United States Patent [19]

Tuckey

[11] **3,738,623**

[45] **June 12, 1973**

[54] **DIAPHRAGM CARBURETOR**

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[22] Filed: **Jan. 13, 1971**

[21] Appl. No.: **106,178**

[52] **U.S. Cl.**..... **261/35**, 261/DIG. 68, 261/69 A

[51] **Int. Cl.**..... **F02m 17/04**

[58] **Field of Search**..... 261/35, DIG. 68, 261/69 A; 123/139 AH, 73 A, DIG. 6; 417/395, 413, 470, 471; 48/184

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[57] **ABSTRACT**

A diaphragm-controlled carburetor having a pressure pump actuated by engine pulses wherein a pump diaphragm is supported by a pan-shaped side mount spring to assist pressure pulses of the engine in a manner to improve the pump efficiency at both low speed and high speed conditions.

2 Claims, 2 Drawing Figures

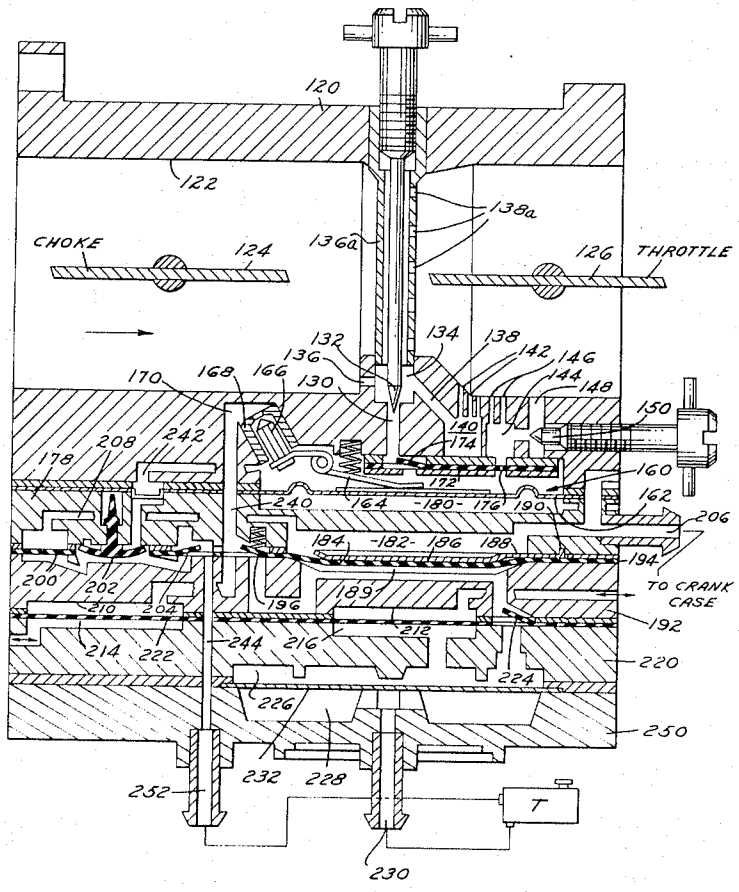
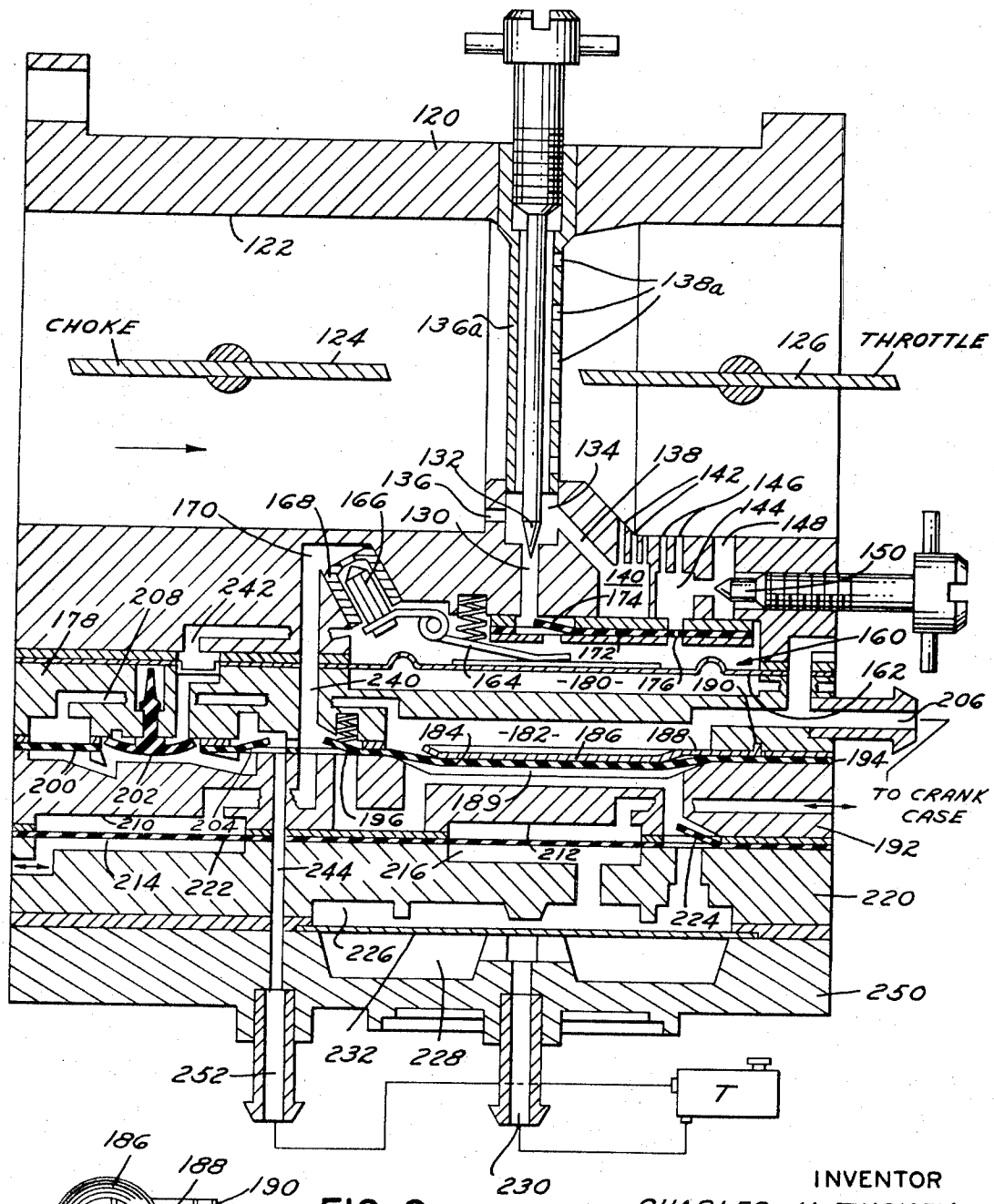


FIG. 1



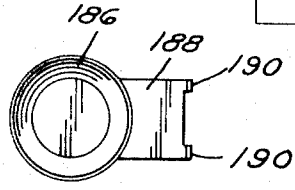


FIG. 2

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DIAPHRAGM CARBURETOR

This invention relates to a Diaphragm Carburetor and more particularly to an improvement in a fuel pump for such a carburetor.

It is an object of the invention to provide a return spring for a diaphragm of a fuel pump to improve efficiency at both low speed conditions, idle, and at high speed, full throttle.

Other objects and features of the invention relating to details of construction and operation will be apparent in the following description and claims in which the principles of operation of the invention are set forth together with the best mode presently contemplated.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIG. 1, a sectional view of a diaphragm carburetor having a fuel pump and a vapor pump incorporated therein.

FIG. 2, a plan view of a diaphragm control plate.

Referring to FIG. 1, a main carburetor housing **120** has a mixing passage **122** with a choke valve **124** an a throttle valve **126.** A main fuel passage **130** controlled by a needle valve **132** leads to a fuel well **134** which is connected to a tube **136** *a* leading upwardly through the venturi portion of the mixing passage. The tube has multiple outlets **138***a* for fuel. The well **134** also has an air inlet **136** and a feed port **138** leading to an intermediate fuel supply chamber **140** with suitable fuel passages **142.** An idle recess **144** has some intermediate passages **146** connecting to the mixing passage and also a main idle port **148** controlled by a needle valve **150.**

In the bottom of the housing **120** is formed a diaphragm chamber **160** closed by a diaphragm **162** which acts on one end of a lever **164** pivoted in the housing and carrying at its other end a fuel inlet valve **166** operating in a suitable seat thimble **168** which has a top port opening to a recess **170.** A small flexible member **172** provides an anti-back bleed check valve **174** for the entrance of fuel into the main fuel passage **130** and this member also has a small port **176** which furnishes fuel from the diaphragm chamber to the idle recess **144.** The diaphragm **162** is held in place by a first intermediate plate **178** which has a top recess **180** below diaphragm **162** and a bottom recess **182** which serves as a part of a pumping chamber above a diaphragm **184** which is controlled in its motion by a leaf spring member having a pan support portion **186** with a side extension anchoring portion **188** provided with locating tabs **190** clamped against the bottom of the housing **178** by a second intermediate housing plate **192.** The pumping chamber **189** is defined by the diaphragm **184** and the shallow opening below it in plate **192.**

The spring or plate **186** and the side extension **188** have sufficient resiliency to allow the pan portion **186** overlying diaphragm **184,** FIG. 2, to fluctuate up and down in conjunction with the diaphragm **184.**

The pan-type spring **184–186** has an important function in the operation of the carburetor. It lies on the pulse exposed side of the diaphragm and is subject alternately to pulses and vacuum from the crankcase of an engine. In a two-cycle engine the vacuum pulses are much stronger than the pressure pulses. In the operation of the pump, the vacuum pulse will draw fuel into the chamber and the spring is intended to assist the pressure pulse to return the diaphragm in the pump-out portion of the cycle. It has been found that the pan-type

spring shown in FIGS. 1 and 2 assists the weak pressure pulse at low throttle or idle conditions. On the other hand, when at wide open throttle when vacuum pulses are weaker, the pan type spring does not hinder the vacuum action, that is, it does not subtract from the weaker vacuum pulses. The shape of the spring also gives support to the diaphragm, the edges being panned to prevent cutting into the flexible portion thereof. Accordingly, the pump performs well at the low end – idle – and, in contrast to the coil spring, does not detract from operation at the high end – full throttle. The diaphragm member **184** also has a valve flap **196** backed by a suitable coil spring to control a passage which will be described below.

At the left-hand portion of the assembly, as shown in FIG. 1, a pump diaphragm **200** is provided between recesses in plate **178** and a second intermediate plate **192,** this being a secondary vapor pump which has a disc-like inlet valve **202** and a flap-type outlet valve **204.** The diaphragms **184** and **200** are pulsed by engine pulses through a connection conduit **206** leading from a crankcase connection of an internal combustion engine to the chamber **182** and thence to a connecting passage **208** to the diaphragm **200.**

The bottom side of the intermediate plate **192** has two flat surface recesses **210** and **212** which serve as portions of booster chambers in conjunction with opposed recesses **214** and **216** in a third intermediate plate **220** which holds a diaphragm member **222** in position between these respective chambers. This diaphragm member **222** also provides a flap valve **224** for the pump diaphragm **184.** In the bottom of the third intermediate plate **220** is a chamber **226** which provides an inlet chamber together with an annular chamber **228** which surrounds a fuel inlet **230** leading from a tank T.

A filter screen **232** serves to filter fuel entering the chamber **226** before it passes through the valve **224.** The normal flow of fuel for the carburetor system will originate at the tank T and flow through the passage **230** and the filter **232** to the valve **224** in response to fluctuation of the fuel pump diaphragm **184.** Fuel will then flow through passages leading to the valve **196** to an upwardly extending passage **240** terminating at the recess **170** at the top of the fuel inlet valve. Fuel will then move through the fuel inlet valve **166** in response to control of the lever **164** and the diaphragm **162** so that it is available to the main jet through the one-way valve **174** and also to the intermediate flow chamber **140** and the idle chamber **144.** Fuel will thus be available to the mixing chamber as it is called for by reason of the adjustment of the choke and throttle.

The pulse chambers formed by the respectively shallow pockets **210–214** and **212–216** serve to enhance the flow of fuel. It will be noted that chambers **214** and **212** are connected to atmosphere. Chamber **210** is connected to the fuel passage **240** and the chamber **216** is connected to the fuel recess **226.**

The vapor removal system of the carburetor is under the control of the pump diaphragm **200** and its respective valves **202** and **204.** The inlet valve **202** is connected through a passage **242** which leads to the diaphragm chamber **160** directly adjacent the valve **166** which is a high point in the fuel reservoir above the diaphragm. Thus, any vapor and foam which is created in the diaphragm chamber by reason of the flow of the fuel and the vibration of the carburetor will be pulled

through the inlet valve **202** and pushed to the outlet valve **204** which leads to a down passage **244** through the plates **192, 220,** and the bottom plate **250** which has formed therein an outlet **252** which will be connected to a fuel tank T. Thus, the out-flow of the vapor pump to passage **244** will carry vapor from the top of diaphragm chamber **160** to the tank. This permits the diaphragm **162** and the related inlet valve **166** to control liquid fuel only and prevents a vapor build-up which interferes with the control system built for handling liquid fuel.

It will be noted that since the pump **200** is actuated by pressure pulsations from the engine, it pumps most vigorously at part or idle throttle conditions when the crankcase pulses are longer and stronger. Since this is the time that the least fuel is being pulled through the carburetor and also the least cooling is being accomplished in the engine cavity, the heat build-up at the carburetor location is apt to be greatest. This contributes to the vaporization conditions. Thus, the pump **200** is most effective when most needed.

What is claimed as new is as follows:

1. A fuel pump for use in a diaphragm-controlled carburetor comprising:

a. a first carburetor section having a pump chamber formed therein,

b. a second carburetor section overlying the first section having a pump chamber formed therein,

c. a diaphragm lying between said sections having its periphery captured therebetween and dividing said recess formed by said chambers into a pumping chamber to be connected to a source of fuel and a pulse chamber for receiving pulses from an engine crankcase, and

d. a spring assist member lying against the diaphragm on the pulse chamber side of said diaphragm comprising a circularly shaped resilient member overlying a substantial portion of the area of said diaphragm only at the center thereof and an integral, co-planar, radial extension from said member having a distal end clamped between said sections, the said member serving as the sole resilient force on the said diaphragm by reason of the inherent resilience of said radial extension.

2. A fuel pump for use in a diaphragm-controlled carburetor comprising:

a. a carburetor body having a pump chamber,

b. a diaphragm lying across said chamber to divide the chamber into a pulse chamber to receive pulses from an engine crankcase and a pumping chamber to be connected to a source of fuel,

c. a spring assist member lying on the pulse chamber side of said diaphragm comprising a circularly shaped member overlying and in contact with a substantial portion of the area of said diaphragm only at the center thereof, and

d. resilient means forming an integral part of said member co-planar therewith and extending radially from said member and rigidly mounted in said body to support said member in said chamber, the said resilient means serving as the sole resilient force on the diaphragm.

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