Feb. 27, 1968 C. L. SPELTS 3,370,578

FUEL SAVING DEVICE FOR INTERNAL COMBUSTION ENGINES

Filed Jan. 4, 1966

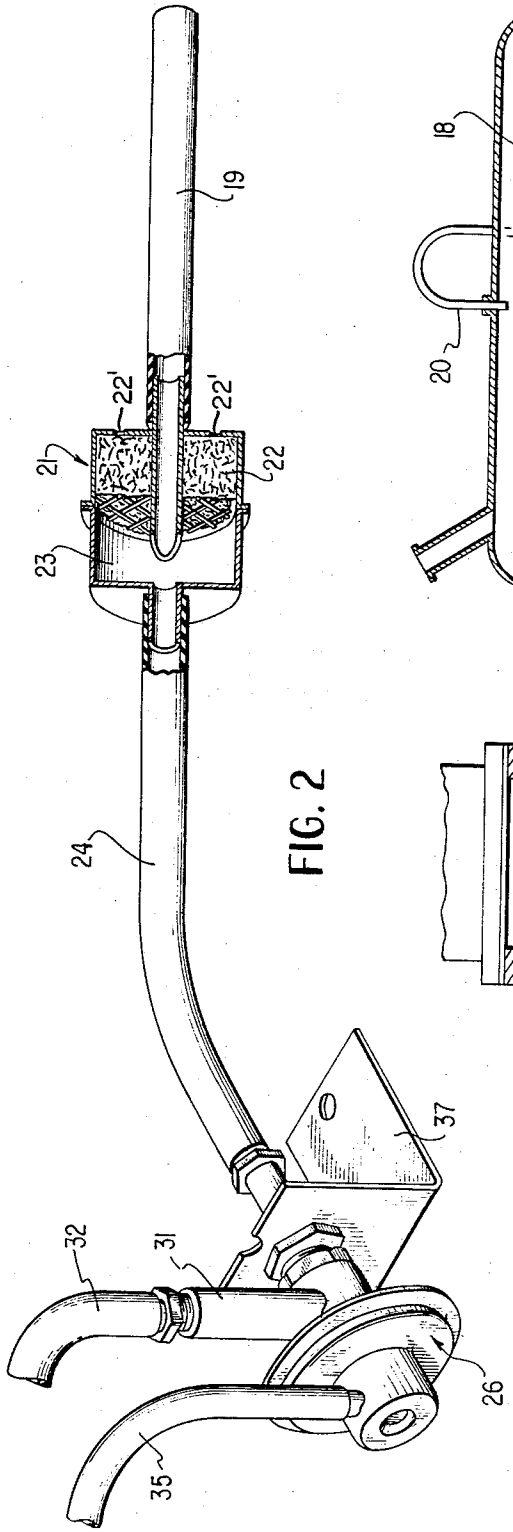


FIG. 2

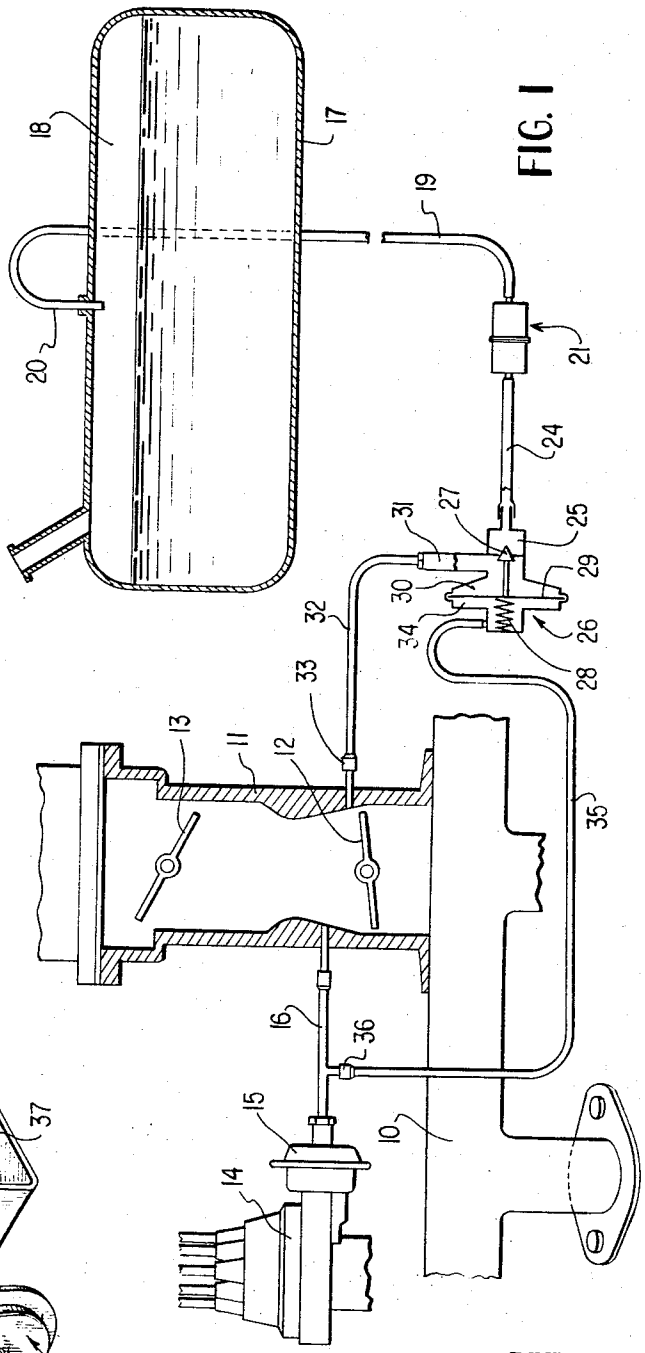


FIG. 1

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FUEL SAVING DEVICE FOR INTERNAL COMBUSTION ENGINES

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3 Claims. (Cl. 123—119)

ABSTRACT OF THE DISCLOSURE

An attachment for internal combustion engines which permits recovery and utilization of fuel vapors in the fuel tank, in which said vapors are drawn through a filtering unit to a mixing chamber thereof where the vapors are mixed with air drawn through the filter, the mixture then being delivered by vacuum means to the engine carburetor for induction into the combustion chambers of the engine.

The present invention relates to a fuel-saving device primarily for use on automobiles but capable of use on power plants in general utilizing gasoline-powered internal combustion engines.

The main object of the invention is to provide a highly simplified and inexpensive attachment which may be sold in the form of a kit for installation on existing automobiles and requiring virtually no change in the conventional structure of the automobile power plant. The invention is also applicable to newly manufactured automobiles, if desired.

A further object is to provide a fuel saving accessory or attachment which has only one moving part and which requires only three simple connections with the conventional automobile power plant structure for proper installation.

Another and more general object is to provide an accessory device of the above-mentioned character which is capable of increasing gasoline mileage and the overall performance characteristics of the engine by utilizing fuel vapors taken from the top of the fuel tank, mixed with fresh air and in the right proportions at the right time during engine operation. It is believed that the invention is capable of increasing gasoline mileage in automotive vehicles while at the same time removing flat and lean spots at cruising and also furnishing increased power and performance characteristics. All of this is done by feeding additional air mixed with gasoline vapors from the fuel tank into the intake manifold of the engine.

Other objects and advantages of the invention will become apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a partily diagrammatic side elevation of the invention installed upon a gasoline engine; and

FIGURE 2 is a perspective view of the invention standing alone, parts broken away.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral **10** designates the intake manifold of a gasoline engine having mounted thereon in a conventional manner a carburetor barrel **11** having a rockable throttle valve **12** mounted therein, above which may be provided an automatic choke valve **13**. The usual distributor head is indicated at **14** having a conventional vacuum actuator device **15** which advances and retards the engine spark setting in accordance with the degree of vacuum in the manifold **10**. The vacuum actuator **15** is connected by a pipe or tube **16** with the barrel **11** above the throttle valve **12**, as shown in FIGURE 1, and

this is conventional. When the throttle valve **12** is completely closed, there will be no vacuum in the line **16** and the spark is retarded. As the throttle valve is opened to increase engine speed, the distributor setting or spark automatically advances.

Continuing to refer to FIGURE 1, the numeral **17** designates the automobile fuel tank substantially filled with gasoline and having a chamber **18** above the level of liquid fuel where highly volatile and combustible gasoline vapors continuously exist. The invention proper is in the nature of an attachment, as stated, and may comprise a hose or tube **19** adapted for connection with the vent pipe **20** of fuel tank **18**. Connected in the hose **19** is a filter and mixing unit **21** of known construction containing a quantity of fibrous filtering material **22** and a mixing space **23**. The unit **21** has plural air inlet openings **22'** adjacent the filtering material **22** as shown in FIGURE 2 so that fresh air can be drawn into the mixing space **23** along with tank vapor. Another tube **24** connects with and leads from the unit **21** and is connected to the inlet chamber **25** of a diaphragm-operated control valve **26** whose operating mechanism may be substantially identical to that of the vacuum actuator device **15**. The valve **26** includes a valve element **27** biased closed by a spring **28** but adapted to be unseated by the action of a vacuum-sensitive diaphragm **29**.

The internal valve chamber **30** on one side of the diaphragm communicates with a valve outlet **31**, connected with another flexible tube **32**, in turn leading to and connected with the carburetor barrel **11** near the throttle valve, as shown at **33**. The other chamber **34** of valve **26** on the opposite side of diaphragm **29** communicates with a vacuum tube **35** leading to and connected with the previously-described line or tube **16** as at **36** by a suitable T-fitting or the like. A simple angle bracket **37**, FIGURE 2, may be employed to mount the control valve **26** rigidly to the engine directly or on the fire wall, if more convenient. The essential elements of the invention attachment as the device would be marketed are shown in FIGURE 2, and it may be seen that the invention has only one moving part, namely, the internal valve element **27**. In order to install the invention, only three simple connections are necessary where the tubes **19**, **32** and **35** are connected, respectively, with the fuel tank, carburetor and distributor vacuum line **16**.

The operation of the invention is quite simple. When the throttle plate or valve **12** is closed, there is no vacuum in the distributor vacuum line **16**, as stated, and consequently no vacuum in the line **35** leading to the control valve **26**. At this time, the spring **28** acts on the diaphragm **29** and maintains the valve element **27** seated and consequently no fuel vapor from the tank **17** enters the tube **32** leading to the carburetor.

When the throttle valve is opened to a particular degree, intake manifold vacuum will exist to corresponding degree in the line **16** and this will advance the distributor setting automatically in the conventional manner. Simultaneously, engine vacuum will exist in the tube **35** when the throttle valve is opened and vacuum will also exist in valve chamber **34**, causing diaphragm **29** to unseat valve element **27**, whereby fumes or vapor from tank chamber **18** are drawn by the engine through the tube **19** and filter and mixing unit **21** and tube **24** to valve chamber **25** and then through outlet **31** and tube **32** to the throat or barrel of the carburetor. The action of the control valve **26** is thus synchronized with the action of the distributor control unit or actuator **15**. Additional air to mix with the fuel vapors from the tank is drawn into the system through the openings **22'** of the unit **21**, FIGURE **2**, and into the mixing chamber **23** of this

unit, and then the mixture is drawn through the tube **24** to the control valve **26** and from this valve into the carburetor or intake manifold. The unit **21** including its filter and chamber **23** is sized or calibrated as to volume so as to be correct for the particular size engine upon which it is installed. This arrangement enriches the charge at the very time when increased power and high performance is demanded and this increase is effected with great economy and without using excessive amounts of the unvaporized liquid fuel. The introduction of this extra mixture of fuel in the vapor state and air into the engine combustion chambers has the effect of increasing gasoline mileage while improving performance characteristics and removing flat and lean spots at cruising speeds. The device is entirely automatic in operation and costs very little to install on the automobile and can be installed in a minimum of time by an unskilled mechanic. The advantages of the invention should now be understood without the necessity for further description.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. An attachment for internal combustion engines allowing the recovery and use of vapors in the fuel tank as a combustion additive for the engine particularly during peak power requirements, said attachment comvapors are collected, and an air filtering and mixing unit prising in combination an engine vacuum operated metering valve for fuel vapor and air having a connection

with a fuel induction component of the engine and also a vapor and air inlet connection, a tubular conduit interconnecting said inlet connection of the valve and an upper chamber of the fuel tank in which said fuel connected in said conduit and containing an air filtering element in one portion thereof and a mixing chamber in another portion thereof leading to said conduit, said unit having air admitting openings adjacent the filtering element so that air may be admitted to the unit for mixing with the fuel vapors in said mixing chamber.

2. An attachment for internal combustion engines according to claim **1**, wherein said valve has a connection with the engine carburetor barrel adjacent the throttle valve thereof and another connection with a vacuum actuator device on the engine distributor mechanism, said valve having an actuating diaphragm therein between the last-mentioned connections.

3. An attachment for internal combustion engines according to claim **1**, and wherein said unit includes a casing having end tubular fittings connected directly in the tubular conduit, one of said fittings extending axially through the filtering element of the unit and into the mixing chamber of the unit for conveying the fuel vapors to the mixing chamber for mixing with air entering the unit through said air admitting openings.

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LAURENCE M. GOODRIDGE, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,370,578 Dated Feb. 27, 1968

Inventor(s) Calvin L. Spelts

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, cancel line 32.

Column 4, after line 4, insert:
--vapors are collected, and an air filtering and mixing unit--.

Signed and sealed this 22nd day of February 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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