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FUEL PUMP FOR INTERNAL COMBUSTION ENGINES

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FIG. 1.

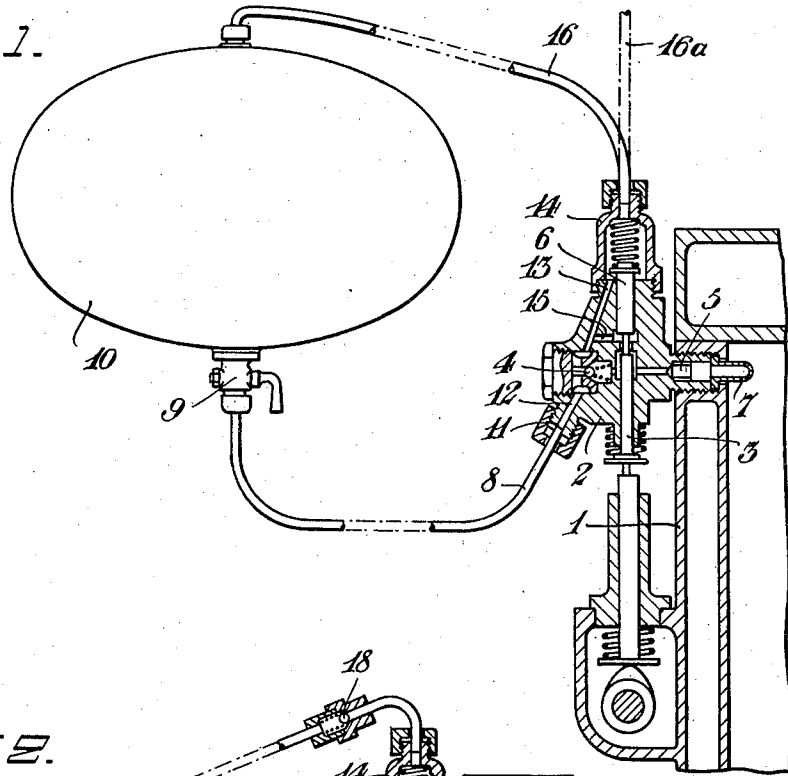
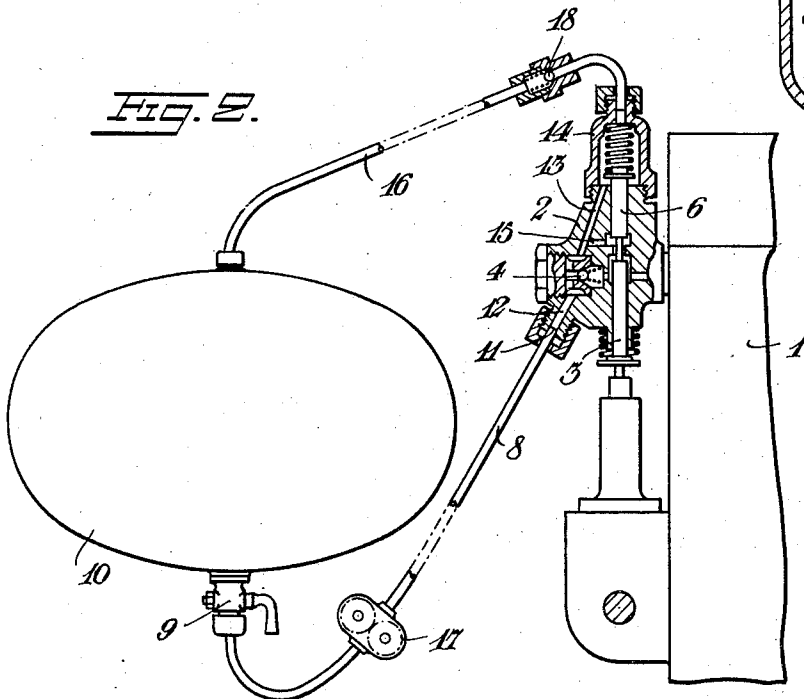


FIG. 2.



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FUEL PUMP FOR INTERNAL COMBUSTION
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near Stockholm, SwedenApplication March 14, 1930, Serial No. 435,682,
and in Sweden March 22, 1929

3 Claims. (Cl. 103—203)

The present invention relates to pumps for supplying fuel to internal combustion oil engines.

In order that fuel pumps of such engines shall be able to operate in the desired manner it is necessary that the air be thoroughly removed. For, if there is any air in the pump at the time of starting, the engine will not be supplied with fuel and hence cannot start, and, should air in some way or another get into the pump while the motor is running, the engine will stop for the same reason. All such pumps are, therefore, provided with means to remove the air, as for instance, small air valves. In engines adapted for propelling automobiles and the like it is specially important, that the air be removed in the most reliable, complete and convenient manner possible, among other things for the reason that, in case of such engines, one cannot expect the same expert supervision as in case of engines that are operated by a trained engineer.

The purpose of the present invention is to provide means whereby the removal of the air takes place automatically as soon as the fuel oil inlet of the pump is opened.

The invention is characterized chiefly by the fact that the pump is provided with a special pipe conduit, which communicates with the pump's fuel supplying inlet in such a way as to allow the air contained within the pump to escape as a result of the feeding of the oil.

In the accompanying drawing some embodiments of the invention are illustrated.

Fig. 1 is a vertical section of a fuel pump according to the invention and a side elevation of an oil tank connected therewith. Fig. 2 is a similar view of a pump and an oil tank with the tank located at a lower level than the pump.

With reference to Fig. 1, the numeral 1 indicates the cylinder of an oil motor, which otherwise is not shown. Mounted at the outer side of the cylinder is the fuel pump. The fuel pump comprises the pump body or casing 2, the plunger 3, the fuel inlet or suction valve 4, the fuel discharge valve 5, and a pressure release valve 6, arranged to be opened by the plunger 3 to control a connection between the pressure chamber and the suction side of the pump in order to limit the effective discharge stroke of the pump. The pressure valve 5 shown is constructed as an injection valve and communicates directly with an injection nozzle 7 projecting into the cylinder 1.

The suction pipe 8 of the pump leads from a cock 9 in the bottom of the oil tank 10 and opens into the lower part of the pump casing, at 11.

Within the pump casing the suction pipe is continued by an upwards leading channel 12, which leads to the suction valve 4 and is continued thereabove by a channel 13, opening into a closed chamber formed at the upper end of the pump casing by a cap 14 screwed on the pump casing. Leading from the channel 13 to the valve 6 is a side channel 15. A pipe line 16 leads from the uppermost part of the cap 14 to the top of the oil tank 10.

If the pump contains air, for example as a result of having been removed and replaced, this air will escape automatically through the pipe line 16, as soon as the cock 9 is opened, as it will be displaced by the inflowing oil. The air contained in the pump chambers proper will rise into the air removing pipe 16, as soon as the motor commences to move and the release valve 6 is opened. Any special manipulations are, consequently, not required for the removal of the air. If air for some reason or another should get into the pump while the motor is in operation, this air will likewise escape through the pipe line 16.

Instead of connecting the air removing pipe 16 to the oil tank, as has been stated hereinbefore, it may open into the open air, in which case, however, its outlet should be placed at a higher level than the top of the oil tank. Such an air removing pipe is shown by dotted lines at 16^a in Fig. 1.

In the embodiment shown in Fig. 1 it has been assumed that the bottom of the oil tank lies at a higher level than the pump's valves and pump chambers, so that the oil, therefore, will flow in by gravity. It may also be convenient, however, to locate the tank lower than the said parts of the pump. Such an embodiment is shown in Fig. 2. In order to lift the oil from the tank 10 through the pipe 8 up to the pump, there is in this case inserted in the pipe 8 a pump 17, which may be a meshing gear pump, as indicated in the drawing, or some other type of pump. The design of the pump 2 is the same as that shown in Fig. 1, and like reference numerals indicate similar parts in both figures so that special description thereof is deemed unnecessary. The return pipe 16 extending from the top of the pump casing to the top of the oil tank 10, the oil tank, the supplying pipe 8, and the pump 2 form a closed circulation system for the liquid put in motion by the pump 17, so that the line 16 in this case serves both as an air removal line and as a return line for superfluous pumped oil. The air that possibly accompanies the oil will collect in the upper part

of the tank, whence it can escape through air-holes, not shown.

At a suitable point of the return line 16^a preferably spring controlled valve 18 is inserted in pipe 16, which maintains the system under pressure but does not interfere with the function of the pipe to carry away the air.

The purpose of the valve 18 is to maintain the flow of oil to the suction valve under pressure, especially in case of high speed motors. The valve 18 may, therefore, be arranged at any place after the suction valve in the direction of flow and, consequently, also may be arranged in the pump casing proper, as in the channel 13.

What I claim is:—

1. A fuel pump of the character described comprising a pump body providing a pressure chamber, a plunger reciprocable in said chamber, inlet and discharge valves for fuel in said body opening toward and away from said chamber, and a pressure release valve located above the level of the inlet and discharge valves for limiting the effective discharge stroke of the plunger, said body having a first channel leading to the inlet valve for supplying fuel thereto and a second channel leading upwardly and communicating with said pressure release valve and said first named channel for conducting from the pump air in the fuel on the suction side of the inlet valve and air released from the pressure chamber through said release valve.

2. A pump for supplying fuel to internal combustion engines comprising a pump body providing a pressure chamber, a plunger reciprocable in said chamber, inlet and discharge passages for fuel in said body, said passages extending laterally of said chamber and being in communication

therewith, valves in said passages and a pressure release valve located above the level of said inlet and discharge passages and located above said pressure chamber and arranged to be opened by the inner end of said plunger to limit the effective discharge stroke of the plunger, said body having a first channel leading to the valve in said inlet passage for supplying fuel thereto and a second channel leading upwardly in communication with said pressure release valve and said first named channel for conducting from the pump air in the fuel on the suction side of the valve in said inlet passage and air released from the pressure chamber through said release valve.

3. A pump for supplying fuel to internal combustion engines comprising a pump body comprising a pressure chamber, a plunger reciprocable in said chamber, inlet and discharge passages for fuel in said body, said passages opening laterally of said chamber below the upper portion thereof to provide a pocket above the level of the passages, valves in said passages, and a pressure release valve located at the top of said pocket and in alignment with said plunger, said valve being adapted to be opened by the plunger to limit the effective discharge stroke of the plunger, said body having a first channel leading to the inlet valve for supplying fuel thereto, a second channel leading upwardly for conducting from the pump air in the fuel on the suction side of the valve in said inlet passage and a third channel for conducting to said second channel air and fuel discharged from the pressure chamber through said release valve, said second and third channels being above the level of said first channel.

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