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(54) FUEL FEED SYSTEM FOR A MOTOR VEHICLE INTERNAL COMBUSTION ENGINE

(71) We, LANCIA & C. FABBRICA AUTOMOBIL TORINO S.p.A., an Italian Joint Stock Company, of 27, Via Vincenzo Lancia, 10141 Turin, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the fuel feed system of a motor vehicle having an internal combustion engine, more particularly a fuel feed system of the kind having a feed pipe incorporating a pump through which fuel is drawn from a tank and fed to a carburettor of the engine, and a return pipe through which surplus fuel is returned to the fuel tank.

The invention has particular reference to fuel feed systems in vehicles in which the level of fuel in the tank may, in certain trim conditions of the vehicle, when the tank is sufficiently full, be higher than the level of a fuel inlet point of the engine, for example the fuel inlet of a carburettor. Such a difference in level could give rise, in the case of imperfect sealing of the pin valve of the carburettor float chamber, to a syphoning transfer of fuel from the tank to the engine cylinders, through the feed pipe and/or through the return pipe, leading to considerable damage to the engine. In the extreme case when the engine is started after a halt during which such syphoning has occurred breakage of the connecting rods of the engine, or even setting on fire of the vehicle, could occur.

According to the present invention, we provide a motor vehicle having an internal combustion engine with a fuel feed system comprising a fuel tank, a feed pipe incorporating a pump through which fuel is drawn from the tank and fed to a carburettor of the engine, and a return pipe through which surplus fuel is returned from the carburettor to the tank, the arrangement being such that, when the vehicle is standing on a horizontal surface, the position of the tank in relation to the carburettor is such that the free level of fuel in the tank may be higher than the level of the fuel inlet to the carburettor, the fuel feed pipe communicates, downstream of the pump, with the extreme upper part of the interior of the fuel tank, and the terminal section of the return pipe communicates with the extreme upper part of the interior of the tank.

The arrangement of the fuel feed and return pipes in accordance with the invention has the advantage of effectively preventing the initiation of a syphoning transfer of fuel between the tank and the carburettor under the previously mentioned unfavourable conditions, provided the level of fuel in the tank is not above the uppermost points at which the fuel feed pipe and the return pipe communicate with the interior of the tank.

In a preferred embodiment of the invention the feed pipe includes, downstream of the pump, a section passing through the upper part of the tank and provided with at least one hole through its wall, while the terminal section of the return pipe preferably includes a portion situated in the upper part of the tank and provided with at least one hole through its wall.

The invention will now be further described, by way of example, with reference to the attached drawings, in which:—

Figure 1 is a digrammatic longitudinal section view of a motor vehicle fitted with a fuel feed system according to one embodiment of the invention; and,

Figure 2 is a perspective view on an enlarged scale, partially broken away, of the fuel feed system shown in Figure 1.

Referring to Figure 1, a motor vehicle A is shown having a fuel tank 1 situated in a fairly high position at the rear of the vehicle.

A fuel feed pipe leads from the tank 1. The feed pipe has a first section 2 extending substantially vertically within the tank, with an open end adjacent the bottom of the tank 1, and emerging through an upper wall of the tank. There follows a second feed pipe section 3 having a U-shaped bend

resting upon the outer surface of the upper wall of the tank 1. The second pipe section 3 incorporates a filter 4 and a pump 5. The second section 3 leads into a third pipe section 6 which, penetrates into the tank 1 and passes through the entire height of the latter generally parallel to the first section 2, emerging from the bottom of the tank. The wall of the pipe section 6 has a vent hole 6*a* at its upper end, within the tank 1. The fuel feed pipe continues with a fourth section 7 which connects the third section 6 to a carburettor 8 mounted upon the engine 9 of the motor vehicle.

A return pipe leads from an overflow outlet of the carburettor 8 back to the tank 1, so as to return any surplus fuel to the tank. This return pipe includes a section 10 connecting the carburettor 8 to the bottom of the tank 1, a substantially vertical section 11 penetrating into the tank 1 and leading to a 180° elbow bend 12 within the tank near the upper wall of the latter, and a substantially vertical descending section 13 which is open at its lower end near the bottom of the tank 1. The two substantially vertical sections 11 and 13, together with the elbow bend 12, form an inverted U-shaped terminal section of the return pipe. The wall of the upper portion of the elbow 12 is provided with a vent hole 12*a*.

Should the pin valve in the float chamber of the carburettor 8 make an imperfect seal with its seat, then the presence of the vent holes 6*a* and 12*a* will usually prevent the initiation of a syphon between the tank 1 and the carburettor through the fuel feed and return pipes.

WHAT WE CLAIM IS:—

1. A motor vehicle having an internal combustion engine and a fuel feed system comprising a fuel tank, a feed pipe incorporating a pump through which fuel is drawn from the tank and fed to a carburettor of the engine, and a return pipe through which surplus fuel is returned from the carburettor to the tank, the arrangement being such that, when the vehicle is standing on a horizontal surface, the position of the tank in relation to the carburettor is such that the free level of fuel in the tank may be higher than the level of the fuel inlet to the carburettor, the fuel feed pipe communicates, downstream of the pump, with the extreme upper part of the interior of the fuel tank, and the terminal section of the return pipe communicates with the extreme upper part of the interior of the tank.

2. A vehicle according to claim 1, in which the fuel feed pipe includes, downstream of the pump, a section passing through the upper part of the tank and provided with at least one hole through its wall.

3. A vehicle according to claim 1 or claim 2, in which the terminal section of the return pipe has a portion situated in the upper part of the tank and provided with at least one hole through its wall.

4. A vehicle according to any of claims 1 to 3, in which the pump incorporated in the feed pipe is supported upon an upper wall of the fuel tank.

5. A vehicle according to claim 2, in which the feed pipe has, downstream of the pump a section passing through the entire height of the fuel tank, said section being provided with said at least one hole at its upper end.

6. A vehicle according to claim 3, in which the return pipe enters the fuel tank through the bottom of the latter and has within the tank a terminal section in the shape of an inverted U, the elbow part of the said U-shaped section being situated in the upper part of the tank, and being provided with said at least one hole.

7. A motor vehicle having an internal combustion engine and a fuel feed system substantially as herein described with reference to and as shown in the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 1

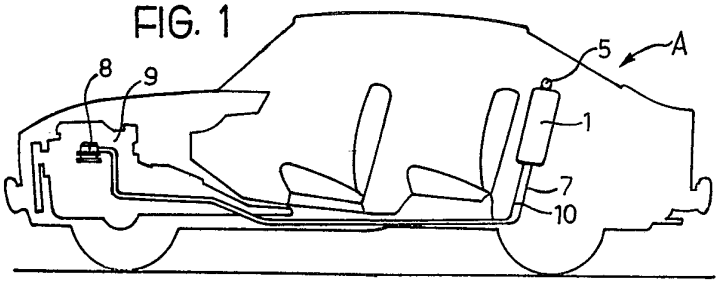

FIG. 2