Jan. 17, 1956 W. G. YON 2,731,250

SUPPLEMENTAL FEED APPARATUS FOR INTERNAL COMBUSTION ENGINE

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Fig. 1

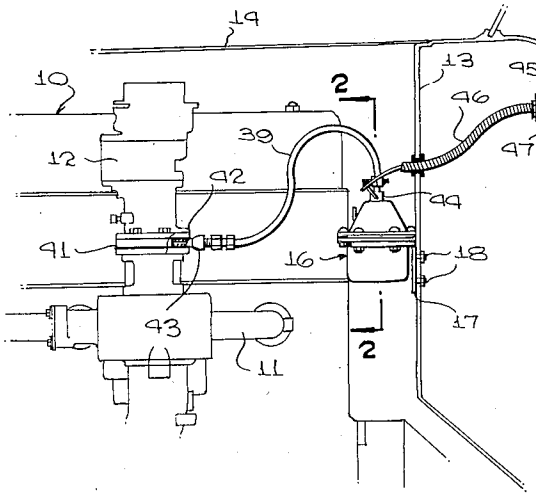


Fig. 4

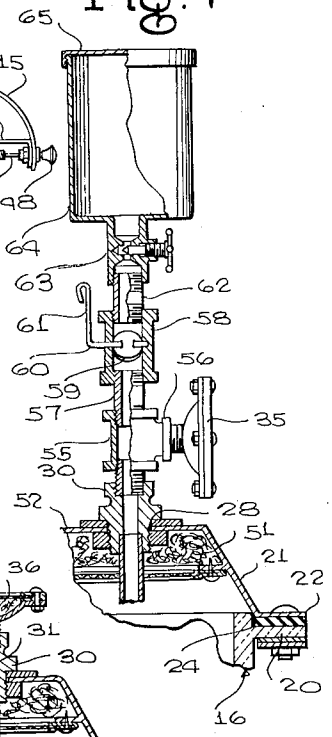


Fig. 2

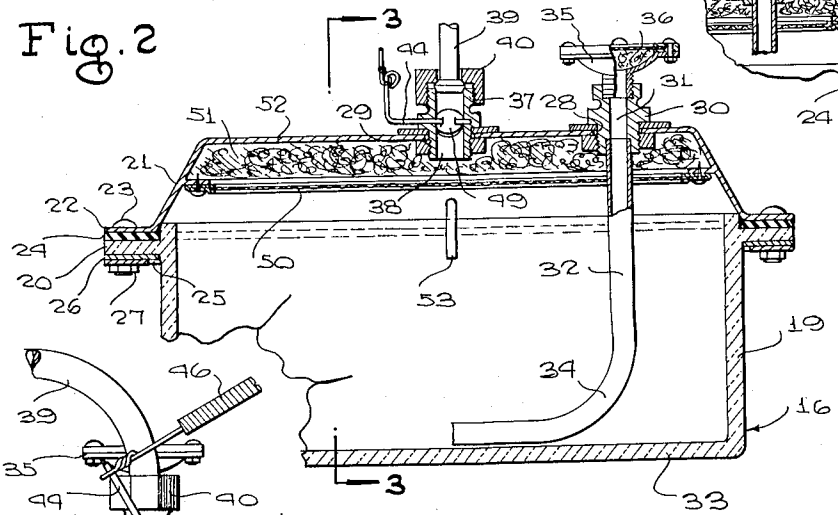
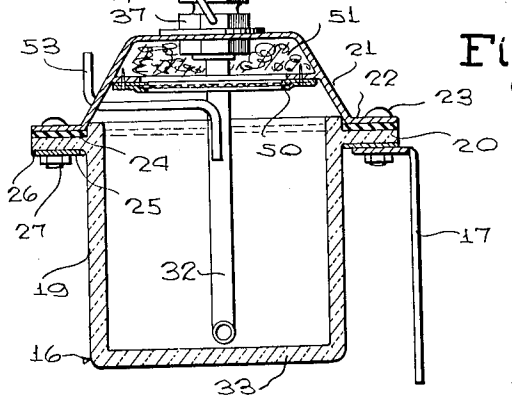


Fig. 3



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SUPPLEMENTAL FEED APPARATUS FOR INTERNAL COMBUSTION ENGINE

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2 Claims. (Cl. 261—18)

This invention relates to supplemental feed apparatus for internal combustion engines and more particularly to apparatus for improving the fuel economy and increasing the power output of an internal combustion engine by feeding additional materials in vaporized form to the engine along with the engine fuel and combustion air.

It is among the objects of the invention to provide supplemental feed apparatus for an internal combustion engine to feed supplemental materials in vaporized form to the engine along with the engine fuel and combustion air to improve the fuel economy and increase the power output of the engine; which can be operatively connected to the engine with no material modification of the engine construction and without changing the adjustment of the engine charge forming mechanism; which is connected into the passage between the engine charge forming mechanism and intake manifold and uses the engine intake manifold vacuum to vaporize the supplemental material and feed such vaporized material to the engine cylinders; which supplies water vapor and other vaporized materials, such as alcohol and gasoline to the engine and may also be used to supply a highly volatile material, such as ether, if desired; which can be temporarily cut off from the engine when its operation is not desired, as when starting a cold engine; and which is simple and durable in construction, economical to manufacture, easy to install, and effective and efficient in operation.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing wherein:

Figure 1 is a side elevational view of a fragmentary portion of an internal combustion engine with supplemental feed apparatus illustrative of the invention operatively connected thereto;

Figure 2 is a cross sectional view on an enlarged scale on the line 2—2 of Figure 1;

Figure 3 is a cross sectional view on the line 3—3 of Figure 2; and

Figure 4 is an elevational view of a device for supplying a highly volatile material to the supplemental feed apparatus, portions of this device being broken away and shown in cross section to better illustrate the construction thereof.

With continued reference to the drawing, the numeral 10 generally indicates an internal combustion engine, such as a motor vehicle engine, having an intake manifold 11 and a carburetor 12 connected to the intake manifold 11 and providing a charge forming device. The engine is mounted in the usual vehicle engine compartment adjacent the vehicle dash or fire wall 13 and is covered by the usual hood 14. An instrument board or panel 15 is provided in the vehicle rearwardly of the upper portion of the fire wall 13 and is located convenient to the operator of the vehicle.

The supplemental feed apparatus of the present invention comprises a receptacle, generally indicated at 16, disposed at the engine side of the fire wall 13 and mounted on the fire wall by suitable means, such as the bracket 17

secured to the receptacle and the bolts 18 extending through registering apertures in the bracket 17 and the fire wall 13.

The receptacle 16 is supported in upright position on the fire wall 13 adjacent the engine 10 and comprises a lower or bottom portion 19 which may conveniently be of elongated, rectangular shape and provided around its open, upper end with an outwardly projecting flange 20. The bottom portion 19 is illustrated as formed of glass, but it is to be understood that it may be formed of any suitable material.

The receptable 16 also comprises a dish shaped top portion 21 formed of a suitable material, such as sheet metal, and disposed in inverted position over the open upper end of the bottom portion 19. This top portion 21 has an outwardly extending marginal flange 22 and the two portions are secured together by screws 23 extending through registering apertures in the flanges 20 and 22, a gasket 24 of suitable, resilient packing material being disposed between these flanges. A flat body 25 of sheet material of hollow, rectangular shape is disposed against the side of the flange 20 remote from the flange 22 and a thin layer 26 of resilient material is preferably disposed between the body 25 and the adjacent side of the flange 20. The body 25 is apertured to receive the bolts 22 and nuts 27 are threaded one on each of the bolts or screws 23 and bear against the lower side of the sheet metal body 25 to clamp the flanges 20 and 22 together and provide an air-tight seal between the bottom portion 19 and the top portion 21 of the receptacle.

The top portion 21 of the receptacle is provided with spaced apart apertures 28 and 29 and a tube fitting 30 having a bore 31 extending therethrough is mounted in the aperture 28. An air inlet tube 32 is connected at one end to the fitting 30 at the end of the bore 31 within the receptacle 16 and extends from the fitting 30 to the bottom wall 33 of the bottom portion 19 of the receptacle. This tube has a right angular bend, as indicated at 34, intermediate its length, so that the end portion thereof remote from the fitting 30 lies along the inner side of the bottom wall 33 of the receptacle, as illustrated in Figure 2. A filter housing 35 is secured to the fitting 30 at the end of the bore 31 disposed outwardly of the receptacle 16 and an air filter 36 is contained in the housing 35 for filtering the air passing from the atmosphere through the fitting 30 and tube 32 into the interior of the receptacle 16.

A fitting 37 is mounted in the aperture 29 in the top portion 21 of the receptacle and has a bore 38 extending therethrough. A feed tube 39 is secured at one end to the fitting 37 at the end of the bore 38 disposed outwardly of the receptacle 16 by a flange nut 40 having an aperture receiving the corresponding end portion of the feed tube and threaded onto the fitting 37.

An adapter plate 41 is disposed between the cooperating flanges of the carburetor 12 and intake manifold 11 and is provided with a fluid passage 42 leading from the outer surface of the edge of the adapter to the interior of the manifold 11 and a tube fitting 43 is secured to the adapter plate 41 at the outer end of the fluid passage 42. The feed tube 39 is connected at its end remote from the receptacle 16 to the fitting 43 for supplying vaporized material and air from the interior of the receptacle 16 of the engine intake manifold 11 through the passage 42 in the plate 41.

A valve 49 is disposed in the bore 38 of the fitting 37 and mounted on a valve shaft 44 extending through bearing apertures in the fitting. A bracket 45 is mounted on the instrument panel 15 at the forward and under side of this panel, and a flexible push and pull device, such as the Bowden wire 46 extends through the fire wall 13 of the vehicle and is connected at one end to the valve shaft 44 and mounted at its other end in the bracket 45,

The core 47 of the Bowden wire extends through an aperture in the instrument panel 15 and is provided at the outer side of the instrument panel with a knob 48 by means of which the valve 49 can be manually opened and closed, as desired.

A wire mesh screen 50 is secured in the top portion 21 of the receptacle at a location spaced below the inner end of the fitting 37 and a body 51 of shredded material, such as copper or glass wool, is disposed in the space between the screen 50 and the top wall 52 of the top portion 21 of the receptacle to maintain the fluid material entering the fitting 37 in a vaporized condition and to prevent such material from entering the fitting and the tube 39 in liquid form.

A small air tube 53 extends through the top portion 21 of the receptacle and terminates within the receptacle adjacent the upper end of the bottom portion 19 to supply a limited quantity of additional air to vapor in the upper portion of the receptacle.

It is contemplated that the receptacle 16 will contain a mixture of vaporizable liquid, such as a mixture of water, alcohol and gasoline and that the air entering the receptacle through the air inlet tube 32 will agitate this body of mixed liquids in a manner to maintain a reasonably thorough mixture of the several liquids and to cause all of the liquids to vaporize simultaneously and the vapors to rise from the body of liquid to the filter 51 and the bore 38 of the fitting 37. This vapor mixture entering the engine intake manifold along with the fuel charge displaces a portion of the fuel charge, so that less fuel is used by the engine, but adds to the combustion efficiency of the fuel drawn into the engine to an extent such that increased power output is obtained with a smaller fuel consumption than is possible to obtain with the same engine without the auxiliary feed apparatus.

Under certain operating conditions, it is considered advisable to add a limited quantity of a highly volatile material, such as ether, to the vapors drawn into the engine from the receptacle 16 through the feed tube 39 and plate 41. Suitable means for supplying such a volatile material in limited quantities to the interior of the receptacle 16 is illustrated in Figure 4, and includes a T fitting 55 secured to the outer end of the fitting 30 in replacement of the filter housing 35, the filter housing being then secured to the side connection 56 of the T fitting. A tube nipple 57 is secured at one end to the T fitting 55 at the end of the latter remote from the fitting 30 and a valve housing 58 is secured at one end to the end of the nipple 57 remote from the fitting 55. A disc valve 59 is disposed in the housing 58 and mounted on a valve shaft 60 which extends through suitable bearing apertures in the valve housing and has, outside of the housing, an angularly disposed portion 61 by means of which the valve 59 can be opened and closed. A second tube nipple 62 is connected at one end to the valve housing 58 at the end of the valve housing remote from the nipple 57 and an adjustable metering valve 63 is connected to the tube nipple 62 at the end of this nipple remote from the housing 58. A reservoir 64 for containing volatile material, such as ether, is secured at its bottom end to the metering valve 63 with its interior in communication with the interior of the metering valve, and a cap or cover 65 is tightly secured on the open, upper end of the reservoir 64 to maintain the volatile material in the reservoir.

When the valve 59 is opened a small quantity of volatile liquid from the reservoir 64 will be metered past the metering valve 63 and will pass into the T fitting 55 where it will be mixed with inlet air entering the T fitting through the filter housing 35 and this mixture of volatile liquid or the vapor thereof and air will then flow through the inlet tube 32 and through the body of liquid in the receptacle 16 to the fitting 37 and feed tube 39 to supply an additional ingredient to the auxiliary material supplied to the engine.

While a mixture of water, alcohol and gasoline in the receptacle 16 has been found to provide satisfactory results in tests of the apparatus, it is to be understood that one or more of these ingredients may be omitted and that other liquids may be used, if found more effective, without in any way exceeding the scope of the invention.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. In combination with an internal combustion engine having an intake manifold and a charge forming device connected to said manifold, supplemental feed apparatus comprising a closed receptacle mounted in upright position adjacent the engine and containing a vaporizable liquid, a main air inlet tube extending from outside the receptacle eccentrically through the top portion thereof to a location adjacent the bottom of the receptacle to admit atmospheric air to the interior of said recepacle near the bottom of a body of liquid contained therein, means connected to said intake manifold providing a fluid passage leading to the interior of said manifold, a feed tube connected at one end to said means in communication with said fluid passage and connected at its other end centrally to the top portion of said receptacle and communicating with the interior of said receptacle near the inner surface of said top portion thereof for conducting vapor and air from said receptacle to said fluid passage, a reservoir containing highly volatile liquid disposed above said one end of said inlet tube and mounted thereon, and means connecting said reservoir to said air inlet tube at said one end of the latter and controlling the admission of liquid contained in said reservoir to said air inlet tube.

2. In combination with an internal combustion engine having an intake manifold and a charge forming device connected to said manifold, supplemental feed apparatus comprising a closed receptacle mounted in upright position adjacent the engine and containing a vaporizable liquid, an air inlet tube disposed in said receptacle and having one end in communication with the atmosphere at the outside of said receptacle and its other end disposed adjacent the bottom of the receptacle to admit atmospheric air to the interior of said receptacle near the bottom of a body of liquid contained in the receptacle, means connected to said intake manifold providing a fluid passage leading to the interior of said manifold, a feed tube connected at one end to said means in communication with said fluid passage and connected at its other end to the top portion of said receptacle in communication with the interior of said receptacle adjacent the inner surface of said top portion for conducting vapor and air from said receptacle to said fluid passage, a reservoir containing highly volatile liquid disposed above said one end of said air inlet tube and mounted thereon, and means including an adjustable metering valve and a manually operated cut off valve connecting said reservoir to said air inlet tube at said one end of the latter.

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