Aug. 2, 1927. 1,637,591

F. H. ROTH

FUEL ECONOMIZER

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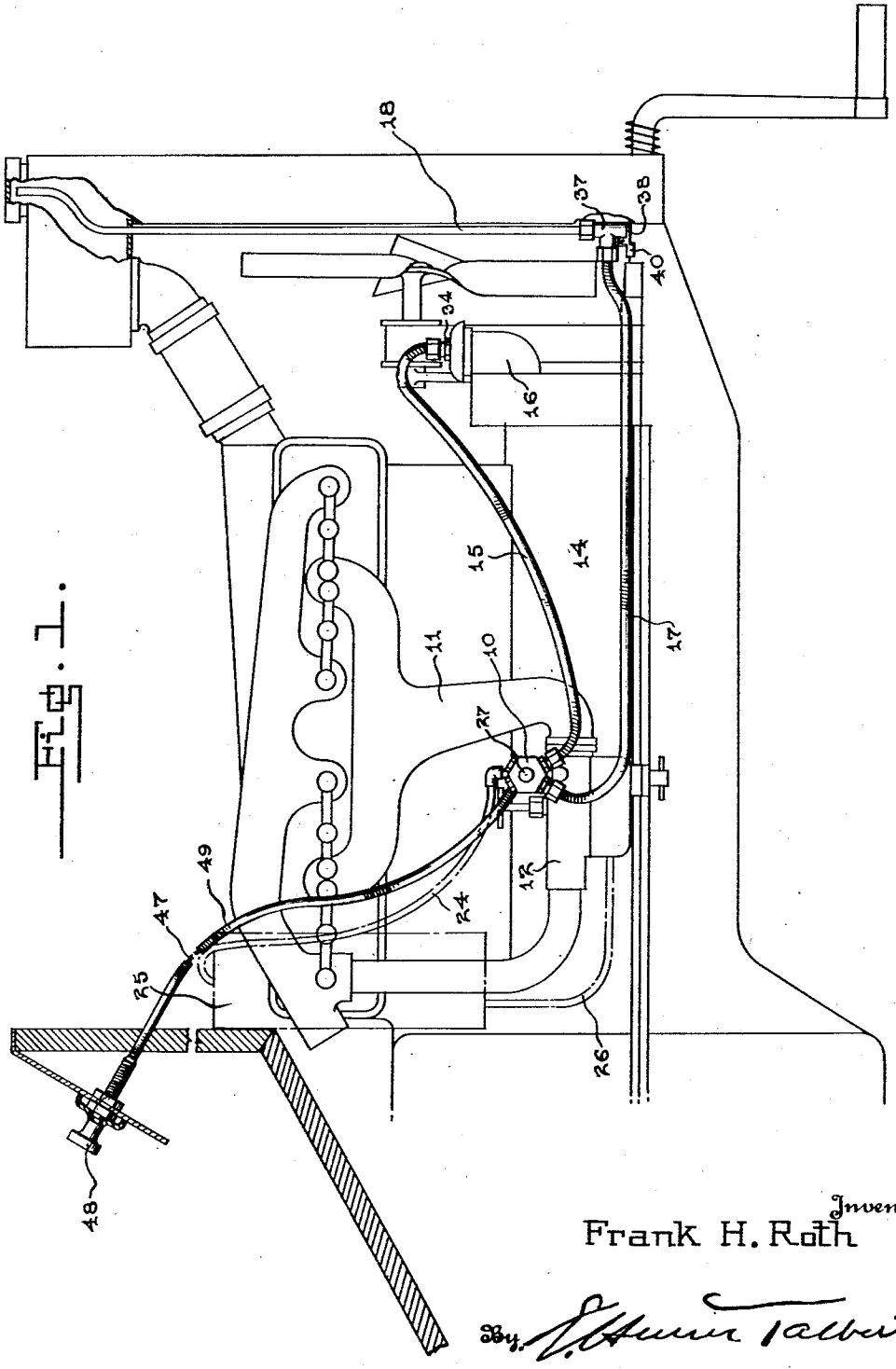


Fig. 1.

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Fig. 2.

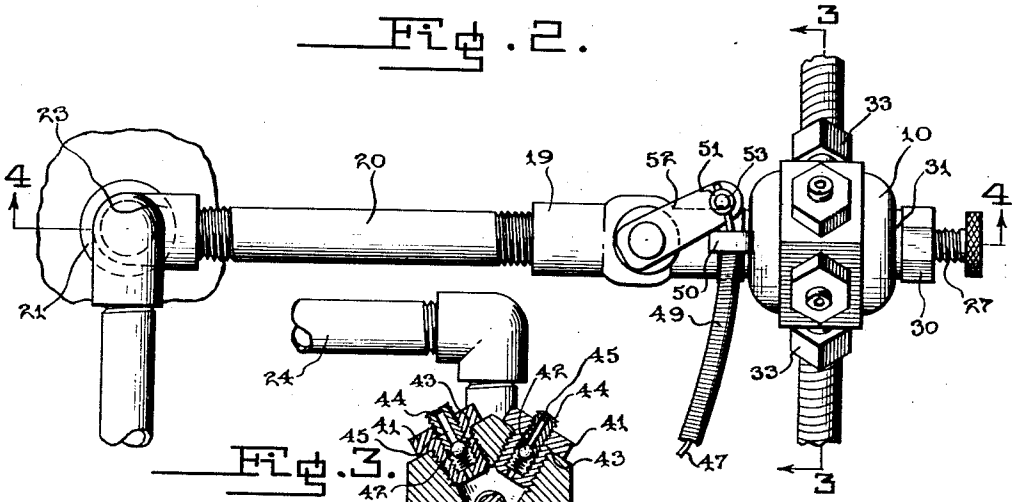


Fig. 3.

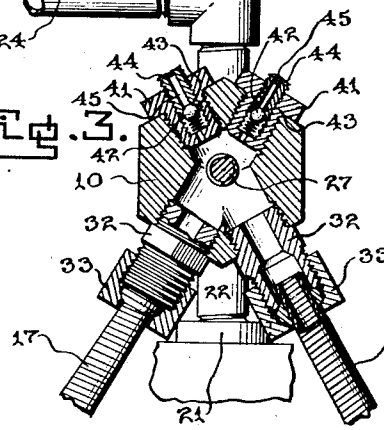


Fig. 4.

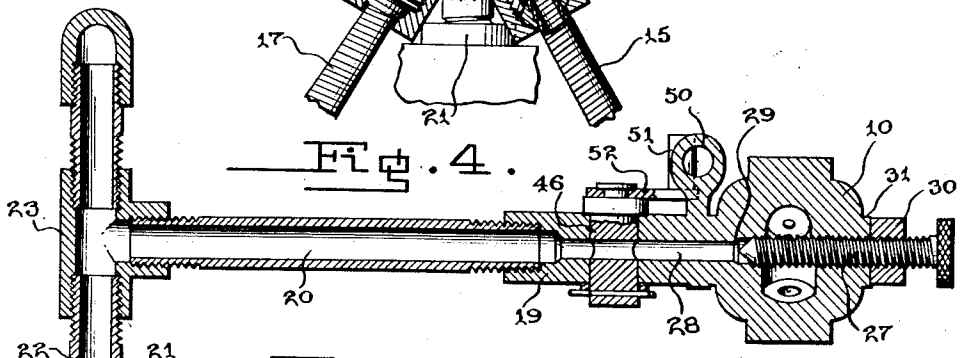


Fig. 5.

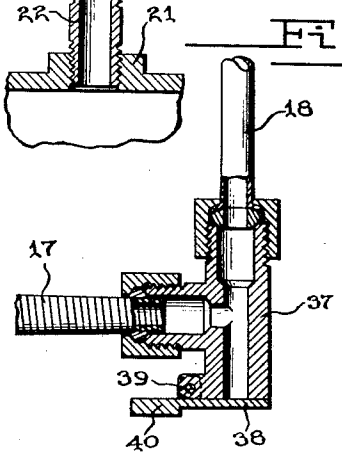
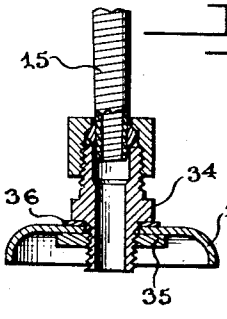


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FUEL ECONOMIZER.

Application filed August 25, 1925. Serial No. 52,457.

The object of the invention is to provide a device for use in connection with internal combustion engines, such as those employed for propelling motor vehicles, so that any unused fuel finding its way past the piston rings and into the crank case will be returned to the combustion chamber of the engine and utilized, thereby preventing dilution of the lubricating oil and therefore increasing its period of usefulness; to provide a device which, while returning unused gases to the cylinders, will also supply moisture which will tend to keep any carbon present in a soft state and therefore prevent its adherence to the cylinder walls and to the valve seats and permit its ejection through the exhaust on the scavenging strokes; and to provide a device of this character which may be readily attached to any of the conventional forms of motor vehicle engines.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of a well known form of vehicle motor, showing the invention applied thereto.

Figure 2 is a top plan view of the invention, the connections between the crank case and circulatory system and the dash control being broken away.

Figure 3 is a vertical sectional view on the plane indicated by the line 3—3 of Figure 2.

Figure 4 is a longitudinal vertical sectional view on the plane indicated by the line 4—4 of Figure 2.

Figure 5 is a central detail sectional view of the connection with the radiator overflow.

Figure 6 is a similar sectional view of the connection with the crank case breather.

The mixing valve 10 which constitutes the essential element of the invention is placed in communication with the intake manifold 11 between the carburetor 12 and the inlet valve. It is also placed in communication with the crank case 14 by a flexible tubular conductor 15 connected with the breather or filling tube 16. Further, it is placed in communication with the circulatory system by means of a flexible conductor 17 connected with a radiator overflow 18.

The mixing valve 10 is formed with an outlet leg 19 and the pipe 20 threadingly connected with this leg serves as a means for supporting the valve as well as a conductor effecting communication between it and the engine cylinders. The preferable means of mounting, where the vehicle employs a vacuum tank, is to drill and tap the top 21 of the carburetor and insert a nipple 22, this nipple connecting with one end of the cross leg of a T 23. The opposite end of the cross leg connects with the tube 24 leading to the top of the vacuum tank 25, the vacuum tank feeding the carburetor in the usual manner, as by a conductor 26. The pipe 20 at the end remote from the leg 19 connects with the lateral leg of the T.

A regulating needle valve 27 is carried by the mixing valve 10 and disposed in axial coincidence with the outlet channel 28 of the outlet leg 19, having a seat 29 at the entrance end of the channel 28. The proper setting of the needle valve is maintained by a nut 30 threaded upon it and bearing on the machined face of a boss 31 on the mixing valve.

The connections between the flexible tubes or conductors 15 and 17 and the mixing valve consist of nipples 32 and coupling nuts 33 and similar connections are made between these conductors or tubes and the breather cap and overflow pipe with the exception that the nipple 34 connecting with the cap of the breather tube passes through said cap and is engaged by a nut 35 to retain it connected therewith, a gasket 36 being interposed between the nipple and top of the cap to prevent leakage. The connection between the overflow pipe and the tube 17 is in the form of a T 37, one end of the cross leg being connected with the overflow tube and the lateral leg being connected with the tube or conductor 17. The cross leg, when in attached position, is disposed vertically, leaving the remote end disposed downwardly and this open end is controlled by a flap valve 38 pivoted as at 39 and held in normally closed position by a counterweight 40.

The T 37, when the valve 38 is closed, closes the overflow, but an excess of steam may be readily discharged since the valve 38 is held yieldingly in closed position and surplus water may readily flow out by depressing the valve. What steam or moisture is present, however, is prevented from escaping by the valve 38 and on the suction strokes of the engine passes through the conductor 17 to the mixing valve 10. Likewise, such unburned gases as may be present

in the crank case are, upon such suction strokes, transferred to the mixing valve through the conductor 15. The steam or moisture admitted through the conductor 17 is then mixed with these gases and with such unvaporized oils as may have passed the carburetor, thus permitting the formation of an emulsion sure to vaporize when brought into contact with the manifold. This mixture is transferred to the engine cylinders in such quantities as may be determined upon by the setting of the needle valve 27, such carbon as may be present being held in a state of suspension by being retained in a sooty condition until it is finally ejected through the exhaust.

Air is admitted to the mixing valve for mixture with the moisture and gases, the provision for this consisting of a pair of valves 41 of which the balls 42 are spring-actuated to be yieldingly held on seats 43 of screws 44, these screws having axial ducts 45. The proper setting of the screws will secure the desired compression of the springs to insure the unseating of the balls an amount just sufficient to admit the desired amount of air.

The setting of the needle valve 27 should be such that the motor may be enabled to utilize all of the waste gas that it can under full load, for the amount to be delivered by the device may be regulated for less loads than full loads by means of a plug valve 46 mounted in the outlet leg 19 and controlling the duct or channel 28 therethrough. The plug valve is actuated from a dash control consisting of a flexible stem 47 terminally connected with an operating knob 48, the stem being housed in a flexible tubing 49 and terminally supported at the mixing valve by a bracket piece 50 into the eye of which it is inserted and is frictionally held. The stem 47 is connected to the valve by insertion through a diametrical hole in a post 51, this post being pivotally mounted on an arm 52 connected with the plug valve. The stem is retained in connection with the post by a set-screw 53 engaged in an axial hole in the free end of the post and bearing upon the stem.

The invention having been described, what is claimed as new and useful is:

1. In combination with an internal combustion motor, a mixing valve in communication with the intake manifold of the motor, a conductor effecting communication between the mixing valve and the crank case, a moisture supply conductor connected with the mixing valve, a valve carried by the mixing valve and mounted for fixed setting to regulate the supply from the mixing valve for full load consumption of the motor, and a manually controlled valve interposed between the mixing valve and the intake manifold for regulating the supply from the mixing valve for variation of load conditions under full load, the last said valve having a remote control.

2. In combination with an internal combustion engine and radiator therefor, a mixing valve in communication with the intake manifold of the motor, a conductor effecting communication between said mixing valve and the motor crank case, a second conductor effecting communication between the mixing valve and the radiator overflow, valve controlled air inlets for the mixing valve, an adjustable needle valve controlling the outlet of the mixing valve, and a yieldingly seated outwardly opening valve controlling the radiator overflow at the point of connection of the conductor therewith.

3. In combination with an internal combustion engine, the carburetor, vacuum tank and radiator therefor, a mixing valve, a tubular connection between the top of the carburetor and the vaccum tank, a T interposed in said connection, a pipe connecting the mixing valve with said T, tubular connections respectively effecting communication between the mixing valve and the motor crank case and said valve and the radiator overflow, valve controlled air inlets for the mixing valve, and a plurality of outlet controls for the mixing valve, one being for fixed setting and the other for adjustment according to operating conditions.

In testimony whereof I affix my signature.

FRANK H. ROTH.