F. O. ALTON.

AUXILIARY AIR INLET FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED OCT. 13, 1920.

1,421,135. Patented June 27, 1922.

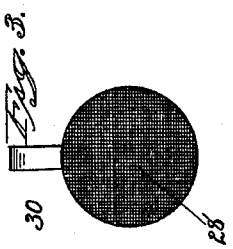


Fig. 3.

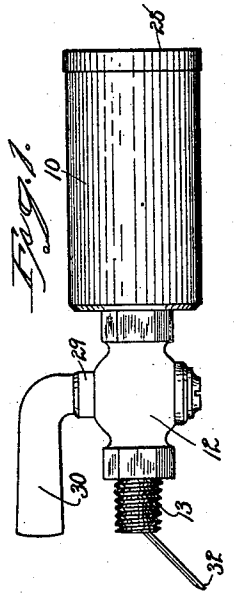


Fig. 1.

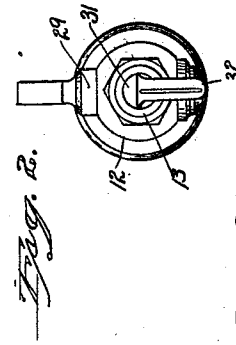


Fig. 2.

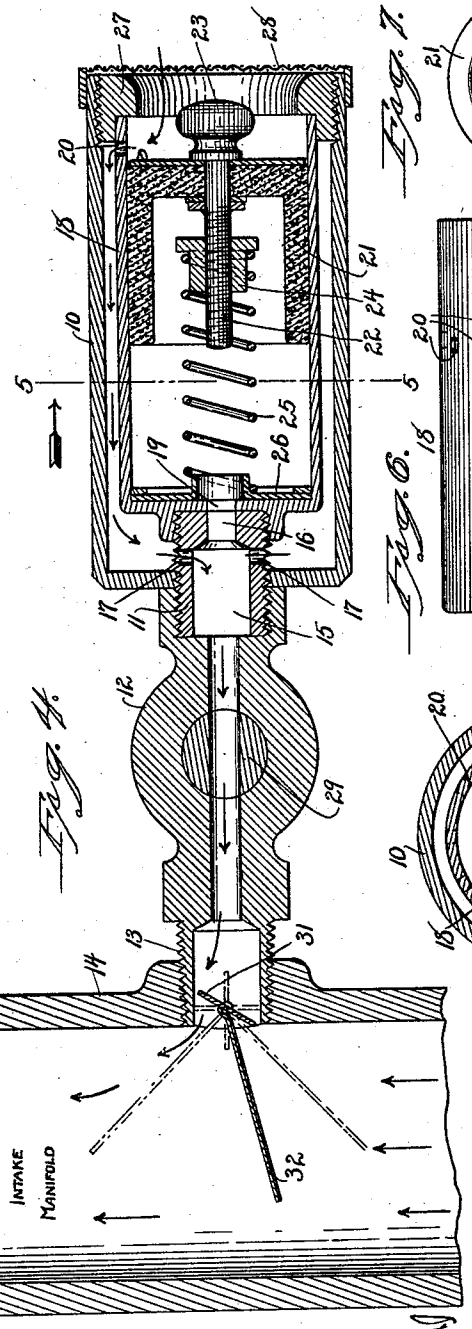


Fig. 4.

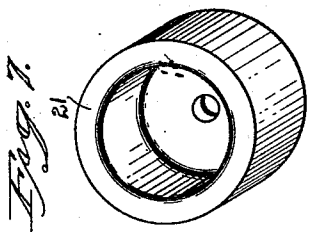


Fig. 7.

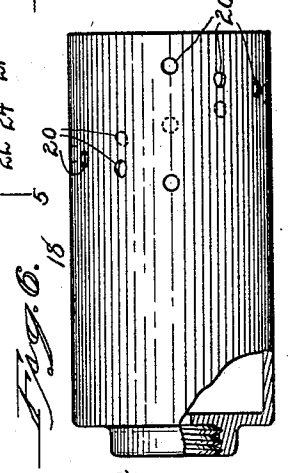


Fig. 6.

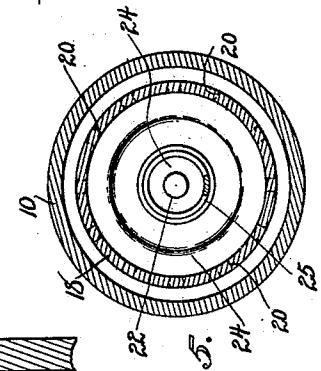


Fig. 5.

Inventor
Francis O. Alton
by Seymour Teare
Attys

UNITED STATES PATENT OFFICE.

FRANCIS O. ALTON, OF WATERBURY, CONNECTICUT.

AUXILIARY AIR INLET FOR INTERNAL-COMBUSTION ENGINES.

1,421,135. Specification of Letters Patent. Patented June 27, 1922.

Application filed October 13, 1920. Serial No. 416,614.

To all whom it may concern:

Be it known that I, FRANCIS O. ALTON, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Auxiliary Air Inlets for Internal-Combustion Engines; and I do hereby declare the following, when taken in connection with the accompanying drawings and the characters of reference marked thereon, to be a full, clear, and exact description of the same.

This invention relates to an auxiliary air inlet for internal combustion engines.

One object of the invention is to provide an auxiliary air inlet in which the air admitted to the intake manifold will be automatically controlled according to the requirements of the engine.

A further object of the invention is to provide such a device in which both the suction and the momentum of the fuel in the intake manifold will be utilized to control the admission of auxiliary air to the manifold.

A further object of the invention is to provide such a device which will be self contained and which may be applied to the manifold as a unit.

A further object of the invention is to provide such a device in which the air will pass from the inlet to the manifold without passing through the cylinder in which the suction operated piston works, thereby preventing the entrance of dirt or foreign matter into the cylinder.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a side view of an auxiliary air inlet for internal combustion engines constructed in accordance with my invention; Fig. 2 is an inner end view thereof; Fig. 3 is an outer end view of the same; Fig. 4 is a transverse sectional view of my improved inlet on a larger scale and shown in connection with an intake manifold; Fig. 5 is a sectional view on the line 5—5 of Fig. 4; Fig. 6 is a side view, partly broken away, of the shell detached; Fig. 7 is a perspective view of the piston detached.

In carrying out my invention I provide a suction operated device connected with the intake manifold to regulate the passage of air to the manifold. In the operation of an internal combustion engine there are times when there is a heavy suction in the intake manifold but a rich mixture is required and it is not desirable that auxiliary air should be admitted to the manifold. I have, therefore, provided in connection with the suction operated device a second device which is actuated by the momentum of the fuel through the manifold to control the communication between the suction operated device and the manifold and to thus control the amount of suction exerted upon the suction operated device. In this manner the amount of auxiliary air drawn into the manifold is limited according to the needs of the engine and is not determined arbitrarily by the suction in the manifold. These results may be accomplished with mechanisms of various kinds and it will be understood that the particular device here shown and described has been chosen for the purpose of illustration only.

In the particular embodiment of the invention here shown the air inlet device comprises a main casing 1 having at one end an air inlet which is here shown as formed in a cap, or plug, 27, screw threaded into the end of the casing 10, which is preferably cylindrical in form. This opening may, if desired, be provided with a screen 28. At the opposite end of the casing a nipple 11 is mounted in the end wall of the casing, preferably centrally thereof, and in the present instance is screw threaded into an opening in said end wall. This nipple projects on both sides of the end wall of the casing and is screw threaded throughout its length. The nipple is provided with a longitudinal passageway, the outer portion of which is enlarged to form the chamber 15 while the inner portion is of relatively small diameter and constitutes a passage 16. The enlarged portion, or chamber, 15 of the passage through the nipple extends to a point within the casing and communicates with the interior thereof by ports 17. That portion of the nipple 11 which projects on the outer side of the end wall of the casing is utilized for connecting the casing with the manifold and it may be screwed directly into an opening in the wall of the manifold, which is shown at 14, or, if, desired, a cut-off may be interposed between the casing and the manifold so that the size of the passageway may be regulated or the air inlet may be wholly disconnected from the manifold. In the present instance I have shown a stop cock interposed between the casing and the mani-

fold and this cock comprises a body portion 12 having a longitudinal passageway therethrough which is controlled by a turn plug, or gate, 29 having a manually operated handle 30. One end of the body portion 12 is provided with a screw threaded socket to receive the end of the nipple 11 and when applied to the nipple the stop cock forms a unitary part of the device as a whole, the passageway therein being in open communication with the chamber 15 in the nipple 11. The opposite end of the body 12 of the stop cock is reduced and screw threaded, as shown at 13, so that it may be screw threaded into the opening in the wall of the manifold. That portion of the passageway which lies in the screw threaded portion 13 of the stop cock is enlarged to form a chamber similar to the chamber 15 which is in open communication with the interior of the manifold.

Mounted within the casing 10 is a suction operated device to control the passage of air from the inlet opening to the manifold and, as here shown, this device comprises a shell, or inner casing, 18 spaced from the wall of the outer casing 10. In the present construction the shell, or inner casing, 18 has its outer end open and arranged within an annular flange carried by the cap, or plug, 27, and is arranged in open communication with the inlet opening in the cap. The opposite, or inner end, of the shell 18 is provided with a boss which is screw threaded to receive the inner end of the nipple 11 and has formed therein an opening 19 to register with the passageway 16 in the nipple, thus connecting the interior of the shell with the chamber 15 and the manifold. The shell 18 is provided with one or more openings 20 to connect the inlet opening in the cap 27 with the space or passageway between the two casings. In the present instance I have shown a series of these openings spirally arranged so that each opening is spaced a greater distance from the end of the shell than is the next preceding opening. Arranged within the shell 18 is a piston, or suction cup, 21, which, when in its outermost position will close the openings 20 and thus interrupt the communication between the air inlet opening and the manifold. Mounted in the piston is a rod 22 the inner end of which is screw threaded to receive a bearing nut 24 between which and a washer 26, at the inner end of the shell 18 a spring 25 is confined and tends to move the piston normally to its outer position. The rod 22 is provided with a knob 23 by means of which it may be rotated to adjust the nut 24 and regulate the tension of the spring, the nut being held against rotation with the rod by the frictional contact between the nut and the spring. The spring is of sufficient tension to hold the piston normally in its outermost position but when the piston is subjected to the suction in the manifold it will be drawn inwardly against the tension of the spring, thus uncovering one or more of the openings 20 and admitting a corresponding amount of air to the manifold. It will be noted that the air does not pass through the shell 18, except the outer portion thereof, but passes through the openings 20 to the passageway between the shell and the outer casing 10 and thence through the ports 17 to the chamber 15 and the manifold. Consequently no dirt or foreign matter will be carried into the shell where it might interfere with the operation of the piston.

As has been stated, satisfactory results can not be had if the suction in the manifold is relied upon alone to control the amount of auxiliary air admitted to the manifold and I have, therefore, interposed between the casing 10 and the manifold a device which is actuated by the fuel passing through the intake manifold to control the communication between the casing 10 and the manifold, thereby regulating the amount of suction exerted upon the piston 21. As here shown, this device is in the form of a butterfly valve 31 mounted in the chamber in the threaded end 13 of the stop cock and has connected therewith a vane 32 which projects beyond the end of the chamber and into the manifold where it lies in the path of the fuel passing through the same. The vane is of relatively narrow construction so that it will not be operated by the suction in the manifold but will be engaged by the fuel and moved according to the momentum of the fuel. As shown in Fig. 4, the device is connected with a vertical portion of the manifold and, consequently, the vane 32 will be acted upon by gravity to retain the butterfly valve normally in its closed position, but as the momentum of the fuel increases the vane will be lifted thereby and the valve 31 gradually opened, thus establishing a communication between the casing 10 and the manifold which increases as the momentum of the fuel increases. Consequently, when the engine is idling, or running light, the butterfly valve will be closed and no suction will be exerted upon the suction operating device. As the throttle valve of the engine is opened the momentum of the fuel increases and the valve 31 is gradually opened until the vane reaches its uppermost position when the valve is fully open and the suction operating device is subjected to the full suction in the manifold. It will be apparent, therefore, that by the use of both a suction operated device and a momentum operated device I am able to automatically regulate the amount of auxiliary air which enters the manifold in accordance with the requirements of the engine and that when a rich fuel is required the supply of auxiliary air will be reduced or entirely cut-

off even though there may be a relatively large suction in the manifold, and that when the engine is running at high speed and a lean fuel is desirable the suction operated device will be in full open communication with the manifold. As has been heretofore explained, the casing 10 may be mounted directly upon the manifold, if desired, and if the stop cock is omitted the velocity operated device will be mounted in the chamber 15 of the nipple 11 and when so mounted will occupy the same position with relation to the manifold and will operate in the same manner as it does when mounted as shown in the drawings.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In a device of the character described, a casing adapted to communicate with the intake manifold of an internal combustion engine and having an air inlet, suction operated means to control the passage of air from said inlet to said manifold, and means arranged to be actuated by the fuel passing through said manifold to control the communication between said casing and said manifold.

2. In a device of the character described, a casing adapted to communicate with the intake manifold of an internal combustion engine and having an air inlet, suction operated means to control the passage of air from said inlet to said manifold, a valve to control the suction on said suction operated means, and a vane connected with said valve and arranged to project into the path of the fuel in said manifold.

3. In a device of the character described, a casing adapted to communicate with the intake manifold of an internal combustion engine and having an air inlet, suction operated means to control the passage of air from said inlet to said manifold, a part connected with said casing, adapted to be mounted in the wall of said manifold and having a chamber to communicate with said casing and with said manifold, a valve mounted in said chamber, and a vane connected with said valve, extending beyond said chamber and arranged to be actuated by the fuel passing through said manifold.

4. In a device of the character described, a casing adapted to communicate with the intake manifold of an internal combustion engine and having an air inlet, suction operated means to control the passage of air from said inlet to said manifold, a part connected with said casing, adapted to be mounted in the wall of the manifold and having a chamber to communicate with said casing and with said manifold, a valve mounted in said chamber, a vane connected with said valve, projecting into said manifold and arranged to be actuated by gravity to close said valve and to be actuated by the fuel passing through said manifold to open said valve.

5. In a device of the character described, a suction operated device to control the admission of air to the manifold of an internal combustion engine, and means controlled by the momentum of the fuel passing through said manifold to regulate the suction exerted upon said suction operated device.

6. In a device of the character described, a casing having an air inlet and an air outlet, a suction operated device mounted in said casing to control the passage of air from said inlet to said outlet, a stop cock connected with said casing and adapted to be mounted in the wall of a manifold of an internal combustion engine, said stop cock having a passageway to connect said casing with said manifold, a valve mounted in said passageway, and a vane connected with said valve and adapted to extend into said manifold and to be operated by the fuel passing through the same.

7. In a device of the character described, an outer casing adapted to be mounted on the intake manifold of an internal combustion engine and having an air inlet and an air outlet, an inner casing mounted within the first mentioned casing, communicating with said outlet and having an opening near the end thereof to connect said inlet with the interior of said outer casing, a suction operated piston arranged within said inner casing, and a spring acting on said piston to hold the same normally in a position to close the opening in said inner casing, and a device controlled by the momentum of the fuel in said manifold to regulate the suction exerted upon said piston.

8. In a device of the character described, an outer casing having an air inlet, a nipple mounted in the casing opposite said inlet to connect the same with the manifold of an internal combustion engine and having a passageway therethrough, an inner casing arranged within and spaced from the walls of said outer casing, connected at one end with said nipple and having an opening communicating with the passageway in said nipple, said inner casing having its other end in open communication with the air inlet in said outer casing and having a series of openings to connect said inlet with the space between the two casings, said nipple having ports to connect the space between the two casings with the passageway in said nipple, a piston mounted in said inner casing to control the openings therein, a spring tending to hold said piston nor-

mally in a position to close all said openings, a valve interposed between said outer casing and said manifold to regulate the suction exerted upon said piston, and a vane connected with said valve and adapted to extend into the path of the fuel passing through said manifold.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FRANCIS O. ALTON.

Witnesses:
IRA L. STEMBEL,
ETHEL HAMILTON.