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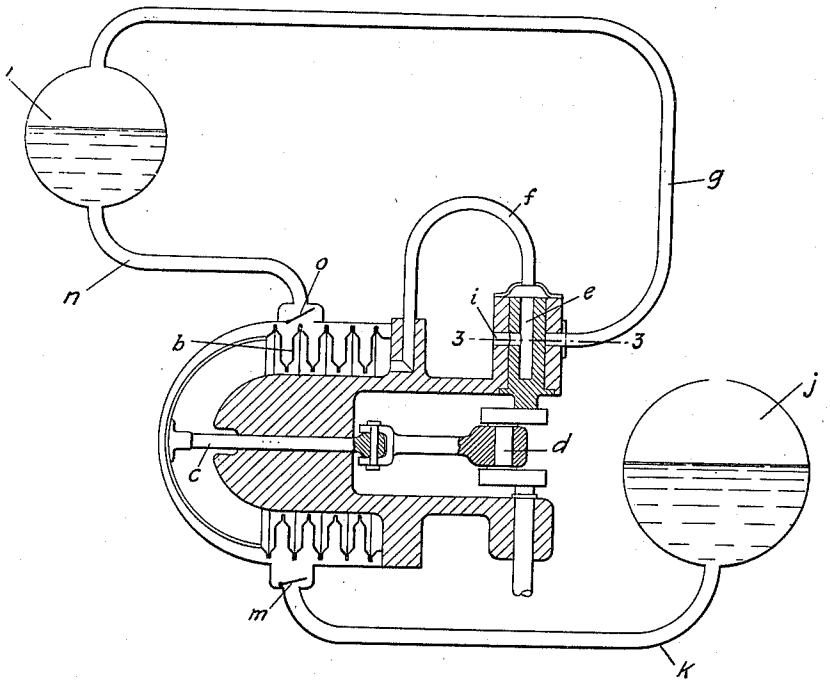
ELASTIC PISTON PUMP.

APPLICATION FILED DEC. 11, 1918.

1,303,080.

Patented May 6, 1919.

Fig. 2



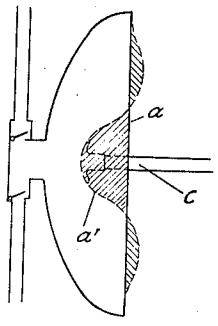


Fig. 1

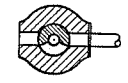


Fig. 3

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ELASTIC-PISTON PUMP.

1,303,080. Specification of Letters Patent. Patented May 6, 1919.

Application filed December 11, 1918. Serial No. 266,270.

To all whom it may concern:

Be it known that I, MARIE JOSEPH J. I. LORAILLE, a citizen of the French Republic, and resident of Paris, France, have invented certain new and useful Improvements in Elastic-Piston Pumps, of which the following is a specification.

The invention relates in general to elastic piston pumps, that is to say, pumps in which the piston is deformable to effect intake and discharge, and is usually in the form of a flexible membrane or a bellows formed in a series of rings. In such pumps the output varies due to deformation of the walls of the elastic piston when delivering a pressure above the intake pressure.

An important object of the present invention is to avoid this variation of output.

A construction embodying the invention is shown by way of example in the accompanying drawings, in which—

Figure 1 shows the deformations possible in pistons of the ordinary pumps of this kind;

Fig. 2 shows as an illustration, a form of carrying out a construction according to this invention, applied to a pump;

Fig. 3 is a detail view of the construction in section following the line 3—3 of Fig. 2.

In the pumps designated under the name of "diaphragm pumps," the piston is composed of a deformable membrane a (Fig. 1) or a bellows b (Fig. 2) formed in a series of rings soldered to each other. The membrane or the bellows is operated by a rod c fixed to its center.

This species of piston is adapted especially for pumps for gasolene or liquids which dissolve fatty materials, in which it is necessary to prevent the liquid from coming in contact with frictional parts such as piston packings or glands.

When the pump is to take liquid from a reservoir at a pressure p_0 and discharge it into a receiver in which there is a pressure p_1 greater than p_0, as is the case, for example, for a feed pump for furnaces, a suction pump for a condenser discharging into atmosphere, or a gasolene pump intended for an explosion motor, in which the carbureter is supplied with air under pressure, there are further the following disadvantages:

Considering the flexibility of the piston, the volume of the liquid discharged diminishes as the discharge pressure increases. The piston, during the discharge stroke, takes a form of the type of that represented diagrammatically at Fig. 1, where a indicates the membrane at the position of rest and a_1 this membrane at the end of the discharge stroke. When the pressure becomes such that the volumes of the hatched parts on each side of a are equal, the pump ceases to discharge. Analogous deformations are produced in each one of the rings in the case of a bellows piston, such as shown in Fig. 2.

Furthermore, in all such apparatus, the elastic material of which the membrane or bellows is formed, undergoes, by reason of the variation of the difference of pressure on the two sides of its wall alternating deformations at each stroke of the piston and the material becomes fatigued and hardened and after a certain duration of operation, rupture of the piston is produced.

The construction forming the subject of this invention has for its object the avoiding of these disadvantages. It is characterized by a distributer of fluid under pressure operating in synchronism with the piston and putting in communication the interior of the membrane or bellows, alternately with the atmosphere of suction during the suction stroke, and with the atmosphere of discharge during the discharge stroke, in such a way as to equalize at each stroke the pressures on each side of the wall of the diaphragm forming the piston.

In the example shown in Fig. 2, the rod c of the piston b is connected to a double crank shaft d on the axis of which is mounted the rotary valve of a cock e forming a distributer. The interior of the rotary valve communicates constantly by a pipe f with the interior of the diaphragm (bellows) b. While in the casing of the distributer there ends on one side the pipe g leading to the discharge reservoir h and on the other side an opening i to the atmosphere in the case in which the suction reservoir j is at atmospheric pressure. If this reservoir is at another pressure, the opening i will be connected to it by a pipe. The construction is completed, of course, by the suction pipe k having flap valve m and the discharge pipe n having a flap valve o.

The rotation of the distributer e puts the interior of the piston b in communication necessarily with the reservoir h during the discharge stroke and with the reservoir j during the suction stroke.

By reason of this construction, the discharge of the pump becomes substantially constant for all differences of pressure. Furthermore, the life of the diaphragm is prolonged.

In lieu of a rotary cock, the distributer may obviously be of any desired type, such as a flat slide valve, positively operated valves or other constructions, with appropriate transmitting means operating in time with the piston.

It is to be noted that with this construction, the power necessary for operating the pump, whatever be the difference in pressure between p_0 and p_1, remains the same as when p_1 is equal to p_0. The excess of work required when p_1 is greater than p_0 is furnished by the air of the inclosed p_1 acting in the interior of the piston during the discharge stroke. Therefore, the operating mechanism of the pump may be lighter than in ordinary pumps.

I claim:—

An elastic piston pump construction, comprising in combination an elastic piston, means for actuating the same to effect intake and discharge, and a distributer of fluid under pressure, operating in synchronism with the piston for putting in communication the interior of the elastic piston, alternately with the atmosphere of suction, during the intake stroke and with the atmosphere of discharge during the discharge stroke, so as to equalize at each stroke, the pressures on each side of the wall of the piston.

MARIE JOSEPH J. I. LORAILLE.