G. C. SHIVERS.

AUXILIARY AIR VALVE.

APPLICATION FILED JUNE 23, 1916.

1,257,134. Patented Feb. 19, 1918.

Fig. 1.

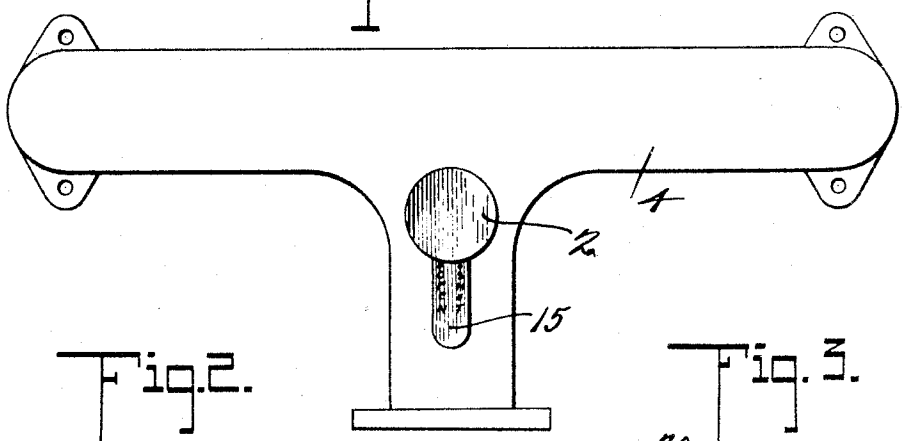


Fig. 2.

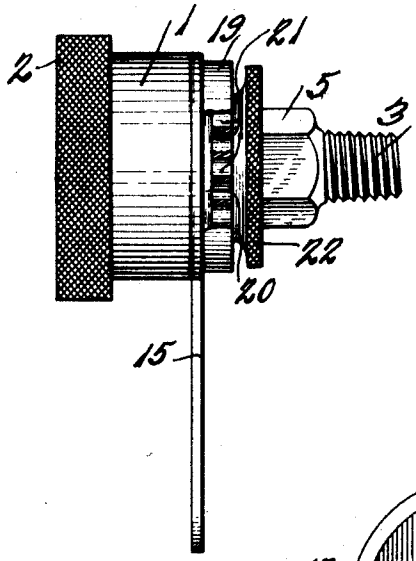


Fig. 3.

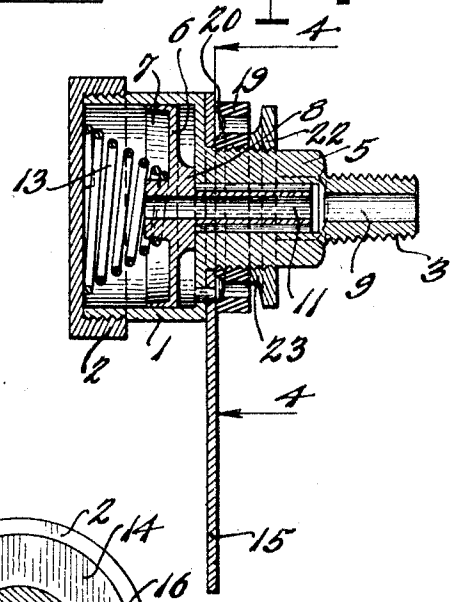
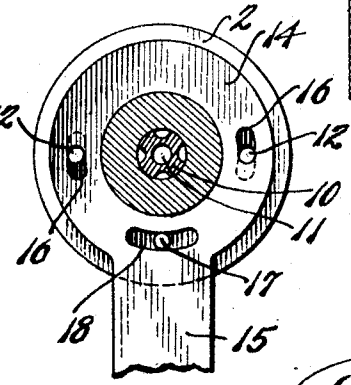


Fig. 4.



Witness

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AUXILIARY AIR-VALVE.

1,257,134. Specification of Letters Patent. Patented Feb. 19, 1918.

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To all whom it may concern:

Be it known that I, GEORGE C. SHIVERS, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Auxiliary Air-Valves, of which the following is a specification.

The present invention has to do with auxiliary valves for internal combustion engines of a type designed to automatically admit fluid, in this instance air, for admixture with the carbureted gas whereby the irregularities of the carbureter control will be adequately compensated.

It is quite generally known at the present time that one of the greatest difficulties which is experienced in the use of engines of the above mentioned type is due to the inability to control the proper proportion of mixing of the gaseous fuel which is supplied to the engine under the variations of the conditions of operation. For instance, it is desirable in starting the engine to have a fairly "rich" mixture, while such mixture should preferably be "lean" after the engine has become warm or when the speed of the engine is relatively high. The proper control under these conditions is important and a number of advantages are secured by the utilization of a device which will produce the result, among which may be mentioned the substantial elimination of carbonization in the cylinders, increase in power and speed, the maintenance of reduced temperature of the engine parts, and finally as an incident to the foregoing, economy of fuel consumption.

I am well aware that it has been proposed to employ auxiliary valve means broadly in connection with combustion engines which means are manually operable but my main objects have been to produce an article which is simple in construction, entirely automatic in action and capable of controlling the admission of the fluid in proportion as the speed of the engine or the suction action in the manifold created by its cylinders increases, this auxiliary means being at present desirable because of the fact that few, if any, but the most expensive carbureters or carbureting devices at present in use, adequately modify the admixture in the manner referred to by an automatic action.

With the above in view the present invention comprises a body or cuplike cylindrical casing having therein a valve member so arranged as to be unseated to more or less uncover a supply passage upon the production of a varying degree of vacuum in said casing and at one side of said valve member, and means normally tending to hold the valve member in seated position.

For a full understanding of the present invention, reference is to be had to the following description and the accompanying drawing, in which:

Figure 1 is a side elevation of an internal combustion engine manifold having my valve attachment secured thereto.

Fig. 2 is a side elevation of the invention.

Fig. 3 is a vertical sectional view; and

Fig. 4 is a sectional view on the plane indicated by the line 4—4 of Fig. 3.

Throughout the following detail description, and on the several figures of the drawing, similar parts are referred to by like reference characters.

Specifically describing the invention and referring to the drawing, 1 designates a cuplike cylinder or casing provided at one side or end with a screw cap 2 and at its other side with a threaded nipple 3 by means of which the device may be attached to the intake manifold 4 of an internal combustion engine, at a point intermediate the carbureter device with which such engine is usually supplied and the engine cylinders. Adjacent to the threaded portion of the nipple 3, the body is hexagonal in shape as indicated at 5 to receive a wrench for screwing the nipple into its operative position in a threaded opening of the manifold provided therefor. Within the cylinder 1 is reciprocally mounted a pistonlike valve member 6 snugly fitting the cylinder and having a cupped face at one side as indicated at 7 and a flat shoulder at its other side as indicated at 8, which shoulder constitutes a valve seat adapted to seat against the extremity of the supply passage 9 which extends through the nipple 3 and places the interior of the casing 1 in communication with the engine cylinders, hereinafter referred to as the suction chamber. It will be observed that the valve member 6 is provided with a laterally projecting stem 10 which is fluted or grooved externally, said stem extending into the supply passage 9 hereinbefore referred to. Furthermore the valve 6 is provided with a longitudinally

extending passage 11 which for the purposes of this description will be termed an exhaust passage, said passage as will be observed in Fig. 3, communicating with the supply passage 9 with which it is coaxial and establishing communication with the suction chamber and the casing 1 at the opposite side of the valve member 6 to the inlet ports 12 provided in the side wall of the casing.

In the drawing I have shown two such ports but it will be understood that any suitable number may be employed for the purpose of admission of air or other fluid into the casing in the manner hereinafter more clearly set forth.

A spring 13, of helical form, is interposed between the cap 2 and the cupped face of the valve member 6 and normally holds said valve in seated position closing the supply passage 9.

The operative area of the inlet ports 12 is controlled by means of a disk or cut off 14 which is formed with a lateral extension 15 for manually adjusting the same and provided with apertures or slots 16 for registry to a greater or less extent with the inlet ports 12 of the casing. The cut off is limited in movement by a stud or stop element 17 projecting from the casing into an arcuate slot 18 formed in the disk. This cut off member is held at adjusted position preferably by a specially formed knurled nut 19 having threaded connection with the body of valve casing. This member performs a dual function, first, that of holding the cut off in adjusted positions as just mentioned, and secondly, constituting a muffling means. For the last mentioned purpose the inner face of the nut 19 is formed with an annular groove or recess 20 which when the nut is in contact with the face of the disk 14 provides for a continuous passage through which the air is fed to the casing inlet ports 12, the nut being provided with a plurality of transverse apertures or passages 21 arranged in close spaced relation and communicating with this annular groove 20 above described. Thus instead of the air being drawn through the relatively small inlet ports 12 direct which would produce ordinarily quite a hissing sound, it is forced through the relatively large passage formed by the transverse apertures 21 and the annular groove 20, all communicating with these inlet ports.

I preferably employ, in addition to the member 19, a lock nut 22 which coacts with the first-mentioned member to prevent displacement thereof, said locking member 22 being provided with a lateral shoulder 23 which holds the body of the locking member in spaced relation to the nut 19 and leaves the passages 21 unobstructed.

Describing the use of the invention, it will be understood that when the engine with which the auxiliary valve means constituting this invention is employed is at rest, the valve member or piston 6 is seated and the supply passage 9 of the device closed. It is to be understood that the tension of the spring 13 is sufficient to hold the valve member seated under normal condition of vacuum which is present in the intake manifold as when the engine is idling or the load is so increased that the speed of the engine is materially reduced and said spring, of course, may be adjusted to produce this effect by the screw cap 2 of the casing 1 which holds the spring in place. The inlet ports of this valve device may be closed by movement of the handle extension 15 for the cut off 14, said handle member being suitably provided with indicia as shown in Fig. 1 to indicate when the inlet ports are open or shut. The ordinarily rich mixture supplied to the engine by the carbureter device is thus admitted to the cylinders in the usual manner by the suction of the engine pistons. When the engine is in operation, the suction of the cylinders exhausts the air from the casing 1 by reason of the communication therewith through the exhaust passage 11, the vacuum thus produced at the inner side of the valve member 6 causing the latter to move against the tension of the spring 13 so as to unseat the valve whereupon such suction draws the air through the inlet ports 12 which have been previously opened by adjustment of the cut off 14, said air passing about the stem 10 and into the intake manifold 4 diluting the carbureted gas passing therefrom into the engine cylinders. It will be apparent that the extent to which the air is thus admitted through this auxiliary valve device is practically proportionate to the amount of suction created by the engine pistons, or the degree of vacuum which is produced at one side of the valve member. When this suction is reduced as in slow speeds of the engine or as in starting, the valve member tends to reseat under the control of the spring 13 cutting off the auxiliary supply of air.

By actual experimentation, it is found that in the use of this device the speed of the internal combustion engine is quite materially increased and there is also a very appreciable reduction in the consumption of the hydrocarbon fuel. The article is capable of being very cheaply manufactured and may easily be cleaned and requires no change in the construction of the engine to which it is applied and having so few moving parts is subject to little or no wear.

It is within the purview of the invention that slight changes may be made in the details of construction without departing from the spirit of said invention and within the scope of the appended claims.

Having thus described my invention, what I claim as new is:

1. In a device of the class described, a casing, a valve mounted therein and dividing the same into a vacuum chamber at one side and an air chamber at the other side, said casing having a supply passage leading to the air chamber normally closed by the valve aforesaid, said valve also having a passage therethrough establishing communication between the vacuum chamber and the supply passage and in alinement with the latter, and a spring in the vacuum chamber pressing the valve against the end of the casing and closing the supply passage to the air chamber, said casing having an air inlet for admitting air to actuate the valve when a vacuum is created in the vacuum chamber and for thereupon supplying air to the supply passage aforesaid.

2. A device of the class described comprising a valve casing having a fluid inlet port, a supply passage for delivering the fluid admitted into the casing by said port, a valve member controlling the passage and establishing communication between the passage and the interior of the casing and having a guide stem projecting into the passage, said valve being operable by the fluid entering said port and the stem being externally grooved to permit passage of the fluid through the supply passage when the valve member is unseated and moved in a direction outwardly of the passage, and means coacting with the valve at the side opposite the stem to normally hold the valve in seated position.

3. A device of the class described comprising a valve casing having a fluid inlet port, a supply passage for delivering the fluid admitted into the casing by said port, a valve member controlling the passage and operable by the fluid entering said port and having a guide stem projecting into the passage, the stem being externally grooved to permit passage of the fluid through the supply passage when the valve member is unseated, a cut off adjustable for controlling the inlet port, and separate means for holding the cut off in adjusted position.

4. A device of the class described comprising a valve casing having means for connecting it to a suction chamber, said casing having a relatively restricted air inlet port, a supply passage for delivering the air admitted into the casing by said port, a valve member controlling the passage, and muffler means coöperating with the valve member for conveying the air to the inlet whereby to prevent hissing incident to the intake of the air therethrough.

5. A device of the class described comprising a valve casing having means for connecting it to a suction chamber, said casing having an air inlet port, a supply passage for delivering the air admitted into the casing by said port, a valve member controlling the passage, an adjustable cut off for controlling the operative area of the inlet port, and muffler means coacting with the cut off and provided with passages normally communicating with the inlet port.

6. A device of the class described comprising a valve casing having means for connecting it to a suction chamber, said casing having an air inlet port, a supply passage for delivering the air admitted into the casing by said port, a valve member controlling the passage, a cut off disk provided with an aperture adapted for registry with the casing inlet port, manipulative means for said cut off, means for holding said cut off at adjusted positions comprising a nut having threaded connection with the casing, said nut being formed with an annular groove coöperating with the inlet port, and apertures communicating with said groove.

7. An auxiliary air valve for internal combustion engines comprising a cup shaped cylinder, a pistonlike valve member operable therein, a fluted guide stem projecting from said valve member, a supply passage in said cylinder, an exhaust passage in the valve member alined with said supply passage, a detachable cap member for the cylinder, a spring interposed between said cap and the valve member for holding the latter seated over the supply passage, the cylinder having an inlet port, means for controlling the operative area of the inlet, and locking means for holding said controlling means at adjusted position.

In testimony whereof I affix my signature.

GEORGE C. SHIVERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."