H. W. TAYLOR & W. E. RUSSELL.

AIR INLET DEVICE FOR AUTOMOBILE MANIFOLD PIPE.

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1,177,831.

Patented Apr. 4, 1916.

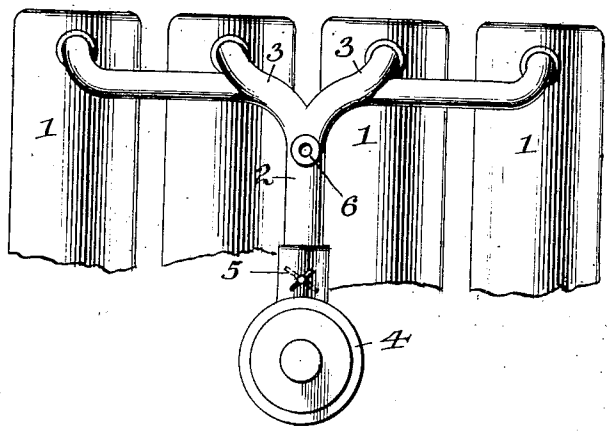



Fig. 1.

Fig. 2.

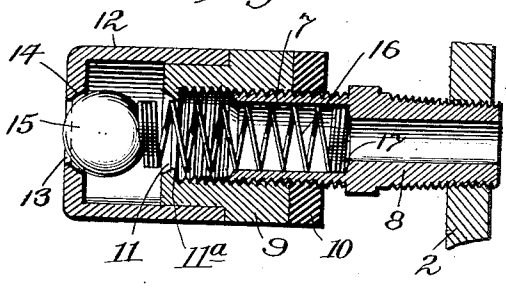
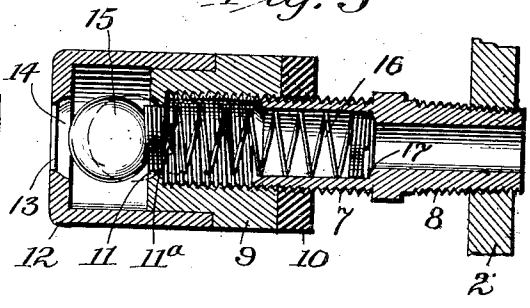



Fig. 3



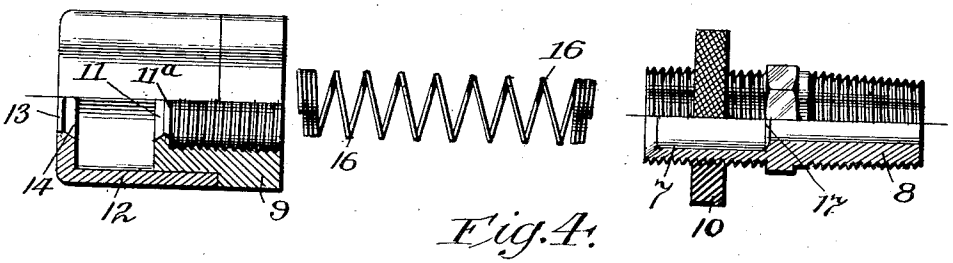




Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## AIR-INLET DEVICE FOR AUTOMOBILE MANIFOLD-PIPE.

1,177,831. Specification of Letters Patent. **Patented Apr. 4, 1916.**

Application filed June 28, 1915. Serial No. 36,766.

*To all whom it may concern:*

Be it known that we, HOWARD W. TAYLOR and WILLIAM EARL RUSSELL, both citizens of the United States, residing at the city of Danbury, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Air-Inlet Devices for Automobile Manifold-Pipe; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention pertains to an improved valve for admitting and controlling an auxiliary air supply to internal combustion engines, the advantages and construction of which will be hereinafter set forth, reference being had to the annexed drawings, wherein:

Figure 1 is a fragmentary elevation of so much of an internal combustion engine as is necessary to a showing of the application of the invention thereto; Figs. 2 and 3 longitudinal sectional views illustrating the valve and allied parts in different positions and adjustments; and Fig. 4 a sectional elevation of the parts, excepting the valve proper, in a separated condition.

The main object of the present invention is to provide a valve structure which may be readily applied to the gas supply manifold of an internal combustion engine, and which will automatically function, under varying operating conditions of the engine, to admit the necessary amount of air or to cut off such air-supply, as requirements may demand.

As is well known, there exists in a gas engine manifold, which leads from the carbureter to the various cylinders, a vacuum more or less strong or complete when the engine is running or is being turned over in the act of starting, and the valve hereinafter set forth in detail is designed to efficiently control the degree or extent of such vacuum. Inasmuch as the valve structure must occupy a horizontal position in the vast majority of installations, it is essential that a construction be provided wherein the valve proper will be fully responsive to the demands thereon, and the present construction affords such a device, the valve being free of any support tending to produce friction under movement and likewise of such form as to present a minimum of surface against which the incoming air could act frictionally. This latter feature, while doing away to a greater or less extent with the frictional retardation of the ingoing air, likewise prevents the valve being forced against its inner seat at an improper time by the inrushing air, as is apt to occur where the valve presents an extended or flat face.

In the drawings (Fig. 1), 1 denotes the engine cylinders, 2 the manifold, 3 the branches thereof, leading to the various cylinders, 4 the carbureter, and 5 the throttling shutter, indicated as of the butterfly type. These parts may be of any approved form, and the auxiliary valve, denoted as a whole by 6, is screwed into the manifold and occupies a horizontal position.

The valve structure is shown in detail in Figs. 2, 3, and 4. It comprises a hollow, exteriorly threaded stem 7, having a nipple 8, which latter is screwed into the manifold 2, the stem having mounted thereon an interiorly threaded shell 9, held in its adjusted position on the stem by a lock-nut 10. This shell 9 has a passageway $11^a$, and the outer end of the shell is provided with a valve seat 11 which surrounds this passageway. The exterior of the shell, at its outer end, is reduced in diameter and a cap piece 12 is secured thereon by sweating or in any other suitable manner, so that the shell and cap-piece are practically integral and constitute the casing of the structure. The cap piece is provided with an inlet port 13 and with an interiorly-disposed valve seat 14, against which the ball valve 15 is normally pressed by a coiled spring 16. The end convolutions of said spring are preferably brought into close contact with one another, and the parts are so proportioned that the ball valve extends to a slight extent into those convolutions which are adjacent thereto. In other words, the spring forms a support for the ball valve, and these parts always maintain such position or contact no matter what may be the position of the valve with reference to the other parts of the structure. The spring, as will be seen upon reference to Figs. 2 and 3, rests at its inner end upon a shoulder 17 formed in the nipple 8, and when expanded extends through the stem, through the shell 9, and projects into the cap piece 12, holding the ball valve 15 to the outer seat 14 and closing off the air supply. By making the spring in the man-

ner specified, with both ends alike, one need pay no attention thereto in assembling the structure; furthermore, the close convolutions afford a better seating for the inner end of the spring on shoulder 17 than would otherwise obtain.

The operation of the structure is as follows: When the engine is at rest, the valve is closed upon the outer seat 14, as in Fig. 2. When the engine is started or turned over, at which time it is usually throttled by closing shutter 5 to a greater or less extent, it is, of course, desirable to have a rich mixture, and as the vacuum on the manifold is high in degree the valve will be drawn inwardly until it comes to the dotted-line position, Fig. 3, and closes upon seat 11, thereby cutting off the inflow of air through the structure into the manifold. Of course, a small amount of air will pass into the manifold 2 while the valve is moving under atmospheric pressure from the outer to the inner seat, but such amount is relatively small. When the engine begins to run and the shutter 5 is opened, the degree of vacuum in the manifold is lessened, whereupon valve 15 moves outwardly into the position shown in full lines, Fig. 3. Upon an increase of speed, brought about by a further opening of shutter 5, the valve 15 will move nearer seat 14, under action of the spring, for the reason that the degree of vacuum is less in the manifold, the action of the engine being relieved or supplied at such times mainly through the carbureter, and the air pressure against the valve being consequently lessened.

The use of the structure is especially desirable when the machine is running on the high speed gear, with the engine throttled down, as under these conditions it is absolutely necessary that the mixture should be exceedingly rich, which, of course, means that a minimum amount of air should be supplied through the air valve; under such operative conditions valve 15 seats against the inner seat 11 and remains in such position, because the throttling down of the carbureter causes a high degree of vacuum to be brought about in the manifold. But this structure possesses especial utility when a car is running fast, on the high gear, and with the throttle, of course, well opened, since in such instance a rich mixture is not desirable, and, furthermore, would entail considerable waste of gasolene, and under these conditions the ball valve 15 will remain in a floating state or balance between the spring 16 and the outer seat 14, or, in other words, such valve will not be quite in its closed position against this outer seat, and, owing to the freedom of the valve it will be in a constant state of oscillation, nearer to or farther away from this outer seat 14, according as the speed of the car becomes a little faster or a little slower, and, therefore, more or less air will be constantly admitted through the opening 13 into the manifold, to correct the more or less vacuum which would ordinarily take place therein and which would result in drawing a mixture that is more or less too rich. The saving of gasolene by the use of this improved structure, under the conditions above outlined, is very material.

It will be appreciated that the valve body, composed of the members 9 and 12, may be adjusted on the stem 7, and as a consequence, the tension or strength of the spring may be regulated to accord with the requirements of any particular engine to which the device may be applied. It is to be further noted, as above mentioned, that the valve is freely movable and out of contact with any surfaces during its movements which would tend to create friction; in other words, it may be termed a floating valve. That it always maintains its position with reference to the spring, even when in its medial or wide-open position, as in full lines in Fig. 3, is due to pressure of the in-rushing air acting in opposition to the spring.

Having thus described our invention, what we claim is:

1. An air-intake and regulating valve, comprising a casing having spaced inner and outer ports; a valve-seat within the casing adjacent each of said ports; a floating valve positioned with the casing; a hollow stem in communication with said casing and forming the support therefor; and a coiled spring mounted within the casing and bearing at one end on the valve and at its opposite end on a fixed portion of the structure and serving to close the valve upon the seat of the outer port.

2. An air-intake and regulating valve, comprising a casing having spaced inner and outer ports; a valve-seat within the casing adjacent each of said ports; a floating valve positioned within the casing; a hollow stem in communication with said casing and forming the support therefor; a coiled spring mounted within the casing and bearing at one end on the valve and at its opposite end on a fixed portion of the structure and serving to close the valve upon the seat of the outer port; and means for securing adjustment of the spring.

3. An air-intake and regulating valve, comprising a casing having spaced outer and inner ports; a valve-seat arranged within the casing adjacent each of said ports; a floating spherical valve loosely placed within the casing intermediate the seats; and a coiled spring bearing against that side or portion of the valve next adjacent the inner port and urging the valve against the outer valve-seat.

4. An air-intake and regulating valve,

comprising a casing having spaced outer and inner ports; a valve-seat arranged within the casing adjacent each of said ports; a spherical valve positioned within the casing; a hollow stem upon which the casing is adjustably mounted; means for securing the casing in its adjusted position on the stem; and a coiled spring, having one end seated within the stem, the opposite end passing through the inner port and bearing upon the valve and serving to close the valve upon the seat of the outer port.

5. An air-intake and regulating valve, comprising a casing having spaced outer and inner ports; a valve-seat arranged within the casing adjacent each of said ports; a spherical valve positioned within the casing; a hollow threaded stem upon which the casing is adjustably mounted; a lock-nut for securing the same in place; and a coiled spring, the convolutions of each end of which are in close contact with one another, said spring being seated within the stem, extending therethrough, through the inner port, and bearing against the valve.

6. An auxiliary air-intake for internal combustion engines, comprising a casing having alined spaced ports which communicate with the atmosphere and manifold respectively; a floating valve adapted for oscillation between said ports to open or close the same; a hollow stem on which the casing is mounted and which communicates with the casing and the manifold; and a spring normally urging the valve to seat against the atmosphere port.

In testimony whereof we affix our signatures in presence of two witnesses.

HOWARD W. TAYLOR.
WILLIAM EARL RUSSELL.

Witnesses:
DWIGHT A. LACEY,
E. ROLAND CROFUT.