

AN IMPROVED MACHINE PROCESS FOR PLACING CONCRETE MIXTURE ON
THE SURFACE OF A CANAL

Khusenov Ulmasbek

Independent researcher of Bukhara State Technical University

Email: ulmasbekstar@gmail.com

Safarov Shermurod

Doctoral Student of Bukhara State Technical University

Annotation: The article provides information on the importance of laying concrete lining on the surface of canals in saving water, the attention paid to this area in our republic, the decisions and decrees issued, and the working process of the laboratory structure developed at Bukhara State Technical University.

Keywords: concreting, concrete coating, automated, economic efficiency, mixture, compaction, labor, energy, equipment and technologies, hoist, bunker, grinder, roller.

According to estimates, an average of 14 billion cubic meters or 36 percent of water is wasted annually in unconcreted irrigation networks without any economic benefit. The largest water losses are in the Republic of Karakalpakstan, Namangan, Navoi, Khorezm and Bukhara regions. It is said that the water supply is very difficult in the 175 thousand hectares of cultivated land located at the ends of the canals [6;7;8].

The President of the Republic of Uzbekistan Shavkat Mirziyoyev chaired a videoconference meeting on the use of water resources in agriculture and the reduction of losses on November 29, 2023, declaring it a "Significant Year for Concreting Canals" in the water sector [1; 2; 3].

In this regard, one of the pressing issues in our Republic is the modernization of irrigation and reclamation systems, the rational use of water resources, and the elimination of water waste. Increasing the efficiency of agriculture is directly linked to the technical condition of irrigation systems, and in particular, reducing water losses in open canals is of great importance.

We know that the canals in our Republic are not fully concreted. For this reason, in order to prevent water infiltration, the sides and bottom of the canals are smoothed, compacted, and concreted simultaneously, thereby preventing water seepage. This, in turn, requires improving the efficiency of machines that compact the canal bed and sides while laying concrete mixtures. In addition, when using machines that level and smooth the surfaces of excavated canals with the aim of laying concrete lining, it is important to ensure the efficiency of their working equipment and to gradually transition from complex machine structures to simpler, more compact designs with combined working tools. It is also necessary to replace heavy and complex canal-cleaning machines, which require a lot of work and are equipped with rail systems, with modern chain- or wheel-type cutting equipment, to automate the adjustment of the excavation depth in relation to the cutting speed, to use machines with chain or wheel-type travel mechanisms that level one slope and half of the canal bed width in canals wider than 3 meters, and to develop machines that can level, smooth, and simultaneously spread concrete in canals with a bed width of up to 3 meters. These are among the pressing issues of today.

Solution method: The construction of canals and the application of concrete lining on their surfaces not only ensure the stability of water flow but also guarantee the long-term and efficient operation of the structure. When concrete lining works on canal surfaces are carried out using traditional (manual) methods, labor input, time, and costs are significantly high.

Therefore, organizing and automating this process with the help of mechanical equipment increases work efficiency. Taking this into account, scientists and graduate students of Bukhara State Technical University have developed an automatic machine for applying concrete lining to canal surfaces (Figure 1). The improved concrete lining machine for canal surfaces introduces a number of positive changes compared to previous machines. Automated machines not only ensure uniform placement of concrete but also accelerate the process. The proposed machine minimizes human labor. During the concrete lining process, the machine performs the main tasks, while workers are only responsible for monitoring and adjustment.

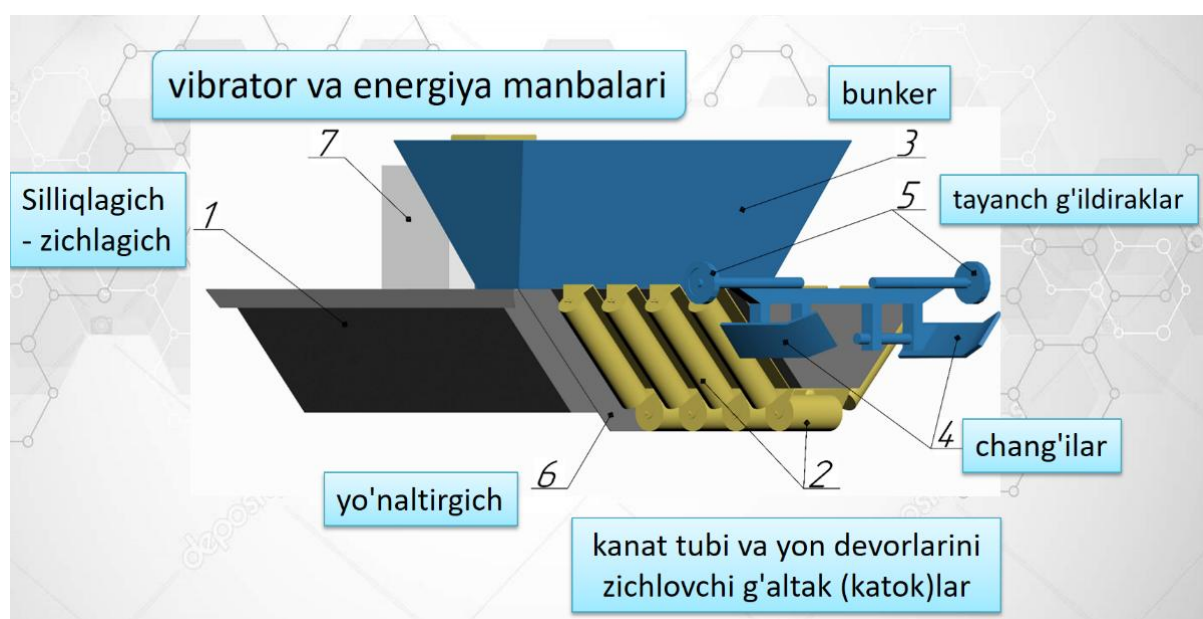


Figure 1. Improved machine for applying concrete mixture to the canal surface

Results and examples: The technological working process of the machine is as follows: The device is placed into the trapezoidal excavated canal and the winch rope is secured. The machine is started through a power source. The prepared concrete mixture is delivered to the machine's hopper. The spread of the concrete mixture onto the canal bed and side walls is ensured by the smoother. The guide prevents the concrete mixture from seeping to the opposite side. In order to ensure the smooth movement of the device and compaction of the soil, it is equipped with rollers and tampers. To enable the device to move on wet or porous soils, support wheels are installed. The support wheels move along pre-installed portable rails. The automation of improved machines not only reduces labor costs but also increases economic efficiency.

Conclusion: Improving and automating the machines used in the process of applying concrete lining to canal surfaces makes it possible to achieve high efficiency. With the help of these machines, work productivity can be increased, labor costs reduced, and economic efficiency improved. By enhancing the process of applying concrete lining to canal surfaces, it is possible not only to shorten the construction time but also to improve the quality of the work. The proposed machine for applying concrete lining to canal surfaces ensures efficient use of labor resources and guarantees high-quality performance of the work.

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