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AUXILIARY VALVE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED DEC. 19, 1914.

1,142,194. Patented June 8, 1915.

Fig. 1.

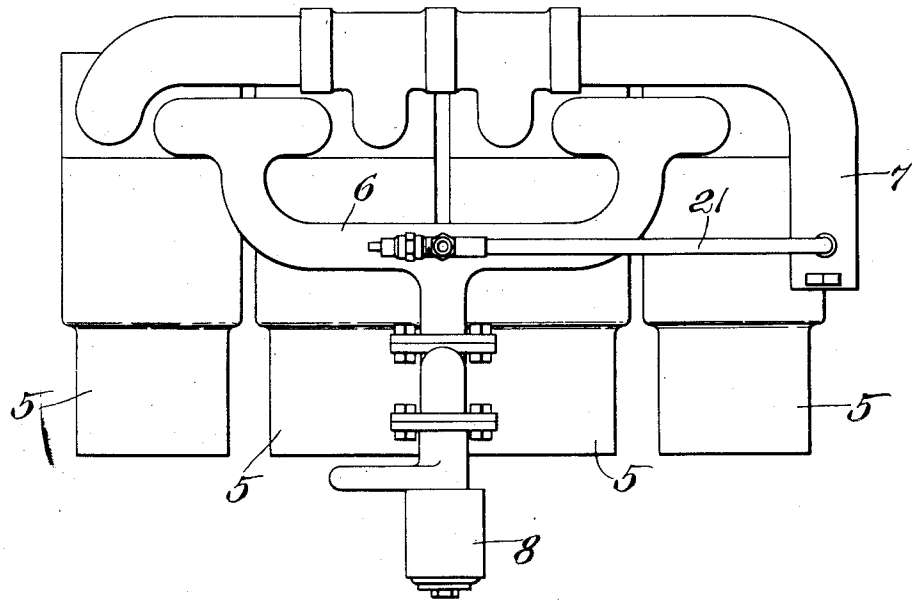


Fig. 2.

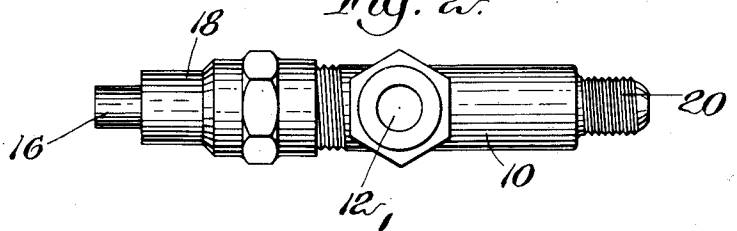
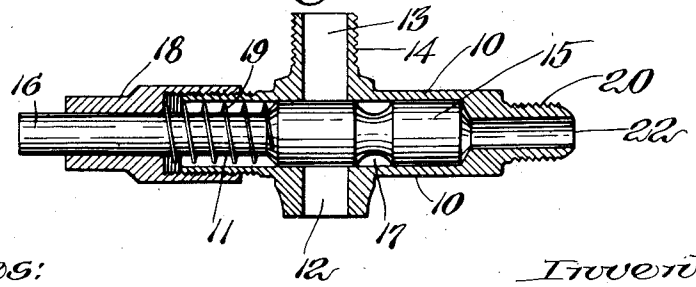


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

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AUXILIARY VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,142,194. Specification of Letters Patent. Patented June 8, 1915.

Application filed December 19, 1914. Serial No. 878,008.

To all whom it may concern:

Be it known that I, FRANK MORGAN, a subject of the Kingdom of Great Britain, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Auxiliary Valves for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an auxiliary air valve designed for use on internal combustion engines particularly engines used for driving automobiles.

It has been found from experience in the use of carbureters with internal combustion engines that when the carbureter is so adjusted that the mixture contains the proper relative proportions of air and gasolene or other fuel to secure perfect combustion that the engine will not operate successfully under all conditions. By this I mean that if the mixture is just right, any sudden opening of the throttle to increase the speed or to take a grade will invariably weaken the mixture and cause a choking and frequently a stopping or "stalling" of the engine. To obviate this result it is the practice to so adjust the carbureter that the fuel mixture is richer in gasolene or other fuel than is required for general running conditions. In order therefore to take care of a temporary condition, that is, the sudden opening of the throttle, the mixture is made richer at the expense of general running conditions. The result is that the excess fuel is deposited upon the cylinders, valves and spark plugs in the form of carbon which in time reduces the efficiency of the engine and requires overhauling and cleaning. It also results in loss of power through incomplete combustion and in waste of fuel.

It has been proposed to mount upon the intake manifold an auxiliary air valve operated by hand from the driver's seat so that the rich mixture may be reduced by the admission of air into the intake manifold under ordinary running conditions to a mixture of proper proportions. Such valves, however, have not been found satisfactory because they not only require constant attention and manipulation on the part of the driver, but also, that the driver be possessed of more than ordinary skill in order to manipulate them successfully.

The object of the present invention is, therefore, to produce an auxiliary air valve for internal combustion engines that will operate, not only automatically and thus independent of the judgment of the individual engine operator, but also accurately and determinately, supplying the additional air in the proper quantities, according to the requirements of the varying conditions under which the engine is operated.

A further object of the invention is to provide a device which is flexible and to this end means are provided for adjusting the valve in order to regulate the point at which the pressure in the exhaust will operate the valve.

Another object of the invention is to provide a device which is simple in construction, durable and efficient in operation and of low cost of construction.

In the accompanying drawings illustrating the application of my improved auxiliary air valve to an internal combustion engine, Figure 1 is a diagrammatic view of a four cylinder internal combustion engine showing the intake and the exhaust manifolds with my improved auxiliary air valve situated on the intake manifold and connected with the exhaust manifold; Fig. 2 is a plan view of the improved valve; and Fig. 3 is a central longitudinal sectional view of the same, at right angles to Fig. 2.

In the drawings illustrating my invention applied to an internal combustion engine, Fig. 1 shows an engine having four cylinders 5, an intake manifold 6, an exhaust manifold 7 and a carbureter 8, all of usual and ordinary construction, being merely a typical example of an internal combustion engine.

In the illustrated embodiment of my invention, 10 designates a valve casing of cylindrical form having a valve chamber 11 which extends nearly the entire length of said casing. The latter is provided with an inlet port 12 and with an outlet port 13 arranged on opposite sides. The outlet port is threaded at 14 so that the valve may be screwed into the intake manifold.

Within the valve casing is mounted a plunger comprising a head-portion 15 and a shank 16, said plunger being longitudinally movable in said valve chamber. The head-portion of the plunger is provided with an annular groove 17 so located that when the plunger is in its normal position as shown in Fig. 3, the groove is out of alinement with

the inlet 12 and outlet 13. That end of the valve casing at the shank end of the plunger is open and provided with an external thread to receive a threaded cap 18 which has a central bore through which the shank of the plunger projects. The cap in this respect serves as a bearing for the plunger shank. Mounted on the said shank within the valve chamber is a helical spring 19 which abuts at one end the head of the plunger and at the other end the cap 18, the spring serving to keep the plunger in a forward position to close the valve as shown in Fig. 3. The other end of the valve casing is reduced in diameter and threaded at 20 to receive a pipe 21 which connects to and opens into the exhaust manifold of the engine. A passage 22 through this end of the valve casing allows the pressure from the exhaust manifold passing through the pipe 21 to bear against the head 15 of the plunger.

The operation of my valve is as follows: It is so adjusted that when the engine is idling the valve remains closed. This is regulated by the pressure exerted on the plunger by the spring 19 and this pressure can be varied in either direction by turning the cap 18. When the amount of fuel passing through the engine is increased by the opening of the throttle, the pressure in the exhaust is increased and this pressure is communicated through the pipe 21 and passage 22 to the head 15 of the plunger, thereby moving the plunger toward the cap 18 and compressing the spring 19. This movement continues until the pressure of the compressed spring equalizes the exhaust pressure. As the plunger is moved longitudinally the groove 17 begins to register with the ports 12 and 13 allowing air to be drawn into the intake manifold to reduce the mixture to proper proportions of air and fuel. As the pressure in the exhaust increases, the plunger is moved correspondingly farther admitting an increased amount of air. When the throttle is closed the pressure in the exhaust manifold falls and then the valve is closed by the plunger being returned to its normal position by the spring 19.

It is to be noted that my device is operated by the pressure in the exhaust manifold and, therefore, is not subject to the sudden and violent fluctuations of air valves operated by the vacuum in the engine and the intake manifold, which fluctuations cause choking and stalling when the mixture is correct and the throttle is suddenly opened. It may also be remarked that the influx of air into the intake manifold through my valve corresponds in amount to the increase of fuel used, because the pressure in the exhaust manifold is increased proportionately to the increase in the power of the engine created by the increase in the amount of gaseous fluid flowing into the cylinders. The result is that the amount of air flowing through the valve is regulated by the exhaust pressure and the mixture is reduced to proper proportions of air and fuel automatically.

In practice my device, by reducing the mixture to correspond to the proportions of fuel and air for complete combustion, prevents the formation and deposit of carbon in the cylinders and on the valves and spark plugs of the engine and also eradicates waste of fuel, thereby maintaining the power and efficiency of the engine at its highest point.

My device may also be used as a priming device to facilitate starting the engine in very cold weather. When so used the shank of the plunger may be grasped with the fingers and drawn to an open position which permits the injection of a small quantity of gasolene and ether into the intake manifold.

From the foregoing disclosure it will be appreciated that my invention resides broadly in providing an auxiliary air valve, operable from the pressure of the exhaust, and while I have herein illustrated a practical embodiment of the invention involving the location of such auxiliary valve on the intake manifold, it will be understood by persons skilled in the art that the valve may be located in a vertical way so as to be in operative association with parts of the engine other than directly with the said intake manifold. Further, that the invention is not to be limited to the details of the particular embodiment herein illustrated since the same is capable of embodiment in other forms of construction, as will be embraced within the hereto appended claims.

What I claim is:—

1. The combination with an internal combustion engine having suitable intake and exhaust portions, of an auxiliary air valve, and means whereby said air valve is operated by the pressure of the exhaust to admit air to the operating mixture.

2. The combination with an internal combustion engine having suitable intake and exhaust portions, of an auxiliary air valve, means whereby said air valve is operated by the pressure of the exhaust to admit air to the operating mixture, and adjustable means for regulating the amount of pressure necessary to operate said valve.

3. The combination with an internal combustion engine having suitable intake and exhaust portions, of an auxiliary air valve, and a connection between said valve and the exhaust whereby the pressure of the exhaust operates to open the valve when said pressure reaches a predetermined point.

4. The combination with an internal combustion engine having suitable intake and exhaust portions, of a valve for controlling the flow of air to the operating mixture, and means whereby said valve is operated to

admit the air to said mixture when the pressure of the exhaust reaches a predetermined point.

5. The combination with an internal combustion engine having suitable intake and exhaust portions, of a valve, connections between the valve and the exhaust whereby when the pressure of the exhaust is increased by reason of an increase in consumption of explosion mixture in the engine, the valve is operated to allow an influx of air to the operating mixture.

6. The combination with an internal combustion engine having suitable inlet and exhaust portions, of a valve provided with means for holding it in a normally closed position, and means whereby said valve is opened by the pressure of the exhaust when the pressure reaches a predetermined point, in order to admit air through said valve to the operating mixture.

7. The combination with an internal combustion engine having suitable inlet and exhaust portions, of a valve for controlling the flow of air into the intake, said valve being provided with means for holding it in a normally closed position, means whereby said valve is opened by the pressure of the exhaust when said pressure reaches a predetermined point, and means for regulating the point at which the pressure will open said valve.

8. The combination with an internal combustion engine having suitable intake and exhaust portions, of a valve casing having a valve chamber provided with an inlet port open to the atmosphere and an outlet port opening to the operating mixture, a plunger mounted in the valve chamber controlling the opening and closing of said ports, resilient means for maintaining said plunger in such position as to close said ports, and means operated by the exhaust for moving said plunger to open said ports when the pressure in the exhaust reaches a predetermined point.

9. The combination with an internal combustion engine having suitable intake and exhaust portions, of a valve casing having a valve chamber provided with an inlet port open to the atmosphere and an outlet port opening to the operating mixture, a plunger mounted in the valve chamber controlling the opening and closing of said ports, spring-actuated means for maintaining said plunger in such position as to close said ports, and means operated by the exhaust for moving said plunger to open said ports when the pressure in the exhaust reaches a predetermined point.

10. The combination with an internal combustion engine having suitable inlet and exhaust portions, of a valve casing having a valve chamber provided with an inlet port open to the atmosphere and an outlet port opening to the operating mixture, a plunger mounted in the valve chamber controlling the opening and closing of said ports, spring-actuated means for maintaining said plunger in such position as to close said ports, means for regulating the pressure exerted upon said plunger by said spring-actuated means, and means operated by the exhaust for moving said plunger to open said ports when the pressure in the exhaust reaches a predetermined point.

In testimony whereof, I hereunto set my hand in the presence of two subscribing witnesses, this the seventeenth day of December, 1914.

FRANK MORGAN.

Witnesses:
E. F. NUIAC,
H. A. ENGLISH.