May 12, 1931. C. BROWN 1,804,524

LIQUID PUMP

Filed Nov. 1, 1930 2 Sheets-Sheet 1

Fig. 1.

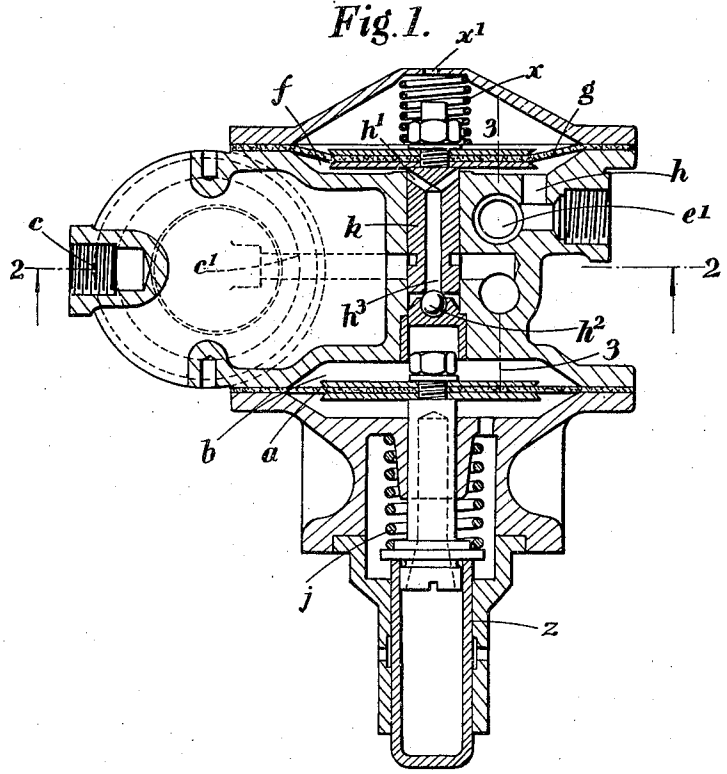
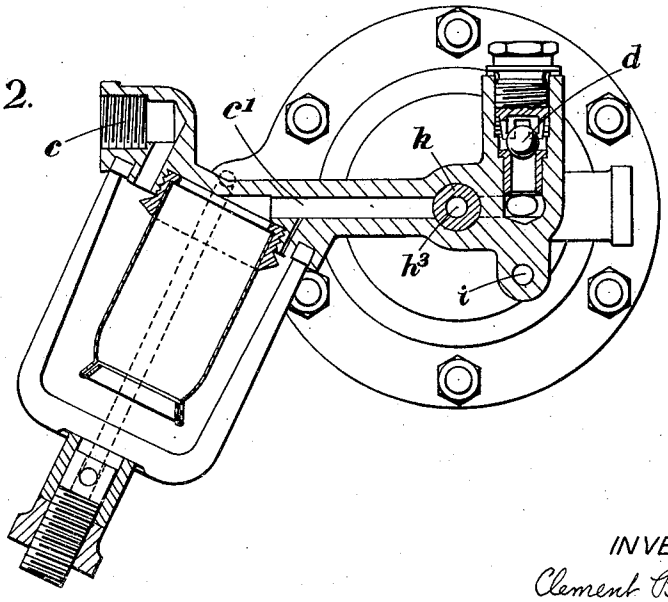


Fig. 2.



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Fig. 3.

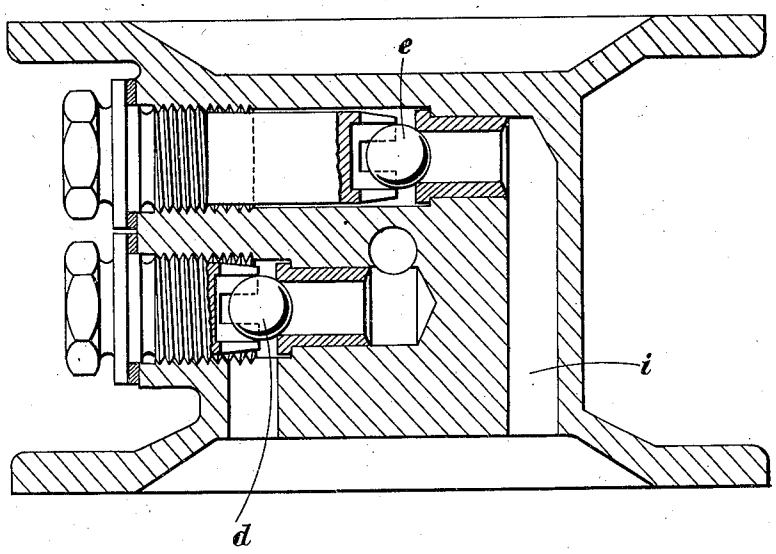
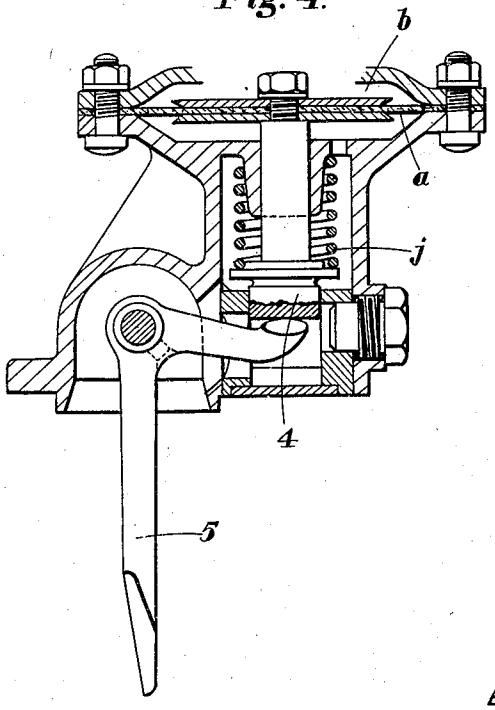


Fig. 4.



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UNITED STATES PATENT OFFICE

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LIQUID PUMP

Application filed November 1, 1930, Serial No. 492,775, and in Great Britain October 31, 1929.

This invention relates to apparatus for elevating or impelling the liquid fuel in an automobile for the purpose of lifting the petrol from the tank to the carbureter when the tank is at a lower level than the carbureter. Conditions as to the necessary rate of flow and otherwise in such and similar circumstances vary between wide limits but it is always necessary that the potential supply of petrol should be maintained in excess of the requirements of the carbureter. The object of the present invention is to provide apparatus for this purpose which will deliver an excess of liquid fuel at constant or semi-constant pressure and which will function effectually under widely differing conditions.

In order that this invention may be clearly understood and readily carried into practice reference may be had to the appended explanatory drawings in which one form of the invention is shown as applied to an automobile of which:—

Figure 1 is a sectional elevation of a pump device according to the present invention.

Figure 2 is a sectional plan of the apparatus shown in Figure 1 the plane of section being on line 2—2 of the figure last mentioned.

Figure 3 is a sectional elevation of the device shown in Figure 1 the plane of section being on line 3—3 of the figure last mentioned.

Figure 4 is a fragmentary elevation similar to Figure 1.

In the particular embodiment of the present invention shown in the drawings the force pump or impulsion element takes the form of a diaphragm a actuated from a cam on the cam shaft of the engine or from another suitable operating part, the diaphragm a forming the oscillating portion of a pump chamber b. The pump chamber b receives liquid from the source of supply c through suitable passages and by way of one non-return valve d and delivers the liquid to the float chamber through a second non-return valve e.

Leading out of the outlet port e^1 is a conduit h communicating with the control chamber f of which one side is formed by a second diaphragm g. This second diaphragm g is supported externally by a suitably tensioned spring x and it will be seen that the diaphragm is affected by the pressure prevailing at the outlet port e^1 of the pump and moves against the action of the spring x when influenced by such pressure. The pressure exteriorly of the control chamber is maintained atmospheric by the provision of a suitable vent x^1. The diaphragm g operates a slide valve k centrally disposed in the apparatus which slide valve checks and/or diverts the flow of liquid through the pump as hereinafter described.

The normal position of the slide valve k is that shown in Figure 1 and the valve takes up this position when there is either suction in the control chamber f or else there is insufficient pressure there to force the diaphragm g against the action of the spring x. This is the position that the valve takes up when the carbureter is requiring all the liquid that the pump can supply and when in this position the slide valve k does not affect the normal working of the pump in any way, the base of the slide valve being seated on a ball valve h^2 positioned at the base of the hollow stem.

When however (as will almost always be the case, in use) the potential supply delivered by the pump is in excess of the requirements of the carbureter a pressure will develop in the control chamber f sufficient to press the diaphragm g against the action of the spring x. This will cause the upward movement of the slide valve k and the primary effect of this is to cut off the supply of liquid to the inlet port of the pump owing to the annular channel k^1 in the valve stem ceasing to register with the fuel passage c^1. Further if, owing to a sudden cessation on the part of the carbureter of the need for liquid, a pressure still obtains in the control chamber after the supply has been thus cut off, the diaphragm g will be further displaced and the slide valve k will be further lifted, thus opening up communication between the inlet and the out-

let ports of the pump, via the conduit h^1 and h^3 and c^1 and reversing the flow.

On the carbureter again needing liquid suction will be set up in the control chamber, the slide valve will return to its normal position and the pump will again effectually operate.

In order to relieve the pump diaphragm from undue stresses and in order to provide means for holding the stem z on its operating cam on the return stroke we may incorporate at any point in the mechanism for manipulating the diaphragm a resilient buffer such as a spring j or similar devices.

The modification shown in Figure 4 differs from that shown in Figure 1 in the fact that whereas in Figure 1 the pump diaphragm a is provided with an actuating stem z which may directly be engaged by a cam the equivalent element 4 in the modification shown in Figure 4 is actuated indirectly through the intermediary of a lever 5 appropriately incorporated.

From the above description the operation of the apparatus when in use will be evident and it will be seen that the pressure at which the liquid is to be supplied can be predetermined by varying the compression strength of the spring x.

It will be understood moreover that the invention is not limited to use in an automobile as has been described as an example, but is applicable to any circumstances wherein liquid is to be supplied at a predetermined constant or semi-constant pressure.

As an alternative to the details shown any convenient form of pump or impulsion element can be utilized and the control slide valve can take other forms than that shown in the drawings.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

Apparatus for pumping liquids, comprehending in combination a casing providing a pump chamber, a pumping diaphragm in said chamber, a supply conduit leading to said pumping chamber, a discharge line leading from said chamber, a control chamber in said pump casing communicating with said discharge line, a control diaphragm in said control chamber subjected to pressure of liquid in the discharge line, a slide valve connected to said control diaphragm, a supply port in said slide valve normally open to said supply line and allowing flow therefrom to the pump chamber, a pump inlet valve between said supply port and the pump chamber, a pump discharge valve in the discharge line between the pump and the control chamber, and a by-pass port in said slide valve communicating between the control chamber and the supply line and normally closed, whereby excessive pressure in the discharge line will move the control diaphragm and slide valve to first move the supply port out of register with the supply line, and increased excessive pressure moves the slide valve further to open the by-pass port.

In witness whereof I affix my signature.

CLEMENT BROWN.