

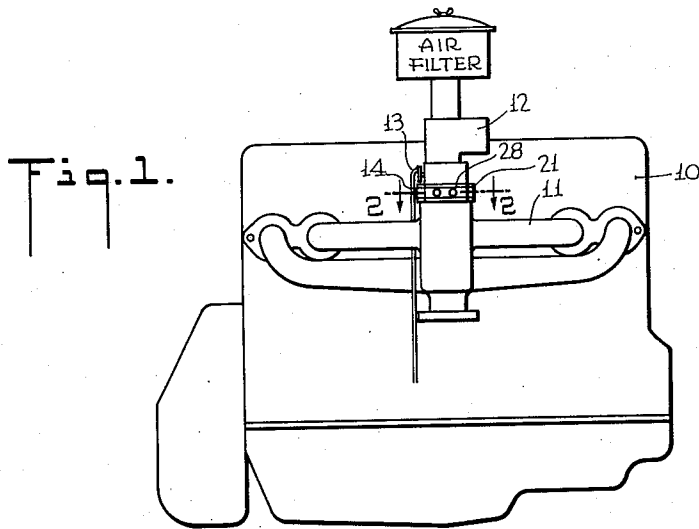
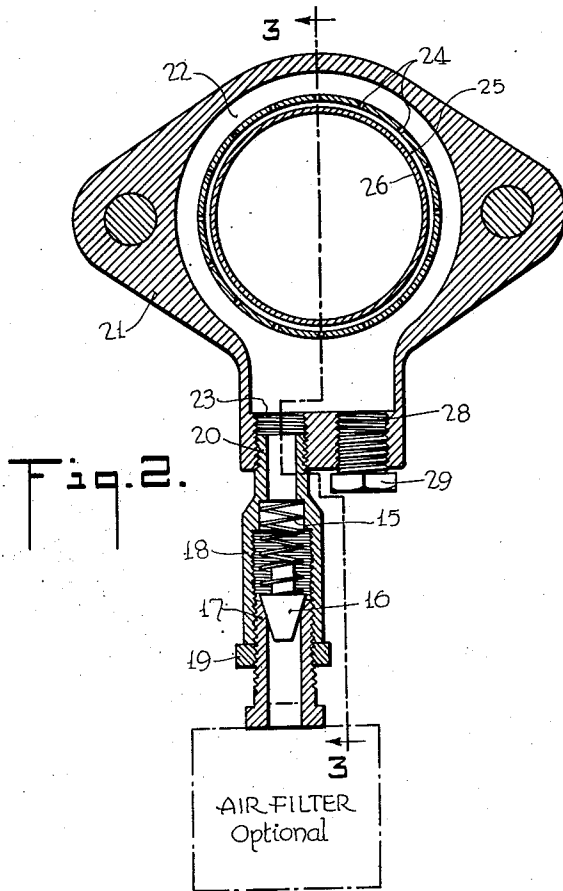
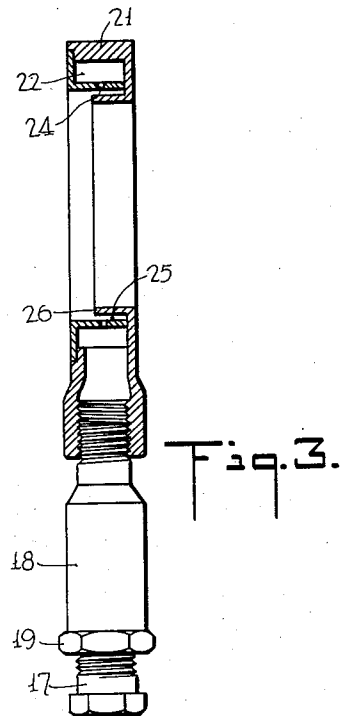
Aug. 8, 1950

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AUXILIARY AIR ADMISSION DEVICE FOR
INTERNAL-COMBUSTION ENGINES

2,518,082

Filed May 26, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4.

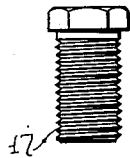
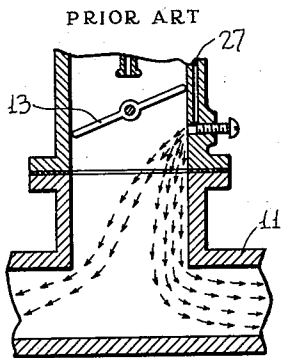


Fig. 5.

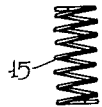
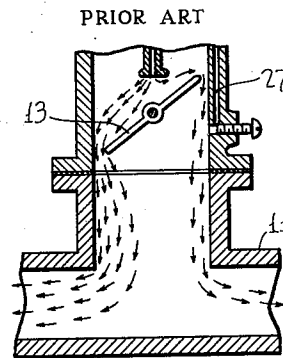


Fig. 7.

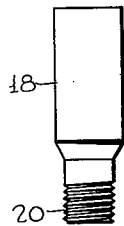
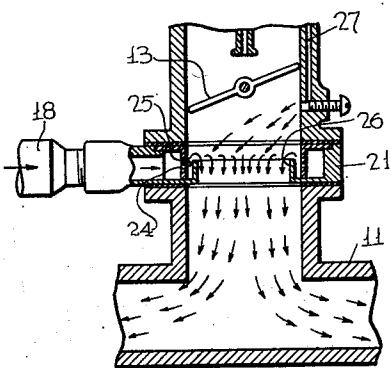


Fig. 6.

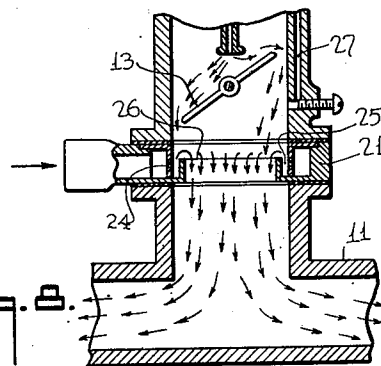


Fig. 8.

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AUXILIARY AIR ADMISSION DEVICE FOR
INTERNAL-COMBUSTION ENGINES

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5 Claims. (Cl. 48-180)

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This invention relates to internal combustion engines and has for an object the provision of improvements in this art.

One of the particular objects of the invention is to relieve the vacuum in the cylinders when the throttle valve is closed. In a motor vehicle, this is the time when the car is coasting or the engine is idling.

Another object is to provide uniform distribution of the carbureted mixture between the various cylinders when the throttle valve is almost or completely closed.

Another object is to provide means for trapping, vaporizing and evenly distributing any uncarbureted fuel which may pass the throttle valve.

Another object is to provide the above-mentioned improvements in a form of apparatus which can be easily installed with either existing or new equipment.

The above and other objects of the invention will be apparent from the following description of an exemplary embodiment, reference being made to the accompanying drawings, wherein:

Fig. 1 is a side elevation of an internal combustion engine having a fuel supply system embodying the present invention;

Fig. 2 is an enlarged horizontal sectional view taken about on the line 2-2 of Fig. 1;

Fig. 3 is a sectional view taken about on the line 3-3 of Fig. 2;

Fig. 4 is an exploded view of the valve parts;

Fig. 5 is a partial section of an ordinary manifold with the throttle valve closed;

Fig. 6 is a view similar to Fig. 5 with the present device installed;

Fig. 7 is a partial section of an ordinary manifold with the throttle valve slightly open; and

Fig. 8 is a view similar to Fig. 7 with the present device installed.

Heretofore a number of proposals have been made for introducing air into an intake manifold between the carburetor and the cylinder of an internal combustion engine. These devices have served as re-carburetors and to establish uniform vacuum pressure in the manifold for all operating conditions. Such devices have employed an auxiliary valve having a weak spring which permitted the valve to open at low vacuum pressure and to remain open at higher vacuum pressure. Other devices have employed valves which stood open at low vacuum pressure but which were sucked closed and kept closed at higher vacuum pressures.

It is a generally known fact that when a gaso-

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line engine is idling during the break-in period, it accumulates more carbon in the combustion chambers than in about the next ten thousand miles of travel. A gasoline engine, when operating under full load, shows little or no vacuum, and that is why the vacuum operated windshield wiper ceases to function going up a steep hill. The ordinary gasoline engine in fair condition will show eighteen to twenty-three inches (Hg) of vacuum when idling and as much as twenty-six or twenty-seven when coasting or traveling down hill. It is at these periods of high vacuum that excessive amounts of oil are sucked past the rings into the combustion chamber, as shown by the fact that when the motor is next accelerated at the bottom of the hill a heavy black cloud of oil smoke is emitted.

According to the present invention, it has been found that most carburetors are properly made and adjusted to serve all normal loaded running conditions and that recarbureting devices weaken the mixture undesirably for loaded conditions. However, during idling and light load conditions when the throttle valve is closed or almost closed an undesirably high vacuum pressure is created in the cylinder which sucks oil up past the piston rings and causes carbonizing in the head end and in addition is unduly wasteful of oil.

To avoid upsetting the normal load-operating functions of the carburetor but to relieve the high vacuum conditions, the present invention provides an auxiliary intake valve, with the auxiliary valve so constructed and set as not to open at all under low vacuum conditions but to open when a high vacuum condition is reached, that is, when the throttle valve is closed or almost closed. In use, this has been found to give greatly improved operating conditions, to save fuel and oil and to minimize carbonization in the cylinders.

In addition, the invention provides a trap for unvaporized fuel, thus furnishing better vaporization and distribution of fuel under these same high vacuum conditions.

Referring to the drawings, an engine 10 is equipped with an intake manifold 11 and a carburetor 12. A throttle valve 13 of the usual butterfly type is provided in the manifold between the carburetor and the intake valves of the motor cylinders. So much is conventional.

According to the present invention, there is provided beyond the throttle valve 13, going in the direction of fuel flow and in the tubular manifold supply section, an auxiliary air intake valve 14 so constructed and set as to remain

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closed under all normal load conditions when low vacuum pressure (say under ten inches) exists in the manifold but adapted to open under idling or coasting conditions when high vacuum pressure (say about twenty to twenty-seven inches, depending on the condition of the engine) exists in the manifold. A spring-loaded valve is used, as shown, having a spring 15 acting upon a plug 16, the spring being characterized as a strong or hard spring, as distinguished from the weak or soft springs heretofore used on auxiliary air inlets.

In the specific form illustrated, the seat member 17 for the valve is a tube which is threaded in the end of the valve casing 18 to provide adjustment of the pressure at which the valve opens. A locknut 19 is provided for maintaining an adjusted position. The inner end of the valve casing 18 is threaded, as at 20, and might be threaded directly into a tapped hole in the manifold, but preferably is connected to an adaptor 21 which is inserted and secured between adjacent sections of the manifold.

The diagrammatic views, Figs. 6 and 8, show how the trap functions to provide a uniform and properly divided flow of carbureted mixture in the manifold. In Fig. 5 there is shown the ordinary equipment with closed throttle. The mixture from the idling channel 27 on one side flows principally along the side of entry and divides unequally between the branches of the manifold, as indicated by the arrow lines. Fig. 6 shows how the flow is made uniform by the present invention. The mixture flowing down from the idling channel enters the annular groove 25 in the ledge 26 and air from the annular series of ports mixes with it and the resultant mixture is uniformly supplied into the manifold from the ledge. The ledge is heated to the temperature of the manifold and acts as a stove to re-vaporize fuel trapped in the groove.

Fig. 7 shows the usual equipment when the throttle is almost closed. The mixture flows principally to the low side of the throttle valve and creates a richer mixture in the manifold branch on that side than in the branch on the high side of the valve. In contrast, Fig. 8 shows how by the present device the same non-uniform flow from the valve is made uniform by the action of the trap and the air from the auxiliary intake ports.

In Fig. 2 there is shown a second inlet 28 provided for test equipment in setting the valve. It may be closed by a plug 29 after setting. Air filters, as indicated in Figs. 1 and 2, may be provided for the air intakes.

As shown in Figs. 2, 3, 6 and 8, the enclosure of channel 22 is completed by a cover plate which extends between the clamped side edges of the manifold, in this case being overlaid by the gasket between parts. Also, in the present case, the plate is made of angular shape so as also to form the inner wall of the enclosure of the channel, this inner wall having the openings 24 to the interior.

In installing the present device, the plug 29 is removed and a vacuum gage inserted in its place. The motor is idled and a reading taken. The spring is then adjusted to cause the plug valve to open at from one to two or three inches below the idling reading. Then the carburetor is adjusted to reduce the gas inflow to bring the idling speed down to the desired point, re-checking and re-setting the auxiliary gas valve if necessary.

The trap is particularly suited for downflow

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carburetors but may be used to some advantage with upflow carburetors. The auxiliary air intake control is as well suited to upflow as to downflow carburetors.

Engines equipped with the improved apparatus of the present invention have been found to operate better, save very considerable percentages of gas and oil, and to remain more free from carbon deposits in the cylinders than motors with conventional equipment with the known re-carbonizing devices.

While one embodiment of the invention has been described for purposes of illustration, it is to be understood that there may be various embodiments within the limits of the prior art and the scope of the subjoined claims.

I claim:

1. Apparatus for supplying a carbureted fuel mixture to an internal combustion engine, comprising in combination, a vertical tubular down-flow intake manifold supply section, an annular air channel surrounding said tubular manifold supply section, means to supply air from outside said tubular manifold supply section to said air channel, and an annular liquid fuel trap located inwardly of said surrounding air channel and separated from it by a partition wall, said trap being closed at its lower end to form a bottom and being open at its upper end with its inner wall spaced inwardly from the inner wall of the manifold supply section to catch liquid fuel and release vaporized fuel, said partition wall being provided around its circumference with a plurality of communicating openings located above the bottom of said trap to cause air entering from said air channel to mix with fuel evaporated from said trap and to enter in an upward direction into the tubular manifold supply section.

2. Apparatus for supplying a carbureted fuel mixture to an internal combustion engine, comprising in combination, a vertical tubular manifold intake supply section, an annular air channel surrounding said tubular manifold supply section and located outside the line of the inner surface of the manifold supply section, means to supply air from outside said tubular manifold supply section to said air channel, and an annular liquid trap located inwardly of said surrounding air channel and within the line of the inner surface of the manifold supply section, said trap being separated from said air channel by a partition wall and having a plurality of openings around the circumference thereof and intermediate the depth of said trap, and said trap being open at the top with its inner wall spaced inwardly from the inner wall of the manifold supply section and closed at the bottom to catch liquid fuel and permit vaporized fuel and air to pass upwardly into the tubular manifold supply section from the open upper end of the trap.

3. Apparatus for supplying a carbureted fuel mixture to an internal combustion engine, comprising in combination, a vertical tubular down-flow intake manifold supply section having a downflow of carbureted fuel and a throttle valve for controlling the amount of fuel flowing downward in said tubular manifold supply section, an annular air channel surrounding said tubular manifold supply section below said throttle valve and located outside the line of the inner surface of said tubular manifold supply section, means for supplying air from outside said tubular manifold supply section to said air channel when said throttle valve is near its closed position, and an annular liquid fuel trap located inwardly of said

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surrounding air channel, said fuel trap having a bottom wall and being open at the top into the manifold supply section, the inner wall of the fuel trap being spaced inwardly from the inner wall of the manifold supply section to catch liquid fuel and release vaporized fuel from its upper end, said fuel trap being separated from the air channel by a partition wall having a plurality of holes above the bottom of said trap.

4. Apparatus as set forth in claim 3 wherein said partition wall and top of the air channel are formed by a separate annular member of angle section assembled with parts forming the remainder of the air channel and trap.

5. Apparatus as set forth in claim 3 wherein said air channel and trap are formed of parts inserted between joint elements of said tubular manifold supply section, said partition wall and the top of the air channel being formed by a separate annular member of angle section assembled with the other parts forming the air channel and trap and secured between the joint elements of the tubular manifold supply section.

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