Oct. 9, 1934. E. A. ROCKWELL 1,976,519

FUEL PUMP

Original Filed Nov. 16, 1929

Fig. 1.

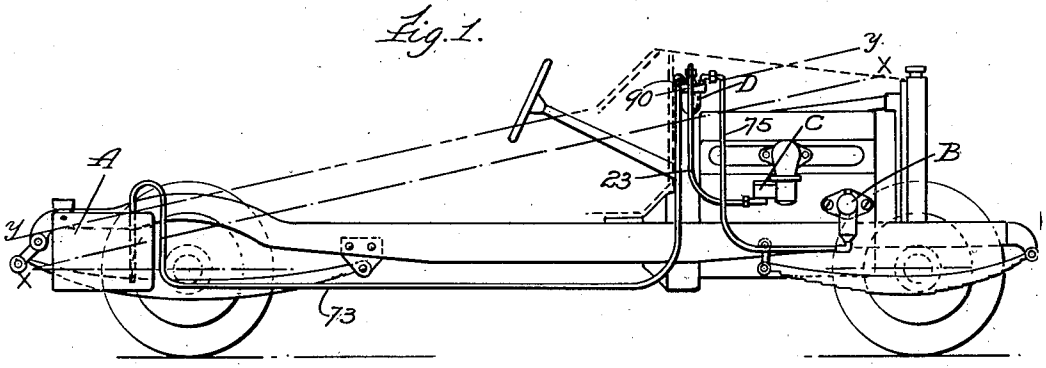


Fig. 2.

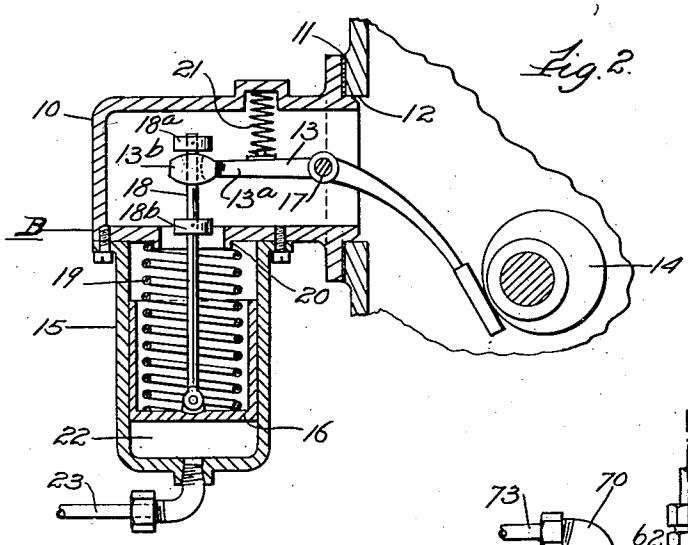


Fig. 3.

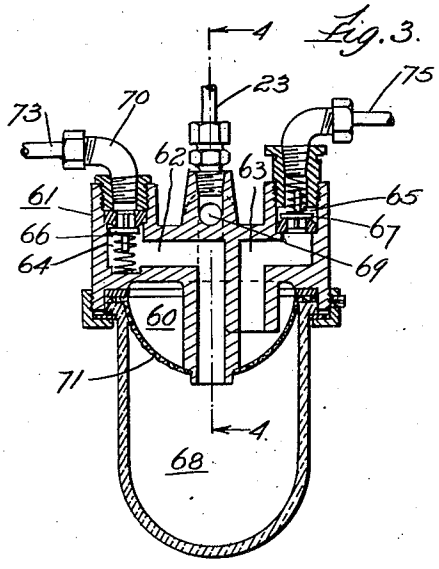
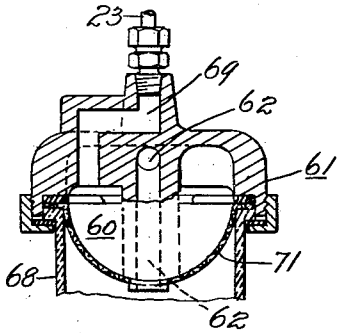


Fig. 4.



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FUEL PUMP

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4 Claims. (Cl. 158—36.3)

The purpose of this invention is to provide an improved construction and arrangement of the fuel line of a motor vehicle from the main fuel supply tank at the rear of the vehicle to the engine, having features and means for preventing the carbureter being flooded by gravity flow of the fuel from the rear tank when the vehicle is on a steep descending grade, causing the tank to be at a higher level than the carbureter, and for obviating certain defects and disadvantages of constructions heretofore commonly employed by reason of possibility of draining the fuel from the carbureter fuel chamber by siphoning back to the main tank when the engine is at rest and the vehicle upon an ascending grade. It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawing:—

Figure 1 is a diagrammatic view for showing the relative location on the vehicle of the fuel supply tank and carbureter and the several distinctive portions and elements of the fuel conduit from the tank to the carbureter.

Figure 2 is a vertical section of a fuel feeding pump or impulser.

Figure 3 is a vertical section of the portion of the fuel line comprising a fuel and sediment trap and the intake and discharge passages and their controlling valves.

Figure 4 is a section at the line 4—4 on Figure 3.

Referring to the drawing:—The main fuel supply tank is shown at A, the impulser or fuel pumping device mounted on the engine for pumping the fuel from the main tank to the engine carbureter being shown at B. The carbureter is indicated at C. At D there is shown an element comprising a fuel and sediment trapping chamber which is associated with the portion of the fuel line in which are located the passages and valves therein which control the flow opening for flow from the main supply tank to the carbureter and seating against reverse flow.

The impulser may be any usual form of pumping device. As illustrated, it comprises a pump casing, 10, arranged to be mounted on the engine casing indicated at 11 at an aperture in the latter indicated at 12, through which the pump operating lever, 13, may protrude for encounter of an engine cam indicated at 14. The pump casing comprises a pump cylinder, 15, in which the piston, 16, is fitted and mounted for reciprocation by the lever, 13, which is fulcrumed in the pump casing at 17, and connected to the operating stem, 18, of the piston, 16, said stem being connected to the piston at the lower end of the latter and of said stem. The piston is hollow for accommodating a spring, 19, reacting between the piston and a stop flange, 20, formed on the pump casing, said spring operating for yieldingly resisting the retraction of the piston in the cylinder for its suction stroke and reacting for giving the piston yieldingly its forcing stroke. The inner arm, 13^a, of the lever, 13, is forked, as seen at 13^b, for engaging the stem, 18, by means of stops, 18^a, 18^b, on said stem, 18, said stops being spaced apart along the stem a short distance for affording lost motion connection between the lever and the piston for a well understood purpose in pumping devices of this character.

A spring, 21, is provided reacting between the lever arm, 13^a, and the casing for causing the lever to follow the cam, 14, on the idle phase of the latter.

The pumping chamber, 22, is connected by pipe line, 23, with the element of the system above mentioned as comprising the fuel and sediment trap, and fuel intake and discharge passages and controlling valves, shown in detail in Figure 3, which will now be described. This element is mounted at a point on the vehicle relatively proximate to the engine and remote from the fuel tank, and at as high a level as support for the same can be conveniently provided on the vehicle, as for example at a relatively high point on the dash. It consists of a trap chamber, 60, having at the upper end thereof a casing member, 61, in which are formed ducts, 62 and 63, constituting parts of the fuel line which comprises also valve chambers, 64 and 65, for intake and outflow controlling valves, 66 and 67, respectively, the fuel and sediment trap chamber, 68, being interposed in the course of flow between the valve chambers, 64 and 65, and having connection by means of the duct, 69, with the pumping chamber of the impulser, the pipe, 23, leading, as described, from said pumping chamber, being connected to said duct, 69, as seen at 70 on Figure 3. A fuel pipe line, 73, leads from the main fuel supply tank, A, to the element, D, to which said pipe line is connected at the inflow passage, 62, and a pipe line, 75, connected by the discharge passage, 63, of said element leads therefrom to the carbureter.

It may be noted that the fuel passages as described are arranged with respect to the fuel and sediment trapping chamber, 68, and a filter screen, 71, therein, in a manner familiar in such devices for trapping the fuel and sediment in the trapping chamber below the filter screen, above which the passage, 63, leads to the discharge valve, 67, so that the fuel is freed from sedimen-

tary impurities before passing the discharge valve.

At a convenient point in the fuel line antecedent to the intake controlling valve, 66, and as illustrated, most conveniently at the highest point in the pipe line, 73, and in any case antecedent to the valve, 66, there is provided a restricted air bleed aperture, 90.

Upon considering this construction it may be understood that starting with the fuel line and trap chamber empty, the reciprocation of the impulser piston actuated in one direction by the engine cam and in the reverse direction by the spring, 19, will operate for lifting the fuel by suction from the main tank to the trap chamber; and that when that chamber is filled, the fuel will be forced by way of the fuel pipe line, 75, to the carbureter. The details of this action may be controlled by details of the construction not described and not specifically significant for the purpose of this invention, which is concerned with means for preventing the carbureter being flooded when the vehicle is on a descending grade of such steepness as to cause the fuel tank, A, to be higher than the carbureter.

And upon considering this construction it may be understood that when the vehicle is descending a grade such that the line x—x in Figure 1 would properly indicate the horizontal, in the absence of preventive means, the fuel line being filled by the action of the impulser while the vehicle is on level road, notwithstanding by gravity the fuel would not rise in the fuel line antecedent to the valve, 66, higher than the point indicated at y, yet the passages and chambers constituting the fuel line having been already filled with liquid, the entire line would constitute a siphon connection which would cause the fuel to be delivered by gravity to the carbureter without limit until the tank was exhausted. This result is prevented by the air bleed, 90, located in the fuel line at a point substantially higher than the level at which the fuel would stand in the pipe under action of gravity alone with the vehicle on the descending grade indicated.

It will be understood that the air bleed, 90, will be restricted relatively to the suction capacity of the impulser so that notwithstanding the presence of said air, the impulser will be competent to lift the fuel to the height of the trap chamber and valves.

This will not operate to prevent the construction from serving its purpose of preventing the flooding of the carbureter, because, so far as the fuel is supplied by the impulser, it is absolutely under the control of the impulser, which will only operate to the limit of the engine requirements, such being the limit of the feeding capacity of the spring, 19.

Upon further consideration it may be understood that when the vehicle is halted on a steep ascending grade and the engine is not running, leakage of the valves in the fuel line will tend to cause backflow of fuel from the carbureter and from the pump; and that such backflow will be promoted and become operative, notwithstanding the fact that the flow from the pump and from the carbureter will be upward to the trapping chamber and the flow controlling valves, by reason of the fact that the entire fuel line back to the main tank being full, siphon action would occur; and it will be observed that under these circumstances the air bleed, 90, will serve for breaking the siphon so that only the fuel in the pipe line from that point back to the tank will recede to the tank.

Upon further consideration of the structure and arrangement of the several elements of the apparatus, it will be observed that the feeding capacity of the pump when the piston makes a full stroke, is not designed to exceed the capacity of the trap chamber between the level of the entrance to the passage, 69, and the entrance to the passage, 63, and that by reason of the lost motion provision at the forked engagement of the lever, 13, and the lever arm, 13^a, with the piston stem, 18, by means of the spaced stops, 18^a and 18^b, makes it impossible for any suction stroke of the piston to exceed the preceding feeding stroke which in turn will be limited by the fuel requirements of the engine; and consequently in the normal operation of the apparatus, the fuel will never be drawn into the pipe line, 23, and thence into the pumping chamber.

On the contrary, the pumping chamber and said pipe lines, 23, will be occupied by air or gas which will act as a slightly yielding piston for transmitting the impulses of the pump piston to the liquid in the fuel line. In this connection it will be observed that the pipe, 23, may be very small and that its length is limited to the few feet of distance from the pump mounted on the engine to the vehicle dash, so that the resilient yielding of the air column in this pipe is not sufficient to prevent the air from acting effectively for transmitting the impulses as mentioned.

I claim:

1. A fluid feed system comprising in combination, a low level fluid supply tank, an impulser at the lower forward part of the apparatus, a fluid line from the supply tank to the point of delivery including an elevated portion above the point of delivery, a pair of check valves in the fluid line at the elevated portion, a depending trap chamber in the fluid line between the valves, a communication from the impulser to the trap chamber and said feed line having a restricted air bleed aperture at the elevated portion antecedent to the valves for preventing siphoning of the fluid.

2. In the construction defined in claim 1, the fluid line having its intake at the lower part of the main fluid supply tank and extending thence upwardly for emerging from the top of the tank to a height approximating the level of the impulser intake, thence reflexed for extending downwardly substantially to the level of the intake of said fluid line, thence extending forwardly for extending upwardly to said elevated portion.

3. In the construction defined in claim 1, the capacity of the trap chamber between the levels of the port of suction from the impulser and the port of fluid discharge from said chamber being at least equal to the stroke capacity of the impulser, whereby the drawing of liquid into the pipe line between the trap chamber and the impulser is prevented.

4. A fluid feed system including a low level fluid supply tank, an impulser, a fluid feed line from the supply tank to a receiving chamber including an elevated portion above the receiving chamber, a pair of check valves in the feed line at the elevated portion, a depending trap chamber in the feed line between the valves, a communication from the impulser to the trap chamber and said feed line having a restricted air bleed aperture at the elevated portion antecedent to the valves for preventing siphoning of the fluid back to the supply tank.

EDWARD A. ROCKWELL.