Aug. 8, 1933. R. BLOM 1,921,905

HYDROELECTRIC INSTALLATION

Filed July 28, 1931

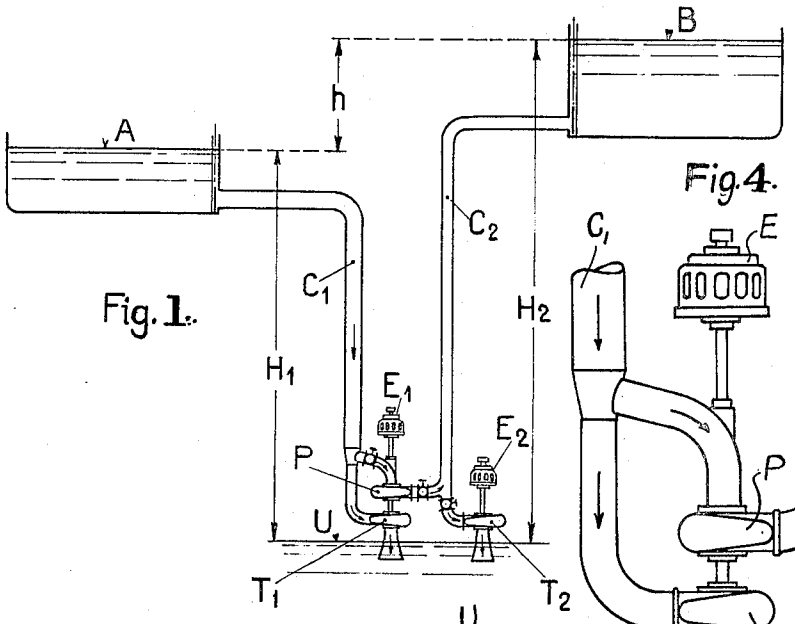


Fig. 1.

Fig. 4.

Fig. 2.

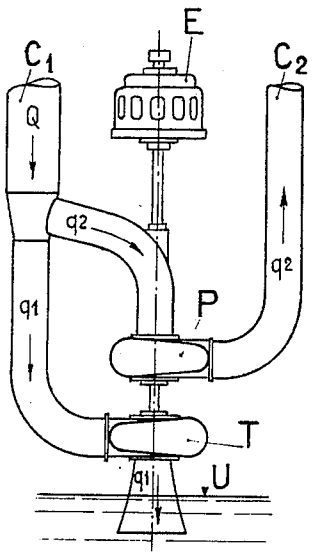
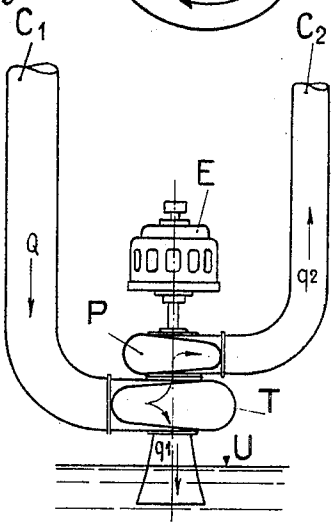


Fig. 3.



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HYDROELECTRIC INSTALLATION

Robert Blom, Paris, France

Application July 28, 1931, Serial No. 553,620, and in Germany July 28, 1930

1 Claim. (Cl. 290—4)

In most cases where it is necessary to raise water to a higher level than that at which it stands, pumps are utilized which receive the mechanical energy necessary for their operation from some external source.

The object of the present invention relates to an installation for performing a process permitting (Fig. 1) when disposing of water at a level A, of raising a portion of this water to a higher level B, whilst utilizing as motive power that which can be derived from the fall of the other portion of the water in A to a lower level U.

Figures 1 to 4 inclusive show respectively several modifications of the said installation.

The process can be summarized as follows:

A portion of the water in the reservoir A is to be pumped into the reservoir B.

Devices C_1 are installed to allow the transfer in U of water from the reservoir A, under a head of H_1 representing the difference in height between the levels A and U.

Devices C_2 are installed to permit the elevation into the reservoir B of the water available in U; the height of elevation H_2 is the difference in height between the levels B and U.

Let Q denote the total quantity of water derived from A and which is available in U under a head of H_1 at the outlet of the piping C_1. This quantity of water is divided into two portions q_1 and q_2. The portion q_1 is sent into a hydraulic turbine T and the portion q_2 into a pump P.

The turbine receives water under a head of H_1 and after utilizing same discharges it at zero pressure. The pump receives water under a head of H_1 and forces it under a head of H_2. The turbine and pump located in U are coupled mechanically. The energy required by the pump to elevate the quantity of water q_2 through the height $H_2-H_1=h$ is supplied by the turbine which utilizes the fall of the quantity q_1 of water under the head of H_1.

In short, disposing of the quantity Q of water in A, a portion q_2 of this quantity is raised into B, whilst the balance q_1, is utilized in the production of the necessary motive power.

The advantage of this process is to procure a higher general efficiency than that obtainable by all other pumping systems in current use.

The arrangement permitting the application of this process is realized (Fig. 2) by means of the turbine T and the pump P mechanically coupled together and both fed with water derived from the reservoir A. The two machines may be of any type. A dynamo-electric machine may be mounted on the extremity of the shaft and utilized either as generator or as motor so as to complete the operation of the group.

The regulation of the speed of the group can be realized by means of a single regulator acting either on the distributor of one of the machines or on the two distributors (turbine and pump) interconnected in accordance with a convenient law. The distribution of the available water in its two proportions, driving water and pumped water, can under these conditions be automatic.

Another embodiment permitting the application of the said process is realized by means of a single machine (Fig. 3) comprising a single shaft carrying a turbine rotor and a pump rotor and a single inflow casing feeding the two rotors. The two distributors can then be combined so as to automatically proportion the admitted water between the two rotors. The machine at the outlet of the turbine rotor is provided with an outflow orifice for the expended water, and at the outlet of the pump rotor with an orifice for the forced water whose pressure has been increased.

Another application of the process allows the realization of hydraulic accumulation for the regulation of the output of hydro-electric stations. In such a case the turbo-pump group can then be supplemented with a dynamo-electric machine E_1 (Fig. 1) utilized either as a motor to increase the driving power for the pumping operation or as a generator driven by the turbine T_1 running under the head H_1; the recuperation of the energy accumulated in the reservoir B can be realized by means of an auxiliary turbine T_2 running under the head H_2 through the piping C_2. This auxiliary turbine T_2 can either drive an independent alternator E_2 (Fig. 1) or be mounted on the shaft of the turbo-pump, in which case it will drive the alternator E of this group Figure 4.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

An hydro-electric installation, comprising a head reservoir, a storage reservoir, an electric machine, a pump feeding the storage reservoir, a first turbine adapted to actuate the electric machine and the pump, and a second turbine for actuating the electric machine, said pump, turbines and electric machines being mechanically coupled together, the pump and first turbine being fed from the head reservoir at the same pressure, and the second turbine fed from the storage reservoir.

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