Improving the Quality of the Hydraulic Shock, Reducing the Resource Waste in the Pump

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Abstract

Around the world, in different parts of the world one can find the use of technologies that help save energy and resources. The life of mankind is inextricably linked to its natural environment, and sources confirming this are found at every step. The rapid global scientific and technological revolution not only has a positive impact on working conditions, improving the standard of living of people, but also the environmental changes caused by it have a significant impact on mother nature.

Keywords: *Hydrotaran, support pipeline, pressure valve, shock valve*

Introduction

Water will be delivered to most of the irrigated land around the world by raising water. A large number of pumps are used for this purpose.To this end, new mechanisms need to be developed and applied.There are various mechanisms for lifting devices [7]. This requires a large amount of energy.From usual point of view, the change in the potential energy of water to kinetic will occur spontaneously. To do this, it is enough to use the natural difference in the heights of river valley or artificially create such a difference in possible places.In a certain method of changing energy based on the use of descending water, automatic pumps will be required that change the energy, allowing the water to rise up without using such simple and natural, external energy. Such pumps were invented much earlier.

Hydrotaran will work due to fully renewable energy. However, due to the high level of water consumption, the use in it decreased. The hydrotaran can automatically run for years without interruption. Low operating costs, low maintenance requirements do not cause any negative environmental consequences during operation. In this regard, it is important to reduce water consumption and increase the efficiency rate of water use.

The efficiency of hydrotaran, a hydraulic shock-based water pump, depends on the shock process in it. The reason for the hydraulic impact is cavitations. When studying motion of real fluids, it is necessary to take into consideration the internal friction force, i.e. viscosity. Because viscosity is a key property of a real liquid in motion. [3;4;5].

If the actual flow of a liquid with a low viscosity is compared with the flow of a non-viscous substance, i.e., an ideal liquid, the above-mentioned true flow pattern (in which curves are formed) is completely different from the ideal liquid flow scene. However, the main difference here is not only the presence of lumps in liquids, but also the presence of lumps in ideal liquids, as their viscosity is similar to lumps in small liquids. The difference is that in the first case they are absolutely stable, in the second case they brake slowly and as a result their energy is converted into molecular thermal motion energy, the main difference being in the conditions that cause the fluctuations. If fluids formed at certain speeds of motion in liquids with the lowest viscosity, they would not have occurred in ideal liquids. Consequently, no matter how small the viscosity is, there will be areas where viscosity will have a greater (effective) influence on the flow of a fluid flowing around a solid. Areas where the velocities of very close layers differ sharply in size, the velocity gradient is very large and therefore the friction force is also large can be such a field.It follows that the essence of the above problem depends on the nature of the liquid boundary layer, i.e. the layer in which the liquid touches the surface of the circulating body. The process of continuity failure and hydraulic losses are necessary in the operation of a hydraulic tank.

Water in existing hydroelectric units must leak from a height of 3-5 meters. During the flow period, most of the water flows out [8]. This causes water (resource) wastage during the flow. In the current global ecological situation, it is not advisable to use any device that works at the expense of such a waste of water flow. The reason why the hydraulic tank can operate automatically is that operating costs, despite the absence of any costs for electricity and fuel, have decreased in recent years, significantly lower operating productivity, higher resource consumption (water).

The principle of operation of the hydraulic tank is briefly stipulated that the violation of continuity in water is the cause of gas bubbles melted in them. The release of water-soluble gases is due to high pressure or low temperature. Let us give the following design satisfying such conditions.

Unlike powerful water flows and extreme prototypes of the hydroelectric unit, the creation of a hydraulic spool without displacement can be carried out on the basis of the design of figure 1.

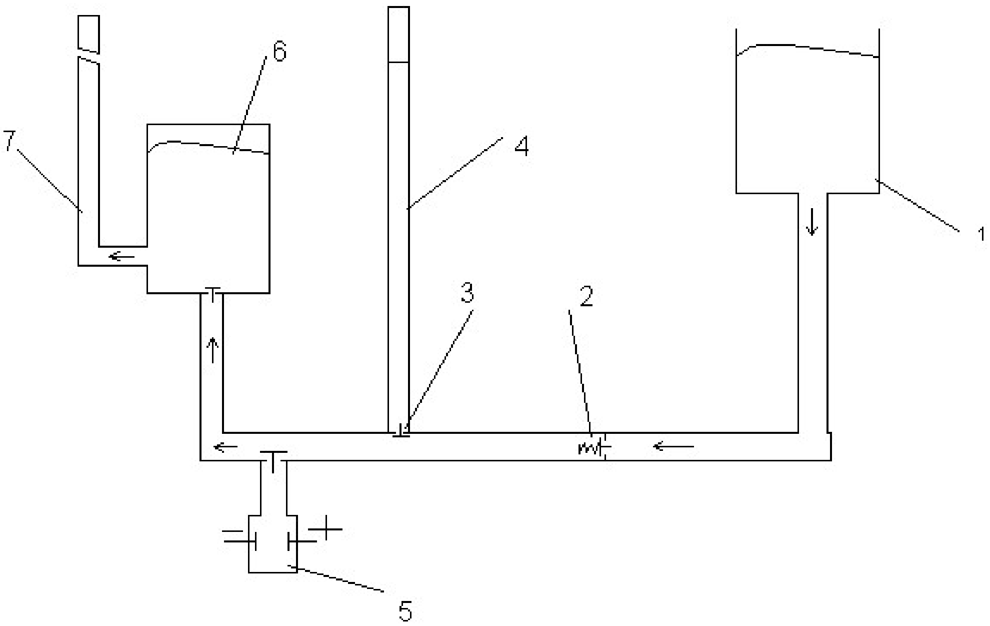

Figure 1. Design to allow for discontinuity in water without strong currents.

1 reservoir, 2 shock valve, 3 pressure valve, 4 water column, 5 electrolysis bath, 6 air cap, 7outlet water pipe.

Figure 1. The water column-4 shown in the diagram is placed to generate high pressure. Its downstream pressure valve-3 is open under the influence of downstream water column pressure and provides continuous additional pressure downstream.

$$P = \rho g h \quad (1)$$

(The pressure in a stationary liquid has two main properties: The first property is that the hydrostatic pressure is directed along the normal to the surface on which it is affected.

The second property is hydrostatic pressure, which has the same value in all directions at the point of impact) . An electrolysis bath-5 is attached between the shock valve and air cap, in which the gases

H_2 and O_2 are continuously released under the influence of electrolysis and begin to move in the direction of the upper water surface-4 under the influence of Archimedes' force. It is previously known that about 1.9 liters of total gas is released from 1 gm of water. These gases move depending on the pressure valve-3 in figure 1, and before arriving here thawing occurs in the lower layer and a kind of hydraulic shock in the released place. The resulting shock waves cannot go up due to the presence of the pressure valve-3, and due to the presence of the shock valve-2, they do not allow backward direction towards the supply warehouse. As a result, the resulting shock waves are forced to penetrate under an air cap. Instead of released water in motion, there is another movement of water from reservoir-1 through the supply pipeline, which can continue regularly.

This action, in turn, additionally increases the viscosity of water, creating small turbulent flows, which in turn cause cavitation due to the additional flow, resulting in a hydraulicshock and its waves. The continuity of this process is ensured by the gas released from the electrolysis bath-5.

The application of electrolysis in the formation of hydraulic shock is a completely new direction.It is clear from the design that no water loss is observed at all in the proposed hydraulic tank (except for evaporation).

The gases released by electrolysis absorb a certain amount of heat during sorption in water (due to the potential energy of water). When gases sorbed in water reach the bottom of the air cap, the heat absorbed during desorption begins to be released. This released heat mixes with the gases under the air cap-6 and exchanges heat there. [1;6]. As a result, under the air cap, a strong deformation occurs under the influence of this additional heat of mixed gases. As a result, additional pressure is created in the water outlet pipe-7.

The principle of operation of this hydrotaran, operating on the basis of electrolysis, is based on the violation of water balance continuity in the world using air.

This means that it is not necessary to increase the flow rate due to the large amount of water leaking out of supply pipe to form a hydropower like the previous prototypes of this proposed hydraulic tank.

In the construction of this hydraulic tank, the pipe material is made of iron (deformable and strong, and water soaks the iron well. Fragile materials are not possible). The inner surface of the supply pipes should have a high roughness that is not polished (causing internal friction and sorption to occur more rapidly).

It can be seen from Euler's differential equation of fluid equilibrium (1) that the change in hydrostatic pressure on a coordinate axis is equal to the product of projections density in that direction. The change in pressure in an equilibrium fluid depends on the mass forces. From this system of equations the general differential of the equilibrium state of liquids is formed.

$$\left\{\begin{aligned}\frac{\partial p}{\partial x} &= \rho X\\ \frac{\partial p}{\partial y} &= \rho Y\\ \frac{\partial p}{\partial z} &= \rho Z\end{aligned}\right\} \quad (1)$$

It can be seen from the Euler equation that when gas is formed by electrolysis water in the supply pipe, the separated gas begins to move from the bottom to the top. At this point, a pressure change occurs in the horizontal direction from the supply reservoir-1 using a mass force. (figure 1).The basic equation of hydrostatics:

$$p = p_0 + \rho g h \quad (2)$$

p-total pressure of the liquid, p_0-atmospheric pressure,$\rho g h$-liquid column pressure. [3;4;5]

Conclusion: As mentioned above, as a result of decreasing the density of released gas relative to water as well as dissolving the part in water in certain amounts, its volume decreases compared to the aqueous. In addition to melting only as a solution, it undergoes adsorption or adsorption on the rough surface of the pipe and between the liquid molecules. As a result, the hydrostatic pressure is converted into hydrodynamic pressure due to its volume reduction, volumetric deformation, stress (at this point it sounds as if small stones are rolling inside the pipe). On the *x*-axis of the coordinate system, an interval change occurs: Δx

$$p = p_0 + \rho g(x - x_0) \quad (3)$$

The change in coordinate Δx means that the equilibrium of the water column is disturbed, which in turn causes a shift.

It should be noted that this movement is limited to a certain size of water network, given that the melting process does not take place repeatedly [2].

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