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J. H. KREIN ETAL

3,139,874

CARBURETOR

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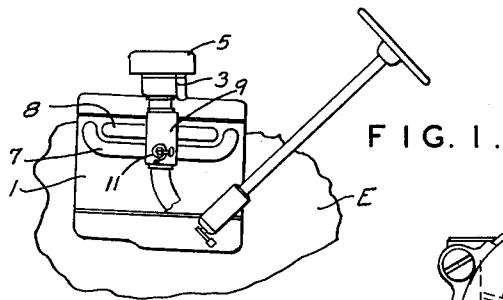


FIG. 1.

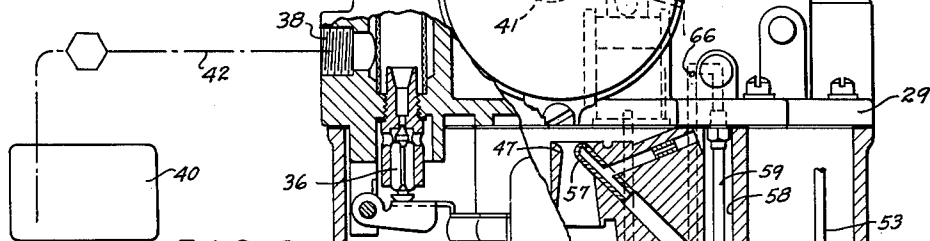


FIG. 2.

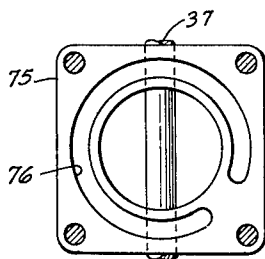


FIG. 4.

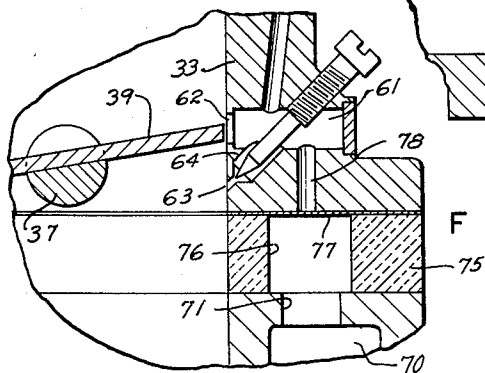


FIG. 3.

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This invention relates to carburetors and in particular to means to spoil or otherwise render inoperative the idle system in a carburetor when dangerous conditions are present.

A carburetor for an internal combustion engine, in accordance with the nature of this invention, includes a high speed fuel supply system and an idle fuel supply system. The high speed system has a fuel nozzle which supplies the mixture conduit with fuel near the top portion of the carburetor. The throttle of the carburetor is normally located at a lower portion of the carburetor. The idle fuel supply system is so arranged that it has a mixture outlet port downstream of the throttle and an air inlet port adjacent the throttle plate in the curb idle position thereof.

A reduction in engine compartment height as a result of modern automotive design necessitates in lower and more compact carburetor design. Such compact carburetor design requires placement of the throttle valve and throttle shaft in close proximity to the lower portion of the throttle body. A carburetor of the type described will be mounted on the intake manifold of an internal combustion engine in such a manner that hot exhaust gases from the exhaust system will contact a certain specific area at the bottom of the carburetor, when the engine is cold, for the purpose of warming the carburetor for prevention of ice formation at the throttle plate. When normal temperatures are approached, the hot exhaust gases actuate a thermostat in the exhaust system to substantially close a valve reducing the flow of exhaust gases to the carburetor. Due to the tolerances of the thermostatically actuated valve, flow of exhaust gases through the carburetor warming circuit is severely reduced but not completely cut off.

A thin non-corrosive, heat-conductive shim is normally located at the lower portion of the throttle body and separates the throttle body from the warming circuit thereby preventing direct contact of the hot exhaust gases on the valve body and eliminating the problem of corrosion due to the action of the exhaust gases on the exposed carburetor portion. Exhaust gases contain acids which react with aluminum alloys from which the carburetor bodies are cast causing severe deterioration thereof.

When a carburetor formed of aluminum alloy is assembled to the manifold of an internal combustion engine, without the shim, a very dangerous condition exists. The exhaust gases will react with the exposed part of the carburetor body causing corrosion and deterioration of the throttle shaft and shaft bearings, thus causing the throttle to lock in an open position against all forces tending to close it.

Accordingly, among the several objects of this invention may be noted the prevention of throttle locking due to seizure of the throttle shaft resulting from exhaust gas corrosion.

It is an object of this invention to provide a carburetor, the idle system of which is reduced to an inoperative condition if the corrosion preventing shim is not present.

Another object of this invention is to provide a carburetor having an idle system the adjustment of which, to achieve operation, is impossible when the shim is not present.

It is among the objects of this invention to provide a carburetor which not only includes a spoilable idle sys-

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tem but also which is inexpensive in manufacture and reliable in use.

Other objects and features will be in part apparent and in part printed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings in which one of various possible embodiments of the invention is illustrated,

FIGURE 1 is a view in side elevation of the engine of an automotive vehicle equipped with a carburetor, in accordance with this invention.

FIGURE 2 is a detail view in elevation with parts broken away, shown in section of a carburetor mounted on an engine, with air filter removed and provided in accordance with this invention with means for spoiling the idle system.

FIGURE 3 is an enlarged partial view in elevation with parts broken away in section of a throttle body, insulator and exhaust gas passages provided in accordance with this invention.

FIGURE 4 is a bottom view of the insulator spacer member taken along line 4-4 in FIGURE 2.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, there is indicated at 1 in FIGURE 1 the internal combustion engine of an automotive vehicle E. At 3 is indicated the carburetor for the engine and at 5 is indicated the air filter on the air horn of the carburetor. An exhaust manifold is indicated at 7, an intake manifold is indicated at 8 and a thermostatically controlled heat riser is shown at 9. Heat riser 9 includes a thermostatically controlled valve 10 for controlling the flow of gases through the warming circuit shown by arrows in FIGURE 2.

Referring now to FIGURE 2, the carburetor 3 is shown to comprise a main body casting formed with a vertical mixture conduit 25, a fuel bowl 27 and an integral throttle section 33 having a throttle bore 35 coaxial with and in continuation of the mixture conduit 25. The throttle section is fixed to the inlet manifold 8 of engine 1.

An air horn casting includes a bowl cover 29 closing the fuel bowl 27. Extending across the air horn 31 is a choke valve shaft 41 carrying a choke valve 43. A choke control is generally indicated at 45.

A float valve 36 operated by a float 34 controls flow of fuel to the fuel bowl 27 from a fuel inlet 38 which is in turn connected to a fuel reservoir 40 by a fuel conduit 42, both schematically shown in FIGURE 2.

A throttle shaft 37 extends across the throttle bore and carries throttle valve 39. Throttle valve 39 is constituted by a plate fitting the bore 35.

A boost venturi 47 is provided in the mixture conduit. A high speed fuel system for the carburetor comprises a metering jet 51 through which fuel may flow from the fuel bowl under control of shaped metering rod 53 to a passage 55 for delivery through a fuel nozzle 57 into the boost venturi 47.

An idle fuel and air system is provided in the carburetor to supply a fuel and air mixture to the engine for low speed or idle operation. The idle system comprises a fuel well 58 opening at its lower end into the main fuel passage 55. An idle fuel tube 59 having an open lower end extending below the normal fuel level in well 58 is connected at its upper end to a fuel passage 60 formed in the carburetor body. An air bleed 66 bleeds air into passage 60 changing the fuel into a rich mixture. Passage 60 extends from the well 58 through the fuel bowl 27 downwardly to an idle fuel chamber 61 formed in the throttle body 33. An elongated idle port 62 opens chamber 61

into the throttle bore 35 adjacent to the edge of the throttle valve 39 when in its curb idle position. Passage 60 extends through chamber 61 into a bore 64 connected by a second idle port 63 to the throttle bore downstream of the throttle valve 39. An idle adjustment screw 65 is threaded into bore 64 and has an inner pointed end to control flow of the mixture through ports 62 and 63.

A more detailed description of a carburetor of the type described herein is found in Patent No. 2,635,625.

The elongated idle port 62 is only partially closed by the edge of the throttle valve 39, when the valve is in its curb idle position and a portion of port 62 extends upstream of throttle 39, as shown in FIGURE 2. This provides another air bleed into idle chamber 61 causing a further break-up of the rich mixture resulting in a correct idle mixture. During engine idle or low speed operation, the negative pressure or vacuum in manifold M is in the order of 18 inches of mercury. This vacuum is effective to draw through port 63 sufficient fuel from passage 60 and air through port 62 and additional air around throttle valve 39 to operate the engine at low speeds with little or no load.

The intake manifold 8 has an exhaust gas passage 70 formed therein forming a portion of the warming circuit, to be described. The exhaust gas inlet passage communicates with the exhaust manifold 7 through a heat riser passage 69.

An insulator spacer member 75 is located between the throttle section 33 and the intake manifold and serves to insulate the throttle section 33 from the engine heat during normal engine operation. The insulator member 75 has an arcuate opening 76 therein forming a portion of the exhaust gas conducting circuit and allowing hot exhaust gases to impinge directly upon the lower surface of the throttle section 33 to apply heat to the lower portion of the carburetor body and thereby prevent ice formation at the throttle plate. The upper wall 71 of the exhaust gas inlet passage 70 has an inlet opening 72 therein communicating the exhaust gas passage with the arcuate channel 76 in spacer 75 and an outlet opening 71 communicating the arcuate channel 76 with an exhaust gas outlet 79. Hot exhaust gases flow upwardly into inlet passage 70, through opening 72 into arcuate chamber 76 and downwardly through opening 71 through outlet passage 79 to the exhaust system.

The exhaust manifold 7 includes a valve 10 which is normally in a blocking position at low temperatures, as shown in FIGURE 2, and is automatically moved to an unblocking position by a thermostatic coil 11, at a predetermined higher temperature to reduce the flow of hot exhaust gases to the carburetor through the riser passage 69 when the engine temperature approaches the normal operating range. The unblocking position of valve 10 is indicated by dotted lines in FIGURE 2.

A thin non-corrosive, heat-conductive shim 77 is located between the insulator 75 and the throttle section 33. The purpose of the shim is to protect the lower surface of the aluminum alloy carburetor from direct contact by the exhaust gases to prevent corrosion thereof. Strong acids present in exhaust gases react with the aluminum alloy and cause very severe deterioration and failure of the carburetor wall structure. Corrosion of the throttle shaft and throttle shaft bearings causes the throttle to lock causing a very dangerous condition. The shim prevents the exhaust gases from contacting the aluminum alloy and also transmits heat to the throttle section of the carburetor. The shim may be composed of stainless steel or any other material which is both heat-conductive and resistant to the corrosive action of engine exhaust gases.

In accordance with a feature of this invention, at least one idle spoiler passage 78 for the idle system is formed in throttle body 33, as shown in FIGURES 2 and 3, and serves to communicate the exhaust system of the engine 1 with the idle system of the carburetor when the shim 77 is not present, making idle adjustment and engine idle operation impossible.

When the shim is present and the thermostatically controlled valve 10 in the exhaust manifold is in its blocking position, hot engine exhaust gases will flow up the heat riser passage 69 through the arcuate opening 76 to the shim 77 to heat an arcuate portion of the throttle section 33, as described. When the thermostatically controlled valve 10 moves to an unblocking position due to an increase in temperature, a lesser quantity of exhaust gases will flow up the riser passage 69 and the insulator 75 will serve to limit the transfer of heat from the manifold to the carburetor.

When the shim is not present, for example, due to failure of the serviceman to insert it when connecting the carburetor to the engine, in accordance with the invention, exhaust gases under pressure will flow into the idle chamber 61 through the idle spoiler passage 78. When the idle fuel chamber is subjected to pressure from the exhaust system, a number of conditions exist in the idle system making adjustment thereof impossible. The exhaust gases contain very little oxygen and reduce the fuel/oxygen ratio of the idle mixture to a point where combustion in the engine will no longer be supported. More important, pressure in the idle fuel chamber breaks or prevents the vacuum required to draw fuel from the fuel bowl thus shutting off the flow of fuel through the idle system.

Since the shim 77 must be in place for the carburetor to function normally, there will be no possibility of a throttle shaft becoming seized due to corrosive action of the exhaust gases.

In carburetors having several bores, one or more idle spoiler bores will be provided for each idle circuit.

It should be particularly noted that the spoiler bores are provided to spoil only the idle system of the carburetor and the engine will function as long as the high speed circuit or circuits are open, but as soon as the engine is reduced to idle, it will cease to operate. Normal starting of an engine with the throttle at its curb idle position would, of course, be impossible without the presence of the shim.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes and modifications could be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a combination, an internal combustion engine having an intake manifold and an exhaust system, a carburetor mounted on said intake manifold, said intake manifold having an exhaust gas passage adjacent to a portion of said carburetor and connected to said exhaust system to convey hot exhaust gases to said carburetor portion, said carburetor having an idle system connected to said intake manifold, a thin corrosion resistant heat conductive shim located between said carburetor portion and said intake manifold and exposed to said exhaust gas passage to protect said carburetor from damage by exhaust gas corrosion, means for spoiling said idle system to prevent said engine at idle from operating at low speeds if said shim is not located between the carburetor and the intake manifold.

2. The combination as set forth in claim 1, wherein said means for spoiling said idle system comprises at least one conduit communicating said exhaust system with said idle system only when said shim is not present.

3. The combination as set forth in claim 1, wherein said means for spoiling said idle system comprises a passage in said carburetor between said idle system and said exhaust gas passage, said shim forming a closure for said passage.

4. An internal combustion engine comprising an intake manifold, an exhaust system, said intake manifold having

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a chamber therein connected to said exhaust system, said chamber having an opening in the manifold wall, a carburetor including a body mounted on said intake manifold, said body including a fuel bowl and a high speed fuel supply system communicating with said fuel bowl, an idle system communicating with said fuel bowl and comprising a low speed metering jet located in said body, said body having a low speed fuel supply chamber communicating with said low speed metering jet, said carburetor mounted on said intake manifold with a portion of the lower surface of said body in communication with said intake manifold exhaust chamber whereby hot exhaust gases will contact said portion of said lower body surface and heat said carburetor, a thin corrosive resistant heat conductive shim located between said body surface and said intake manifold to protect said body surface from corrosion by the exhaust gases and to conduct heat to said body surface, means for rendering said idle system inoperative should said shim not be located between the body surface and intake manifold.

5. An internal combustion engine as set forth in claim 4, said means for rendering said idle system inoperative comprising conduit means communicating said idle system with said exhaust system, said conduit means being closed by said shim.

6. A carburetor as set forth in claim 5, said bore means being formed in said throttle portion and extending from said low speed fuel supply chamber to the lower surface of said throttle portion, said shim normally closing said bore at the lower surface of said throttle portion.

7. In a carburetor for an internal combustion engine having a main body including a throttle portion, said main body and said throttle portion having an idle system therein, the throttle portion having a throttle bore therein, a throttle shaft mounted transversely of said throttle bore and adjacent the lower portion of said throttle portion, a corrosion resistant heat conductive shim located adjacent the lower portion of said throttle portion in sealing engagement therewith to protect said throttle portion against the corrosive action of exhaust gases, said carburetor being adapted for mounting on an intake manifold having an exhaust gas passage therein directing exhaust gases to the shim, the exhaust gases impinging on said shim to heat said throttle portion, the improvement comprising means for spoiling the operation of said idle system when said shim is not positioned between said throttle portion and said manifold.

8. A carburetor, as recited in claim 7, said spoiling means comprising a bore in said throttle portion from said idle system to the lower surface of said throttle portion, said shim normally closing said bore at said surface whereby, exhaust gases under pressure will flow from said exhaust gas passage into said idle system spoiling said idle system and rendering the engine inoperative at idle when said shim is not located between said throttle portion and said intake manifold.

9. A carburetor for an internal combustion engine having an opening in an outer wall thereof and a conduit for conducting exhaust gases to said opening, said carburetor comprising a body having a mixture conduit therethrough, means at one end of said mixture conduit for mounting said carburetor body with a portion of said body superimposed over said opening in said engine wall, a throttle shaft journaled in said carburetor body and closely spaced from said one end of said mixture conduit, a throttle valve fixed to said shaft for movement therewith and positioned across said mixture conduit, said body having a fuel reservoir and a fuel passage connecting said fuel reservoir to said mixture conduit to form an idle system for said carburetor for low speed engine operation, means for rendering said carburetor idle system inoperative, said last means including a gas passage extending from said fuel passage through said carburetor body portion to connect with said opening in said engine wall, and a shim adapted to be positioned between said

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body portion and said wall opening to close said gas passage to said idle system to prevent corrosion of said carburetor by exhaust gases at said opening.

10. A carburetor for an internal combustion engine having an opening in an outer wall thereof and a conduit for conducting exhaust gases to said opening, said carburetor comprising a body having a mixture conduit therethrough, said body having a mounting flange at one end of said mixture conduit for mounting said carburetor body with a portion of said body superimposed over said opening in said engine wall, a throttle shaft journaled in said carburetor body and closely spaced from said one end of said mixture conduit, a throttle valve fixed to said shaft and positioned across said mixture conduit for movement from a closed to an open position, said body having a fuel reservoir and a fuel passage connecting said fuel reservoir to said mixture conduit downstream of the closed position of said throttle to form an idle system for said carburetor for low speed engine operation, and means to prevent corrosion of said carburetor by engine exhaust gas, said last means including a gas passage extending from said fuel passage through said carburetor body portion to connect with said opening in said engine wall and a shim adapted to be positioned between said body portion and said wall opening to close said gas passage to said idle system and to separate said carburetor portion from said engine body opening to prevent corrosion of said carburetor by exhaust gases at said opening.

11. A carburetor for an internal combustion engine having an opening in an outer wall thereof and a conduit for conducting exhaust gases to said opening, said carburetor comprising a body having a mixture conduit therethrough, said body having means at one end of said mixture conduit for mounting said carburetor body with an outer surface of said body superimposed over said opening in said engine wall, a throttle shaft journaled in said carburetor body and closely spaced from said outer body surface, a throttle valve fixed to said shaft and positioned across said mixture conduit for movement from a closed to an open position, said body having a fuel reservoir and fuel and air passages connecting said fuel reservoir to said mixture conduit downstream of the closed position of said throttle to form an idle system for said carburetor for low speed engine operation, and means to prevent corrosion of said throttle shaft by engine exhaust gas, said last means including a gas passage extending from said idle system through said carburetor body portion to said outer body surface to conduit exhaust gas passing through said opening in said engine wall into said idle system and a shim adapted to be positioned between said body surface and said wall opening to close said gas passage to said idle system and to prevent corrosion of said carburetor surface by exhaust gases through said opening.

12. A carburetor for an internal combustion engine having an opening in an outer wall thereof and a conduit for conducting gases from the exhaust system of said engine to said opening, said carburetor comprising a body having a mixture conduit therethrough, means for mounting said carburetor body with a body portion adjacent to one end of said mixture conduit superimposed over said opening in said engine wall, a throttle shaft journaled in said carburetor body and closely spaced from said one end of said mixture conduit, a throttle valve fixed to said shaft for movement therewith and positioned across said mixture conduit, said body having a fuel reservoir and a fuel passage connecting said fuel reservoir to said mixture conduit to form an idle system for said carburetor for low speed engine operation, and means to prevent corrosion of said throttle shaft, said last means including a gas conduit extending from said idle system and adapted to be connected to the exhaust system of said engine and a shim adapted to be positioned between said body portion and said wall opening to prevent corrosion of said

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carburetor by exhaust gases at said opening, said shim forming a closure for said gas conduit.

13. In combination with an internal combustion engine including an intake manifold for conducting fuel into the engine and an exhaust manifold for discharge of burnt gases, a carburetor supplying fuel to the intake manifold including a fuel reservoir and a wall defining a portion of the fuel mixture conduit, means connecting the mixture conduit to the intake manifold, and idle passage subject to vacuum in the intake manifold for conducting fuel from the fuel reservoir to the mixture conduit for low speed operation of the engine, a throttle valve mounted on a throttle shaft journaled in the mixture conduit portion of the carburetor, a conduit means for conducting burnt gases from the exhaust manifold against said portion of the carburetor mixture conduit in the area of the throttle shaft for heating the mixture conduit and the fuel mixture passing therethrough, a spoilage passage

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formed in said wall and opening at one end into said idle system and at the other end communicating with the conduit conducting the burnt gases from the exhaust manifold, and a removable heat conducting plate positioned in abutting relation to said portion of the mixture conduit wall exposed to the burnt gases for protecting said wall portion against corrosion from said burnt gases, said heat conducting plate including a portion normally closing said spoilage passage, whereby removal of the plate will open the idle system to the burnt gas conduit and disable the idle system.

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