Jan. 8, 1952 L. GADDONI 2,581,478

GASOLINE ECONOMIZER VALVE

Filed July 21, 1944

Fig. 1.

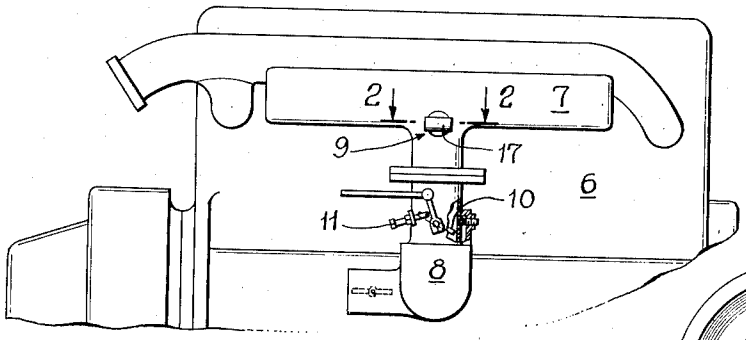


Fig. 4.

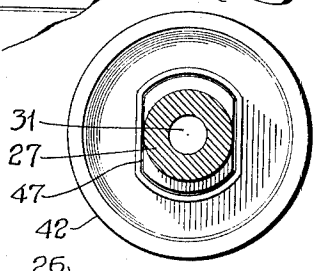


Fig. 2.

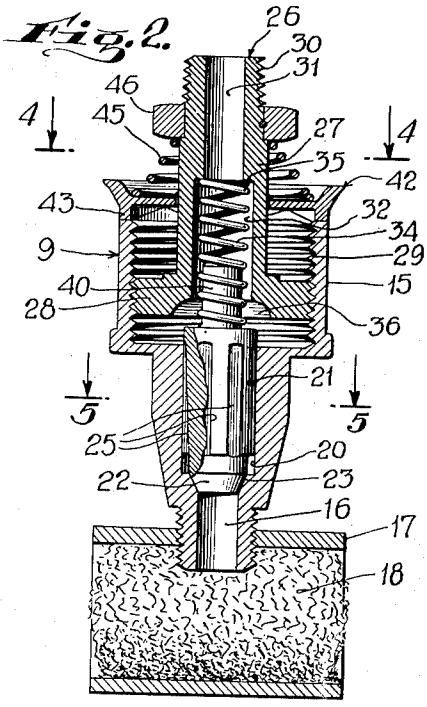


Fig. 3.

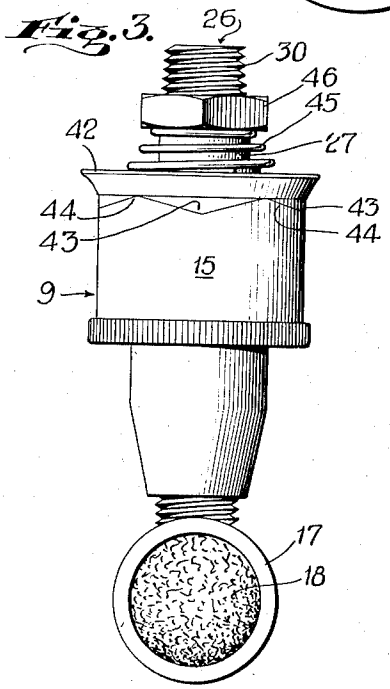
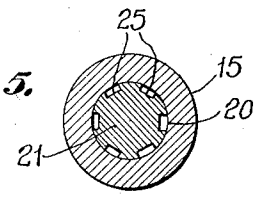


Fig. 5.



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GASOLINE ECONOMIZER VALVE

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3 Claims. (Cl. 251—145)

1

This invention relates to a gasoline economizer valve.

Explosion engines more particularly, gasoline engines, stationary and vehicle powering engines, and more particularly automobile engines are called on to drive the automobile under various load conditions and at various speeds with maximum maneuverability. These engines must start cold when cranked or turned over at a small number of revolutions per minute requiring a rich explosive mixture for this purpose. Rich explosive mixtures are also required for quick pick-up. For idling operations the mixture should be just rich enough to operate the motor at normal idling speed.

On descending hills or steep grades using the motor as a braking power to retard the speed of the automobile or on releasing the throttle to slow down the automobile before coming to a stop, the mixture should be very lean to save gasoline.

Certain of the above desired requirements are satisfied to some degree by present day carburetor equipment. The carburetor is made to provide a proper mixture of say 15 to 1, but is unable to do so at all speeds and loads.

Under vacuum conditions produced by cranking and with the throttle closed, the mixture drawn into the engine is just rich enough for a proper starting. This part of the operation in starting the engine should be allowed to function in the normal manner and should not be disturbed. It is known that the richest mixture is obtained when the vacuum in the manifold is the highest and that the mixture becomes leaner as the vacuum decreases. The vacuum is produced by the engine speed, but it is modified by the position of the throttle. The mixture will become richer due to the fact that as the speed of the air through the carburetor increases due to increased suction, the supply of the liquid gasoline increases at a faster rate with the result that the mixture is too rich at high speed of the engine with a consequent waste of fuel.

The pressure in the intake manifold is a result of the speed of rotation of the engine and the position of the throttle.

Various attempts have been made to economize on the amount of gasoline used that it has been proposed to place an air admitting valve in the manifold between the throttle and the engine, but the efficiency obtained has not been good enough to cause it to be adopted. Its initial cost, expense of installation and maintainence and poor performance did not warrant its adoption. As understood, the inventor's object was to

2

introduce air into the existing mixture in the manifold at any time the vacuum would open the valve and thereby a certain economy was probably obtained, but no thought, however, was given to provide a proper amount at all speeds of the motor and positions of the throttle in order to obtain fine performance and good maneuverability.

Among the objects of my invention is an air intake valve which is made adjustable so that it can be set to cause a smooth running motor at idling speed with a minimum consumption of gasoline.

It is also an object to produce such a valve which will be non-operating at cranking speed so that the engine will receive the rich carburetor controlled mixture for starting purposes.

It is a further object of this invention to provide a valve which will close when the throttle is opened wide for a quick pick-up so as to not dilute the rich mixture required at this time, but which will be opened to admit air to dilute the mixture as the throttle is gradually released to a position to maintain the acquired speed.

It is a further object of this invention to provide a valve which will admit the maximum amount of air into the manifold in descending a steep grade or coming to a stop so that full advantage may be taken of the braking power of the engine in retarding the speed of the automobile without unnecessary waste of the very rich mixture that the carburetor alone would deliver at that particular time.

It is a further object to provide a valve which will come into operation after a certain amount of suction has been attained in the intake manifold and which thereafter gradually permit more and more air to enter the manifold in direct proportion to the increase of suction due to increase of speed of the engine, the position of the throttle or both.

Having been able to effect an economy of from 20 to 30% and more in the use of gasoline with a better and smoother performance, as shown by a series of tests on several makes of automobiles, and in view of the immediate importance of my invention, I will describe a present preferred form found satisfactory in connection with the accompanying drawings in which:

Fig. 1 shows in side elevation an engine, intake manifold and carburetor diagrammatically with my improved air intake valve mounted on the manifold,

Fig. 2 is an axial section through the air intake valve,

Fig. 3 is a side view of the air intake valve,

Fig. 4 is a section on the line 4—4 of Fig. 2 and

Fig. 5 is a section on the line 5—5 of Fig. 2.

In Fig. 1 I have shown diagrammatically a gasoline engine at 6, an intake manifold at 7, a carburetor at 8 and my improved air intake valve at 9 mounted on the manifold at the point where the stream of explosive mixture enters the distributing section of the manifold. The valve may be mounted in a vertical position in the top wall of the manifold or it may be mounted anywhere between the throttle 10 and the manifold proper.

The throttle is of the usual construction and is operated by the usual means from the accelerator and an adjustable stop 11 is provided to control or fix the released or closed position of the throttle.

The carburetor is provided with the usual adjusting means and idling of the engine is made in the usual manner. After this adjustment has been made, this valve, which is originally locked in a closed position, is released slowly to admit air which will cause the engine to pick up speed and turn faster. Releasing or opening of the valve is continued until the engine becomes irregular. At this point the valve is turned back a few notches until a smooth idling operation is attained. A minor adjustment of the throttle stop 11 may be necessary to slow the engine down to a desired idling speed.

My improved air intake valve 9, as viewed in Fig. 2, comprises a cylindrical housing 15 provided with a bore of three different diameters. The lowermost bore section 16 constitutes the air intake port of the valve which is of sufficient cross sectional area to admit the greatest amount of air required. If desired, an air filter casing 17 containing any suitable filtering material 18 may be threaded on the lower end of the housing 15.

The bore section 16 communicates with a slightly larger diameter long bore section 20 in which operates the valve 21 of my invention. The valve has a sliding fit in the bore section 20 and is of substantially the same length as indicated to provide for a large amount of movement between its closed and fully open positions and to provide for a certain amount of inertia. The lower end of the valve 21 is conical as at 22 to seat on a conical seat 23 formed in the shoulder between the bore sections 16 and 20. The outer face of the valve is grooved or fluted as indicated at 25, the grooves being of increasing depths as at the left in Fig. 2, from a point near the upper end of the valve toward the lower end of the valve so as to admit a small amount of air when the valve is first moved away from its seat and increasing amounts as the movement of the valve away from its seat is continued by stronger suction in the manifold.

Threaded in the upper end of the cylindrical housing 15 is a member 26 which has a tubular body 27 and an enlarged head 28 on its lower end threaded as indicated into the upper large section 29 of the bore in the housing 15 whereby the member 26 and the housing may be relatively adjusted toward and away from each other for controlling the spring pressure on the valve and for locking the valve in seated position as will appear presently.

The member 26 is threaded at its upper end as indicated at 30 for threaded engagement in a hole in the intake manifold 7.

The member 26 is provided with a through bore, the upper end section 31 of which is of

sufficient size to permit the largest amount of air required to pass therethrough into the intake manifold. The lower end section of the bore is enlarged as at 32 to provide a space to receive a weak valve seating spring 34 which at its upper end is seated on a shoulder 35 formed between the sections of the bore.

The lower end of the enlarged bore section 32 terminates in a transverse groove 36 extending diametrically and laterally beyond the outer face of the valve and of no greater width than the diameter of the enlarged section 32 of the bore which is of less diameter than that of the valve with the result that when the upper end of the valve 21 is forced against the lower end of the member 26 air will be permitted to pass by the valve into the bore 32, etc. and into the intake manifold. The member 26 may be screwed far enough into the housing 15 to engage and seat the valve 21 for purposes referred to. The lower end of the spring surrounds a projection 40 on the upper end of the valve.

For the purpose of maintaining adjustment of the valve spring, I employ a spring pressed cup-like member 42 which is provided with teeth 43 engaging teeth 44 on the housing 15, the teeth being shaped so that they may ride over each other as the housing 15 is rotated to adjust the valve spring. The teeth of the member 42 are held in engagement with the teeth of the housing 15 by a spring 45 seated against a wrench engaging flange or member 46 on the member 26. The member 42 is held against rotation on the member 26 in any suitable manner as indicated at 47, Fig. 4.

I have illustrated and described a preferred embodiment of my invention. In this form I employ a rather heavy valve to provide for a certain amount of inertia and a rather weak spring and valve controlled openings which extend in the direction of movement of the valve. When an internal combustion engine of the usual reciprocating piston type is running at a constant speed, for example as in idling, there are fairly great variations in the vacuum in the intake manifold which result in corresponding variations in the effective pressures operating on the lower or outer end of the valve to open it. There is, therefore, a rapid succession of forces tending to reciprocate the valve which in the case of the usual form of valve, which has a small amount of movement and which is relatively light and urged toward its seat by a relatively strong spring, rapidly reciprocates the valve causing variations in the valve opening and a destructive hammering action on the valve seat. My valve is not responsive to such changes and remains stationary and, therefore, provides a valve opening which admits the same amount of air at all times during idling except as such amount is effected by the changes in vacuum in the intake manifold. I have found by tests that the changes in vacuum in the intake manifold equipped with my valve are small with the further advantage that the speed of the air through the carburetor varies very little resulting in a carburetor delivered mixture which is fairly uniform rather than one which is alternately rich and lean.

In my construction the lower or outer end of the valve moves a considerable distance away from its seat preventing fluttering of the valve that might otherwise be caused by a rapid flow of air between the valve and seat. Furthermore, as the flow controlling ports or openings are

located between the side of the valve and the valve guide, the resultant pressure on the valve, due to the speed of the air past the valve, operates at right angles to the movement of the valve. It is obvious that I may employ the reduced faced end of the valve merely as a stop or that I may omit it in which case the inner or upper circumferentially continuous end of the valve would in its home position lie within the upper end of the guide and prevent the passage of air. From this aspect I may regard the inner face of the guide as the valve seat.

While I have shown a preferred form for purposes of disclosure and described it with particularity, it is to be understood that I reserve the right to all changes and modifications that fall within the principles of this invention as defined by the appended claims.

What I claim is:

1. A valve mechanism comprising a valve casing provided interiorly with a cylindrical valve guiding chamber, an enlarged chamber at one end of said guiding chamber providing a shoulder at said end, a reduced section at the other end of said guiding chamber providing a valve seat ported to the exterior, a spring pressed piston type valve mounted for reciprocation in said guiding chamber and provided at one end with a valve face cooperating with said seat and provided in its cylindrical face with grooves tapering with increasing cross section toward said end of said valve and cooperating with said shoulder to control the area of the passageway between said valve and shoulder.

2. A valve mechanism comprising a valve casing element provided interiorly with a cylindrical valve guiding chamber providing a shoulder at one end, a reduced section at the other end of said guiding chamber providing a valve seat ported to the exterior, a spring pressed piston type valve mounted for reciprocation in said guiding chamber and provided at one end with a valve face cooperating with said seat and provided in its cylindrical face with grooves tapering with increasing cross section toward said end of said valve and cooperating with said shoulder to control the area of the passageway between said valve and said shoulder, a spring bearing at one end against the other end of said valve, and a ported valve casing element adjustably connected to said first valve casing element and bearing against the other end of said spring to adjust the compression of said spring, and engageable by said valve to limit the opening movement of said valve and to be advanced to move and hold said valve on said valve seat.

3. A valve mechanism comprising a valve casing element provided interiorly with a cylindrical valve guiding chamber providing a shoulder at one end, a reduced section at the other end of said guiding chamber providing a valve seat ported to the exterior, a spring pressed piston type valve mounted for reciprocation in said guiding chamber and provided at one end with a valve face cooperating with said seat and provided in its cylindrical face with grooves tapering with increasing cross section toward said end of said valve and cooperating with said shoulder to control the area of the passageway between said valve and said shoulder, a spring bearing at one end against the other end of said valve, and a ported valve casing element adjustably connected to said first valve casing element and bearing against the other end of said spring to adjust the compression of said spring, and engageable by said valve to limit the opening movement of said valve and to be advanced to move and hold said valve on said valve seat, said other end of said valve and said ported valve casing element having means defining fluid passageways there-between when said valve is moved against said ported valve casing element.

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