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FUEL ECONOMY APPARATUS FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

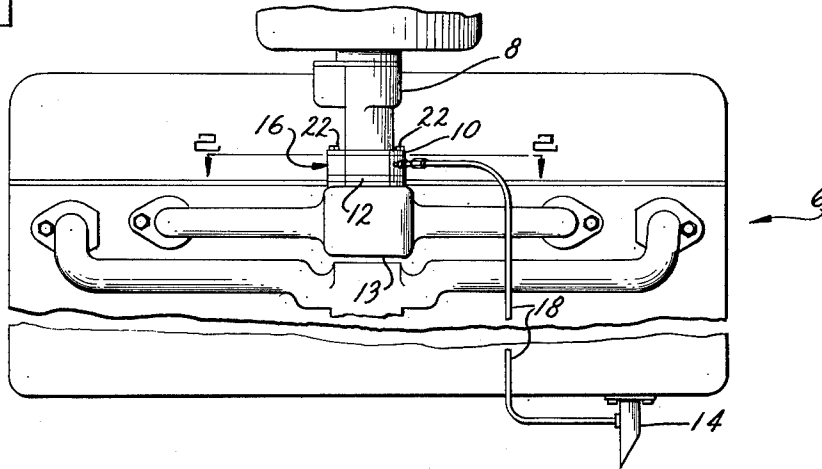


Fig. 2.

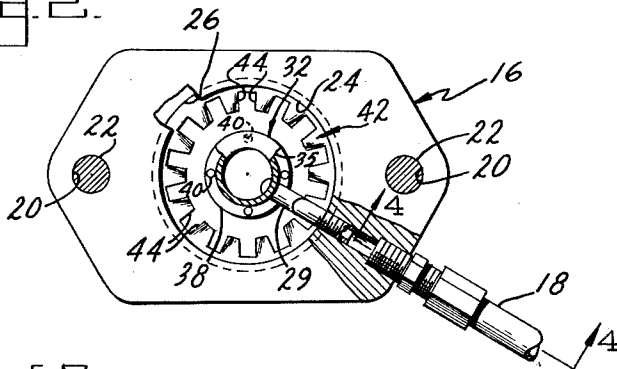
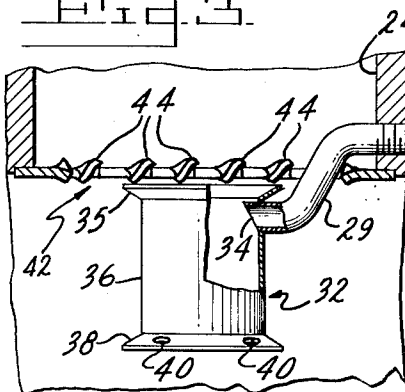
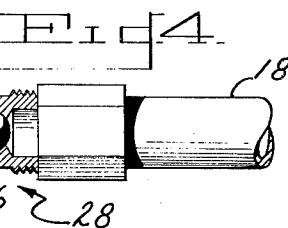


Fig. 3.



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FUEL ECONOMY APPARATUS FOR INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 123-119)

This invention relates to internal combustion engines and more particularly to means for improving fuel economy of internal combustion engines.

This application is a continuation-in-part of my earlier filed application, Serial No. 58,748, filed September 27, 1960 and now abandoned.

The principal object of this invention is to provide an improved device of the type disclosed in my Patent No. 2,986,132, granted May 30, 1961, for increasing the gasoline economy of internal combustion engines and for decreasing the amount of engine gases exhausted into the air.

Another object of this invention is to provide a simple and inexpensive attachment which may be readily mounted on a vehicle engine without substantial alterations or modifications in the engine.

A further object of this invention is to provide an improved fuel economizer for obtaining superior engine performance while reducing the amount of air pollution normally caused by engine operation.

The above and other objects and advantages of this invention will be more readily apparent from the following description and with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatical side view of an internal combustion engine embodying my invention;

FIG. 2 is a section taken along line 2-2 of FIG. 1;

FIG. 3 is a partial elevational view partly in section and on an enlarged scale showing in detail the nozzle of FIG. 2; and

FIG. 4 is a section on an enlarged scale taken along line 4-4 of FIG. 2.

Referring in detail to the drawings, an internal combustion engine is shown generally at 6 in FIG. 1. A down-draft carburetor is indicated at 8. The carburetor includes a flange 10 for mounting the carburetor on a flange 12 of the engine intake manifold 13. A breather pipe 14 is provided for venting the engine crankcase.

Gases within the engine crankcase are a source of unburned hydrocarbons in the form of oil and gasoline mist or vapor. These gases are normally discharged from the crankcase by the breather pipe and are the major cause of air pollution which is an acute problem in large cities where automotive traffic is heavy. It has been found that if the crankcase gases are thoroughly mixed with the carburetor fuel-air mixture, an enriched mixture can be obtained which results in improved engine performance. Moreover, utilization of crankcase gases in this manner substantially reduces the quantity of harmful gases or vapors exhausted from the crankcase into the atmosphere.

In accordance with my invention, an economy block or plate 16 is interposed between the carburetor and intake manifold flanges. Tube 18 provides conduit means from the crankcase breather pipe 14 to the block 16 for conducting a portion of the crankcase vapors to the intake manifold. The block 16 includes means for supplying and intermixing the crankcase vapors with the fuel-air mixture delivered by the carburetor to the intake manifold.

The block 16 is provided with suitable holes 20 (FIG. 2) to receive carburetor securing bolts 22. The block also includes a central opening or bore 24 registrable with an opening 26 of the intake manifold and the discharge opening of the carburetor 8. The tube 18 is connected to a

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valve member indicated generally at 28 for automatically controlling the supply of crankcase gases to the block, as will be described below.

As shown, the valve member 28 is threaded into a passageway or conduit 30 which extends through the block from its outer surface to the bore 24. The block 16 further comprises means for supplying and intermixing the crankcase vapors with the fuel-air carburetor mixture.

While my invention is shown in the form of a block mountable between the carburetor and manifold of an engine, it is to be understood the device may also be integral with a carburetor.

As shown, the intermixing means comprises a conduit or tube 29 extending from the passageway 30 and a nozzle 32 on the terminal end of the tube 29. The tube 29 communicates with the interior of the nozzle. The end of the tube 29 within the nozzle may be tapered as indicated at 34 for deflection of the crankcase vapors downwardly into the body of the nozzle 32.

As shown, the nozzle 32 comprises a conical upper portion 35, a cylindrical throat portion 36, and a conical lower portion 38. The nozzle is disposed coaxially of the carburetor and manifold openings. The upper portion 35 extends upwardly and flares outwardly from the upper edge of the cylindrical throat portion 36 for funneling the fuel-air carburetor mixture into the nozzle throat and past the end of the return tube 29. The lower flange 38 extends outwardly and downwardly from the lower end of the cylindrical throat portion. The lower flange is provided with a plurality of circumferentially spaced ports or orifices 40. Coaxial or concentric to the nozzle 32 is an annular turbowasher 42 which serves to impart a rotary or swirling motion to the fuel-air mixture coming from the carburetor.

The turbowasher 42 comprises a plurality of vanes 44 extending radially inwardly of the wall of the bore 24 and around its circumference. The vanes 44 are similar in shape to the blades of a fan or propeller (FIG. 3) so that the carburized air will be deflected circumferentially and radially toward the nozzle 32. The vanes are preferably located at a height not lower than the upper edge of the nozzle 32 (FIG. 3).

The nozzle 32 is disposed generally at the center of the manifold opening for introducing the hydrocarbon enriched crankcase vapors into the central portion of the fuel-air carburetor mixture. The upper edge of the nozzle 32 is located sufficiently below the carburetor flange to enable the throttle valve of the carburetor to be fully opened. The carburetor mixture, drawn by the engine vacuum, passes downwardly through the bore 24. A portion of the mixture passes downwardly through the nozzle; the outer radial portion of the carburetor mixture is deflected inwardly and circumferentially by the vanes 44. As the gases pass through the nozzle throat 36, there is a reduction in pressure which sucks crankcase vapors from the tube 29. A vacuum is developed at the lower edge portion of the beveled tube 29 so that the crankcase vapors are drawn downwardly into the nozzle, enriching the carburetor mixture. As the enriched mixture leaves the flared lower end of the nozzle, it expands outwardly uniformly from the center of the manifold, and the portion of the fuel-air mixture which passes downwardly into the manifold around the outer periphery of the nozzle 32 is deflected outwardly by the flange 38. Other portions of the fuel-air mixture pass through the orifices 40, further intermixing with the hydrocarbon enriched fuel-air mixture flowing from the lower end of the nozzle.

The cylindrical portion of the nozzle provides, in effect, a venturi throat and mixing chamber located in the center of the carburetor stream. The vanes 44 serve to whirl or swirl the air-fuel mixture and the lower flange and its

orifices provide for further mixing of the crankcase gases and the carburetor charge and for the uniform distribution of the resultant mixture to the intake manifold. The nozzle is of sufficient overall length so that its lower flange 38 will be located within the manifold when the block is mounted on the manifold flange 12. This arrangement prevents channeling of the gases and insures wide and uniform distribution of the fuel mixture to the engine cylinders. The area of flanges 35 and 38 should be sufficient to provide uniform distribution of the gases to the engine without substantially reducing the volumetric capacity of the manifold or disrupting the air flow from the carburetor.

Valve means is provided for automatically controlling the supply of crankcase vapors to the nozzle 32 in response to carburetor air flow and/or the engine vacuum. As shown in FIG. 4, the valve means comprises a ball-type check valve. Ball 46 is releasably urged toward its closed position against seat 48 by a compression spring 50. The spring tension is selected to enable the ball to be unseated when the engine is idling. As the engine vacuum or carburetor air flow increases, the ball further compresses the spring 50 and additional crankcase vapors are sucked from the breather pipe 14 and conducted to the nozzle 32 by tubes 18 and 29 for enriching the carburetor mixture.

Having thus described my invention, what is claimed is:

1. Fuel economy attachment for internal combustion engines comprising a plate mountable between the engine carburetor and intake manifold and including an opening registrable with the openings of the carburetor and intake manifold, a tubular nozzle disposed coaxially of the opening of said manifold and including a throat portion, an upper conical portion extending upwardly and outwardly from the upper edge of said throat portion and a lower conical portion flared outwardly and downwardly from the lower edge of said throat portion for deflecting the air-fuel mixture outwardly of the center of said nozzle, said lower conical portion including a plurality of circumferentially spaced orifices, and conduit means connecting said nozzle to the breather pipe of the engine crankcase.

2. Fuel economy attachment as set forth in claim 1 in which said block includes a check valve responsive to engine vacuum and the rate of flow of carburized air through said nozzle for controlling the supply of crankcase vapors to said nozzle.

3. Fuel economy apparatus for internal combustion

engines comprising a plate mountable between the engine carburetor and intake manifold and including an opening registrable with the openings of the carburetor and intake manifold, a tubular nozzle disposed coaxially of said opening, a plurality of vanes disposed concentric with said nozzle and extending radially inwardly of the wall defining said opening, said vanes being of fan-like configuration for deflecting the carburetor mixture circumferentially and radially towards said nozzle and conduit means connecting said nozzle to the breather pipe of said crankcase.

4. Fuel economy apparatus for internal combustion engines comprising a plate mountable between the engine carburetor and intake manifold and including an opening registrable with the openings of the carburetor and intake manifold, a tubular nozzle disposed at the center of said opening, a plurality of vanes disposed concentric with said nozzle and extending radially inwardly of the wall defining said opening, said vanes having a fan-like configuration for deflecting the carburetor mixture circumferentially and radially towards said nozzle, said nozzle having a lower conical portion flared outwardly and inwardly for deflecting the air-fuel mixture outwardly from the center of said nozzle, and conduit means connecting said nozzle to the breather pipe of said crankcase.

5. Fuel economy apparatus for internal combustion engines comprising a plate mountable between the engine carburetor and intake manifold and including an opening registrable with the openings of the carburetor and intake manifold, a nozzle disposed at the center of said opening and including a throat portion, an upper conical portion extending upwardly and outwardly of the upper edge of said throat portion, and a lower conical portion flared outwardly and downwardly of the lower edge of said throat portion for deflecting the fuel-air mixture outwardly of the center of said nozzle, said lower conical portion being provided with a plurality of circumferentially spaced orifices, a plurality of vanes disposed around said nozzle and extending radially inwardly of the wall of said opening, said vanes being located not lower than the upper edge of said nozzle, and conduit means connecting said nozzle to the breather pipe of the engine crankcase.

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