Jan. 19, 1926. 1,570,554

G. CONSTANTINESCO

PUMP

Filed July 25, 1923

Fig.1.

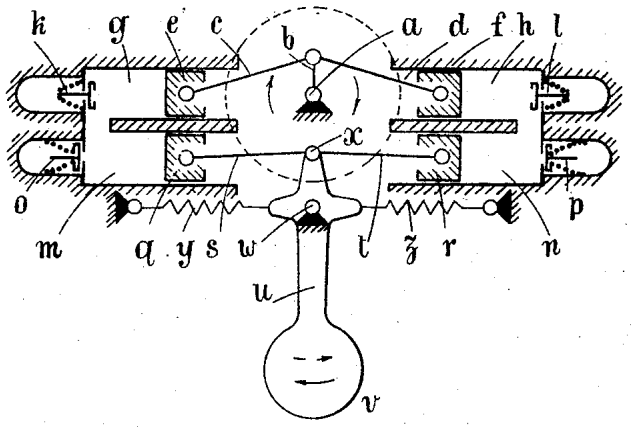
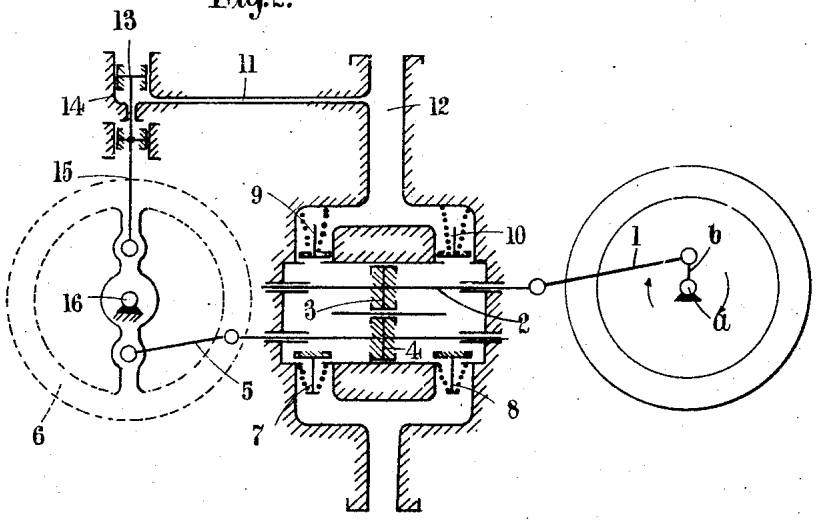


Fig.2.



INVENTOR

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By

Atty

Patented Jan. 19, 1926. 1,570,554

UNITED STATES PATENT OFFICE.

GEORGE CONSTANTINESCO, OF WEYBRIDGE, ENGLAND.

PUMP.

Application filed July 25, 1923. Serial No. 653,775.

To all whom it may concern:

Be it known that GEORGE CONSTANTINESCO, a subject of the King of Great Britain and Ireland, residing at "Carmen Sylva," Beechwood Avenue, Oatlands Park, Weybridge, in the county of Surrey, England, has invented certain new and useful Improvements in Pumps, of which the following is a specification.

The invention relates to pumps and has for its object to construct a pump which will give with a constant piston displacement a discharge which varies according to the head of liquid against which the pump is working. The greater the discharge, the less the head; and conversely.

The invention in one form consists in a pump having two single stroke pistons working in cylinders with a phase difference of 180 degrees; the two cylinders are interconnected so as to oscillate a solid inertia device. The inertia device is actuated by pistons working in cylinders in permanent connection with the pumping cylinders.

In another form there is one double stroke pumping piston, the inertia device being likewise oscillated by a single piston.

Figure 1 shows the first named form of pump.

Figure 2 shows the second form.

In the form of the pump shown in Figure 1, the driving shaft a carries a crank b connected by the connecting rods c d to opposed pistons e f working in co-axial cylinders g h, suction valves k l being provided in the ends of the cylinders. The ends of the cylinders are in communication with parallel cylinders n m having delivery valves o p at their ends. Opposed pistons q r are provided in these cylinders connected by rods s t with a lever u carrying a mass v and pivoted at a fixed pivot w. Springs y z are provided tending to keep the swinging mass in its mean position.

The operation of the above described pump is as follows:—

Supposing that the suction valves k l are in permanent communication with a liquid tank under given constant pressure, the pump cylinders g h m n being filled with liquid together with the other pipes in the system. Then for any given oscillation of the pump pistons e f the liquid will transmit movement to the lever u and mass v. Since the liquid columns are relatively short, the liquid will practically operate as a flexible connecting rod. If the frequency of the pump piston increases, the inertia of the mass v will oppose considerable resistance to the motion and considerable pressures will be generated in the pump cylinders. When there is no delivery from the pump these pressures will be greater or less according to the speed of the pump pistons e f, but the displacements of the point of connection x to the inertia device will always be the same as the displacements of the pump pistons e f. When the pump is delivering liquid the pressures diminish and consequently there is less movement of the inertia mass. At each suction stroke of the pump piston a fall of pressure will take place on the corresponding side of the piston. The inertia device, however, will not be able to follow the liquid column immediately and thus the suction valve on that side will open and liquid will enter the cylinder. On the pressure stroke of the pump piston the pressure generated will not be able to move the inertia device immediately and some liquid will therefore be discharged through the delivery valve, if the back pressure is not higher than the pump pressure.

If the back pressure rises to a certain limit, the delivery valves will not open and the inertia device will then simply be kept swinging to and fro, with its maximum stroke, the motion going on without any absorption of power by the prime mover driving the pum except to overcome friction. When, however, the back pressure diminishes, for examble, by utilizing the liquid the delivery valve will again open and work will be done by the prime mover depending on the amount of flow.

It will be readily seen that the maximum pressure obtained at the delivery valves for constant average delivery per stroke is a function of the frequency of the pump and therefore by speeding up or slowing down the prime mover, different maximum pressures may be obtained for the same delivery.

In the form of the invention shown in Figure 2, a double acting piston is employed in each of the pump cylinders. The crank b of the prime mover is connected by the rod 1 with the piston rod 2 carrying a double acting piston 3. The double acting piston 4 is connected by the rod 5 with an oscillating flywheel 6. Suction valves 7, 8 are provided on the suction side and delivery valves 9, 10, on the delivery side. The

small passage 11 leads from the delivery pipe 12 to a piston 13 in a cylinder 14 which is connected by the connecting rod 15 with the swinging flywheel 6 which oscillates about the fixed point 16. The piston 13 serves to maintain the mean position of the oscillating flywheel 6 and it will be seen that as the pressure in the delivery passage increases, the force acting on the oscillating mass is automatically increased, so that forces tending to keep the oscillating flywheel in the mean position are increased automatically with the forces producing the oscillations.

The invention may be applied to hydraulic installations in which it is required always to maintain a given pressure of liquid. By means of the invention this can be obtained without the use of any safety discharge valve or other form of cut-off. The work done by this pump is automatically regulated by the delivery from the air vessel and delivery reservoir and if higher pressures are required all that is necessary is to accelerate the prime mover or to increase the inertia.

What I claim is:—

1. In combination a piston pump for liquids, and oscillating solid mass, and means for oscillating the said mass by fluid pressure generated in the pump with the same frequency as that of the pump delivery but with an amplitude which increases with increase of the delivery head of the pump, and decreases with decrease of the said head.

2. In combination a pump comprising two pistons working in cylinders with a phase difference of 180 degrees, two pistons working in cylinders permanently connected with the aforesaid cylinders, and an inertial mass operately connected by fluid pressure means with the last named pistons so as to oscillate with the pump frequency, but with amplitude varying inversely with the delivery head.

In testimony whereof I affix my signature.

GEORGE CONSTANTINESCO.