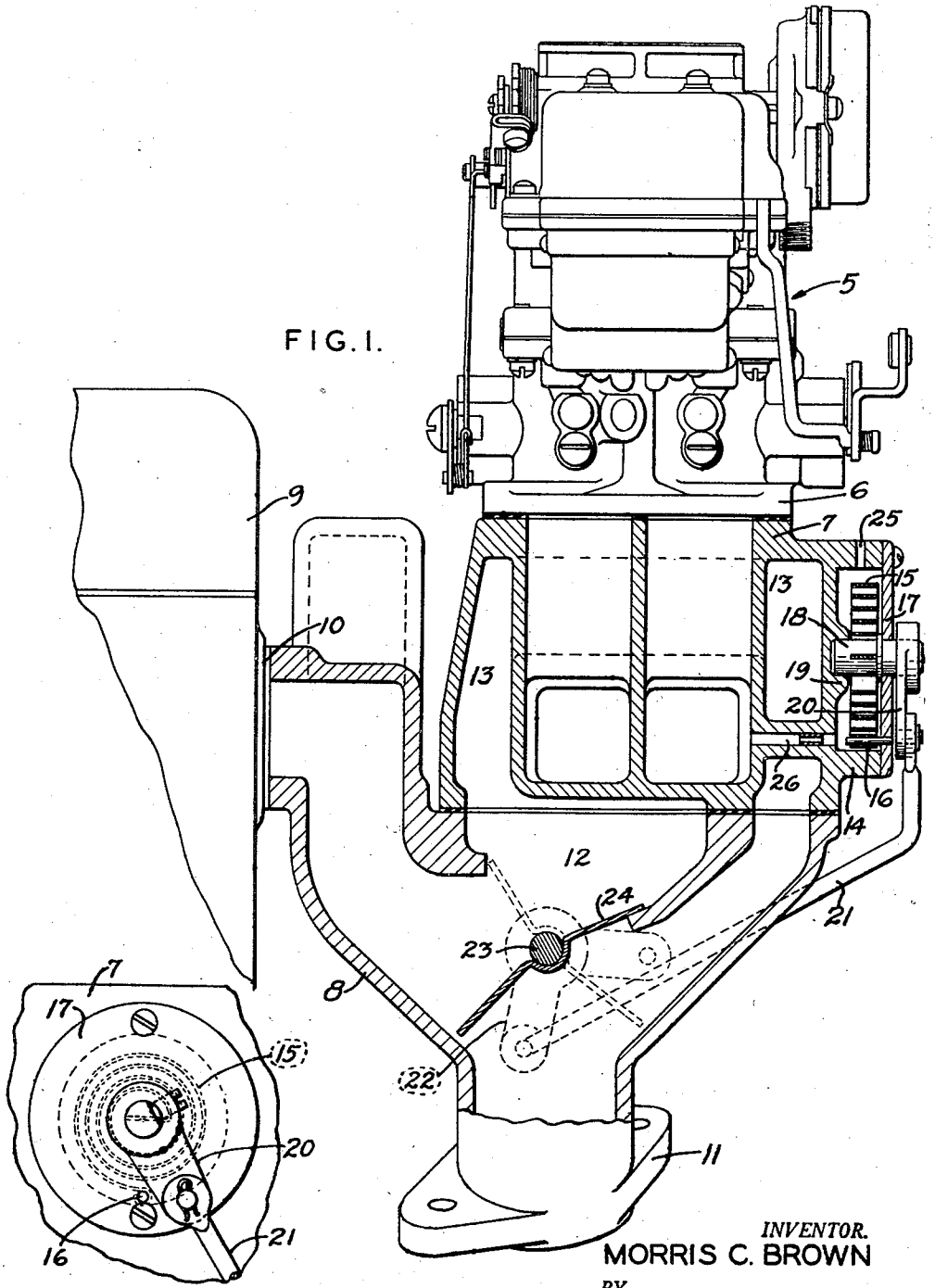


FIG. 2.

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MANIFOLD HEAT VALVE CONTROL

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5 Claims. (Cl. 123—122)

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This invention relates to fuel mixture heaters for internal combustion engines and consists, particularly, in novel control means therefor.

Internal combustion engines of the automotive type are customarily provided with "hot spots" wherein a portion of the hot exhaust gases are diverted into close proximity to the intake manifold for heating the fuel mixture prior to admission into the engine cylinders. The exhaust bypass is usually controlled by a valve which, in turn, may be operated by a thermostat mounted on the exhaust manifold. It has been found, however, that the operation of the hot spot valve by such means is improper under certain circumstances. For instance, it is desirable that more heat be applied to the mixture when the engine is operating under load than when it is operating in the economy range or under light load regardless of the exhaust manifold temperature. This is because in the former case there is frequently insufficient vacuum in the intake manifold to aid materially in vaporizing the fuel while, in the latter case, a relatively high suction exists and the fuel is thoroughly atomized thereby.

It is an object of this invention to vary the application of heat to the fuel mixture in accordance with the characteristics thereof as it enters the intake manifold.

Another object is to provide means for varying the heat applied to the mixture in accordance with the load applied to the engine.

Another object is to provide a thermostatically actuated heat valve of the above type in which the response of the controlling thermostat is modified in accordance with engine suction.

These objects and other more detailed objects hereafter appearing are attained by the device illustrated in the accompanying drawings in which

Fig. 1 is an elevation of a portion of an engine induction and exhaust system, parts being sectioned for clearer illustration.

Fig. 2 is a detail view at 90° of Fig. 1 showing the thermostat housing in elevation.

Fig. 1 shows a carburetor at 5 having a lower flange 6 attached to the riser 7 of a dual intake manifold. Exhaust manifold 8 is connected to engine 9, as at 10, and has a flange 11 for attachment to the usual exhaust pipe leading to the rear of the vehicle. In the usual practice, one branch 10 of the exhaust manifold connects with each adjoining pair of cylinders.

An opening 12 in the upper wall of the exhaust manifold provides for diverting a portion of the hot exhaust gases through the spaces 13 which

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surround the riser portion 7 of intake manifold. The structure by which the exhaust gases are diverted about the riser is known as a "hot spot". Formed on the outer wall of the "hot spot" is a housing 14 receiving a bi-metal coiled thermostat 15 having its outer end hooked about a pin 16 secured in housing cover 17. A pintle 18 is journaled in a recessed boss 19 on the inner wall of the housing and in a central aperture in cover 17. The inner end of thermostat 15 is anchored to this pintle. Attached rigidly to the pintle on the outside of the thermostat chamber is an arm 20 which is connected by a link 21 to an arm 22 rigid with a shaft 23 journaled in the walls of the exhaust manifold just below opening 12. A double wing butterfly valve 24 is carried by shaft 23 so as to control opening 12 and, consequently, the diversion of hot exhaust gases through the "hot spot" by-pass.

A port 25 in the wall of the thermostat housing admits atmosphere to the interior thereof. A suction connection 26 leads through the adjacent exhaust space 13 in the "hot spot" and connects the thermostat housing with one branch of the intake manifold. Suction transmitted through connection 26 draws cooling air through port 25 past the thermostat and thence into the engine.

The solid line position of valve 24, as shown in Fig. 1, corresponds with the cold position of the thermostat in which substantially the whole volume of exhaust gases is diverted through the hot spot for heating the fuel mixture. As the thermostat is heated, the valve rotates counter-clockwise to the dotted line or hot position in which no exhaust gases are diverted. However, port 25 and suction connection 26 provide for modification of the thermostat action by the cooling air. The rate air is drawn past the thermostat varies in accordance with the intake suction so that the condition of the thermostat and, consequently, the position of valve 24 are likewise varied. For instance, when the engine is operating under a light load and the suction in the intake is relatively high, large volumes of cool air are drawn past the thermostat which tends to move valve 24 towards the cool position and to increase the quantity of gases diverted. Conversely, when the engine is operating under heavier loads, the suction in the intake decreases and, correspondingly, less cooling air is drawn past the thermostat. This tends to cause movement of valve 24 toward the hot position and to reduce the quantity of hot gases diverted through the hot spot. Thus, the heating of the fuel mixture is modified auto-

matically in accordance with the relative degree of atomization of the fuel mixture.

The invention may be modified in various respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In an internal combustion engine, intake and exhaust manifolds, a by-pass for diverting a part of the exhaust from said exhaust manifold in close proximity with said intake manifold, a valve for controlling said by-pass, a thermostat adjacent said exhaust manifold and controlling said valve, said thermostat being exposed to atmosphere, and suction means for drawing air past said thermostat at a variable rate in accordance with the suction in said intake manifold.

2. In an internal combustion engine, intake and exhaust manifolds a by-pass from said exhaust manifold for diverting a portion of the exhaust in close proximity with said intake manifold, a valve controlling said by-pass, a housing mounted adjacent said exhaust manifold, a thermostat in said housing and operatively connected to said valve for controlling the same, there being an orifice in the wall of said housing for exposing said thermostat to atmosphere, and a connection between said housing and said intake manifold for drawing air past said thermostat at a variable rate in accordance with the intake suction.

3. In an internal combustion engine, exhaust and intake manifolds, a by-pass from said exhaust manifold for diverting a portion of the exhaust into close proximity with said intake manifold, a valve controlling said by-pass, a housing adjacent said exhaust manifold, a thermostat in said housing and connected to said valve for controlling the same, there being an opening in the wall of said housing for exposing said thermostat to atmosphere, and a suction connection between said housing and said intake manifold for drawing cooling air past said thermostat at variable rates in accordance with the suction in said intake manifold.

4. In an internal combustion engine, exhaust and intake manifolds, a by-pass from said exhaust manifold for diverting a portion of the exhaust into close proximity with said intake manifold, a valve controlling said by-pass, a thermostat mounted on said exhaust manifold, a housing for said thermostat, there being an opening in the wall of said housing for exposing said thermostat to atmosphere, and a suction connection between said housing and said intake manifold for drawing cooling air through said housing and past said thermostat at a variable rate in accordance with the intake suction.

5. In an internal combustion engine, exhaust and intake manifolds, a by-pass from said exhaust manifold for diverting a portion of the exhaust into close proximity with said intake manifold, said by-pass merging with the wall of said intake manifold to form a "hot spot," a valve controlling said by-pass, a thermostat mounted on said "hot spot," a housing for said thermostat, there being an opening in the wall of said housing for exposing said thermostat to cooling atmosphere, and a suction passage extending from said housing through the exhaust portion of said hot spot and into said intake manifold for drawing atmosphere past said thermostat at a variable rate so as to vary the action of said thermostat and said valve under the influence of exhaust heat in accordance with the intake suction.

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