

Cleaning Sediments from the Accumulation



- ▶ *By Partitioning the River with a Dam, the Natural Movement of Sediments is Prevented;*
- ▶ *Then the Sediment Stops and Settles in the Riverbed;*
- ▶ *The Sediment Interferes with the Production of Electricity in the Hydroelectric Power Plant.*





Sediment Removal Techniques *for Reservoir Sustainability*

RECLAMATION
Managing Water in the West

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*This Video Presentation On the YouTube Describes very Precisely
the Dam Reservoir Congestion Problems with Sediment*

Current Technology



- ▶ *It's insufficiently efficient;*
- ▶ *It's Absolutely Unprofitable for Cleaning Sediments From Reservoirs, since*
- ▶ *It Consumes Enormous Amounts of Diesel Fuel.*

Innovative Technology Basics

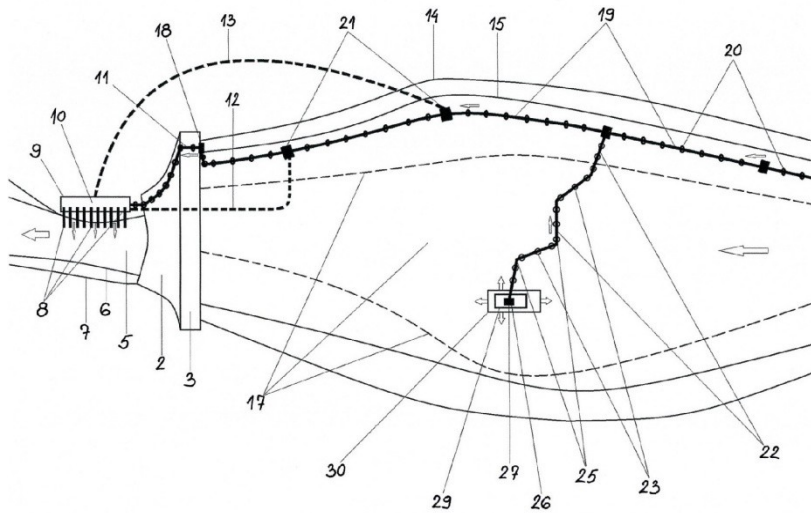


Figure 1.

- ▶ It Uses the Water Level Difference Between the Reservoir and the River Below the Dam;
- ▶ It Doesn't Use any Additional Energy to Power the System;
- ▶ A Vacuum in the Tubes Created by the Accumulated Water is Used to Clean the Sediment;
- ▶ Consumption of Up To Only 1% of Yearly Accumulated Water is Projected for the Entire System Operation.

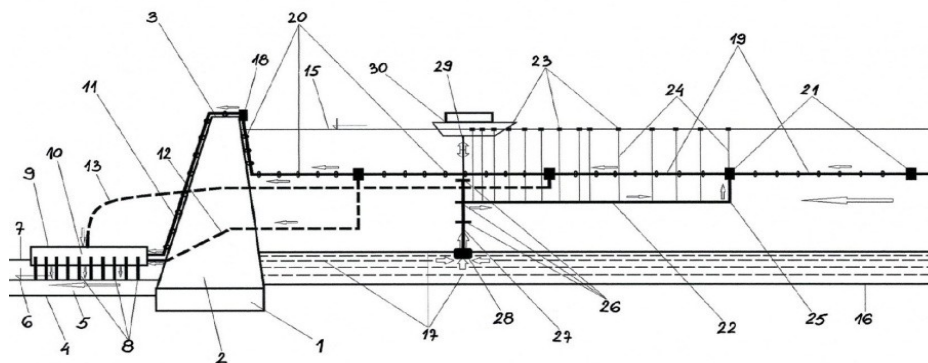


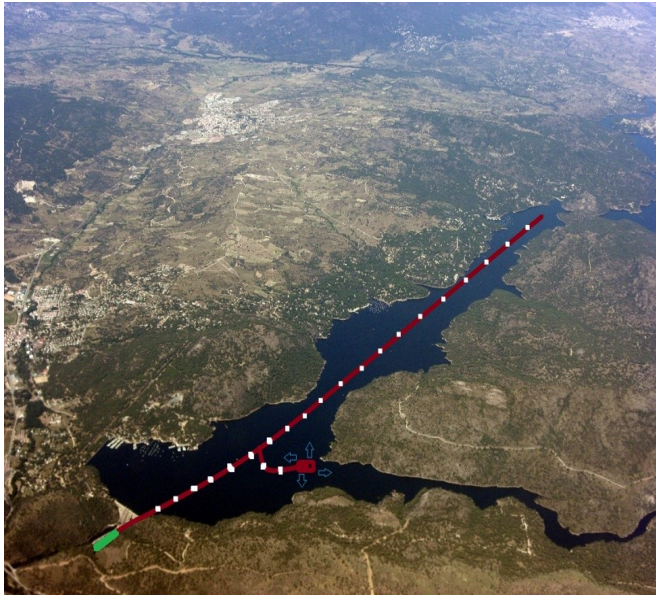
Figure 2.

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*The Working Procedure of the New Technology Can be Seen
On This [YouTube Website](#)*

Descriptive Possibilities of New Technology



- ▶ *The Water Level Difference of 20m to 25m Between the Accumulation and the River, Ejects Approximately 0.2 m³ of Sediment Per Second;*
- ▶ *In Smaller Reservoirs the Daily Average is 5,000 To 10,000 m³ of Sediments, and in Larger Ones it Goes Over 100,000 m³;*
- ▶ *The Pipeline is Buoyed and Located Below the Water Surface, and Does Not Interfere with the Visual Appearance of, and Navigation on the Lake;*
- ▶ *Suction Control From 1 To 16 Meters Per Second;*
- ▶ *Sediment Suction is Selective in Layers, From Floating Sludge to Coarse Gravel;*
- ▶ *Sediment Water Discharge Control is From 3 To 10 Meters Per Second;*
- ▶ *You Can Watch the Real Time Demo Experiment On the Next Page:*

Real Time Demo Experiment: Video



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Real Time Demo Experiment: Info I

- ✓ 2.5 m³ of Flowing Water in Two Time Overflows;
- ✓ Of the 1,000 kg of Gravel, 700 kg Was Dumped Into the Lower Pool
- ✓ An Inner Pipe Diameter of 76 mm Was Used;
- ✓ A Height Difference of 3.2 m to 3.4 m Was Used;
- ✓ The Average Saturation of Water with Gravel Is 20%;
- ✓ The Average Discharge of Water with Gravel Is 16 Liters/Second
- ✓ The Largest Stone with a Diameter of 82 mm Was Thrown Out.

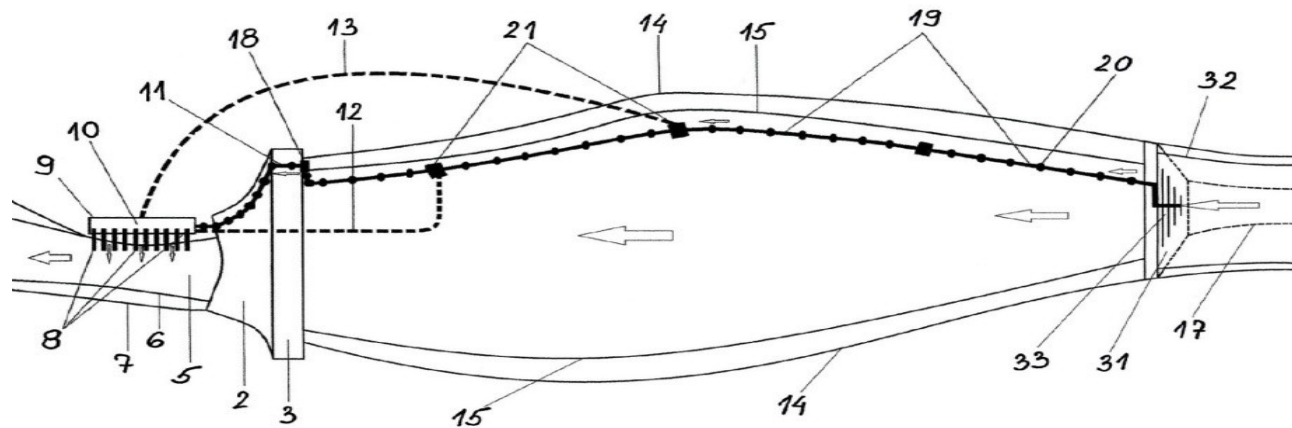
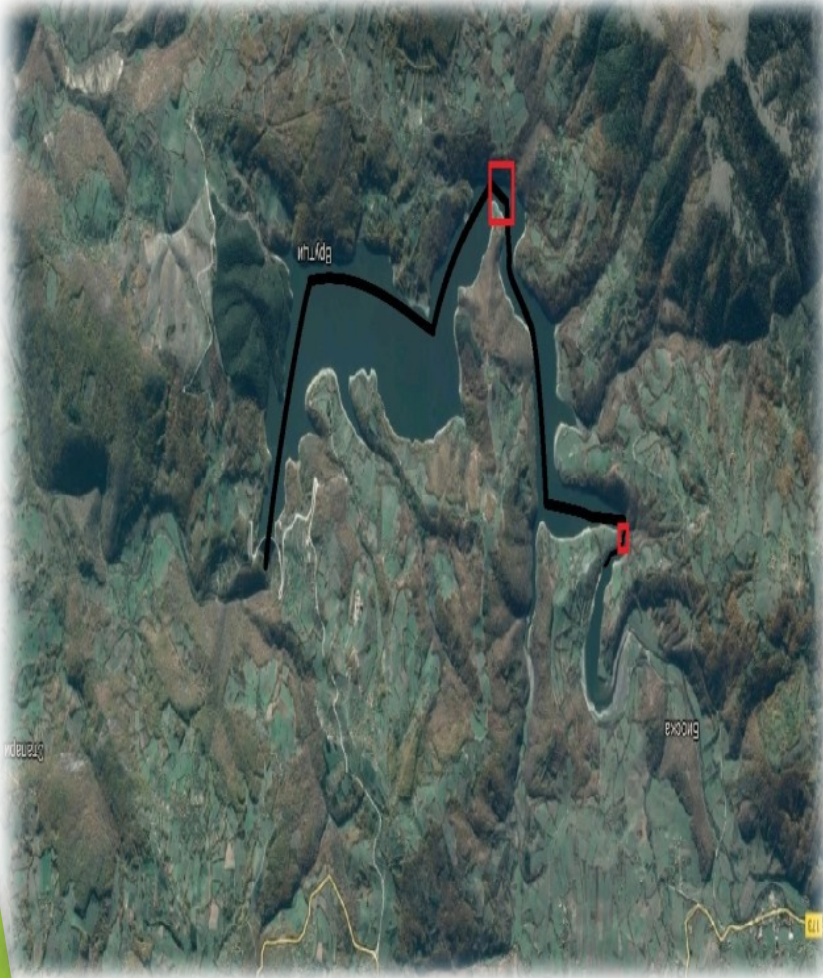


Figure 3.

Real Time Demo Experiment: Info II



- ▶ *The Project Problem of Water Inflow Into the Lake, which is Polluted by the Settlements and Livestock in the Upper River Basin, Should be Eliminated;*
- ▶ *Self-Purification Technology Should Be Implemented, Before the Water Enters the Reservoir;*
- ▶ *The Water Passes Through the Auxiliary Dam, and is Filtered at a Constant Rate;*
- ▶ *The Rest of the Sludge and Dirt from the Upper Lake is Sucked Up by the Innovative Technology and Emptied Under the Existing Dam Without Consuming Additional Energy;*
- ▶ *The Water in the Reservoir, Cleaned of Faeces and Sediments, is Used to Supply the Population with Drinking Water.*

Siltation

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Al Wahda Dam



- ▶ **Al Wahda Dam:**

"The Second Most Important Dam in Africa After the High Aswan Dam.,,

- ▶ *Unfortunately, the Dam's Reservoir Has a Very High Rate of Siltation what is Estimated to Lose 60 Million Cubic Meters (2.1×10^9 cu Ft.) of Storage Each Year*



Larger Hydroelectric Power Plants in Morocco

Hydroelectric Power Station	Community	Coordinates	River	Type	Reservoir	Capacity (MW)	Year completed
<u>Afourer Pumped Storage Station</u>	<u>Afourer</u>			<u>Pumped Storage</u>		465	2004
<u>Al Massira Dam</u>	<u>Settat</u>					128	1979
<u>Al Wahda Dam</u>						240	1997
<u>Allal Al Fassi Dam</u>						240	1994
<u>Bin El Ouidane Dam</u>	<u>Beni Mellal</u>					135	1953
<u>El Borj Hydropower Station</u>	<u>Khénifra</u>			<u>Run of River</u>	N/A	22[2]	
<u>Hassan I Dam</u>	<u>Demnate</u>					67.2	1991
<u>Idriss I Dam</u>						40	1978
<u>El Kansera Dam</u>	<u>Meknes</u>					8.3	1946
<u>Mohamed V Dam</u>	<u>Zaio</u>					23	1967
<u>Tanafnit Hydropower Station</u>	<u>Khénifra</u>			<u>Run of River</u>	N/A	18	

The Technology is Approved and Protected by WIPO Patent Rights in Switzerland

1. WO2017184005 - VACUUMING SEDIMENT FROM RIVER RESERVOIRS

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Title
[EN] VACUUMING SEDIMENT FROM RIVER RESERVOIRS
[FR] MISE SOUS VIDE DE SEDIMENTS PROVENANT DE RESERVOIRS DE RIVIERE

Abstract
[EN]
This innovative solution completely solves the problem of siltation of accumulation, maintained projected state hydro facilities with a dam, to resource accumulation in the long term sustainable. Cleaning reservoirs for water supply, has additional technical solutions, which are installed to prevent sediment accumulation, in a way, is formed cascade of dams upstream from the existing dam, on its surface is set perforated pipes and equipment, related to the further described piping system that drains water from sludge out of the reservoir. Example, a variety of means known to establish the position of deposits (17) in the accumulation, is determined by the surface deposits on the bottom (15) of the accumulation, which should be removed. Working tube (22) is positioned in the zone, below the level (15) of the accumulation at a certain horizontal depth, is positioned with a set of buoys (23) working tubes and cables (24) to position the working tube, then it is clipped onto the corresponding manifold with an automatic valve (21) and the transport tubes (19). The working tube (22) having flexible side movement in the water, with their associated elements of the flexible coupling (25). Then, the head (28) of the suction tube with a suction tube (27) is associated to the working tube (22), located at the suction position of deposits (17) in the accumulation. Its work head (28) of the suction tube with a suction tube (27) is connected and positioned by means corrector (29) and the intake position of the vessel (30) for the intake position. Now the system is fully ready, networked, controlled by the position of specialist in the mechanical room (18) by means of appropriate equipment. This raises the requirements of electricity generator, the device (16) for the low pressure in the water with the help of electronics and pumps, rain water in the tube (11) over the dam crest, to open the valve in place the regular turbine with tubes (16). The water in the tube (11) over the dam crest is below the free fall, draws water law of connected vessels from the reservoir or moves and sucks the deposits (17) in the accumulation of water in the scale of work head (28) of the suction tube. The water flow in the pipes at a constant speed. Transport of water from the sediment via a suction tube (27), the working tube (22), a transport tube (19), tube (11) over the dam crest, to the regular turbine with tubes (16), wherein water from the sediment leaving the river flow (15), under the dam or in the separation. Additional positions, a possible east lead with the deposits through a tubes (12) through the body of the dam and the tube (13) through the coast of accumulation. Shows the position work, have the option of cleaning the sludge on the entire surface of the reservoir; the working tube (22) is transmitted, so that the consolidated deposits can remove the entire bottom surface of the reservoir to the technically feasible, practical and fast way.
[FR]
L'invention propose une solution innovante qui résout entièrement le problème de l'envasement d'accumulation, maintient l'état prévu d'installations hydrauliques comportant un barrage, et assure l'accumulation des ressources de manière durable à long terme. Il existe pour le nettoyage de réservoirs d'alimentation en eau des solutions techniques additionnelles qui sont mises en œuvre pour prévenir l'accumulation de sédiments, qui consistent à créer sur un trajet une cascade de barrages en amont du barrage existant et à installer en surface des tuyaux perforés et des équipements reliés au système de tuyauterie décrit ci-après, drainant l'eau présente dans les bords hors du réservoir. Par exemple, une diversité de moyens connus pour établir la position de dépôts (17) dans l'accumulation est déterminée par les dépôts de surface au fond (15) de l'accumulation qui doivent être enlevés. Un tube de travail (22) est placé dans la zone, au-dessous du niveau (15) de l'accumulation, à une certaine profondeur horizontale, est positionné par un ensemble de bouées (23), de tubes de travail et de câble (24) servant à positionner le tube de travail, puis est fixé sur le collecteur correspondant muni d'une vanne automatique (21) et de tubes de transport (19). Le tube de travail (22) présente un mouvement latéral flexible dans l'eau avec les éléments associés du raccord flexible (25). La tête (28) du tube d'aspiration munie d'un tube d'aspiration (27) est ensuite associée au tube de travail (22) situé à l'emplacement d'aspiration des dépôts (17) dans l'accumulation. La tête de travail (28) du tube d'aspiration munie

The Owner of the Intellectual Property is the Engineer Mr. Tomislav Tesla

Current User of the Intellectual Property is Tesla Technologies Turbines DOO Corp

Thank you for Your Time and Interest in Applying the Technology, which Returns the Reservoirs to the Natural Ecosystem of the River Flow in a Way as if Artificial Dams in the Riverbed have not Even Been Built.

Date: 1 Sep. 2020

Innovator,
Mr. Tomislav Tesla, with Associates!!