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(54) **River bedload trap**

(57) The trap, in accordance with the invention, is a portable, light, and comfortable to operate construction enabling performing measurements of the mass and volume of river bedload at the same sites and in the same time intervals adjusted to the discharge regime. Measurements with continuous, even 24h monitoring, can be performed irrespective of the environmental conditions of the catchment, and in extreme climatic conditions.

Incorporating single building blocks in the additional stabilizing-safety construction anchored strongly in the river banks allows for eliminating the effects of high-energy flood flow discharges, and collisions with drifting parts of trees or ice floats.

The River Bedload Trap is constructed of at least one building block equipped with a container (1) fastened

to a body (4) together with a stabilizing frame, and fastened, by means of strings (8 and 9) and stainless snap hooks (10) to a steel rope (11) in PVC coating, stretched across the river channel, and anchored in the river banks by means of stakes (12) with a rope stay system.

The containers (1) are made of waterproof net strengthened on seams with waterproof belt, and assembled together with a clamp yoke (3), in a manner enabling its unfastening, on the metal body (4) to which also the stabilizing frame is fastened, resting on a pair of perforated brackets (2) anchored in the river channel bed, enabling screwing on a crosspiece (5) equipped with a vertical rifled rod (6) with a screwed on tighten bolt. The body is additionally equipped with a handle (7), made of waterproof belt, for pulling the container out.

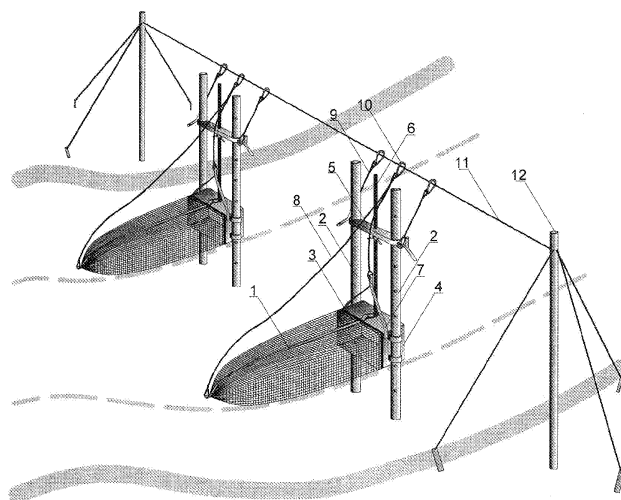


Fig. 1

Description

[0001] The subject of the invention is a device for trapping bedload dragged on the river bed with the purpose of obtaining thorough knowledge on the phenomenon of the movement of the material, and in particular determining the conditions at the beginning of bedload movement, and intensity of bedload transport.

[0002] The determination of the mass of bedload transported in a river bed during a specified time aims at the assessment of the intensity of bedload movement for the purpose of specifying the morphodynamic, hydrodynamic, and ecological conditions of a river, necessary for undertaking hydrotechnical, and in particular flood control, retention, and energy engineering works.

[0003] The issue of accurate assessment of bedload transport regime concerns particularly mountain rivers transporting significant amounts of bedload. In many cases, the application of direct measurement methods, in particular by means of modern devices, is not possible due to difficult field conditions and lack of infrastructure — electricity supply.

[0004] Both Polish hydrometric practices and measurements of material dragging intensity in American gravel-bed rivers apply sets composed of a container with a pole for its lowering and lifting, system of cords for opening and closing the inlet of the container, and a directional rudder enabling positioning the container parallel to the direction of the water flow. Devices of this type are operated by a researcher directly in a river, or indirectly — from a boat, pontoon, footbridge, or bridge. The presence of a researcher during the measurement limits the time of taking the sample to short time periods, and therefore causes reduction of quality of the measurement results. At high water levels and high turbidity, there is no possibility to control the position of the trap on the river bed, which usually disturbs the measurement. Moreover, the large weight and dimensions of the equipment limit the possibility of its application in the conditions of high-energy mountain rivers.

[0005] The issue is partially solved by the construction of traps stabilized in the river bed by means of steel rods and a metal sheet basis (aluminum ground plate), known from the publication by K. Bunte, S.R. Abt, J.P. Potyondy, S.E. Ryan, *Journal of Hydraulic Engineering*, Vol. 130, No. 9, 2004.

[0006] This type of traps proves effective only in the conditions of low-water and sustainable discharges. Their operation in the conditions of flood flow requires minimum three persons securing the bedload trapping device by means of ropes. Replacement of the container requires partial or entire immersion of a researcher under water. In the conditions of mountain rivers, at low air temperatures, it is a serious inconvenience, also limiting the measurement time.

[0007] The objective of the invention is to construct a device easy to operate, enabling a thorough insight into the phenomena of river bedload movement in the river

channel in any climatic-geographical conditions, in any given time unit, and with the application of continuous measurement procedure.

[0008] The River Bedload Trap, in accordance with the invention, is composed of at least one building block in the form of a bedload fraction container fastened to a body together with a stabilizing frame, and fastened, by means of strings with clasps, favourably stainless snap hooks, to a construction securing and stabilizing the entire system in the form of a steel rope, favourably in PVC coating, stretched across the river channel, and anchored in the river banks by means of stakes with a regulated rope stay system.

[0009] The bedload fraction container, built of waterproof net with mesh adjusted to the trapped fraction, favourably strengthened on seams with waterproof belt, is assembled, together with a clamp yoke, in a manner enabling its unfastening, on the metal body to which also the stabilizing frame is fastened, resting on a pair of perforated brackets anchored in the channel bed, enabling screwing on a crosspiece equipped with a vertical rifled rod with a screwed on tighten bolt. The body is additionally equipped with a handle for pulling the container out, favourably made of waterproof belt.

[0010] The trap, in accordance with the invention, is a portable, light, and comfortable to operate construction enabling carrying out measurements of the mass and volume of river bedload at the same sites and in the same time intervals adjusted to the discharge regime. Measurements with continuous, even 24h monitoring, can be performed irrespective of the environmental conditions of the catchment, and in extreme climatic conditions.

[0011] Incorporating single building blocks in the additional stabilizing-safety construction anchored strongly in the river banks allows for eliminating the effects of high-energy flood flow discharges, and collisions with drifting parts of trees or ice floats. Owing to situating the vertical and horizontal stabilizing elements over the water surface, the construction of the trap allows for its safe operation irrespective of the river stage.

[0012] The trap, in accordance with the invention, is presented in the picture, where Fig. 1 presents the perspective view of the entire construction.

[0013] The invention is presented as an embodiment.

[0014] The River Bedload Trap is constructed of two building blocks, each having the container (1) fastened to the body (4) together with the stabilizing frame, and fastened, by means of strings (8 and 9) and stainless snap hooks (10), to the steel rope (11) in PVC coating, stretched across the river channel, and anchored in the river banks by means of stakes (12) with the rope stay system.

[0015] The containers (1) are made of waterproof net with mesh of 3.5 mm, strengthened on seams with waterproof belt, and assembled together with the clamp yoke (3), in a manner enabling its unfastening, on the metal body (4) to which also the stabilizing frame is fastened, resting on a pair of perforated brackets (2) an-

chored in the channel bed, enabling screwing on the crosspiece (5) equipped with the vertical rifled rod (6) with the screwed on tighten bolt. The body is additionally equipped with the handle (7), made of waterproof belt, for pulling the container out.

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Claims

1. The River Bedload Trap, with a bedload trapping element stabilized in the river channel, **characterised in that** it is composed of at least one building block in the form of a net container (1) for bedload fraction, fastened to a body (4) together with a stabilizing frame, and fastened by means of strings with clasps, favourably stainless snap hooks, to a construction securing and stabilizing the entire system in the form of a steel rope stretched across the river channel, and anchored in the river banks by means of stakes with a rope stay system.
2. The building block mentioned in claim 1, **characterised in that** the container (1) is assembled together with a clamp yoke (3), in a manner enabling its unfastening, on the metal body (4) equipped with a handle (7) for pulling the container out, favourably made of waterproof belt, to which also the frame is fastened, resting on a pair of perforated brackets (2) anchored in the river channel bed, enabling screwing on a crosspiece (5) equipped with a vertical rifled rod (6) with a screwed on tighten bolt.
3. The container mentioned in claims 1 and 2, **characterised in that** it is made of waterproof net with mesh adjusted to the trapped bedload fraction, favourably strengthened on seams with waterproof belt.

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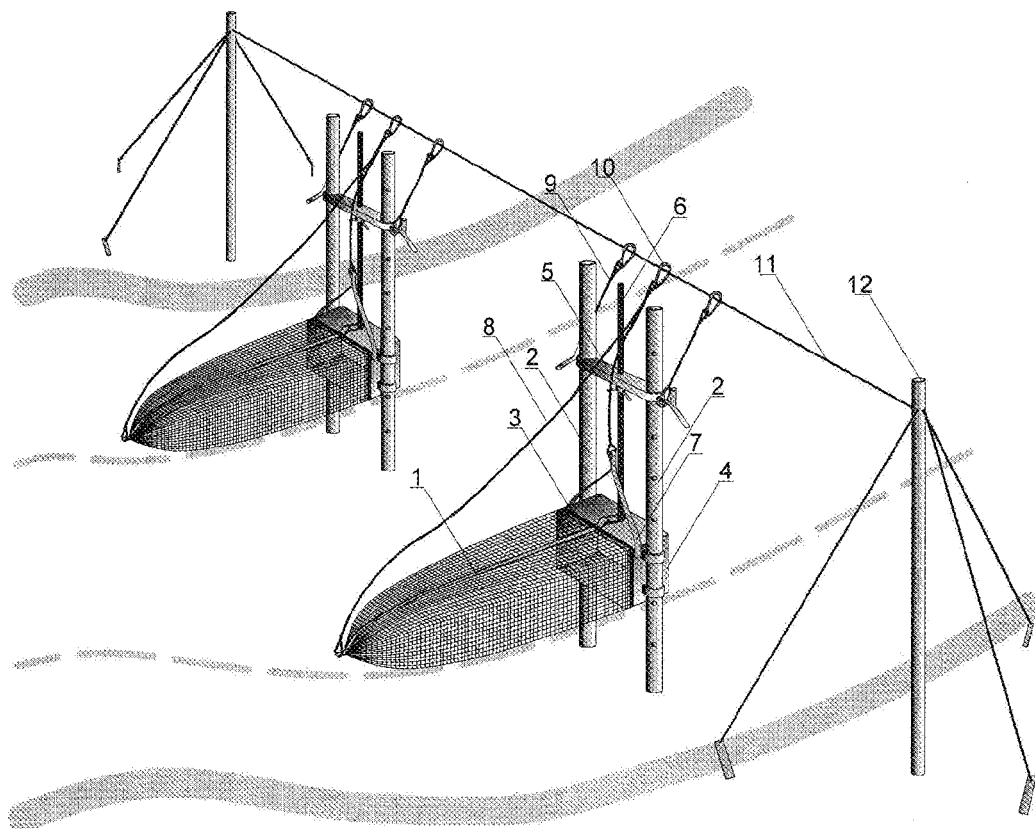


Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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Non-patent literature cited in the description

- **K. BUNTE ; S.R. ABT ; J.P. POTYONDY ; S.E. RY-AN.** *Journal of Hydraulic Engineering*, 2004, vol. 130 (9 [0005])