DEVELOPMENT OF ECONOMIC WATER LIFT TECHNOLOGIES

A. Abdurakhmanov
Associate Professor, PhD, Andijan Engineering Institute
https://doi.org/10.5281/zenodo.8219171

Abstract. *According to analysts, by the middle of the third decade of the 21st century, the problem of drinking water will become more global. This, in turn, has a negative impact on the global economy. The demand for water products in the world market is growing. This topical issue determines the importance of the rational use of water resources and their conservation, taking appropriate measures to provide the population with drinking water. This article discusses methods for the rational use of water donated by nature For example, As part of the project, it is planned to create new types of efficient devices that use the kinetic energy of water to lift it up. It consists in a complete study of the operation of devices and the correction of their shortcomings. Saving water with the help of new technologies. Methods. The experiment created a hydraulic pump operating on the basis of waterfalls and a spiral water-lifting device "Archimedes" using the power of running water without a waterfall, pumps operating on the basis of energy received from a microhydroelectric power station. become a topical area of today. he creation, operation and recommendation of such devices to farmers and gardeners is the goal of this project. The theoretical and practical aspects of this very topical problem are studied in detail.*

Keywords: *water, hydroram, Archimedes spiral, kinetic energy, water pressure, ecology, drinking water supply, water scarcity, resources, waterfall, hose, pipe, flow force, height, drip irrigation.*

Water is the source of our life, the main resource for the existence of all creatures, animals and plants on earth. It is impossible to imagine our life and environment without water. Total existence is closely connected with water.

Residents of some districts of Bukhara, Khorezm, Kashkadarya and Jizzakh regions buy and drink clean drinking water. Those who do not know and have not heard about it, look in amazement.

Every year on March 22, the World Water Day is widely celebrated around the world. The celebration of World Water Day is a call to the people of the world to use water wisely, conserve water resources and once again realize how important water is for our life and the development of our society.

After all, clean drinking water is becoming a big problem all over the world today. According to the UN, since 2000, 1.2 billion people live in regions where problems with fresh water are regularly observed. According to analysts, by the middle of the third decade of the 21st century, the problem of drinking water will become more global. This, in turn, has a negative impact on the global economy. The demand for water products on the world market is increasing.

According to environmentalists, the situation with water scarcity in Central Asian countries, especially in Uzbekistan, is becoming more serious every year. Each of us sees and observes this around him, in his life. This makes each of us think about the role of water in human life, pay attention to the problems associated with the shortage of drinking water, the importance

of rational use of water resources and their conservation, take appropriate measures to provide the population with drinking water [1]

While the water issue is becoming one of the problematic issues from year to year, systematic work is being carried out in our country on the basis of certain programs and plans. In our republic, 1.5 million people in the regions will be connected to centralized water supply in 2021. Another 3 million people have improved their water supply. As a result, the centralized water supply of the population in our country has reached 65-70%.

In addition, only in 2021, water-saving technologies were introduced on 433,000 hectares, and their total figure was 17% of irrigated areas. In 2022, water-saving technologies were introduced on another 478 thousand hectares. [2]

The Concept of Development of the Water Economy of the Republic of Uzbekistan for 2020-2030 defines a number of tasks in terms of water resources management, efficient use of water and the introduction of effective water consumption mechanisms.

The work carried out within the framework of this concept will serve to prevent threats to water supply to the population and economic sectors, improve the reclamation of irrigated lands. Rational use of transboundary water resources and widespread introduction of water-saving technologies will allow rational and efficient use of water resources[3].

According to the analysis of observations of the Uzhydromet service in the period from 2012 to 2021, the lack of precipitation due to climate change, drought in some years during the growing season, 10-15 percent less water was observed at the Charvok reservoir (Chirchik) than usual. in 2013-2014, 2018, 2020 and 2021.

Lack of water, in turn, leads to a shortage of drinking water. Over the past 15 years, the annual volume of water per capita has decreased to 1,589 cubic meters. The demand for drinking water supply and sanitation services is growing every day.

According to the analytical indicators of the World Bank, by 2050 the demand for water in Uzbekistan will increase from 59 cubic km to 62-63 cubic km. km, and the available water resources will be reduced from 57 cubic km to 52-53 cubic km, which means that the current water increases its deficit five times (from 2 cubic kilometers to 11-12 cubic kilometers)[4].

It is noted that the main risks when using drinking water supply are acute shortage of fresh water, competition for its use, its pollution, drought.

Using the conditions created at our institute, under the guidance of our professors, we conducted our own research on lifting and saving water and achieved the following results.

Methods.

Based on the above considerations, we have focused our research on the free distribution and conservation of water. During our research, we used several devices and performed the following processes.

Hydraulic pump refers to a pump that raises water based on the hydraulic pressure of the water. The simplicity and efficiency of the hydraulic ram device attracts everyone. It does not require the consumption of electricity or petroleum products. It has a rotating complex exhaust part, but it has 2 simple valves with which the kinetic energy of the water flow is compressed, and on the basis of this a wonderful water rise is achieved. We also used a water ram in our study.[5]

Experiments and results on the creation of water lifting devices.

In 2018, the areas where the operation of a hydraulic ram is possible and where there is a high demand for this device were studied. It became known that there is a high risk of producing

a large amount of Hydraulic ram, but it was determined that separate calculations should be carried out for each location. The water flow velocity, size, channel width and other parameters were studied.

GT-150, 200 hydraulic cranes installed on waterfalls have been created and tested in practice. Their technical documents are being drawn up.

The next step is the creation, manufacture and practical verification of technical calculations of more powerful hydraulic turbines - GT 350, GT-400, GT-500. Such a device as the Archimedes spiral, effective in slow and calm water, is a continuation of the experience of creating Hydrothrans.

Necessary requirements and operating conditions of the hydraulic ram.

There are 6 types of hydraulic pumps that are effective when installed in streams, channels, rivers with a flow rate of more than half a meter per second (0.5 m/sec), a waterfall with a height of more than 1 meter, and valves are regulated according to the conditions of a particular place. The relationship between the amount of water rise q (in cubic meters) and the required height h (meters), water flow N (m/sec) and the initial pipe dimensions (GT-) is shown in the table.

Типоразмер насоса	H,м	h,м	q,м^3/сутки
ГТ-100	Мин.0,5	1,0 -3,0	50 - 13
	макс.6,0	10 - 50	164 - 33
ГТ-150	Мин.0,5	1,0 -3,0	131 - 38
	макс.6,0	10 - 50	426 - 86,5
ГТ-200	Мин.0,8	1,0 -5,0	389 - 69
	макс.6,0	10 - 50	164 - 33
ГТ-300	Мин.0,5	1,5 -5,0	838 - 207
	макс.6,0	10 - 50	1728 - 345
ГТ-400	Мин.0,5	1,5 -5,0	1417 - 380
	макс.6,0	10 - 50	3378 - 674
ГТ-500	Мин.0,5	2,0 -7,0	3473 - 777
	макс.6,0	10 - 50	5365 - 1071

1. The primary (expansion valve) must be installed below 45 degrees so that the hydraulic pump starts up quickly and works efficiently. Its working section should be equal to the section of the main (booster) pipe. It is necessary to ensure the operation of the valve based on the hydrodynamic lifting force of water.

2. It should be borne in mind that the sections of the hydraulic accumulator working valve do not interfere with the acceleration of water movement.

3. The length of the primary (booster) pipe must be taken into account to ensure the pump's operability.

4. The Ram has another drawback - the air in the battery may decrease, it is necessary to control this.

5. In order for a properly made hydraulic crane to work without knocking, it is necessary to create an environment that ensures a soft valve stroke.

6. It is necessary to ensure that part of the water bypasses the initial barrier in order to prevent the death of fish and other living creatures from entering the pipe.

7. The device parameters suitable for the environment in which the hydraulic pump will be installed must be calculated separately. [6]

Water lifting devices in the form of an "Archimedes spiral".

It is known that the height of the hydraulic transmission is at least 2 m. The presence of a waterfall is mandatory. Otherwise, the impact force will be insufficient and the process of lifting the water will not occur. The demand of many farmers reflects exactly this issue, the need to raise water above the normal flow of water without a waterfall. From this necessity was born the creation of a device based on the law of centrifugal force, which, without a waterfall, raises the water of quiet streams and channels to the irrigation system for free.

The water-lifting device in the form of an "Archimedes spiral" consists of eight blades, four of which are equipped with (a vessel). The bottom of these logs is pierced and a short pipe is installed in it. A 35-meter plastic hose is connected to each of these pipes, which is wound on the rotor disc, and the other end is connected to the rotor axis. As a result of increasing the water pressure from the center to the center of the submersible device, a high water pressure is created in the central axis of the drum, and the water is directed upwards through the connecting hose using a special extension cord. [7]

Inexpensive water meter

Improving the efficiency of this technology, which was first created at our institute, requires a number of studies. Currently, this problem is being solved on the basis of theoretical research and experiments.

The first sample of a water-lifting device in the form of an "Archimedes spiral" was created and put into operation at the landfill. In practice, it has been proven that this device can raise the water of quiet streams and channels without a waterfall by 8-10 meters. Productivity: 50 tons of water per day can be raised to this height.

Theoretically, it was proved that the efficiency is maximum at the optimal angle of deflection of the blades of the Charkspalak (110) and next year this will be tested in practice, the device will be improved [8].

1. The water lifting device has been tested and put into operation at our institute. A device that raises water solely due to the kinetic energy of the flow:
Diameter of the device: 250 cm .
Hose length: 35x4=140 meters
Upward movement : 8 _ meter
Amount of raised water: 50 tons/day
The cost of the device: 4.5 million soums
Water consumption: 1 m3/sec
The presence of a waterfall: not required

Below is information about the drip irrigation device used in water conservation, which is another area of our scientific research, and the principles of its operation.

The system of "drip" irrigation using two water lifts.

The next question is to put two such devices into operation in 2022, raise them to an 8–meter water storage tank and apply a "drip" irrigation method from the water supply in it.

Based on the kinetic energy of water, a plan has been developed for the organization of a drip irrigation system based on cost-free (electricity or fuel) lifting, which will be demonstrated in agricultural work this year.

The plan and implementation of the hydroturbine and the Archimedes spiral.

- The plan defined within the framework of the project has been fully implemented, including the following works.
- GT-150, 200 types have been created and tested in practice. Their technical capabilities were calculated. At a waterfall height of more than 2 meters, the relationship between the efficiency of hydraulic pumps and the speed of water was determined.
- Technical calculations of more powerful hydraulic turbines of the GT 350, GT-400, GT-500 types have been created.
- A device in the form of an Archimedes spiral has been created, effective in slow and calm water. The mathematical relationship between the water velocity, volume and amount of rising

water of such devices was studied on a statistical basis. Currently, experiments are being conducted on what type of hydraulic threshing machine or "spiral" device can be installed on farm plots.

Innovative approach in irrigation system: economical water lifting technology and its implementation

- **Creation, installation and commissioning of hydraulic turbines:** GT100 and GT200 models of hydraulic turbines have been created and tested. Scientific research has been conducted to improve its effectiveness.


. They can work in rough water conditions.

- **A water-lifting device in the form of an "Archimedes spiral":** A device based on the law of centrifugal force has been created to lift the water of quiet streams and channels without a waterfall into the irrigation system. A water-lifting device in the form of an "Archimedes spiral" was created and put into operation at a specially allocated site at our institute. In practice, it has been proven that this device can raise the water of quiet streams and channels without a waterfall by 8-10 meters. It is determined that the optimal angle of deflection of the Charkhpalak blades is (11 0). The device is being improved.

This device consists of 4 buckets mounted on buckets, the bottom of which is perforated, and each of them is wrapped with a 35-meter hose. In total, 140 meters of hoses are connected to the axis of the device. Thanks to the high pressure created in the center, it was possible to raise the water up to 8 meters without costs. A system technology for creating a large reservoir collection and drip catchment system has been created and is planned to be implemented [8 , 9].

A water - lifting device in the form of an Archimedes spiral , which we recommend for use . It can lift 50 tons of water per day to a height of 8 m due to the kinetic energy of the water flow.

Discussion.

Innovative research in agriculture, especially irrigation problems, are among the most pressing issues these days. In fact, there are enough areas in our country that need improvement of such an irrigation system, and there is a great need to raise the water flowing from it. Electric pumps are not always highly efficient, as this type of energy is becoming increasingly scarce and

expensive as a result of increased production volumes. Regular interruptions in the power supply system and the high cost of lifting water using electric pumps make it unprofitable.

Usually, the high points of the water supply facility are used in conditions when they are at the maximum distance from the pumping station. Because by placing a pressure water tower at the highest point, we will get a pressure water tower and a pumping station at opposite points. [9]

Modifications "GT-100", "GT-200" are being prepared and delivered to customers. The equipment "Hydrotaran", which gives a great economic effect, is effectively used in many farms of the region.[10]

From this necessity was born the creation of a device based on the law of centrifugal force, which, without a waterfall, raises the water of quiet streams and channels to the irrigation system for free. The water-lifting device in the form of an "Archimedes spiral" consists of eight blades, four of which are equipped with a bucket.

Results. According to the results obtained, the devices operating at the expense of the kinetic energy of water turned out to be very effective. With the help of a hydraulic pump, the water was raised to a height of 8 m, and the amount of water raised per day is 50 tons. With the help of a water-lifting device in the form of an "Archimedes spiral", water was raised to a height of 8-10 meters without any costs, using only the kinetic energy of water. Drip irrigation has significantly reduced water losses.

Conclusion. Based on our research, it has been proven that water can be pumped at no cost and that drip irrigation using two devices is very effective.

REFERENCES

1. Buriev S., Makhkamova D. Ecology and Environmental Protection Tashkent 2018
2. Argumentov Z. A., Sheraliev H. S. Fundamentals of irrigation of agricultural crops Tashkent 2022
3. Decree of the President of the Republic of Uzbekistan No. PF-6024 dated 10.07.2020.
4. Hasan Babayev, an expert at the Center for Economic Research and Reforms, made his conclusions about the existing problems in the field of water management and their elimination. Review.uz, 2022
5. Latipov K.Sh., Arifzhanov O.M., Kadyrov H.G., Toshev B.R., Hydraulics and hydraulic machines, Alisher Navoi Publishing House, Navoi-2014
6. Arifzhanov A.M., Fayziev H., Toshkhodzhaev A.Y. Hydraulics, Youth Publishing House, Tashkent-2020
7. Abdurashid, A. (2023). Renewable energy source. Journal of new century innovations, 20(1), 178-186.
8. Abdurashid, A. (2023). Organization of energy innovation landfill. Journal of new century innovations, 20(1), 169-177.
9. https://staff.tiiame.uz/storage/users/441/books/Br4r61EoYlqYRQ3mnbevTOeqfwAGkGz08J6Xsh76.p
10. https://uza.uz/uz/tech/innovatsion-g-oyalar-amaliyot-va-samara-10-12-2015df050000