

E. BROWN.
OPERATION OF CENTRIFUGAL PUMPS.
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1,066,581.

Patented July 8, 1913.

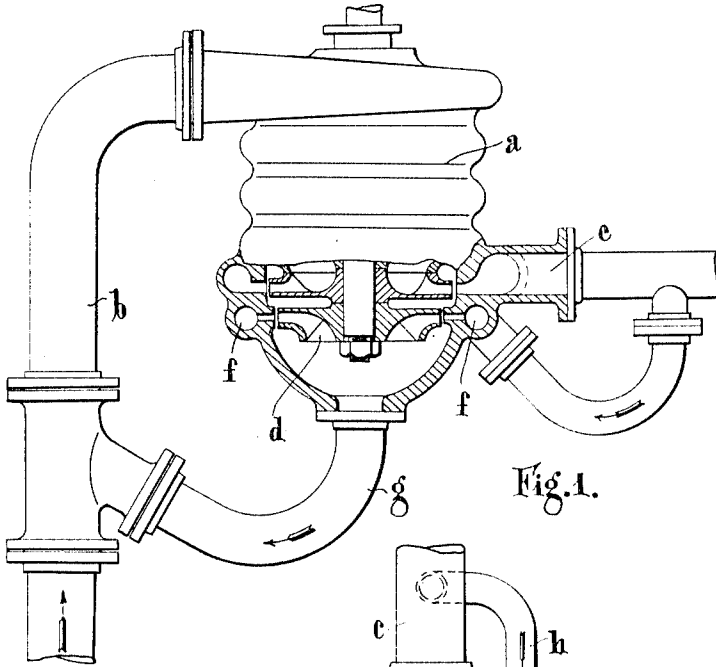


Fig. 1.

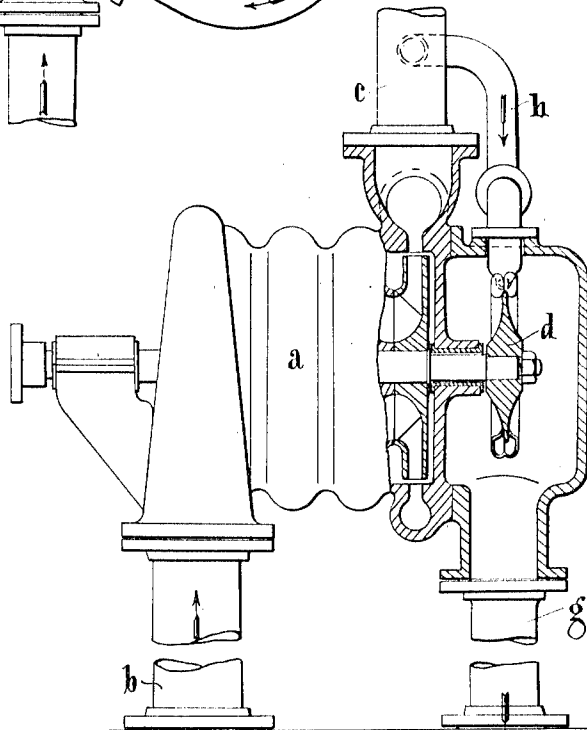


Fig. 2.

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OPERATION OF CENTRIFUGAL PUMPS.

1,066,581.

Specification of Letters Patent.

Patented July 8, 1913.

Application filed April 28, 1911. Serial No. 623,859.

To all whom it may concern:

Be it known that I, ERIC BROWN, a subject of the King of Great Britain and Ireland, and residing at Bahnhofweg, Baden, Switzerland, have invented certain new and useful Improvements in and Relating to the Operation of Centrifugal Pumps, of which the following is a specification.

This invention relates to the operation of centrifugal pumps, and has for its object to provide an improved method and apparatus efficient and economical in use.

It is known that the curve connecting pressure heads against which a centrifugal pump works as ordinates and volumes of discharge per unit of time as abscissæ first rises to a maximum and then falls. On account of this property, pumps which have to start against pressure, have usually been provided hitherto with a valve, and the discharge has been allowed to flow away to waste until the pressure maximum has been reached. The pump is in an unstable condition of pressure so long as it is working between the limits of running idle and running at the pressure maximum, due to the fact that the cross sectional areas of running wheels and diffusers which are designed for a given delivery are not continuously filled when the delivery is diminished. Now the above mentioned method (flowing to waste) although permissible with pumps which are started only at rare intervals during the day, but it cannot usefully be employed with pumps in which the desired delivery fluctuates within very wide limits, for instance, in the distribution of hydraulic power, feeding boilers, etc. In such installations the pump must run continuously, and great waste of power would result if the above method were employed.

The present invention consists in a centrifugal pump installation with continuous delivery and fluctuating consumption of water under pressure with an arrangement in which the energy available in the fluid delivered in excess of the demand at any particular moment is converted into useful work and returned to the pump shaft without the surplus water first entering the main delivery pipe.

The invention also consists in the improved methods of and means for operating centrifugal pumps herein described.

Referring now to the accompanying diagrammatic drawings,

Figure 1 illustrates one example of the present invention with a vertically arranged pump and a turbine for utilizing the exhaust water. Fig. 2 shows a modified construction with a pump on a horizontal axis and a Pelton wheel.

In the form illustrated by way of example in Fig. 1 the centrifugal pump *a* draws from the suction pipe *b* and discharges into the delivery pipe *c*. From this pipe the waste liquid is conducted by way of a pipe to an annular duct *f* and thence to a reaction turbine wheel *d* mounted on the same shaft as the centrifugal pump. Below the turbine is an outlet pipe *g* leading to the suction pipe *b* of the centrifugal pump.

In the arrangement shown in Fig. 2, a pipe *h* leads from the delivery pipe *c* directly to the nozzle of the Pelton wheel *d*. In this case also, the water which has passed through the turbine flows through the pipe *g* back into the suction pipe *b*.

It will be understood that the above arrangements are described merely by way of example and modifications may be made as desired, for instance devices may be provided for throwing the turbine out of operation above the so-called pressure maximum. The centrifugal pump may have one or more stages and may be horizontal or vertical. The type of turbine is immaterial. An arrangement may also be constructed in which the turbine is mounted on a separate shaft and is connected by mechanical gearing to the pump shaft. The turbine mounted on a separate shaft may also be utilized to drive an electrical current generator, the current from which feeds an electric motor mounted on the pump shaft. When the turbine is mounted on the same shaft as the pump, the turbine wheel may be constructed as a pressure relieving disk and may be utilized to aid in counterbalancing the axial thrust of the pump.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In combination a centrifugal pump, a turbine wheel, a common shaft connecting said pump and said wheel, a fluid inlet and outlet for said centrifugal pump, means for delivering fluid to said turbine wheel and

a by-pass connection between said delivery means and said fluid outlet; as set forth.

2. In combination a centrifugal pump, a turbine wheel, a common shaft connecting said pump and said wheel, a fluid inlet and outlet for said centrifugal pump, means for delivering fluid to said turbine wheel and a by-pass connection between said delivery means and said fluid outlet, a discharge outlet for said turbine wheel and a by-pass connection between said discharge outlet of said turbine wheel and the fluid inlet of said centrifugal pump; as set forth.

3. In combination a centrifugal pump, a turbine wheel, a common shaft connecting said pump and said wheel, a fluid inlet and outlet for said centrifugal pump, a discharge outlet for said turbine wheel and a by-pass connection between said discharge outlet and the fluid inlet of the centrifugal pump; as set forth.

4. A centrifugal pumping installation com-

prising a centrifugal pump and a turbine, each including a stator and a rotor, a mechanical connecting device between said rotors, an inlet and outlet for said pump and an inlet and outlet for said turbine together with hydraulic connections between said inlets and said outlets respectively; as set forth.

5. In combination a centrifugal pump and an auxiliary fluid motor, each including a stator and a rotor, a mechanical connecting device between said rotors, an inlet and outlet for said pump and an inlet and outlet for said auxiliary motor together with hydraulic connections between said inlets and said outlets respectively; as set forth.

In testimony whereof, I affix my signature in presence of two witnesses.

ERIC BROWN.

Witnesses:

ARTHUR J. BUNDY,
CARL GUBLER.