

Feb. 21, 1933.

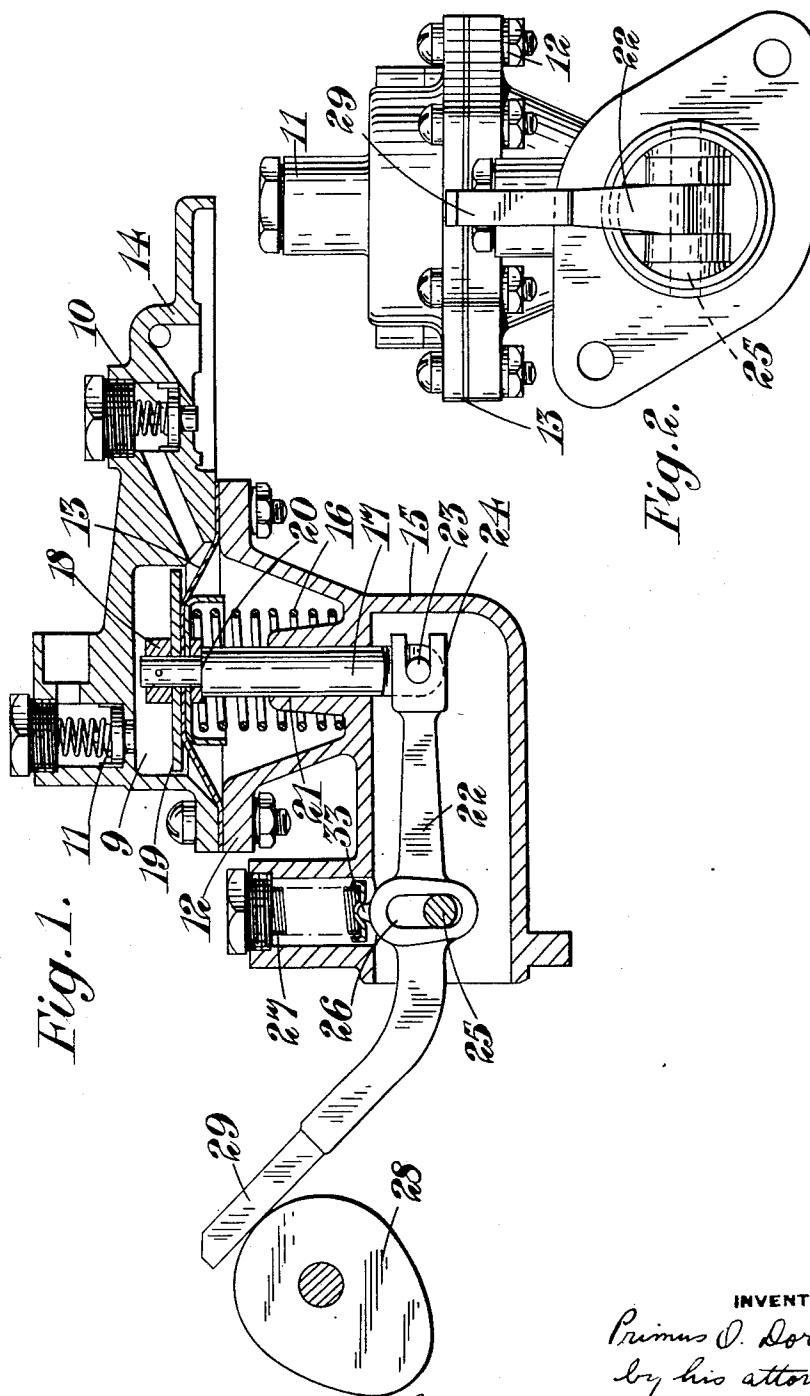
P. O. DORER

1,898,348

PUMP

Filed Sept. 8, 1931

2 Sheets-Sheet 1



INVENTOR

Primus O. Dorer
by his attorneys

Byrnes, Stebbins, Parmelee & Blenko

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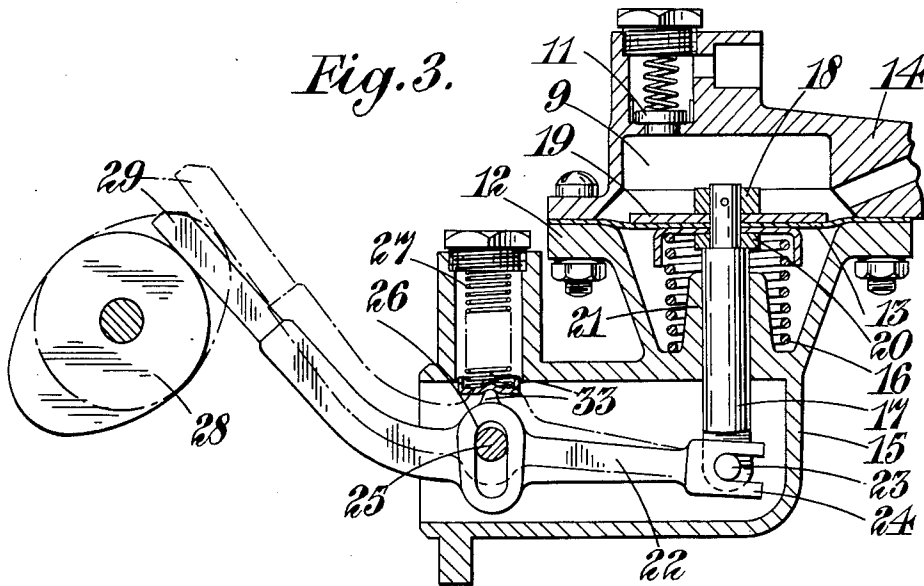
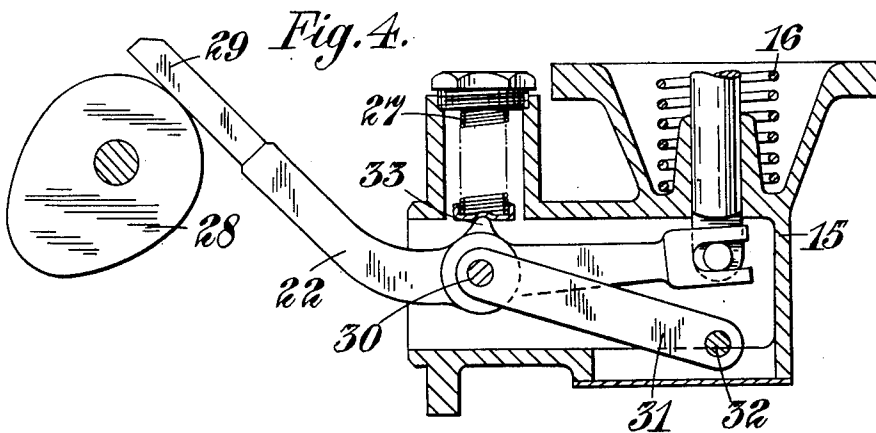
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UNITED STATES PATENT OFFICE

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PUMP

Application filed September 8, 1931, Serial No. 561,594, and in Great Britain October 21, 1930.

This invention relates to pumps such as are used as fuel-pumps in motor-vehicles.

The invention is concerned with the type of pump in which the delivery-stroke is produced by compressible means (for example a spring, hereinafter referred to as the "delivery spring") on one side of the pump-diaphragm overcoming the pressure of the liquid in the pump-chamber, and in which a lever directly connected to the pump-rod is power-actuated to overcome said compressible means and produce a suction stroke.

It is an object of the present invention to provide an improved pump in which the delivery of fluid from the pump will be varied in accordance with the consumption of such fluid. Another object of the invention is to provide a simplified construction of such pumps which will be comparatively silent in operation.

According to the present invention, there is provided a pump of the type above referred to, wherein the pivot of the power-actuated operating lever (which produces the suction stroke) is resiliently supported, for example in the pump-casing. The purpose of supporting the pivot resiliently is to ensure that the end of the lever is always in contact with the power-actuated means which drives it.

According to a further feature of the invention, the pivot of the lever is supported by a link which is pivoted on the casing at one end and resiliently (for example by a spring) connected to the casing at the other end.

According to a further feature of the invention the pivot of the lever may be mounted in a fixed slotted member (for example a slot in the pump-casing) and may be urged towards one end of the said slot by a spring-compressed saddle.

Embodiments of the invention will now be described with reference to the accompanying drawings, whereon:

Figures 1 and 2 are a sectional elevation and end view respectively of a fuel-pump for a motor vehicle of the class with which the present invention is concerned:

Figure 3 is a sectional elevation of the

pump shown in Figure 1 with the operating parts in a different position corresponding to conditions described hereinafter:

Figure 4 is a form of support for the pivot of the operating lever in accordance with the present invention and applied to the class of pump illustrated in Figs. 1, 2 and 3.

In Figures 1 and 2, inlet and outlet valves 10 and 11 for the pump chamber 9 are provided in the pump-casing 12 and so disposed with respect to a flexible diaphragm 13 that, on movement of the diaphragm in the downward direction, fuel is drawn through the inlet valve 10, and on movement of the diaphragm in the other direction fuel is delivered through the outlet valve 11. The fuel entering by the inlet valve may first pass through a fuel filter and this filter may conveniently be connected to the casting 14 which, together with the casting 15, forms the pump-casing 12. The filter is not shown in the drawings. The diaphragm 13 is normally deformed by a delivery spring 16 into a position which corresponds with the end of the delivery-stroke of the pump.

A connecting-rod 17 is secured to the diaphragm by the nut 18 and washers 19 and 20 and extends through guides 21 formed in the pump-casing to the operating lever 22. The connection between the operating lever 22 and the connecting rod 17 is by way of the pin 23 on the connecting rod and the bifurcated end 24 of the lever 22.

The lever 22 pivots about a pin 25 fixed in the pump-casing and engaging a slotted part 26 on the lever. A light compression-spring 27 acts on the lever 22 directly above the slotted part 26, and, under normal conditions of supply as shown in Figure 1, is completely compressed to provide a base on which the lever can pivot. A cam 28 driven, for example, from the engine bears on the end 29 of the lever 22 and produces the suction stroke. The delivery stroke is effected by the spring 16 deforming the diaphragm 13 to overcome the pressure of the fuel in the pump-chamber 9.

In operation, when there is no substantial pressure in the pump-chamber, the delivery spring 16 holds the diaphragm 13 in the full-

in position. The cam 28 acting on the end 29 of the lever 22 rocks the lever about its pivot 25 and since the spring 27 is completely compressed the pump-connecting-rod 17 is pulled
 5 down and deforms the diaphragm 13 to draw fuel through the inlet valve 10 into the pump-chamber 9.

If, however, as shown in Figure 3, the pressure in the pump-chamber 9 is greater than
 10 the urge of the delivery spring 16, the pump-connecting rod 17 will be moved through a distance proportional to this pressure. The slot 26 will also move along the pin 25 to a new position since the end 29 is always in
 15 contact with the cam 28 and the pin 25 will still act as the pivot for the operating lever 22 but part of the lift of the cam will be taken up in lost motion of the slot 26 against the urge of the spring 27 with respect to
 20 the pin 25 until the pin is in the lower end of the slot as shown in Figure 1. In this way, a suction-stroke, limited in accordance with the increased pressure in the pump-chamber 9, will be produced.

25 In the extreme position when the pressure in the pump-chamber is such as to deform the diaphragm 13 into a position corresponding with the end of the suction stroke, the lift of the cam will be entirely taken up in
 30 compressing the spring 27 and in moving the slot 26 with respect to the pin 25; that is to say the lever 22 will pivot, under these conditions, about the pin 23 on the pump-connecting-rod 17. The above description of
 35 Figs. 1, 2 and 3 relates to the class of pump with which the present invention is concerned. In Fig. 4 of the drawings the construction of pump which forms the subject matter of the invention is illustrated and in
 40 this figure the pivot of the lever 22 is constituted by a pin 30 carried by a link 31 pivoted at 32 to the pump-casing 12. The purpose of the link 31 is to keep the nose 33 in its correct position in relation to the
 45 spring 27. Since the lever 22 is supported by the pump rod through its bifurcated end and is in sliding contact with the cam 28 it is necessary to provide a guide for the nose 33. A spring 27 bears on a nose 33 formed on the
 50 lever 22. The operation of this modified form is the same as the slotted lever construction above described since the pivot of the lever 22 is resiliently supported.

55 It will be understood that modifications may be made in the invention without departing from the scope thereof. For example, a spring support may be provided for the lever 22 between its pivot and the end of the lever which is coupled to the pump-connecting-rod. Further, the pivot of the lever may be mounted in a fixed slotted member (for example a slot in the pump-casing) and may be urged towards one end of the said slot
 60 by a spring-pressed saddle but held away

from the said end by the cam 28 bearing on the end 29 of the lever.

Moreover, all mechanical inversions and/or equivalents of the construction hereinafter
 70 claimed are held to lie within the scope of the invention as set out in the appended claim.

I claim:—

A liquid-pump comprising in combination a casing, a pump-chamber formed in the said
 75 casing, inlet and outlet valves for the chamber, a pump-diaphragm, compressible means on one side of the said diaphragm for producing a delivery stroke, a pump-rod, a lever, a pivot point for the lever intermediate the
 80 ends thereof, a pivotal connection between the said lever and the said pump-rod whereby the pump-rod supports one end of the said lever, a power-actuated part supporting the other end of said lever and operating on it
 85 to overcome the said compressible means and produce a suction stroke, a link, a pivotal connection between the said link and the pump-casing, a pivotal connection between the said link and the said lever to constitute a guide for the pivot of the lever, and
 90 a resilient member bearing on the said pivot point of the said lever, the resilience of the said member being such that when stressed to a predetermined limit it exerts such a force
 95 that an effective fulcrum is provided for the lever.

In testimony whereof I affix my signature.
 PRIMUS OTTO DÖRER.

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