

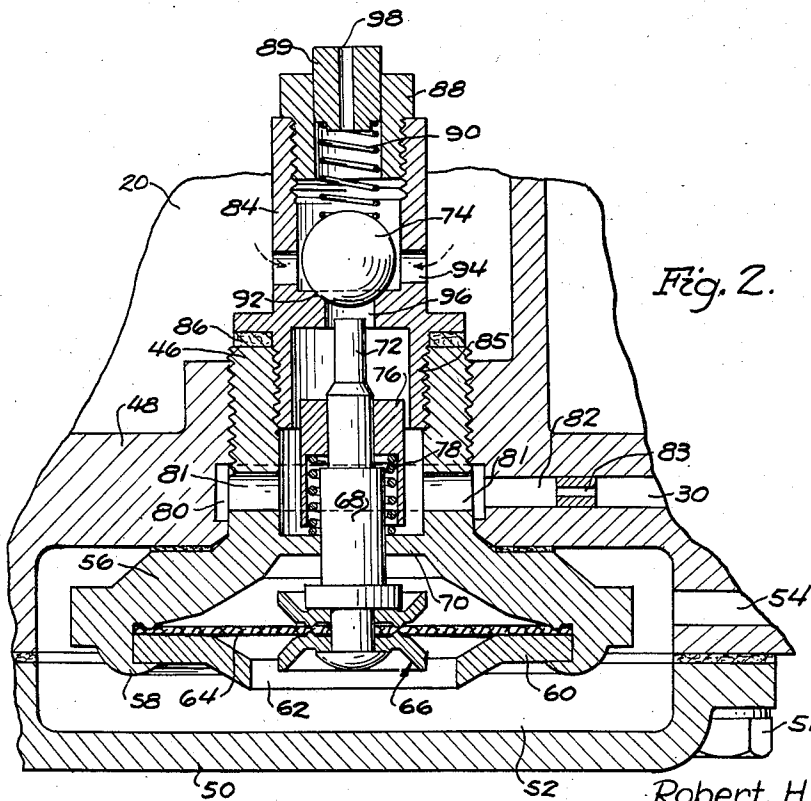
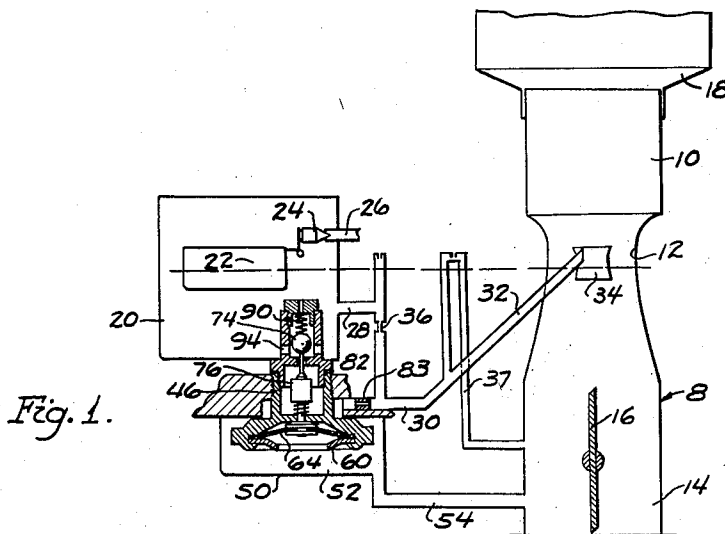
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R. H. HIEGER ET AL

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ECONOMIZER

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INVENTORS  
Robert H. Hieger &  
Orville C. Keller

BY *A R McCrady*  
ATTORNEY.

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## ECONOMIZER

Robert H. Hieger and Orville C. Keller,  
Detroit, Mich.

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1

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

Many commercial carburetors as now constructed include a device, sometimes referred to as the power jet or economizer, actuated by a spring-pressed diaphragm controlled by the vacuum in the intake manifold to increase the rate of fuel supply to the main nozzle, and thereby enrich the fuel-air mixture, when the throttle is in or near its fully open position. Such device is necessarily 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 a leaky diaphragm, which permits fuel to flow through the vacuum line to the induction passage. It may also 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 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 is difficult to detect, since commercial carburetors are so constructed that it is impossible, without removing the economizer from 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 economizer mechanism having improved means for preventing leakage of fuel therethrough.

A further object of the invention is to provide an economizer wherein the check 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 may readily be withdrawn for testing, cleaning and adjustment.

A further object of the invention is to provide

2

an economizer which does not depend upon manifold suction acting upon the diaphragm to retain the economizer valve closed, but wherein a spring closes the valve whenever the manifold suction increases to a critical value.

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.

A further object is to provide an economizer not mechanically connected to the acceleration pump and wherein all of the parts are contained in an assembled unit which can be installed in the carburetor as such, and can be removed from the carburetor and tested as a unit.

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.

Fig. 2 is an enlarged sectional view of the economizer unit and its associated parts.

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 downdraft 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 and 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 idle passage 37, of any suitable construction, leads from the passage 30 to discharge adjacent the edge of the throttle 16 when the same is in closed position. Suitable acceleration pump mechanism, as well as check valves, air bleeds, and metering orifices may be provided, as known in the art.

The economizer constituting the present invention comprises a body 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 when the same is in closed position. The lower portion of the economizer body is flared to form a recessed disk 56 the lower edge 58 of which is spun inwardly to retain an annular member 60 having a central aperture 62. A flexible diaphragm 64 has its edges clamped between members 56 and 60 and is subjected on its under side to the vacuum in the induction passage posterior to the throttle. The diaphragm 64 is preferably formed of neoprene having a double coating of Buna N, both materials being highly resistant to gasoline and to acids and other impurities contained therein. The diaphragm is connected by any suitable coupling 66 to a plunger 68 which passes through a septum 70 in disk 56. The upper reduced end 72 of the plunger is designed to engage a ball valve 74 to raise it off its seat when the manifold vacuum is low, as shown in Fig. 1. At higher vacuum, the upper end 72 is spaced from the valve 74, as shown in Fig. 2, to enable the valve to seat itself freely.

A recessed collar 76 is adjustably fixed to plunger 68, as by a driving fit, and carries a 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 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 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 ball 74 to retain the same on its seat 92 until unseated by upward movement of the plunger 68. Radial ports 94 connect the float chamber 20 to the interior of member 84, whence fuel flows through a port 96 to the interior of the economizer body, 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 valve 74 to move freely.

In general, the fuel system in the carburetor just described functions in the same manner as the fuel system in known types of carburetors. However, the economizer mechanism herein disclosed is particularly resistant to factors tending to cause leakage, since the ball valve 74 will ordinarily be made of a metal which is resistant to

corrosion, and its spherical shape enables it to rotate on its own center to thereby distribute the wear over its entire surface and prevent the formation of grooves such as are often formed in needle valves and the like. Also, the ball will by its rotation often dislodge grit or other foreign matter which would otherwise lodge between the valve and its seat.

If at any time there is a question whether fuel is leaking through the diaphragm 64, or escaping past the valve 74 when the same is not raised from its seat by plunger 68, or if it is desired to test the functioning of the valve 74 under various degrees of suction, the entire economizer unit may be unscrewed from the carburetor. Suction may then be applied to port 62 to draw the diaphragm 64 downwardly and permit the spring 90 to press the ball valve 74 against its seat 92. With the parts in this position, suction may be applied to ports 81 in such degree as would exist in passage 82 if the carburetor were in operation. If there is leakage past the ball valve 74 that fact will then manifest itself by release of the suction, as known in the art. Alternatively, the member 84 may be unscrewed from the portion 46, a rubber hose may be slid over the sleeve 85, and suction applied to the rubber hose to determine whether there is leakage past the ball valve. Leakage in the diaphragm may be similarly detected by application of suction to aperture 62.

If the economizer is found not to be functioning properly, the diaphragm or valve may be replaced, or the spring 90 may be adjusted or replaced by a stiffer or a weaker spring, or collar 76 may be driven up or down on plunger 68 to vary the force exerted by spring 78, increase of such force acting to counteract too great stiffness of spring 90. The economizer may then be replaced in the carburetor as a unit without disturbing its adjustment.

The fact that ball valve 74 is held on its seat only by the force of the light spring 90, rather than by the force of suction acting on the diaphragm 64, reduces wear and distortion of the valve seat.

Although the invention has been described with reference to a particular embodiment thereof, it may be embodied in other forms within the skill of artisans in this art, and is not limited except in accordance with the terms of the following claims.

#### We claim:

1. An economizer unit for a carburetor having a fuel reservoir and a fuel conduit leading therefrom provided with a calibrated orifice; comprising a body designed to seat in an aperture in the reservoir, a fuel passage in said body bypassing said orifice, a chamber in said body having a movable wall responsive to varying pressures in the chamber, a plunger connected to said movable wall to be moved thereby, a fuel valve having a ball valve member rotatably mounted in the path of the plunger normally spaced therefrom and closing said passage but movable by said plunger to open position, a spring in said body urging said valve member to closed position, a partition separating said fuel passage from said chamber and acting as a stop to limit movement of the movable wall in one direction, a collar adjustably mounted on said plunger and cooperating with said partition to limit movement of the movable wall in the other direction, and a spring between said partition and said collar urging said movable wall in said one direction.

2. An economizer unit for a carburetor having a fuel reservoir and a fuel conduit leading there-

5

from provided with a calibrated orifice; comprising a body designed to seat in an aperture in the reservoir, a fuel passage in said body bypassing said orifice, a chamber in said body having a flexible wall responsive to varying pressures in the chamber, a plunger connected to said flexible wall to be moved thereby, a fuel valve in said passage opened by movement of said plunger in one direction, a partition separating said fuel passage from said chamber and acting as a stop to limit movement of the plunger in said one direction, a collar on said plunger, and a compression spring seated against said partition and said collar and urging said plunger in said one direction.

3. The invention defined in claim 2, wherein said body is formed in two nested sections detachably threaded together, one of said sections being externally threaded to engage female threads in said aperture.

6

4. The invention defined in claim 2, comprising in addition a plug adjustably mounted in said body, and a compression spring interposed between said plug and said fuel valve urging the latter in the other direction.

ROBERT H. HIEGER.  
ORVILLE C. KELLER.

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