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DOUBLE ACTING VACUUM PUMP

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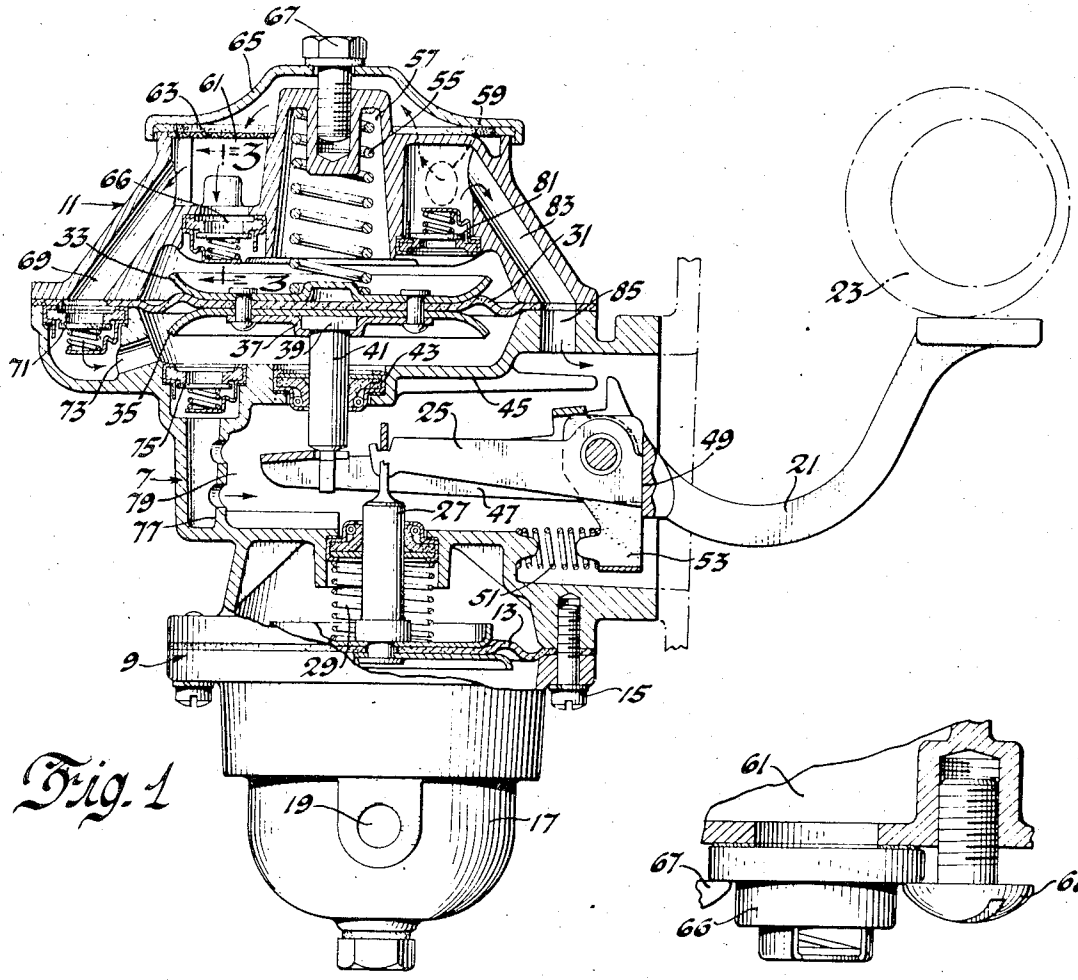

Fig. 1

Fig. 3

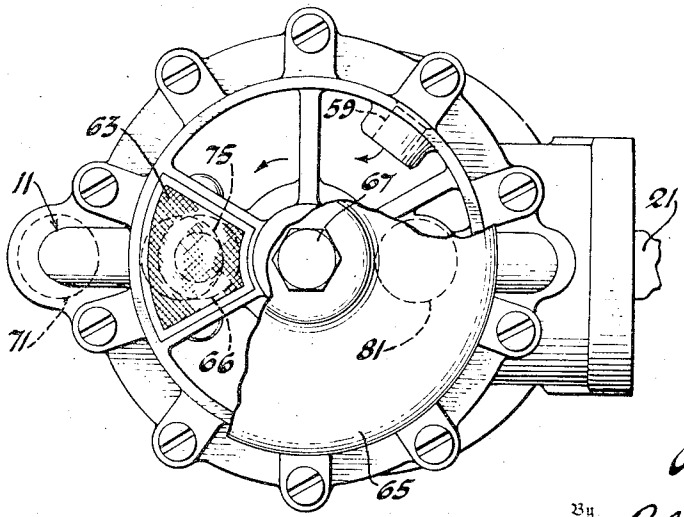

Fig. 2

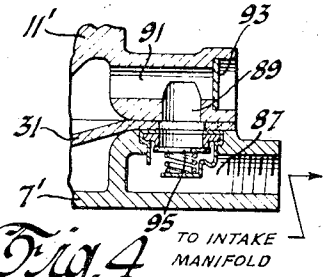

Fig. 4

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DOUBLE ACTING VACUUM PUMP

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3 Claims. (Cl. 230—38)

This invention relates to air pumps and is intended more particularly as an improvement in the air or vacuum pump constituting a part of a combined fuel and vacuum pump for use with motor vehicles, the fuel pump being used to supply the engine from the fuel reservoir, and the suction pump being intended to actuate a vehicle accessory such as the motor of a windshield cleaner.

The primary object of the invention is to utilize both sides of a vibrating pump diaphragm as pump chambers whereby a lesser diaphragm stroke produces the required suction.

More specifically the inventive idea contemplates but minor changes from prior pumps to accomplish the above stated major object.

Other objects and advantages will be understood from the following description.

In the drawing:

Figure 1 is a view in vertical section of the novel pump.

Figure 2 is a top plan view, the cover being partly broken away.

Figure 3 is a section on line 3—3 of Figure 1.

Figure 4 is a sectional detail of a modified form.

The drawing shows a combined fuel and suction pump. The combined pump is made up of three die castings of which the intermediate or body part is marked 7. To the body 7 is secured a bottom part 9 and an upper casting 11. No novelty is herein claimed for the fuel pump mechanism. Since pumps of this kind are well known it need be only briefly described. There is a flexible diaphragm 13 clamped between parts 7 and 9 by cap screws 15. The usual filter cup for the fuel is marked 17 and at 19 is designated an inlet opening. The diaphragm is lifted to create suction in a pump chamber beneath the diaphragm by means of a lever 21 rocked by an engine cam 23, the lever acting through the instrumentality of a link 25 attached to the diaphragm stem 27. The action of the lever and the link 25 energizes a spring 29 which produces the discharge stroke after the completion of the suction stroke.

The body 7 and the top member 11 together form the suction pump. Clamped between these members 7 and 11 is a flexible diaphragm 31. Above the diaphragm is a metal disc 33 and beneath the diaphragm is a disc 35, the discs being attached to the diaphragm as usual. A pocket 37 in the lower disc carries therewithin the head 39 of a diaphragm stem 41. The stem passes through any suitable seal 43 located in an upper closure wall 45 of the body. At the lower end of stem 41 it is engaged by a lever extension or arm 47. This extension is adapted to be engaged by a shoulder 49 of lever 21 and to be rocked with the lever and pushed upwardly against the diaphragm stem when the cam 23 rocks the lever 21. It will thus be seen that this lever 21 serves to produce vibrating movements in both diaphragms 13 and 31. Under the influence of a spring 51 engaging the body 7 and a part 53 which latter also engages the lever, the lever is held against the cam 23. The upward movement of the diaphragm 31 energizes a spring 55. The spring 55 is seated within the upper end of a recess 57 formed in the die cast top member 11. At its lower end this spring engages the diaphragm plate 33. When so energized the spring is available to move the diaphragm downwardly after the completion of the upward movement which has been given it by the mechanical means associated with the cam. The diaphragm 31 is therefore made to vibrate.

The top member is formed with an opening 59 in its outer wall. This top member is cast to form a so-called surge chamber or inlet chamber 61. This chamber is located beneath a filter screen 63 which latter is held in position by a cap 65 and a screw 67. Access to the surge chamber from the opening 59 is afforded only through the screen 63 as is shown by the arrows in Figure 1. From the surge chamber a valve 66 of conventional form admits air to the chamber above the diaphragm. This valve may be held in position by screws 68 as shown in Figure 3. Also from the surge chamber a passage 69 leads to an opening in the lower surface of top member 11, this opening registering with a corresponding opening in the top portion of body 7. The last mentioned opening is controlled by a valve 71, the valve 71 together with a bore 73 admitting air to the second pump chamber, the chamber beneath the diaphragm. The outlet valve from the second pump chamber is marked 75. It discharges air through an apertured baffle 77 to the intermediate chamber 79 of the body 7, this being the chamber occupied by the pump operating mechanism. Chamber 79 is in communication with the engine casing receiving the lever 21 and housing the cam 23. From the upper pump chamber a valve 81 discharges into a sloping passage 83 which together with a registering passage 85 in the top of body 7 also communicates with chamber 79 and with the engine casing.

By the structure above described the ampli-

tude of vibration of the diaphragm is materially reduced because of the vacuum condition prevailing in one chamber or the other and resisting the diaphragm movement. It will be obvious that because of the use of the space on both sides of the diaphragm as pump chambers there is an effective displacement equal to twice that existing in the case of a single acting diaphragm pump. In the event that the accessory device to be operated is a windshield cleaner, a conduit from the suction motor of the cleaner will be connected to inlet opening 59.

In practice the construction may be as shown in Figure 1 where the discharge from both pump chambers is into chamber 79. Should it be desired to use the engine vacuum for normal operation of the vacuum operated accessory and to use the present invention as a booster, the expedient shown by Figure 4 may be adopted. Here the upper part of body 7' is formed with an outlet passage 87 instead of with the passage 85. Passage 87 is in communication with a passage 89 in the lower wall of top 11'. Passage 89 communicates with a passage 91 plugged as at 93 and leading into the upper pump chamber above the diaphragm 31. In this form of the invention it is intended that the intake manifold be connected by a suitable conduit with outlet passage 87. A valve 95 opens from passage 89 to passage 87. In this form of the invention valve 81 and the passages 83 and 85 may be omitted. The suction of the manifold tends to open valve 95 and create suction in the upper pump chamber. The suction in the upper pump chamber may operate through valve 66 to draw air through the surge chamber 61, and through opening 59 and thereby from the windshield cleaner motor. If the engine suction is sufficient it may lift diaphragm 31 against the tension of spring 55 to such an extent that no movement is imparted to the diaphragm by the lever 21. Under these circumstances the windshield wiper motor is actuated solely by manifold suction. In the event of failure of manifold suction the spring 55 and the lever 21 at once operate the diaphragm and suction is available for operating the engine accessory.

I claim:

1. In a double pump, a body, a top, a diaphragm clamped between said body and top, means constituting rigid parts of said body and top to form, together with said diaphragm, upper and lower pump chambers, an inlet valve and an outlet valve in each of said body and top to communicate with each of the respective pump chambers, an inlet chamber in the top communicating with the inlet valve of the upper pump chamber, registering passages in the top and body whereby the inlet chamber communicates with the inlet valve of the lower pump chamber, an outlet chamber in the body communicating with the outlet valve of the lower pump chamber and other registering passages in the top and body whereby the outlet valve of the upper pump chamber communicates with said outlet chamber, said inlet chamber adapted to be connected to a suction operated accessory and said outlet chamber adapted to be connected to the atmosphere.

2. The invention defined by claim 1, together with an apertured wall forming a baffle within said outlet chamber through which baffle the discharged gas from the lower pump chamber passes to prevent the transmission of valve noise.

3. The invention defined by claim 1, said diaphragm being apertured in registration with said registering passages of the top and body.

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