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Publication number:

0 152 924
A2

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EUROPEAN PATENT APPLICATION

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Application number: **85101641.0**

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Int. Cl.⁴: **F 02 M 25/00**

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Date of filing: **14.02.85**

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Priority: **16.02.84 IT 6715384**

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Date of publication of application: **28.08.85**
Bulletin 85/35

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Designated Contracting States: **AT BE CH DE FR GB LI
LU NL SE**

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Internal combustion engine fuel supply system.

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Internal combustion engine supply system whereby petrol is supplied from a main tank and, under special running conditions, provision is made for an additional supply of alcohol and for conveying the oil vapour and gas from the engine block into the engine itself.

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TITLE MODIFIED
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INTERNAL COMBUSTION ENGINE SUPPLY SYSTEM

The present invention relates to an internal combustion engine supply system comprising a main fuel tank, a carburetor upstream from the engine intake header and complete with a throttle valve, and means for supplying fuel from the main tank to the carburetor.

The aim of the present invention is to provide a supply system of the aforementioned type designed to enable a high degree of engine efficiency. The main characteristic of the present invention is that the said supply system also comprises :

- . an auxiliary alcohol tank;
- . means for conveying a mixture of air and alcohol from the auxiliary tank into an outlet pipe on the tank itself;
- . a control electrovalve having :
 - . a first inlet communicating with the inner cavity on the engine block, for receiving the oil vapour and gas coming from the block;
 - . a second inlet communicating with the said outlet pipe

on the auxiliary tank;

. a first and second outlet communicating respectively with the intake pipe on the engine up- and downstream from the throttle; and

5 . a moving member recalled elastically into a first operating position in which the said second inlet and the said second outlet are isolated and the said first inlet communicates with the said first outlet, provision being made for moving the said moving member, by energizing the
10 solenoid on the electrovalve, into a second operating position in which the said first outlet is isolated and the first and second inlets communicate with the said second outlet;

. an engine speed detector; and

15 . electronic control means for energizing the solenoid on the electrovalve when engine speed exceeds a first threshold, and for de-energizing the said solenoid when the said speed falls below a second threshold lower than the first. A further characteristic of the supply system according to
20 the present invention is that it also comprises a minimum throttle detector, and the said electronic control means are designed to close an auxiliary nozzle for supplying fuel into the intake pipe as the vehicle decelerates.

Further characteristics and advantages of the present invention will now be described with reference to the attached drawings provided by way of a non-limiting example and in which :

- Fig.1 shows a diagram of a supply system according to the present invention;

30 - Fig.2 shows a detail of Fig.1 in a different operating

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mode;

- Fig.3 shows a section of the electrovalve on the Fig.1 supply system.

Number 1 in Fig.1 indicates the section of the intake pipe
5 on an internal combustion engine located in the carburetor on the said engine.

The carburetor comprises known means (not shown) for supplying petrol from a main fuel tank into the intake pipe, and, in known manner, a throttle valve 2 for controlling
10 the amount of air supplied to the intake header on the engine.

The supply system according to the present invention comprises an auxiliary fuel tank 3 containing alcohol, and means for supplying a mixture of air and alcohol to out-
15 let pipe 4 on the said tank. As the said air and alcohol mixture is drawn in by the vacuum in the intake header, the said means may consist of the internal combustion engine itself. Pipe 4, in fact, is designed to be connected, as described in more detail later on, with the said intake
20 pipe.

The auxiliary tank is provided with a pipe 5 for receiving air from outside, the said pipe being fitted at the top end with a filter 6.

The system according to the present invention comprises an
25 electrovalve 7 having a first inlet 8, communicating via pipe 9 with the inner cavity on the engine block so as to receive the oil vapour and gas coming from the said block, a second inlet 10, communicating via a non-return valve 11 with outlet pipe 4 on auxiliary tank 3, and a first and
30 second outlet, 12 and 13, communicating respectively with

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the intake pipe on the engine up- and downstream from throttle 2.

Electrovalve 7 comprises a moving member 14, normally held by spring 15 in a first operating position (Fig.1) in which second inlet 10 and second outlet 13 are isolated and first inlet 8 communicates with first outlet 12.

Under such conditions, the oil vapour and gas from the engine block are conveyed into the inlet pipe on the engine upstream from the throttle.

When solenoid 15 (shown schematically in Fig.1) on electrovalve 7 is energized, moving member 14 moves against the action of spring 15 into a second operating position (Fig. 2) in which first outlet 12 is isolated and inlets 8 and 10 communicate with second outlet 13.

Under such conditions, the air and alcohol mixture is supplied to the engine in addition to the air/petrol mixture and together with the oil vapour and gas from the engine block.

Number 16 indicates an auxiliary nozzle, in addition to the main nozzle (not shown) for supplying petrol into the inlet pipe on the engine. Nozzle 16, of known type, is controlled by solenoid 17 which opens or closes it according to how the vehicle is running.

The system according to the present invention comprises an electronic control system having an engine speed detector 18 and a detector 19 for indicating when throttle 2 is in the idling-engine position.

One end of solenoid 15 is connected to positive pole 20 on the vehicle battery, whereas the other end is connected to a hysteresis threshold comparator 21. The output sig-

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nals from detectors 18 and 19 are also sent to an OR gate 22, the input signals at the said gate having inverted logic levels in relation to the output signals from detectors 18 and 19.

- 5 The output on gate 22 is connected to the base of transistor 23 designed for grounding one of the two ends of solenoid 17.

The other end of the said solenoid is connected to the positive pole on the vehicle battery.

- 10 The system as described operates as follows.

As engine speed increases, solenoid 15 remains de-energized until a first threshold, e.g. corresponding to a speed of 1200 rpm, is exceeded. Once the said threshold is exceeded, the solenoid is energized, so as to set electrovalve 7 as
15 shown in Fig.2 and cause operation as already described. As engine speed is reduced, solenoid 15 remains energized until the said speed falls below a second threshold lower than the first, e.g. 1200 rpm.

Solenoid 17 is normally energized (nozzle 16). It is de-
20 energized during deceleration, i.e. when the throttle is set to minimum and speed exceeds the said second threshold, e.g. 1200 rpm, and is re-energized when the throttle is set to minimum and speed falls below 1200 rpm.

Fig.3 shows one arrangement of electrovalve 7. Number 24
25 indicates the electrovalve body consisting of a tubular element having inlet and outlet openings 8, 10 and 12, 13 on its side wall, and closed off at one end by plate 25. The other end of body 24 supports the armature 26 of solenoid 15 which comprises a moving core 27 connected by
30 rod 28, made of non-ferromagnetic material, to moving

core 14 on the electrovalve.

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To those skilled in the art it will be clear that changes can be made to the construction parts and arrangement described herein by way of a non-limiting example without,
5 however, departing from the scope of the present invention.

CLAIMS

- 1) - Internal combustion engine supply system comprising a main fuel tank, a carburetor upstream from the engine intake header and complete with a throttle valve, and means for supplying fuel from the main tank to the carburetor, characterised by the fact that the said supply system also comprises :
- . an auxiliary alcohol tank (3);
 - . means for conveying a mixture of air and alcohol from the auxiliary tank into an outlet pipe (4) on the tank itself;
 - . a control electrovalve (7) having :
 - . a first inlet (8) communicating with the inner cavity on the engine block, for receiving the oil vapour and gas coming from the block;
 - . a second inlet (10) communicating with the said outlet pipe (4) on the auxiliary tank (3);
 - . a first and second outlet (12, 13) communicating respectively with the intake pipe on the engine up- and downstream from the throttle (2); and
 - . a moving member (14) recalled elastically into a first operating position in which the said second inlet (10) and said second outlet (13) are isolated and the said first inlet (8) communicates with the said first outlet (12), provision being made for moving the said moving member, by energizing the solenoid (15) on the electrovalve, into a second operating position in which the said first outlet (12) is isolated and the first and second inlets (8, 10) communicate with the said second outlet (13);

5 (15) when the said speed falls below a second threshold lower than the first.

10 the said electronic control means are designed to close the auxiliary nozzle (16) supplying the fuel intake pipe from the main tank, during deceleration of the vehicle. All essentially as described and illustrated and for the purposes specified herein.

FIG. 1

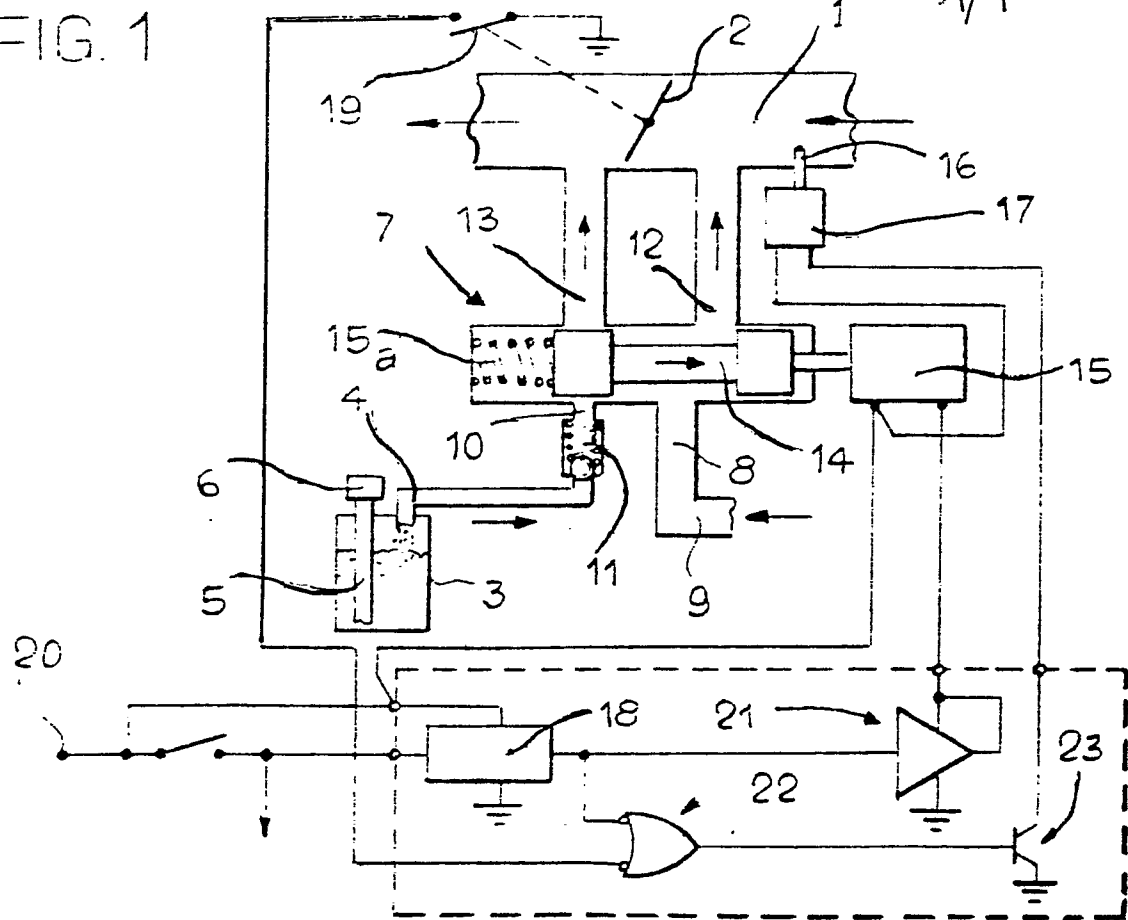


FIG. 2

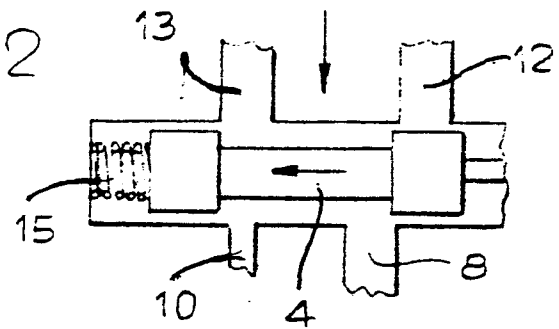


FIG. 3

