

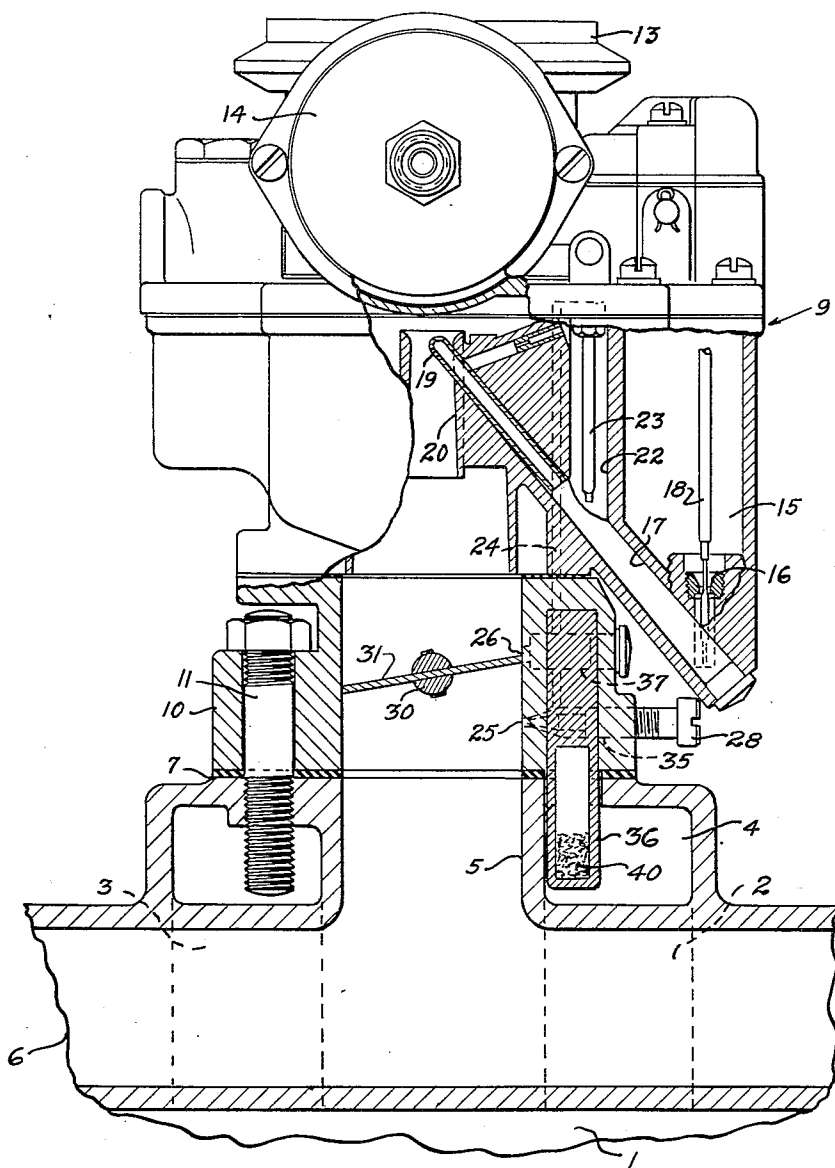
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DE-ICING MEANS FOR CARBURETORS

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DE-ICING MEANS FOR CARBURETORS

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1 Claim. (Cl. 261—14)

This invention relates to internal combustion engines and, more specifically, to improvements in the induction system of an engine to prevent the formation of ice around and on the throttle valve and adjacent fuel nozzles of a carburetor.

In an engine induction system, air is forced over the fuel nozzles and past the throttle valve of the carburetor by the differential pressure existing between normal atmosphere and the suction produced in the manifold by the pumping action of the cylinders. During engine operation, a substantial pressure difference can exist on opposite sides of the throttle valve, especially in part-throttle operation, causing a substantial drop in pressure to occur at this point. Since some of the fuel nozzles are located anterior of the throttle, it is inevitable that gasoline will be discharged in the vicinity of the throttle and pass over the throttle valve. Gasoline, being highly volatile in nature, at least the lighter ends thereof, will change from a liquid to a gaseous state as it experiences the change in pressure from one side of the throttle to the other. Thus, the carburetor can subject the fuel to a rapid drop in pressure which will be accompanied by a change in the state of fuel from liquid to gas. Both rapid expansion and vaporization are present in the usual refrigeration cycle. As a result, any substantial amount of moisture in the air will precipitate as ice when it strikes the refrigerated parts such as the throttle and possibly the fuel nozzles adjacent the throttle. The accumulation of any substantial amount of ice in this part of the induction system necessarily interferes with the mixture ratio. This can cause a loss of power, having serious consequences, or engine stalling, which is a nuisance, to say the least.

In order to effect a cure, it has been proposed that the throttle body of the carburetor be provided with suitable passages for hot exhaust gases. This proposal, however, is not wholly satisfactory because of the corrosive nature of exhaust gases and their consequent deleterious effect on metal. Instead of heating the throttle body by conduction of heat directly from the gas passing through the body, it is proposed to obtain the same heating effect indirectly, so that the corrosive gases do not come in contact with any part of the carburetor.

According to this invention, a form of heat exchanger is used, of proper material and so located as to be exposed to the heating effect of the exhaust gases. The heat absorbed from the exhaust is transferred to regions within the carburetor where the heat will be effective adjacent the fuel nozzles and throttle, and where the combined effects of conduction and radiation will be most beneficial.

The accompanying drawing illustrates one form of the invention in which the single figure is an elevation of an engine induction system with parts of the carburetor and manifold broken away to illustrate the location of the heat exchanger.

Referring to the drawing, an exhaust manifold 1 is connected by means of passages 2 and 3 with a jacket 4

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surrounding the riser 5 of an intake manifold 6 of the engine. The jacket 4 has a flange 7 for mounting a carburetor generally indicated as 9. The throttle body of the carburetor 9 is flanged at 10 to seat upon the flange 7 of the heating jacket 4 and is provided with a suitable gasket and studs 11 passing through the flange 10 and threadedly engaged with suitable threaded openings in the heating jacket 4. It will be noted that the stud 11 passes well within the heating jacket 4 so as to absorb heat from the gases circulating from the exhaust manifold of the engine 1 through passage 2 into the jacket 4 and out of the passage 3 to the exhaust manifold 1. The carburetor 9 is of conventional construction, and its details form no part of the present invention. It is described here only for the purpose of explaining the application of the present invention.

Carburetor 9 has an air horn 13 which contains the usual automatic choke mechanism generally indicated as 14. Integral with carburetor 9 is the fuel reservoir 15, which communicates by way of a metering orifice 16 with a main fuel passage 17. Orifice 16 is controlled, in turn, by a metering rod 18 operated by suction or by movement of the throttle valve in a manner well known in the art.

Fuel passage 17 leads to main nozzle 19 located in the throat of primary venturi 20. Communicating with the main fuel passage 17 is a well 22. Within the well is an idle tube 23 which connects, in turn, with a passage 24 passing vertically through the carburetor and connecting with a low-speed nozzle 25 adjacent the throttle and an atmospheric bleed 26 at the edge of the throttle. Fuel nozzle 25 has an adjustable metering valve in the form of an idle screw 28.

Journalled within the throttle body of the carburetor is a throttle shaft 30 mounting a throttle 31. The throttle body adjacent the fuel nozzles 25 and 26 has an insert 36 received within a suitable cavity in the throttle body. This insert is of copper or some other metal having a high rate of heat conductivity, and is bored vertically to register with, and form a continuation of, passage 24. The insert 36 extends upwardly within the throttle body, and is also apertured as shown at 35 and 37 to contain the passages leading to the idle port 25 and idle bleed port 26.

In operation, heat from the exhaust gases within the jacket 4 circulates about the heat exchanger and is conducted up to and around the nozzle passages by conduction through the insert 36. The same effect is also characteristic of the stud or studs 11, since the stud may be of suitable metal for this purpose. Heat will be transferred to the fuel or the air passing through the passage 24 so that the fuel leaving the ports 25 or 26, as the case may be, will be raised in temperature to decrease the cooling effect on the throttle plate or valve and the nozzles. In this manner, it is possible to conduct sufficient heat to the fuel to supply some of the latent heat required for vaporization of the fuel. If the latent heat of vaporization is supplied to some extent by the exhaust gases instead of by the air passing through the mixture conduit of the carburetor, then the refrigerating effect is somewhat neutralized.

Heat conducted by the exchanger insert 36 and studs 11 will be transferred to the walls of the throttle body and help to prevent the formation of ice on the throttle valve by radiation.

This description has not been limited, but is generic to any heat exchanger structure combined with the throttle body. Any known way of effecting a transfer of heat from the exhaust gases would be satisfactory. For example, the insert 36 has a chamber 40 containing sodium, or other substance, which will be vaporized by the hot gas and then condense within the portion of the

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insert in the throttle body, giving up the heat to this part of the carburetor.

In order to prevent operation of the heat exchanger when heat transfer is not necessary, a temperature responsive valve may be installed in either one of the passages 2 and 3 to prevent circulation through the chamber 4. This valve can be made responsible to exhaust temperatures, coolant temperatures, or ambient temperatures of the air beneath the hood of the automobile, whichever is desirable.

A device which will carry out the objects of the invention has been disclosed, but it is contemplated that other modifications of the invention will occur to those skilled in the art which come within the spirit of the invention as defined by the appended claim.

I claim:

In an internal combustion engine fuel system, an air inlet conduit having separable portions, a throttle valve in a first portion of said conduit, another portion of said conduit having a passage containing heated fluid during the operation of the engine, means for securing together said conduit portions including studs extending

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from said first conduit portion adjacent said throttle valve through a portion of said second conduit and into the heated fluid in said passage, a heat exchange insert fixed in said second portion and extending from said first conduit portion into the heated fluid, said heat exchange insert containing a medium which is vaporized at the temperature of said heated fluid, said studs and said heat exchange insert transferring heat from the heated fluid to the walls of the carburetor adjacent the throttle valve to reduce the tendency of ice to form in the carburetor.

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