

New Hydro-Engineering

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Problems with floods in Kazakhstan, and throughout the world are growing every year.

You cannot enter into the same river twice. The rivers continuously raise the level of bottom sediments. The movement of water blurs the shore in its endless current, but most of the bottom melts during floods, when water washes into the river everything that lies on the coastal territories - loose soil, sand, clay, various objects and debris. These accumulations most of all gather below the settlements, forming underwater dams, impassable for ships and floods in the next season.

The outflow of water from the coast occurs, mainly, in such places. They are invisible from the land, but the capacity of rivers decreases within and below towns and cities along the current. Therefore, in floods and heavy precipitation, water emerges from the banks, destructive floods occur.

The existing technologies of dredging are based on excavation, bulldozer cleaning, suction and dredging with known technology with pollution of coastal areas and, incredibly, with great financial and material costs. Modern dredgers with a capacity of 100 - 800 kW, as well as their lease are not available to every coastal economy. Giant monsters on the river consume rivers of fuel, most of which goes to confront the river, for example: The great Austrian hydraulic engineer Victor Schaubberger once wrote that rivers can self-clean.

Indeed, this is possible if the bottom of the rivers is formed in such a way as to give the flow of water a spiral motion. In fact, the natural movement of water in the river tends to such a form of flow meandering a gradual and continuous alternate washing of river banks. In this case, rather large bends of the river are obtained, constantly increasing the total width of the floodplain. The consequence of the expansion are the collapse of the coast, the agricultural areas are being cut, houses and buildings are being destroyed.

Developments have been developed that use the forces of the river to form the river bed and river bed, within specified limits, with specified depths for passing ships, with straightening bends, and controlling water flow. There are possibilities of influencing meandering processes by the simplest means. Manufacture and operation of such facilities are available to small coastal farms that suffer from floods, collapse of shores, shallowing of fairways.

Work to deepen the rolls should be started during and immediately after floods with strong water movements to prevent floods next year. In the low period, in the summer, the effectiveness of such work is reduced because the water flows in the rivers are decreasing, and some rivers are completely dry.

The proposed method of influencing bottom sediments by the current itself is based on the constraint and control of part of the stream to influence bottom sediments. Devices change and concentrate river flows, without requiring any third-party energy at all. The technological process is carried out by concentrating and directing a part of the stream to the preselected places of the channel, creating erosion and deposition zones of bottom sediments. Depending on the parameters of the river, the devices are controlled from the shore by cables or supplemented with mobile transport means. Structurally, the devices depend on the thickness of the streams, the width and depth of the river. Tests of individual elements of micromodels of the proposed device on small rivers and trays were conducted, which showed the result.

New facilities can affect the bottom and banks without using energy sources for the main process. Only for moving against the current and controlling the organs of orientation. Passive devices made of shields, reinforced and controlled by cable-block systems from the shore or anchor. The designs of such devices are developed for each type of water body. From any small rivulets, which provide cleanliness from deposits of mud, debris, to the great rivers, such as the Irtysh, the Urals, the Mississippi and the Amazon, which need fairways for navigation. Both measures are needed to preserve the banks from erosion.

The same problem occurs in the deltas of rivers when they flow into lakes and seas. Gradual sedimentation of the channels and the delta duct lifts their bottom, raising the water level. Shipping dies off, new channels appear, new areas are flooded and swamped, water is spent on impregnating new areas and evaporation. All this ultimately leads to the fact that the lakes dry up, for example, the Aral Sea. On the turn Balkhash.

The proposed devices can save water from spreading and fumes, narrow deltas, restore shipping. Created inventions

1. **Eurasian patent:** № 18312 of July 30, 2013 Author: Khalidullin Oleg Khanyshovich. <http://easpatents.com/6-18733-sposob-razrabotki-mestorozhdeniya-i-obrabotoki-morskikh-donnyh-otlozhenij.html>

<http://kzpatents.com/6-ip29623-sposob-ochistki-ot-nanosov-i-uglubleniya-rusel-rek-i-ustrojstvo-dlya-ego-osushhestvleniya.html>

2. The method of sediment cleaning and deepening of river beds and the device for its implementation: US Patent No. 87062 <https://e.mail.ru/attachment/1517518919000000234/0>; Authors: Khalidullin Oleg Khanyshovich, Salnikov Vitaliy Grigoryevich, Duskaev Kasim Koyanbaevich.
3. The way to prevent flooding and water flow management in the flood period and the device for its implementation № 26962 of May 15, 2013 Author: Khalidullin Oleg Khanyshovich.
4. Method and device for deepening riverbeds and their cleaning from sediments. US 9,650,751 B2. patentsgazette.uspto.gov/...3/US09650751-20170516.html Vladimir Grigorievich Salnikov, Almaty (KZ); Oleg Halidullin staging.patentbuddy.com/PatentBuddy/Patent/9650751 <https://www.google.com/search?q=9650751+B2&ie=utf-8&oe=utf-8>

Designing and testing are required to test and demonstrate the effectiveness of the new method in full river conditions. The first experience on a natural object can start a widespread deepening of the rifts on all rivers, where floods occur and warn them in the next high water. It is interesting that the development of the idea of self-cleaning the river led to a revolutionary direction in the development of new technologies underwater. Opens a new era of hydraulic engineering. This device is mobile moving for work under water.

5. Patent RK 32640 dated 19.09.2016. Device for Underwater Hydrotechnical Works. Khalidullin O. Kh., Nurushev M. Zh., Kerimbai B., Zh., Kadyrov Zh. N.

The new type of hydraulic engineering works according to this invention is the most effective. Underwater universal machine (PUM) for work under water using the movement of water. The movement of water can be a natural flow of the river or artificial - created by a propeller, which allows you to work in ponds with standing water.

The new machine can stand firmly on the bottom. Stability at the bottom is provided by the weight of the side plates, the power plant, the filling of the float device with water. The change in buoyancy, sail and propeller ensure its free movement under the water and on the surface of the water. There is the possibility of supplementing it with serial devices for carrying out any known hydraulic engineering works: searching for and lifting sunken objects, mowing vegetation, using dredges, cutting off surface and underwater branches and tree trunks, washing and raising of dung and drowned objects. The need for energy is reduced by orders of magnitude than that of the known machines, because the flow of water is used to perform basic technological work. Disappears the need to resist the flow of the river.

The most valuable and unique is the emergence of new technological opportunities for work under water. For example, the creation of an underwater enrichment process or the washing of bottom sediments, which creates unprecedented productivity and a reduction in the cost of gold mining.

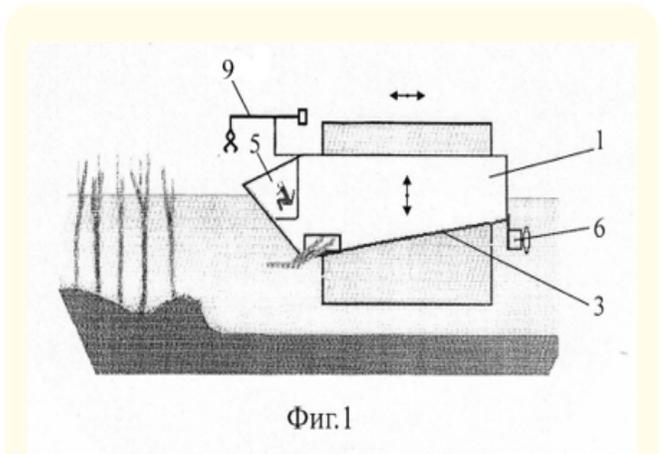
At present, all river transport enterprises have reduced the volumes of traffic along the Ertis and Zhaiyk rivers, and the transportation on the Ili River has practically ceased. Using the new device will deepen the fairways and restore river navigation.

But the most dangerous not only in Kazakhstan, but also on the rivers of the whole world are floods. Almost every spring, many rivers and streams of Kazakhstan come out of the shores and destroy roads and structures. The management and concentration of streams create absolutely new opportunities not only for deepening the rolling stock, but also for the formation of riverbeds.

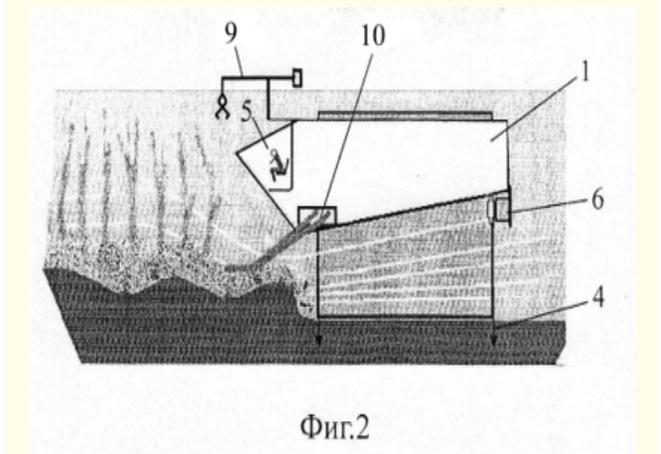
The PUM has many directions, including can be used as a research and tourist vehicle by selecting the right mechanisms.

Two vertical, parallel installed walls defined dimensions, connected together by a rigid frame, with several compartments and mechanisms, with a float device become the basis of an entirely new self-propelled autonomous front gayuschegosya on the bottom of a river or pond with pond surfacing. Depending on the required depth of immersion, the control compartments, the power plant and the float device can be provided with ventilation ducts with floating means located on the surface of the reservoir. If it is necessary to work at considerable depth, it is ensured by the known devices of autonomous life support of underwater vehicles.

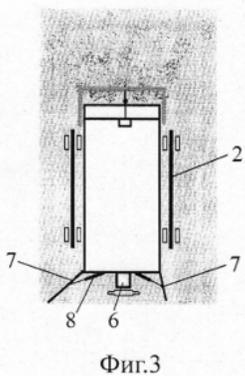
The control of the device completely immersed on the bottom is made from the cab with transparent windows. Float cavity filling the air regulates buoyancy from zero - reliable standing on the bottom - until it completely floats to the surface of the water. The control system contains wings for stabilizing the set position on the bottom and controlling when moving afloat.



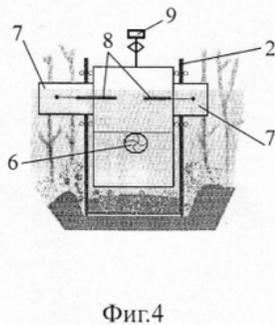
Фиг.1



Фиг.2



Фиг.3



Фиг.4

Movement under water, along the water in all directions is provided by a propeller, connected to a power plant located in one of the compartments. PUM can stand in a given place for a given time, performing the specified tasks for any flow of water in the river or waves in the ocean. Can perform all the known underwater work. With the weight of the corresponding stock For example, a dredger can clean the bottom, drain marshes, excavations, lakes, wash shores, remove mud and vegetation, extract sand and other nonmetallic and ore materials. Grapple, manipulator can lift sunken single items, for example, metal structures, recessed trees. There is an opportunity to study the bottom, repair submarine structures and communications. Even more effective is the use of its basis for completely new technologies for the extraction and enrichment of useful bottom sediments, for example, gold. The use of a propeller in the reverse mode will allow all these works to be carried out in water bodies with immobile water - transparency or visibility in the flow of clean water is provided.

The main difference of this device is the use of water movement, as the main working tool, which reduces the need for energy to zero. This is especially important for profiling the bottom and river banks. The device can concentrate or constrict the streams in order to influence the bottom, forming wash and wash zones. The concentration of such zones along the specified trajectories can change the profile of the bottom of the rivers. To do this, controlled movement of the device in the flow of the river along its entire flow with the orientation of the flow and with variable buoyancy.

Standing vertically mounted walls parallel to the river, in the place for deepening, the device restricts the flow and directs it to the erosion zone before performing the specified works. After this, when it is raised by replacing the water with air in the float device and/or changing the position of the wings, it is shifted downward and again pressed to the bottom, releasing air. It is possible to increase the flow and move downward by stopping and reversing the propeller.

Depending on the parameters and properties of the river, there may be many devices. If the goal is to clean the rivers and deepen the bottom, then the devices can be equipped with a complex of various tools and adaptations. For deep-sea rivers, the device should be provided with blades, wings and guides that provide a strictly directed orientation relative to the current and use its forces to change the river bed. Additional tools are available to destroy hard deposits, shear or lift stones, metal, etc. recessed material. On shallow rivers, you can add devices for sawing trunks and branches, both under water and over water. A lifting mechanism for removing debris.

It is necessary to promote the invention, to carry out research and design work, to create in metal, to create in metal. Its effect is so huge that it is impossible to calculate. Especially, if on its basis to create new technologies of underwater works for extraction, enrichment and processing of bottom sediments.

There are further developments in the development of the direction. The dredgers offered on the market are morally obsolete:

- Devices mounted on pontoons require an increase in the buoyancy of the pontoon.
- Increasing buoyancy leads to increased sailing.
- A rise in sail requires increasing the propeller's power to withstand the current.
- Constant fighting with the current requires energy as much as the work process itself.
- To stand still and work on the bottom requires a powerful anchoring device.
- All this requires energy and not small.

Due to the unavailability of storage facilities over ripening and decaying were the major problems during postharvest handling. Various problems were seen during the process of marketing which includes price variation, low farm price, communication with traders and transportation problems.

The proposed underwater universal machine (PUM) or device for underwater hydraulic engineering has its own power unit for driving under water in any direction, forcing air to change buoyancy, drive for executive orientation mechanisms and working bodies

1. On orders reduces metal consumption and power-to-weight ratio. The more weight or less the buoyancy, the stronger it is at the bottom.
2. The current of the river is used for movement, orientation and impact on the bottom.
3. By changing the position of the wings, we regulate the movement and orientation along the current.
4. The change in buoyancy ensures movement to the water surface and movement in any direction.
5. Hitching equipment for any known underwater work. The possibility of creating new technologies and production under water, for example:
 - The possibility of active impact on the bottom and the formation of its profile
 - Study, study of underwater landscapes and structures,
 - Repair and construction of underwater structures,

- Search and lifting of sunken items and materials,
- Processing and sorting of bottom sediments,
- Development of useful materials, e.g. gold without lifting to the surface of ore

<http://www.beyer-russland.ru/-zemsaryady>

Applications:

Description Patent: MSC E02B 3/02E02B 15/00

DEVICE FOR UNDERWATER HYDROTECHNICAL WORKS

The invention relates to objects for hydraulic engineering construction, namely, to devices for deepening the bottom and cleaning from sediment of river beds and can be used for cleaning rivers and canals.

A method is known deepening and straightening of the river perekata according to A.S. The USSR № 256646, МПК E02B 3/02, publ. in BI No. 34, 1969. Bottom sediments during operation. The building is not removed from the river, but is only carried by the current and settles on the bottom of the river downstream.

A method of cleaning, deepening and straightening of the river bed is described in Pat. RF No. 2086729, IPC E02B 3/02, publ. in the BI on 08/10/1997. In accordance with this technical solution, the mud is not removed from the river, but is agitated, transported from place to place and back to the river. Do not remove and large bottom sediments. A method for cleaning channels of small rivers according to Pat. RF № 2219305, МПК E02B3/02, E02B 15/00, publ. in the BI 20.12.2003. This technical solution is difficult and time-consuming. To implement it, large additional logistical and labor resources are required. A method is known for cleaning river beds from sediments according to Pat. RF No. 2256023, IPC E02B 3/02, E02B 15/00, publ. in the BI 10.07.2005. The drawbacks of this method include the need for preliminary drying (shoaling) of the river bed, which adversely affects the ecosystem of the region, as well as the fact that the energy of the moving water flow is not used. A method for cleaning river beds from sediments according to Pat. RF No. 2318951, IPC E02B 3/02, publ. in the BI 10.03.2008. The drawbacks of the method include the need for repeated use of movements of transport mechanisms. A method and a device for cleaning up sediment from channels of rivers and canals according to Pat. RF 2415993, IPC E02B 3/02, publ. in the BI 10.04.2011. In the process of producing the work on this method, it is not possible to simultaneously collect the stone for its subsequent use. The presence of large inclusions in these deposits can lead to blunting and deterioration of the cutting elements and a decrease in the efficiency of the cutting mechanism as a whole. A method of hydraulic flushing of the bed and a device for its implementation according to Pat. RF 2474642, IPC E02B 3/02, E02B 8/02, publ. in the BI 10.02.20131. Because of the ac-

cumulation in front of the device of alluvial masses, it becomes necessary to suspend the operation of the device and remove the deposited bottom sediments. A method for cleaning and deepening river beds from bottom sediments and a device for its implementation according to Innovats.pat. RK No. 22367, IPC E02B 3/02, E02B 15/00, publ. in BI No. 3, 2010. The disadvantage of the method is the complexity of its implementation and the insufficient use of the flow rate of the river. The closest in technical essence to the proposed one is a device for cleaning up sediments and deepening river beds by Innov.Pat.RK No. 29623, IPC E02B 3/02, E02B 15/00, publ.v B3 №3, 2015, which has in the composition connected to the float limited by the side walls and the bottom of the float water-resistant device. As part of the device there is also a device for regulating the depth of immersion correction and creating a pulsating speed and flow rate inside the water-flow device. This device is the closest in the technical essence to the proposed one and is accepted for the prototype. The known device has drawbacks. It is technically difficult and unproductive to move the device along the channel river. The created flow-pulsating flow and speed is not intensified enough and it does not allow for efficient and thorough cleaning of river and channel channels. The device is limited in its functionality. The technical result of using the proposed device is to expand the functionality, intensify the movement of the cleaning channel of rivers and flow channels, and also in the possibility of mobile relocation of the device. This technical result is achieved due to the fact that in the device for underwater hydraulic engineering works, which has a water-resistant device connected to the float and bounded by the side walls and bottom of the float, and t As well as a device for regulating the float's immersion depth and creating a pulsating flow rate and flow rate inside the water-flow device, the float is vertically movable along the sidewalls of the water-resistant device with fixation of the immersion level, the side walls along the edges are additionally equipped with telescopic anchors, In addition, it is equipped with an operator's cabin located in the front part with a life support system under water and placed at the opposite end of the cab, with a rotary propeller with two fixed mutually opposite positions of the blades relative to the cab. The invention is further illustrated, where figure 1 shows the proposed device in the transport position; Figure 2 - it is the same during the cleaning of river beds and canals; Figure 3 is a top view of the device; Figure 4 shows a front view of the device. The device has a float 1 and a water-resistant device, the working space of which is limited by vertical side-walls 2 and the inclined bottom 3 of the float. The float 1 can be moved in the vertical plane along the side stacks 2 as along the guides. Any intermediate vertical level of the float can be fixed. The side walls 2 at the edges are equipped with retractable telescopic heights ngami - anchors 4. The device is additionally

equipped with an operator located in the front of the cab. Cabin 5 has a life support system for the operator with a long time in the cabin under water. The cabin has transparent walls. On the opposite end of the car, the device is additionally equipped with a rigidly connected rotary propeller 6. The screw has two fixed positions of the blades mutually opposite to the cockpit (as in figures 1 and 2). The device has rotary wings 7, and for carrying out additional hydrotechnical works, such as searching for and lifting drowning bodies or objects, mowing the reeds growing on the bottom, absorbing bottom sediments with further transportation ashore or cargo island, it is equipped with a nab rum working and handling ustroystv. Podom-dropping of the float along the guide 1 - 2 is sidewalls program-controlled float alternately filled compartments and (or) oriented air or seawater, which is provided for the air intake, its production, filling the compartments with water, release of their water and other necessary actions to regulate the depth of immersion of the float (section of the float, the intake and discharge devices of air and water in FIG. not shown). The arrows in figure 1 show the possible movements of the float along the walls and the device as a whole. The device operates as follows. The device moves along the river bed and is quickly delivered to the desired location (Figure 1). By adjusting the air outlet in the compartments and filling them with water, the desired level of float immersion is achieved. If necessary, pull out the anchor arms 4 before plunging them into the bottom). Stabilize the device along the longitudinal axis along the flow by changing the angle of attack of the rotary wings 7 with the drives 8. The bottom of the river bed is cleaned by scouring the bottom sediments with a water flowing device directed by the flow of water. If necessary, the flow through the water-resistant device can be strengthened by further lowering the float and thereby reducing the cross-sectional area of the water-resistant device, as well as turning the propeller (as in figure 2) and intensifying the flow velocity directed to the erosion zone. The washout zone moves forward. The device "drives" the erosion zone in front of it, simultaneously cutting off stranded, unevenness and hillocks of the bottom of the river. Turning the propeller (with the rod-anchors removed) the device can move forward at a small stroke. After passing through the entire chalk to the reach, the device, if necessary, is returned either backward or relocated to another location. For which the anchor bars are removed, the propeller is put in a position that provides the necessary direction of movement, the release of water from the compartments and their filling with air, the device is afloat and moves to a predetermined place at high speed. If it is necessary to extend the fairway to passing vessels, layer by layer in depth and row by row along the width, achieves the desired configuration and cleanliness of the bottom of the river or canal. Possible deepening of the bottom on the lake, bog and other standing ponds. If necessary, the device can additionally be equipped with a set of working manipulation devices (such as excavating bucket, manipulator-lift 9, dredging equipment 10, mower and others), a set of video lighting devices of video cameras (not shown in

figure, which broadens the functionality of the device as a whole, after which it can be used for dehydration of boron, foundation pits, lakes, shoveling, removal of mud, for the care and cleaning of tailing dumps, for sand mining, gold, sapropel, repair of underwater constructions and communications, search and lifting of sunken objects, cutting reeds and for other purposes.

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