# RIVER WATER FLOW REGULATION DEVICE

DESCRIPTION

An analysis of available literature (1), related to non-affluent hydroelectric power plant, has revealed that the main difficulty of installation of this technique is a low flow speed of the majority of plain rivers.

So, I offer my own invention that will allow changing the current situation and to increase a flow speed of every river that could be exploited for the aim to generate electric power more efficiently.

My offered underwater device is made of two parts: the 1st increasing river flow speed and the 2nd – rotary, rotating, joined with a low-speed generator.

Drawing No. 1.
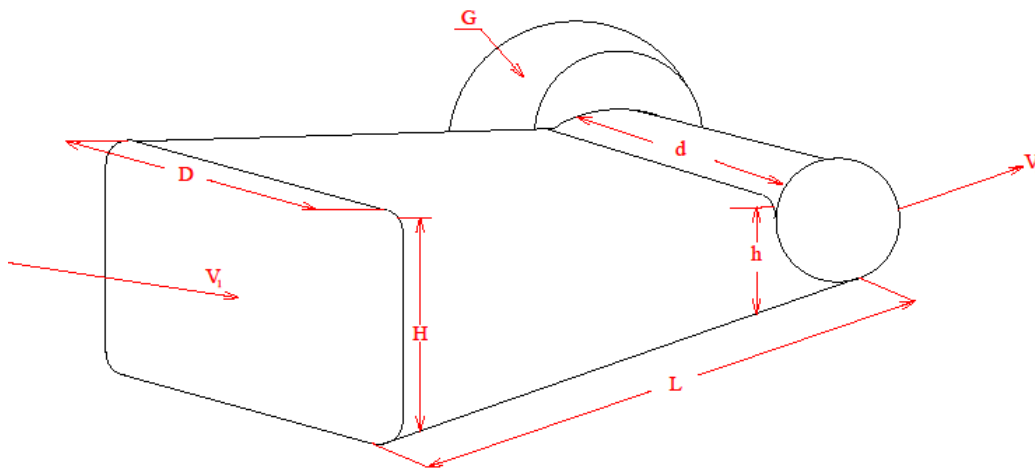
Drawing No. 2.
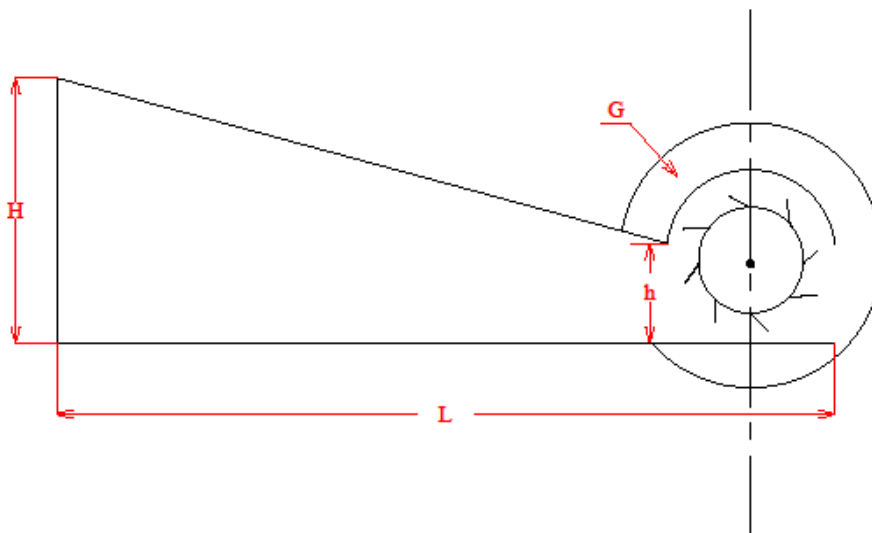
The first part is a rectangular "arm" which dimensions are reducing gradually according to the river flow direction. This part is mounted on the river floor that has to be prepared for this aim for a device to be fixed properly. Two drawings (enclosed) indicate that a primary height of a device – H, a final height – h.; a primary width of a device – D, a final width – d; length L – (1,3 – 2) D.

Let's consider that the primary river flow speed is equal to v1 = 1 m/s. If H mathematical ratio to h is equal to a particular value, flow speed of water, that passes the device, increases for the times of the said value due to reduction of a water pressure. If considering that a device tapers off D/d-fold, flow speed will increase additionally. So, it's possible to get a high hydro power increase from a low speed of river flow. Formula – (1). The mentioned increase includes kinetic (water flow Ekin. = m x v²/2) and height part potential water power- Epot. = (H-h)/H x m x g x (H-h). Formula - (2).

$$V2 = V1 \times H \times D/h \times d \quad (1)$$

$$\text{Whole energy} \quad E = Ekin.+ Epot. = m \times v^2/2 + (H-h)/H \times m \times g \times (H-h) \quad (2)$$

Let's analyze, how much energy would be received if a device, which D is equal to 10 m, height H - 2 m, d – 7 m., h- 0.5 m. The speed of outward flow v2 = 5,7 m/s. So, if a speed of inward flow v1 – 1 m/s, an amount of inflowing water will be 20 m3 (20 tons) per 1 s at a primary time moment. The counting reveal that a full hydro power value of one device will amount for 550 kJ. After deducting 10-15% resistance damages, a rather high value of hydro power is left for rotating the generator. A high demand has appeared for nowadays productive underwater low-speed generators. A total estimate price of a device without a generator is relatively low. The device could be easily made even within common technical workshops. The device is made of separate joined parts.

Moreover, if placing the similar device after the first one (without the 2nd – rotary, rotating, joined with a low-speed generator), the inflowing water value for the second device will be significantly faster than the river's value. It is possible to place more devices, thus forming a cascade. It is useful to place a device (the devices) prior and after hydro power plant dams.

It should be taken into consideration that a device does not occupy a total width of river flow. An ice-breaker protective metal net is to be placed prior to the device in order to protect aqua fauna. The former structure should be winter ice-resistant, also visible at day/night time.

Smaller rivers could be equipped with structures of smaller dimensions, although resistant and visible protection is necessary in each case. To sum up, this technique could be applied everywhere, where water flow gradient and an appropriate place for a device exists.

Literature:
1. Prof. P.Punys, A.Vaišvila. Nepatvankinės hidroelektrinės.Žemėtvarka ir hidrotechnika", 2012, Nr.4. (Lithuanian).
2. http://masterclub.org/index.php?m=54&p=350
3. http://www.erg.glb.net/scientific-article1.doc

Author: Edmundas Jauniskis©