Oct. 11, 1938. A. L. MENNESSON 2,133,207

DIAPHRAGM PUMP

Filed May 5, 1937

Fig. 1.

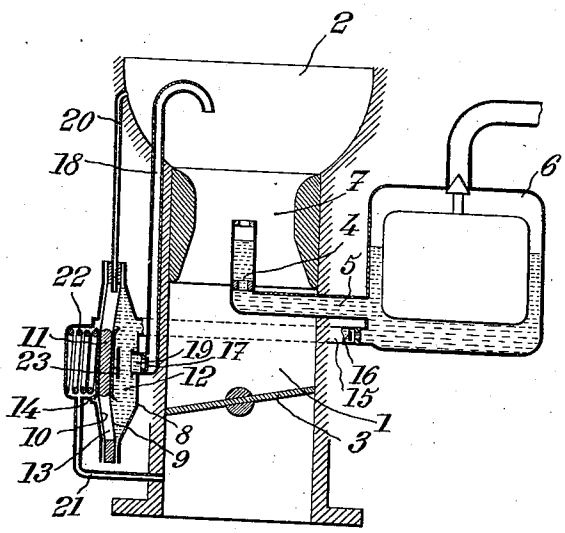
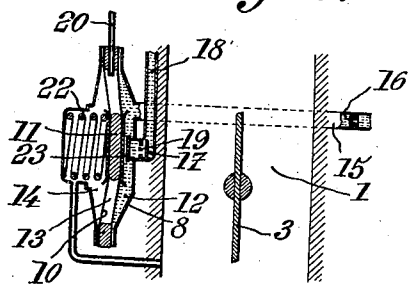


Fig. 2.



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Patented Oct. 11, 1938 2,133,207

UNITED STATES PATENT OFFICE

2,133,207

DIAPHRAGM PUMP

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Application May 5, 1937, Serial No. 140,992
In France May 12, 1936

4 Claims. (Cl. 261—34)

This invention relates to diaphragm pumps supplying additional fuel to carburettors of internal combustion engines, particularly during periods of acceleration, and has for its object to make such devices of great efficiency and certainty of operation.

In general, diaphragm pumps according to the invention comprise two diaphragms, connected between themselves, one of which serves for the suction and delivery of the fluid and the other of which is actuated by the forces to effect the drive, such as the variable pressure of a fluid, determining the operation of the pump, the use of the double diaphragm moreover avoiding danger of leakage of the fluid to be delivered towards the engine mechanism.

The invention further consists, apart from this general arrangement, in certain other arrangements which are preferably utilized at the same time, and more especially relative to the case where the pump is used for the supply of a carburettor and operates under the action of the suction existing downstream of the throttling member thereof, and consists in making the space existing between the two diaphragms always communicate with the atmosphere, particularly with the air-admission conduit of the carburettor.

In order that the invention may be better understood it will now be described with reference to the accompanying drawing, in which:

Fig. 1 shows, in diagrammatic vertical section, a carburettor provided with a diaphragm pump constructed according to the invention, the parts of the pump occupying a position corresponding to the end of the suction.

Fig. 2 shows, similarly, this same pump, the parts occupying a position corresponding to the end of the delivery.

Regarding the carburetor properly speaking, it is constituted in any appropriate manner and for example in the usual way. On the drawing there has been shown diagrammatically and by way of example a carburetor of the so-called "inverted" type and comprising particularly a body 1, the upper part of which constitutes an air inlet 2 and the lower part of which is intended to be mounted on the induction pipe of the engine, a throttling member 3, a jet device 4, supplied by a passage 5 from a constant level chamber 6 and delivering fuel into a venturi 7.

The carburetor is provided with a so-called "accelerating" diaphragm pump intended to introduce a quantity of additional fuel at any point of the admission of the engine and which is added to the normal quantity of air-fuel mixture when the throttling member 3 is opened after having been closed, for example for slow-running or for a change of speed.

For this purpose there are accommodated in a casing 8, which can be mounted laterally on the body 1 of the carburetor, two diaphragms 9 and 10 separated by a space 13 and which are connected between themselves at their middle part for example by a disc or rod 11. In this way the diaphragms divide the casing 8 into three distinct chambers 12, 13 and 14.

The chamber 12 is connected by a conduit 15, with a non-return valve 16, to a chamber which always contains fuel, particularly to the constant level chamber 6. Moreover, the chamber 12 is made to communicate with a delivery tube 18, with calibrated orifice 19 provided with a non-return valve 17, and which opens into the induction pipe 1 of the engine upstream of the throttling member 3, or even of the jet device 4. It is realized that by the movement in one direction of the diaphragm 9 (Fig. 1) there is first obtained the drawing in of a certain quantity of fuel into the chamber 12 and by its movement in the opposite direction (Fig. 1) the delivery of this quantity of fuel into the induction pipe 1.

The intermediate chamber 13 is connected by a tube 20 to the atmosphere or to the air inlet of the carburettor. The chamber 14, bounded by the diaphragm 10, is made to communicate, by a tube 21, with the induction pipe 1 downstream of the throttling member 3. Moreover, a return spring 22 is housed in the chamber 14.

When there is occasion to close the throttling member 3, the suction increases in the part of the induction pipe downstream of the member 3 and in consequence in the tube 21 and the chamber 14. The diaphragm 10 is consequently drawn in and leaves the position shown in Fig. 2 to occupy its extreme position (Fig. 1) by compressing the spring 22. The diaphragm 10 draws along the diaphragm 9 which draws in a certain quantity of fuel as explained above. Advantageously the wall of the casing 8 is given such a shape that the diaphragm 10, under the effect of the suction, is adapted to be applied exactly on the said wall so that this diaphragm is not subjected to too great forces when the suction acts on its surface. When the throttling member 3 is again opened (Fig. 2) the suction diminishes and the spring 22 forces back the assembly of the two diaphragms in such a way that the fuel is delivered into the induction pipe 1. There is advantageously mounted on the central part

of the diaphragm 9 a valve 23 which is adapted to close the inlet of the conduit 18 when the acceleration pump is not operating.

The operation of such a double diaphragm pump is therefore identical with that of an ordinary acceleration pump with a single diaphragm. However, by having recourse to the arrangement according to the invention and for which one face only of the diaphragm 9 is in contact with the fuel in order to draw in and deliver this latter whilst its other face is constantly subjected to a determined pressure and for which one face only of the diaphragm 10 is actuated by the effect of the suction whilst its other face is constantly subjected to the above-mentioned pressure, the following advantages are obtained:

a. If the diaphragm 9 becomes porous or perforated, the fuel which passes through it is collected in the intermediate chamber 13 without being able to penetrate into the chamber 14, which prevents any direct communication between the fuel and the source of suction.

b. The accidental or fortuitous presence of the fuel in the intermediate chamber 13 does not hinder the operation of the pump in any way and this fuel can easily be withdrawn by the dismounting of the cover of the casing, particularly when it is desired to replace the perforated diaphragm 9, or through a simple orifice pierced for this purpose in the wall of the chamber 18.

c. As the diaphragm 9 is only in contact with the fuel and the diaphragm 10 with the gaseous mixture contained by the induction pipe 1, these diaphragms can be made in different materials which do not run the risk of being attacked or deteriorated by the fluids with which they are in contact.

It will be evident that although the invention has been particularly described in connection with a carburettor, it is not limited to such use as it may be otherwise employed, for example as an ordinary feed or delivery pump.

The invention is not limited to the precise forms or details of construction described, as these may be varied to suit particular cases.

What I claim is:—

1. In a carburetor having an air passage and a throttle valve therein, an accelerating pump comprising two spaced diaphragms, means at the peripheries of said diaphragms to exclude fuel from the space therebetween, means rigidly connecting the central portions of said diaphragms, housings cooperating with the exterior surfaces of said diaphragms to form two chambers, means for conducting fuel to one of said chambers, means for conducting fuel from said first chamber to said air passage, means connecting the other chamber to the air passage on the downstream side of the throttle valve, a spring in said second chamber acting on the outside of the diaphragm forming a part of the chamber, and means connecting the space between said diaphragms to a point of substantially atmospheric pressure.

2. In a device as claimed in claim 1, a valve mounted on the outside of said first diaphragm and adapted to close said second conducting means when the diaphragm moves under the action of the spring.

3. In a device as claimed in claim 1, non-return valves in each of said conducting means.

4. In a device as claimed in claim 1, said last means terminating in a part of said air passage of substantially atmospheric pressure.

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