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A. M. CHAMBERS
CHARGE FORMING DEVICE

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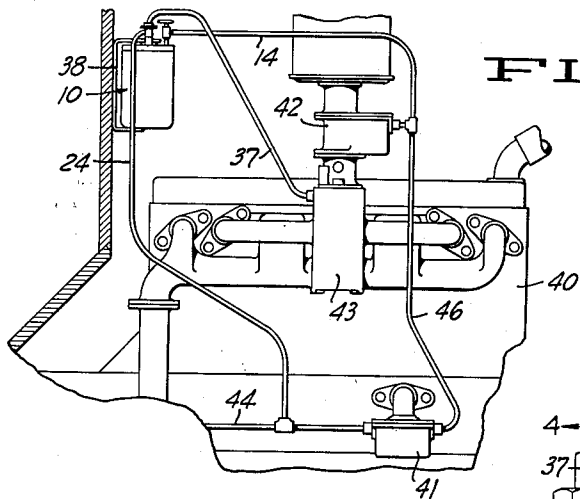


FIG. 1.

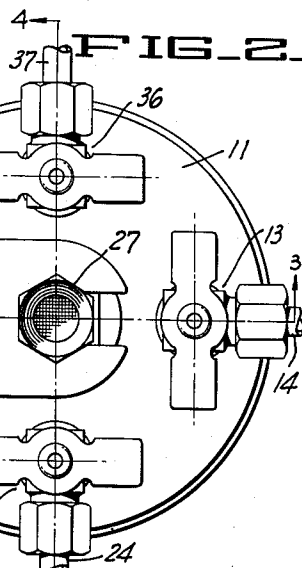


FIG_2.

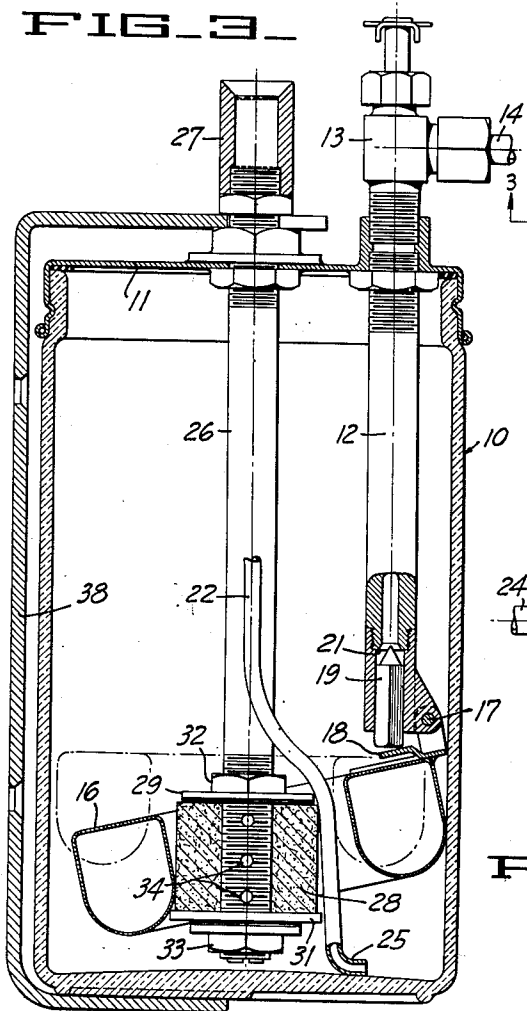


FIG_3_

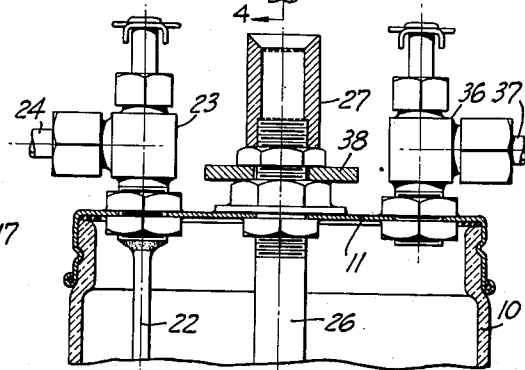


FIG_4

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CHARGE FORMING DEVICE

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5 Claims. (Cl. 123-127)

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This invention relates generally to devices for supplying various liquid materials to internal combustion engines.

Present automotive internal combustion engines are provided with a fuel pump which is operated either mechanically from a moving part of the engine, or electrically. The pump supplies gasoline to the float chamber of the carburetor, and the carburetor supplies atomized fuel to the air stream entering the engine through the intake manifold. I have found that the general performance of an engine can be bettered by introducing vapor and atomized droplets of gasoline into the intake manifold at a point between the carburetor and the engine. Also I have found that gasoline introduced in this manner can be advantageously blended with a "tune up" oil of the detergent type.

It is an object of the present invention to provide a simple and practical device for introducing materials into internal combustion engines in the manner generally outlined above.

Another object of the invention is to provide a device of the above character which will avoid the use of critical and troublesome metering devices.

Another object of the invention is to provide a device of the above character which can be readily installed and which can be adjusted to various engines and operating conditions.

Additional objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

Figure 1 is a side elevational view illustrating my device installed on an automobile.

Figure 2 is a plan view of the device, on an enlarged scale.

Figure 3 is a cross-sectional view taken along the line 3-3 of Figure 2.

Figure 4 is a cross-sectional detail taken along the line 4-4 of Figure 2.

The device as illustrated consists of a vessel 10, which can be in the form of a glass jar having a screw-on metal cover 11. The cover serves to mount a tube 12 which has its outer end provided with a manually operated valve 13 and a fitting serving to make connection with the pipe or tube 14. The inner end of the tube 12 is equipped with a float operated valve. Thus a suitable float 16 has a pivotal connection 17 to the lower end of the tube 12, and a finger 18

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which is mounted upon the float engages the lower end of the movable valve member 19. The valve member cooperates with the stationary seat 21 and the arrangement is such that raising or lowering of the float causes the valve member to move between closed and open positions relative to the seat.

Another tube 22 extends downwardly through the cover, and is provided with an open lower end (Figure 3) terminating below the level of liquid maintained by the float 16. The upper end of this tube is equipped with the manually operated valve 23, and with a fitting for making connection with the pipe 24. The lower end 25 at the bottom of the vessel can be turned laterally as illustrated.

Another tube 26 extends downwardly through the cover and has its exterior end open to the atmosphere through the screen fitting 27. The lower end of the tube 26 serves to mount the porous body 28, by means of which air is admitted to the lower portion of the vessel. With the specific construction illustrated the body 28 is cylindrical, and has a central opening to accommodate the lower portion of the tube 26. Washers 29 and 31 engage the ends of the body 28, and are held in clamped position by the nuts 32 and 33. That part of the tube between the washers 29 and 31 is provided with a plurality of openings 34 for admitting air to the interior of the body 28. The body can be made of suitable material such as a porous refractory, or a porous metal body made by compressing metal powder, followed by sintering.

An adjustable valve 36 is mounted upon the cover 11, and establishes communication between the interior of the vessel and the pipe 37.

As illustrated in Figure 3, the device can be carried by a mounting bracket 38, which can be attached to some convenient part of the automobile body, as illustrated in Figure 1. The upper end of this bracket is shown being secured to the upper end of tube 26, and the lower end is bent to engage the bottom of the vessel.

Figure 1 illustrates a typical automobile or truck installation. The internal combustion engine 40 is equipped with the mechanically operated fuel pump 41, the carburetor 42, and the intake manifold 43. A pipe 44 connects the intake side of the fuel pump to the gasoline tank, and a pipe 46 connects the discharge side of the pump to the carburetor 43. The pipe 14 connects with the pipe 46, whereby it receives gasoline from the discharge side of the pump. Pipe 24 connects with the pipe 44, whereby it con-

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tinuously returns gasoline to the intake or suction side of the pump. Pipe 37 connects with the intake manifold 43 whereby it introduces material into the intake manifold between the carburetor 42 and the engine.

Operation of my device is as follows: When the engine is in operation some gasoline from the discharge side of the fuel pump 41 is delivered through the float valve to the interior of the vessel, and the float valve maintains a predetermined level independent of the pump pressure. A small amount of this liquid is continuously returned back into the fuel pump, through the line 24. The amount thus returned can be adjusted by the setting of valve 23. Suction in the intake manifold draws air through the pipe line 37 from the upper part of the vessel. Air is continuously supplied to the vessel through the tube 26, and this air passes through the porous body 28 and bubbles upwardly through the upper strata of the liquid. The resulting aeration of the liquid in the vessel causes a continuous foaming and breakage of bubbles which causes some vaporization and also causes small droplets of liquid to be entrained in the air in the upper part of the vessel. The resulting mixture of air, vapor and liquid droplets is drawn through the pipe line 37 into the intake manifold. Note that the aeration is in the upper strata of liquid and at a level above the lower end 25 of tube 24.

Assuming that no liquid material is introduced into the vessel other than gasoline from the fuel pump, the device serves to introduce supplemental gasoline vapor and atomized droplets into the intake manifold, thus supplementing the atomized fuel introduced by the carburetor. In many instances such an arrangement can be used to advantage to better the operation of an internal combustion engine, assuming that the carburetor is adjusted to take into account the supplemental fuel thus introduced into the intake manifold.

It is advantageous to use my device for introducing small amounts of a tune-up oil into the engine, particularly an oil of the detergent type. Thus from time to time a measured amount of such oil can be introduced into the vessel, where it is progressively blended with gasoline. The introduction can be by way of the fitting 27 and pipe 26. The detergent oil increases foaming of the liquid within the vessel, and the mixture thus produced in the upper part of the vessel and introduced into the intake manifold consists of air, gasoline vapor and liquid droplets consisting of gasoline together with detergent oil. Also some of the tune-up oil is returned to the fuel pump with the returned gasoline, whereby it is introduced into the engine by way of the carburetor 42. Introduction of tune-up oil in this fashion tends to prevent accumulations of carbon in the cylinders, to maintain the valves adequately lubricated, and in general to promote performance of the engine.

Another method for introducing tune-up oil is to first remove gasoline from the vessel and then introduce a quantity of the oil. Valve 13 can then be closed whereby the tune-up oil is gradually fed to the intake manifold without blending with gasoline.

It will be evident from the foregoing that I have provided a device which serves both for the introduction of liquid fuel, and for introducing treatment material such as liquid tune-up oil. There is no tendency towards clogging, which I attribute to the absence of critical metering valves or orifices, and the feeding of the liquid

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material does not continue when the engine is not in operation. While the device can be adjusted to various engines and operating conditions, and to secure a rate of feed as desired, such adjustments are not critical and do not require frequent attention.

I claim:

1. A device for introducing liquid material into an internal combustion engine, the engine having a fuel pump for delivering liquid fuel to a carburetor which in turn supplies carbureted air to the intake manifold of the engine, said device comprising a vessel adapted to contain liquid, a float controlled valve in the vessel, a pipe serving to connect said float controlled valve to the discharge side of the fuel pump whereby liquid fuel is supplied to the vessel, means forming a connection from the lower part of the vessel to the intake side of the fuel pump, whereby liquid fuel is continuously circulated through the vessel when the engine is in operation, means serving to connect the space in the upper part of the vessel with the intake manifold of the engine, and means for introducing air into the lower portion of the vessel to aerate the liquid therein.

2. A device for introducing liquid material into an internal combustion engine, the engine having a fuel pump for delivering liquid to a carburetor which in turn supplies carbureted air to the intake manifold of the engine, said device comprising a vessel adapted to contain liquid, a float in the vessel, a valve controlled by the float, a first pipe connection adapted to connect the valve to the discharge side of the fuel pump, a second pipe connection from the lower part of the vessel and adapted to connect the lower part of the vessel to the inlet side of the fuel pump, a third pipe connection adapted to connect the space in the upper part of the vessel with the intake manifold of the engine, and means for introducing air into the lower portion of the vessel to aerate the upper strata of liquid therein.

3. A fuel device for introducing liquid material into an internal combustion engine, the engine having a fuel pump for delivering liquid fuel to a carburetor which in turn supplies carbureted fuel to the intake manifold of the engine, said device comprising a vessel adapted to contain a liquid, a float within the vessel, a valve controlled by the float, a first pipe connection to said valve and adapted to connect the valve to the discharge side of the fuel pump, a second pipe connection associated with the vessel and adapted to form a connection from the lower part of the vessel to the inlet side of the fuel pump, a third pipe connection associated with the vessel and serving to connect the space in the upper part of the vessel with the intake manifold of the engine, and means for introducing air into the lower part of the vessel to aerate the upper strata of liquid therein, said second pipe connection communicating with the vessel at a point below the said aerated strata of liquid.

4. A fuel device as in claim 3 in which an adjustable valve is included in said second pipe connection to adjust the rate of flow of a liquid from the vessel back to the fuel pump.

5. A device as in claim 3 in which adjustable valve means is provided for said third pipe connection to adjust the rate of feed from the vessel to the intake manifold.

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No references cited.