

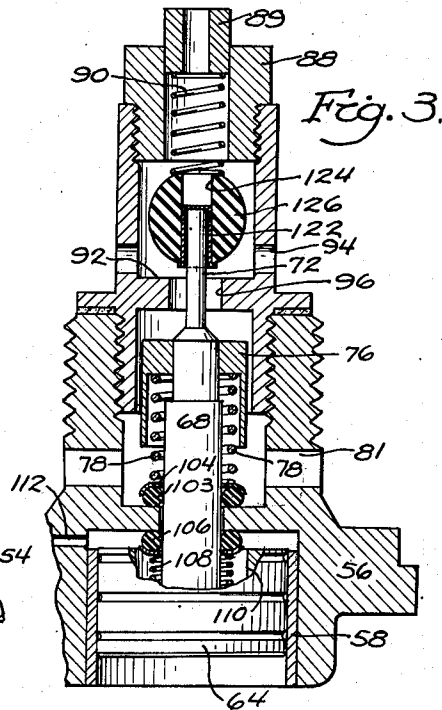
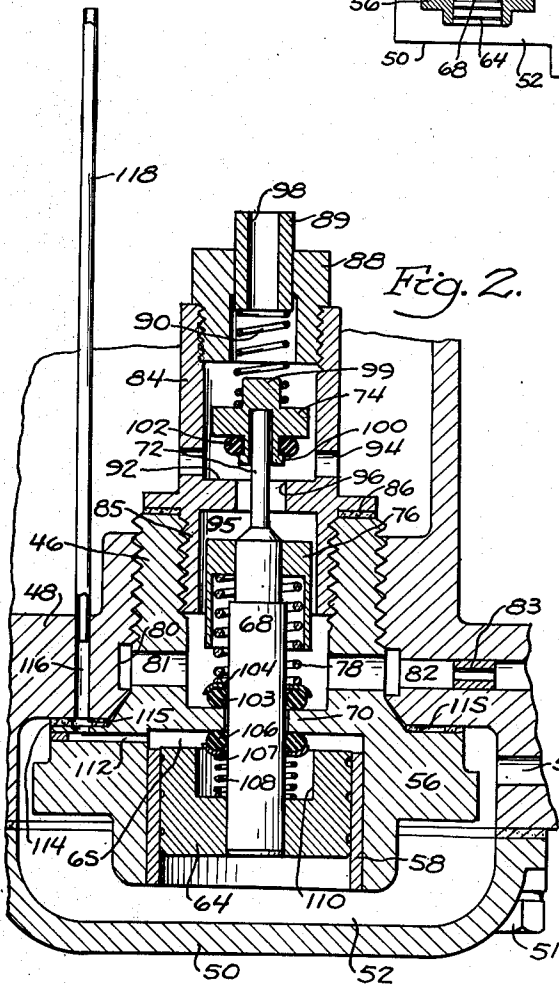
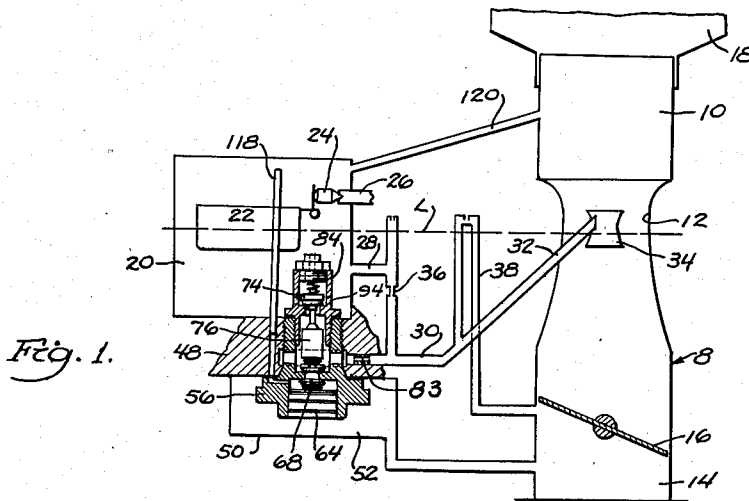
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ECONOMIZER MECHANISM FOR CARBURETORS

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ECONOMIZER MECHANISM FOR
CARBURETORS

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5 Claims. (Cl. 261-69)

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This invention relates to carburetors for internal combustion engines, and more particularly to an economizer mechanism to enable the carburetor to supply fuel to the engine in increased quantity to increase the power thereof when needed.

Most carburetors as now constructed include a device, usually referred to as an economizer or power jet, which includes a valve controlled by a piston or diaphragm subjected to the vacuum in the intake manifold to increase the rate of fuel supply to the carburetor, and thereby enrich the fuel-air mixture, when the throttle is in or near its fully open position. Such devices are often subject to leakage, which may result in drawing excess fuel into the induction passage at times when it is not wanted, thereby unduly enriching the mixture, with loss of gasoline economy. Leakage through the economizer may result from defective operation of the economizer valve, either because of wear due to vibration or because corrosion or the presence of foreign matter such as grit prevents it from seating properly.

Defective operation of the economizer may also result from a defective or maladjusted valve spring. Thus, if the economizer valve is designed to open at a suction in the manifold of, say, seven inches of mercury, it may open at a lower or a higher suction, causing either a waste of fuel or faulty operation of the engine.

Defective operation of the economizer may also result from leakage of the fuel through the economizer, which may result in draining the float chamber by gravity while the car is standing with the engine not in operation.

Defective operation of the economizer may result from various other causes, and is difficult to detect, since commercial carburetors are so constructed that it is impossible, without disassembling the carburetor, to apply a measured amount of suction to the fuel outlet thereof and to the vacuum connection, and measure the resulting fuel flow. Also if leakage is found or suspected, it is difficult to remedy by means of ordinary shop tools.

An object of the present invention is to provide a carburetor comprising an economizer mechanism having improved means for preventing leakage of fuel therethrough.

A further object of the invention is to provide an economizer wherein the valve is readily replaceable and which will not often get out of proper working order.

A further object of the invention is to provide a carburetor wherein the economizer unit

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may readily be withdrawn for testing, cleaning and adjustment, and replaced without altering its adjustment.

A further object of the invention is to provide economizer mechanism which is usable in known types of carburetors in substitution for the corresponding mechanism originally supplied with the carburetor.

The invention comprises an economizer of the piston type including a shell or body which, with its contained elements, may be removed as a unit, tested by applying suction thereto, adjusted by means of suitable tools, and replaced in the carburetor without disassembling the unit or disturbing the adjustment. Leakage between relatively moving parts of the unit is prevented by sealing members of special type.

Further objects and advantages of the invention will be apparent from the following description, taken in connection with the appended drawing, in which:

Fig. 1 is a diagrammatic view of a carburetor and the fuel system thereof showing, on an enlarged scale, the device of the present invention incorporated therein, with the economizer valve in closed position.

Fig. 2 is an enlarged sectional view of the economizer unit and its associated parts, showing the economizer valve in open position.

Fig. 3 is a fragmentary sectional view similar to Fig. 2, but showing a modified form of economizer valve.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

The carburetor shown in the drawing is of the down-draft type commonly used with automobile engines, but may be of any known or suitable construction. It comprises a body 8 forming an induction passage which includes an air inlet 10, a main venturi 12, and a mixture outlet 14 designed to be connected to the intake manifold of an internal combustion engine, not shown. The induction passage is controlled in the usual manner by a manually operated throttle valve 16. Usually an air cleaner, such as is indicated fragmentarily at 18, is connected to the air inlet.

Fuel is supplied to the induction passage from

a reservoir 20, which in the example shown is a float chamber having a float 22 therein, which actuates a fuel valve 24 controlling a fuel inlet 26 leading from any suitable source of supply. Thence the fuel flows through passages 28, 30 to the main fuel nozzle 32, which discharges at the throat of the main venturi 12. In the example shown, a second venturi 34 is provided to form a discharge member for the main nozzle. A metering orifice 36 is provided in the passage 28, as is the usual practice, and an idling fuel passage 38 of any suitable construction may lead from the passage 30 to a point above the fuel level L and discharge adjacent the edge of the throttle 16 when the same is in closed position. Suitable acceleration pump mechanism, as well as check valves, vents, and metering orifices may be provided, as known in the art.

The economizer constituting the present invention comprises a body or shell having a threaded portion 46 which is screwed into a threaded bore in the bottom 48 of the float chamber so that the entire unit may readily be removed from the carburetor. The bottom 48 cooperates with a cover plate 50, secured thereto by bolts 51, to form a vacuum chamber 52 which is connected by a vacuum passage 54 to the induction passage of the carburetor at a point posterior to the throttle 16.

The lower portion of the economizer body is flared to form a base 56 formed with a cylindrical bore in which is mounted a cylinder liner 58 which terminates below the upper end of the bore, as shown. Slidable in the liner 58 is a piston 64 the lower end of which is subjected to the vacuum in vacuum chamber 52. The space above the piston 64 forms a chamber 65.

The piston 64 is connected as by a driven fit to a plunger 68 which is slidable in a septum 70 formed in base 56 of the economizer body. The upper reduced end of the plunger constitutes a stem 72 which is designed to actuate a retaining member 74 forming part of the movable member of the economizer valve, to raise it off its seat when the manifold vacuum is low, as shown in Fig. 2, and to close it when the manifold vacuum is high, as shown in Fig. 1.

A recessed collar 76 is adjustably fixed to an intermediate portion of plunger 68, as by a driven fit, and forms a seat for a stiff compression spring 78 which urges the plunger upwardly. The bottom wall 48 of the float chamber is formed with an annular recess 80 which communicates with radial ports 81 formed in the portion 46 of the economizer, and thence with an outlet passage 82 which is connected to passage 30 by a metering orifice 83.

A tubular member 84 forms the upper portion of the economizer body, and has an externally threaded sleeve 85 which is threaded into the upper end of the portion 46, leakage between the two being prevented by a gasket 86. A bored plug 88 is threaded into the upper end of the member 84, and a retaining plug 89 is driven into the bore of plug 88, to serve as an adjustable seat for a light compression spring 90 which bears against the retaining member 74 to urge the same toward its seat 92.

Radial ports 94 connect the float chamber 20 to the interior of the economizer body, whence fuel flows through a port 96 to the fuel space 95 within member 84, past the collar 76, and thence through ports 81, passage 82, and orifice 83 to the main nozzle 32. Plug 89 is provided with a relief port 98 which connects with the interior

of the float chamber, to permit the member 74 to move freely.

The retaining member 74 is of circular form, and has a projection 99 at its top to provide a seat for the spring 90. An axial bore in member 74 receives the stem 72 in loose fitting relation to form a one-way rockable connection therewith. The member 74 has a depending flange 100 which surrounds the stem 72 and is spun outwardly to retain an annular washer 102, which acts to contact the shoulder of the seat 92 and to be deformed thereby when the valve is closed. The washer 102 thus forms with the retaining member 74 a valve element which, when manifold vacuum causes stem 72 to move downwardly, is moved by spring 90 into contact with the valve seat 92, to thereby obstruct the flow of fuel as indicated in Fig. 1. At lower vacuums, the member 74 is moved by spring 78 to the position indicated in Fig. 2, to permit an auxiliary flow of fuel through port 96 and thence to the carburetor.

Sufficient clearance is provided between plunger 68 and septum 70 to permit free movement of the plunger. In order to prevent leakage of fuel downwardly from the space 95 to the chamber 65 above the piston 64, an annular sealing member or O-ring 103 is fitted about the plunger 68 above the septum 70 and is provided with a collet 104 which forms a seat for the spring 78. Additionally or alternatively, a second sealing member 106 is fitted about the plunger 68 below the septum 70 and is provided with a collet 107 which forms the upper seat for a light compression spring 108. The spring 108 is positioned in a cylindrical recess 110 in the piston 64, so as to urge the member 106 against the septum and thereby prevent passage of fuel therepast.

In order to prevent the trapping of fuel or vapors the space 65 is vented to atmosphere through a passage 112 which communicates through apertures in a gasket 114 with a bore 116 in the bottom 48 of the float chamber, and thence through a tube 118 with the interior of the float chamber above the fuel level L. Gasket 114 is formed with a plurality of apertures 115 spaced so closely that no indexing of the gasket is necessary in order to provide communication between passage 112 and the bore 116. The float chamber is in turn vented to the air inlet 10 in any suitable manner, indicated schematically in Fig. 1 by the vent tube 120.

The sealing members 103, 106, and the washer 102, are preferably of the type disclosed in applicant's copending application Serial No. 83,688, filed March 26, 1949, being of circular cross section and made of material which is capable of elastic distortion under the pressures to which it is subjected, and impervious and resistant to gasoline and to the acids and other impurities contained in commercial gasoline. An example of a material which is satisfactory is Buna N, which has also a low coefficient of friction to metal in the presence of gasoline, and thus forms a relatively frictionless yet fluid tight seal between the parts.

The construction shown in Fig. 3 is the same as that above described, except that in this embodiment the stem 72 is loosely fitted into a cup 122 which is tightly seated in the bore 124 of a spherical member 126. The member 126 is pressed downwardly upon the stem 72 by a compression spring 99 of the same type as shown in Fig. 2. The member 126 is so shaped as to seat against the seat 92 of port 96. It may be

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formed of an elastomer such as is used in elements 102, 103 and 106, or may be formed of metal such as steel.

In both forms of the invention, the economizer may be withdrawn from the carburetor, inspected, adjusted so that the fuel valve will open at the desired degree of vacuum, and replaced as a unit in the carburetor without disturbing the adjustment. In order to increase the initial stress of spring 90, and thereby decrease the degree of vacuum required to seat the retaining member 74, the plug 93 may be driven downwardly without disassembling the economizer unit. In order to decrease the initial stress of spring 90, the plug 93 may be unscrewed and the plug 93 driven in the opposite direction.

Although the invention has been described with reference to certain illustrated embodiments thereof, it may be embodied in other forms, and is not limited except in accordance with the terms of the following claims.

I claim:

1. In a carburetor having an induction passage, a constant level fuel chamber, and a fuel passage leading from said chamber to said induction passage; a valve controlling said fuel passage, a cylinder positioned below the level of fuel in said chamber, a wall separating said cylinder from said fuel passage, a piston in said cylinder, a valve stem connected to said piston passing through said wall and connected to a movable member of said valve, an annular washer encircling said stem for preventing leakage between said fuel passage and said cylinder, a spring urging said washer against said wall and means for venting one end of said cylinder to atmosphere.

2. The invention defined in claim 1, comprising in addition a collet overlying said washer and forming a seat for said spring.

3. In a carburetor having an induction passage, a throttle therein, a constant level fuel chamber, and a fuel passage leading from said chamber to said induction passage; a cylinder positioned below the level of fuel in said chamber, a wall separating said cylinder from said

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fuel passage, a piston in said cylinder, a stem connected to said piston and passing through said wall, a valve controlling said fuel passage and having a movable member connected to said stem a spring-pressed washer encircling said stem to prevent leakage between said fuel passage and said cylinder, a connection from one end of said cylinder to a point in said induction passage posterior to said throttle, and a connection from the other end of said cylinder to a point in said fuel chamber above the level of fuel therein.

4. The invention defined in claim 3, comprising in addition a connection between said fuel chamber to a point in said induction passage anterior to said throttle.

5. In a carburetor having an induction passage, a constant level fuel chamber, and a fuel passage leading from said chamber to said induction passage; a pressure chamber positioned below the level of fuel in said fuel chamber, a wall separating said pressure chamber from said fuel passage, a pressure responsive member in said pressure chamber subjected to varying pressures developed in the carburetor, a valve stem connected to said member and passing through said wall, a valve controlling said fuel passage and having a movable member rockably mounted on said stem, an elastomer washer encircling said stem, a compression spring between said member and the washer holding the washer in contact with said wall to prevent leakage between said fuel passage and said pressure chamber, and a venting connection from said pressure chamber to a point in said fuel chamber above the level of fuel therein.

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