June 4, 1929. A. G. WAGNER 1,715,440

AUXILIARY AIR VALVE FOR INTERNAL COMBUSTION ENGINES

Filed May 12, 1927

Fig. 1.

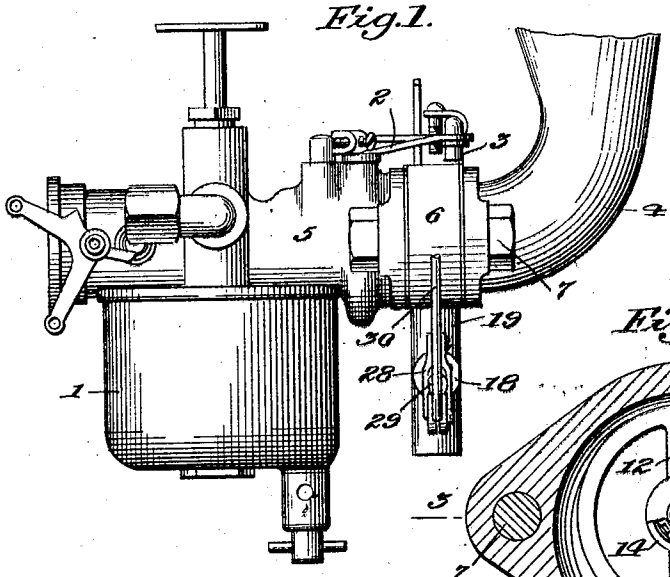


Fig. 2.

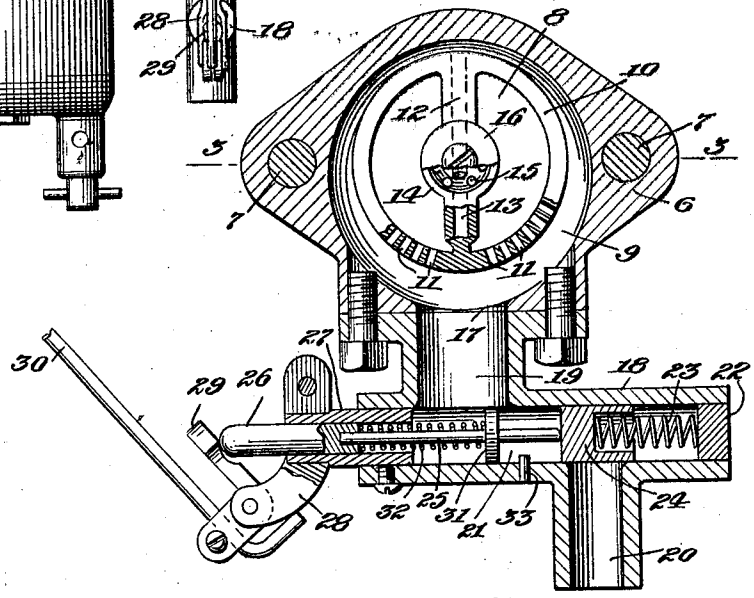
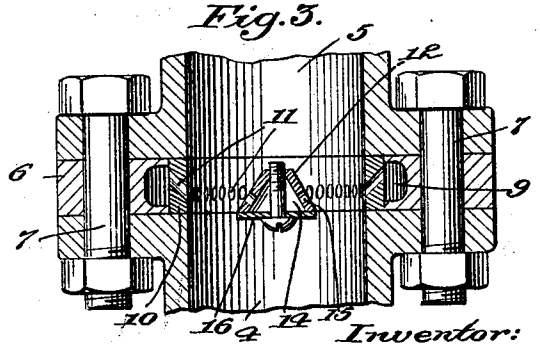


Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUXILIARY AIR VALVE FOR INTERNAL-COMBUSTION ENGINES.

Application filed May 12, 1927. Serial No. 190,837.

This invention is an auxiliary air valve for internal combustion engines and has for its object the provision of a simple and inexpensive valve either in the carbureter proper, or attached thereto immediately adjacent the outlet and which will operate in consonance with the carbureter throttle valve to admit air between the carbureter and intake manifold in order to supply a lean mixture at high speed and economize fuel, and which will effectually mix the air and fuel so that the mixture flowing through the passages of the intake manifold will be uniform in quality.

The invention is illustrated in the accompanying drawing and will be hereinafter first fully described and then more particularly defined in the appended claims.

In the drawing:—

Fig. 1 is an elevation of a carbureter and part of the trunk of an intake manifold having the present invention embodied therein;

Fig. 2 is an enlarged vertical transverse section of the device of the invention;

Fig. 3 is a section on the line 3—3 of Fig. 2.

The carbureter 1 may be of any approved type and includes a throttle valve which is controlled by a lever 2 connected with a throttle rod 3, the fuel passing from the carbureter being delivered into the trunk 4 of the intake manifold for distribution to the engine cylinders.

Attached to or formed integrally with carbureter outlet 5 adjacent the manifold trunk, I interpose a flat-sided substantially elliptical body 6 which, in the embodiment shown in the drawing, is firmly secured in place by bolts 7 which construction will be understood from the drawing. This body or block 6 has an opening 8 therethrough aligning axially with the outlet 5 and the trunk 4 for the passage of the fuel from the carbureter, and in the circular wall of said opening is a circumferential groove 9, it being noted, upon reference to Fig. 2, that the groove is deeper at the bottom of the block than at the top of the same so that the groove is eccentric to the bore or opening through the block. A ring 10 is fitted in the opening 8 and rests against the wall of the opening with its sides flush with the sides of the block, as shown clearly in Fig. 3, being secured by brazing or other preferred means. Through the wall of the ring are openings or ports 11 establishing communication with the groove 9 and disposed obliquely relatively to the circumferences of the ring, and on its vertical diameter the ring is provided with an integral spoke 12 having a passage 13 extending from end to end thereof and opening into the groove 9. At the center of the spoke is a conical enlargement 14 having openings 15 through its wall, said openings having their axes disposed parallel with the axes of the openings 11 and a cover plate 16 being secured upon and extending over the base of the cone.

An opening 17 is formed through the lower edge of the body or block 6 from the groove 9 and to said lower edge is secured a valve casing 18 having a tubular neck or nipple 19 registering with said openings 17 and constituting an air outlet, the air inlet nipple 20 depending from the valve casing in offset relation to the outlet and a cylindrical valve chamber 21 forming a communication between the inlet and the outlet. One end of the chamber 21 is closed by the plug 22 which provides an abutment for an expansion spring 23, said spring bearing upon a piston valve 24 and holding it normally in the position shown in Fig. 2 to cut off inflow of air. Bearing against the inner end of the piston valve 24 is a plunger rod 25 extending through the open end of the valve chamber and equipped at its outer end with an enlarged head 26 fitting snugly but slidably through a bushing 27 in the end of the valve chamber. A bracket 28 is carried by the projecting end of the bushing 27 and extends below the bushing, an angle lever 29 being fulcrumed upon said bracket in such position that its upwardly extending arm will bear upon the end of the head 26 while the outstanding arm of the lever carries a handle rod 30 which extends into the path of the throttle-controlling lever 2 or is operatively connected therewith in any convenient manner so that, as the throttle is opened, the rod will be swung upwardly and the angle lever 29 rocked. Rocking of

the angle lever 29 will cause the plunger rod 25 to push the valve 24 from over the air inlet 20 in an obvious manner. Loosely mounted on the plunger rod is a retarding valve 31 in the form of a disk of proper diameter to fit closely but slidably in the valve chamber 21, and a spring 32, weaker than the spring 23, bears at one end against the disk and at the opposite end against the annular shoulder presented by the inner end of the head 26, a stop 33 being provided to limit the movement of the disk under the influence of the spring 32.

It is essential, for the most efficient operation of the engine, that the air and fuel be very thoroughly mixed. Admitting air without mixing will merely weaken the mixture, as the gases or vapors leaving the carbureter are not thoroughly mixed and the charges are streaked, some portions being heavy with gasoline and continuing in this condition through the entire length of the intake manifold, while other portions will be very lean, even to the extent of being air without any gasoline. The heavier portions condense and the condensation accumulates in the manifold and forms puddles on the lower inner surface of the same. When the mixture, under these conditions, reaches the combustion chamber of the engine, it will not have the desired proportions of air and gasoline but will have a preponderance of air, and the accumulations of gasoline in the manifold are spasmodically picked up my the passing mixtures so that mixtures may enter the combustion chamber excessively rich and containing a ratio of gasoline double what is considered good practice.

The present invention overcomes the described undesirable conditions by admitting the air in such manner that thorough and complete mixing of the same with the fuel is insured. The air enters the chamber 9 around the ring 10 and escapes through the ports 11. Some of the air flows through the passage 13 in the spoke to escape through the ports 15 in the cone 14, the fuel from the carbureter flowing through the bore of the ring and past the sides of the spoke. It will be noticed, upon reference to Fig. 3, that the air discharging through the ports 11 will issue in the form of fine jets or sprays in the general direction of travel of the fuel but converging toward the center of the fuel stream, while the air issuing through the ports 15 will be divergent jets traveling in opposition to the direction of flow of the fuel stream, the result being that the air spray thoroughly penetrates the fuel stream and a complete mixing is effected.

As the plunger rod 25 is pushed inward to open the valve 24, the spring 32 is compressed and will move the valve 31 toward the air inlet so that sudden inrush of air will be counteracted and the passing of too much air through the device, when the carburetor is suddenly opened, will be prevented.

It will, of course, be obvious that the device described above may be formed as an attachment to be inserted between the conventional carbureter and the manifold trunk or may be formed as an integral part of the carbureter and I do not desire to be limited except in accordance with the claims appended hereto.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A device for the purpose set forth comprising a body secured to the outlet of a carburetor adjacent an engine intake manifold and having an opening therethrough for the flow of fuel from the carbureter, the body having an air chamber, means for admitting air to said chamber, a ring secured in said chamber and constituting an inner circular wall therefor, said ring having ports for the discharge of air from the air chamber in the general direction of flow of fuel and a hollow spoke in said ring communicating with the air chamber and provided at its center with ports for the discharge of air in a direction opposed to the direction of flow of the fuel.

2. A device for the purpose set forth comprising a body secured to the outlet of a carbureter adjacent an engine intake manifold and having an opening therethrough for the flow of fuel from the carbureter, the body having an air chamber, means for discharging air from said chamber into the fuel stream, a cylindrical valve chamber below said air chamber and in communication therewith, and provided with an air inlet, a free piston valve in said chamber, yieldable means holding the valve normally over the air inlet to close the same, and means cooperating with the carburetor throttle valve for moving the free piston valve to open position, and means in said valve chamber to limit movement of said cooperating means.

3. A device for the purpose set forth comprising a body secured to the outlet of a carbureter adjacent an engine intake manifold and having an opening therethrough for the flow of fuel from the carbureter, the body having an air chamber, means for discharging air from said chamber into the fuel stream, a cylindrical valve chamber below said air chamber and in communication therewith, and provided with an air inlet, a free piston valve in said chamber, yieldable means holding the valve normally over the air inlet to close the same, and means cooperating with the carbureter throttle valve for moving the free piston valve to open position, and a retarding disk valve mounted in the valve chamber co-axially with the free piston valve.

4. A device for the purpose set forth comprising a body adapted to be secured between a carbureter and an engine intake manifold and having an opening therethrough for the flow of fuel from the carbureter, the body having an air chamber, means for discharging air from said chamber into the fuel stream, a cylindrical valve chamber below said air chamber and in communication therewith, and provided with an air inlet, a free piston valve in said chamber, yieldable means holding the valve normally over the air inlet to close the same, a plunger mounted axially in the valve chamber and bearing upon the free piston valve in opposition to the yieldable means, an angle lever mounted adjacent the outer end of the plunger and having one arm extending across and bearing against the outer end of the plunger, and a handle extending from the other arm of the plunger and arranged to be operated by the devices controlling the carbureter throttle valve.

5. A device for the purpose set forth comprising a body adapted to be secured between a carbureter and an engine intake manifold and having an opening therethrough for the flow of fuel from the carbureter, the body having an air chamber, means for discharging air from said chamber into the fuel stream, a cylindrical valve chamber below said air chamber and in communication therewith, and provided with an air inlet, a free piston valve in said chamber, yieldable means holding the valve normally over the air inlet to close the same, a plunger mounted axially in the valve chamber and bearing upon the free piston valve in opposition to the yieldable means, an angle lever mounted adjacent the outer end of the plunger and having one arm extending across, and bearing against the outer end of the plunger, and a handle extending from the other arm of the plunger and arranged to be operated by the devices controlling the carbureter throttle valve, a disk valve mounted loosely on the plunger, and an expansion spring bearing at one end against the valve and at the opposite end against an abutment on the plunger.

6. In a carbureter, having a throttle and having an outlet portion, an opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, means movable independently of said throttle and controllable thereby for admitting air to said chamber, and means for discharging the air from said chamber in the general direction of flow of the fuel stream.

7. In a carbureter, having a throttle and having an outlet portion, an opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, means movable independently of said throttle and controllable thereby for admitting atmospheric air to said chamber, and means for discharging the air from said chamber in a direction opposed to the direction of flow of the fuel stream.

8. In a carbureter, having a throttle and having an outlet portion, an opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, means movable independently of said throttle and controllable thereby for admitting air to said chamber, and means for discharging a portion of the air from said chamber in the general direction of flow of the fuel stream, and means for discharging an additional portion of said air in a direction opposed to the flow of the fuel stream.

9. In a carbureter, having an outlet portion adapted to be secured to an engine intake manifold and an opening through said portion for flow of fuel to the manifold, the combination with an air chamber located at said portion, means for discharging air from said chamber into the fuel stream, a valve chamber in communication therewith, and provided with an air inlet, a valve in said chamber, with yieldable means holding the valve normally over the air inlet to close the same, a shutter or closing means mounted axially in the valve chamber in opposition to the yieldable means, an angle lever attached to the outer end of the closing means and arranged to be operated by the devices controlling the carbureter throttle valve.

10. In a carbureter, having a throttle and having an outlet portion, an opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, means for discharging air from said chamber into the fuel stream, a cylindrical valve chamber below said air chamber and in communication therewith, and provided with an air inlet, a free piston valve in said chamber, yieldable means holding the valve normally over the air inlet to close the same, a plunger mounted axially in the valve chamber and bearing upon the free piston valve in opposition to the yieldable means, an angle lever mounted adjacent the outer end of the plunger and having one arm extending across, and bearing against the outer end of the plunger, and a handle extending from the other arm of the plunger and arranged to be operated by the devices controlling the carbureter throttle valve, a disk valve mounted loosely on the plunger, and an expansion spring bearing at one end against the valve and at the opposite end against an abutment on the plunger.

11. A diluting device including a body block having an opening therethrough for flow of fuel, said body block having an air

chamber, means for admitting air to said chamber, and means for discharging the air from said chamber centrally of said opening and in a direction opposed to the direction of flow of the fuel stream.

12. A diluting device including a body block having an opening therethrough for flow of fuel, said body block having an air chamber, means for admitting air to said chamber, and means for discharging the air from said chamber peripherally of said opening and in the general direction of the flow of the fuel stream, and means for discharging some air centrally of said opening and in a direction opposed to the flow of the fuel stream.

13. A diluting device including a body block having an opening therethrough for flow of fuel, said body block having an air chamber, means for admitting air to said chamber, and means for discharging the air from said chamber in opposite directions to the flow of the fuel stream, and means for commingling the streams of air with each other and with the fuel stream.

14. A diluting device including a body block having an opening therethrough for flow of fuel, said body block having an air chamber, means for admitting air to said chamber, and means for discharging the air from said chamber in jets, certain of said jets being located peripherally of the fuel stream and others of the jets being located centrally of the fuel stream and opposed to said first jets.

15. In a carbureter having a throttle and an outlet portion adapted to be secured to an engine intake manifold, and an opening through said portion for flow of fuel to the manifold, the combination with an air chamber located at said portion, means for discharging air from said chamber into the fuel stream, a valve chamber in combination therewith and provided with an air inlet, a valve associated with said chamber, yieldable means normally holding said valve in position to close the air inlet, and means in said valve chamber movable independently of said valve and operable by the throttle to open the valve.

16. In a carburetor having a throttle and having an outlet portion, an opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, and having a passage effective to establish communication with the atmosphere, means for controlling air flow to said passage, means to check and govern the flow of air from said controlling means, and means to discharge the air from said chamber into the fuel stream.

17. In a carburetor having a throttle and having an outlet portion, and opening through said portion for flow of fuel therefrom, the combination with an air chamber adjacent the line of flow from said portion, and having a passage effective to establish communication with the atmosphere, a valve controlled by said throttle, for admitting air to said passage, a spring controlled suction valve between said admission valve and the chamber for checking and governing the flow of air from said admission valve, and means to discharge the air from said chamber into the fuel stream.

In testimony whereof I hereunto affix my signature.

ALBERT G. WAGNER.