



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) **EP 1 285 142 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:

**10.12.2003 Bulletin 2003/50**

(21) Application number: **01930342.9**

(22) Date of filing: **15.05.2001**

(51) Int Cl.7: **E03F 5/14**

(86) International application number:  
**PCT/PL01/00043**

(87) International publication number:  
**WO 01/088291 (22.11.2001 Gazette 2001/47)**

(54) **SELF-CLEANING DEVICE, ESPECIALLY FOR TRASH SCREENING**

SELBSTREINIGENDE VORRICHTUNG, INSBESONDERE FÜR ABWASSERRECHEN

DISPOSITIF AUTONETTOYANT DESTINE NOTAMMENT AU CRIBLAGE DE DECHETS

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**

(30) Priority: **15.05.2000 PL 34014200**

(43) Date of publication of application:  
**26.02.2003 Bulletin 2003/09**

(73) Proprietor: **Czekala, Zygmunt  
05-820 Piastow (PL)**

(72) Inventor: **Czekala, Zygmunt  
05-820 Piastow (PL)**

(74) Representative:  
**Iemenschot, Johannes Andreas, Ir.  
Exter Polak & Charlouis B.V.,  
P.O. Box 3241  
2280 GE Rijswijk (NL)**

(56) References cited:  
**EP-A- 0 440 573 DE-A- 2 921 536**

**EP 1 285 142 B1**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

[0001] The invention relates to liquid cleaning equipment of the mechanical screening type.

[0002] Trash screens are widely used at water intakes of different purpose, either industrial or those related to drinking water for communal use. They are intended to mechanically stop rubbish enter intake pumps so as to avoid pump malfunctioning, choking or even damage. Trash screens of different types are described in the book "Urządzenia do uzdatniania wody - zasady projektowania i przykłady obliczeń" (Equipment for water treatment - principles of design and calculation examples) by Zbigniew Heidrick, issued in Poland by Arkady publishing house in 1987, pages 139 to 143.

[0003] Trash screens take the form of grates, screens or micro-screen. With respect to their design trash screens can be divided into two groups: stationary and replaceable. Depending on the method of removing the cumulated screenings trash screens can be classified as cleaned manually or mechanically, the latter applicable particularly at large water intakes. Known trash screens that are installed at water intake windows are built as frames with vertical or horizontal rods running across, the proper clearance between adjacent rods left, depending on the size of rubbish particles that have to be stopped.

[0004] With their advantage of simplicity, known trash screens have important disadvantages, including the necessity of periodical removal of screenings deposited on them, usually following quite short periods of the screening process, and difficulties or even impossibility to remove rubbish stuck between screen bars.

[0005] The present invention is aimed at providing a trash screen that is mechanically self-cleaned in such a way that a long unattended operating period is ensured. A device according to the preamble of the appended claim is known from DE-A-2 521 536.

[0006] In accordance with the invention as defined by said claim, the device comprises a screening grate made in the form of a frame that is favourably out of plumb with its top edge down the liquid flow. Parallel grating bars are arranged in the frame plane, running from the bottom to the top. Before the grate, above the surface of raw liquid, a screenings container is placed, whose one side wall is so fixed that it can rotate around its bottom edge while sticking with its top edge to the grate across the whole grate width. After the grate, on the clean liquid side, a system of two carrier belts is arranged, guided along the side edges of the grate. A number of screenings pickups are arranged across the grate bars, attached with their ends to the carrier belts and moved along the bars from the bottom towards the top of the grate as the carrier belts travel. Each screenings pickup is made in the form of a comb whose teeth enter the clearances between the grate bars, and their parts protruding into the opposite side of the grate make the working part of the screenings pickup which extracts

screenings deposited on the bars and picks them up over the liquid level. The active parts of the pickup teeth make an obtuse angle with the plane of that grate part which is above the particular pickup.

[0007] The carrier belts of the pickups are deflected from the grate plane in their section running above the screenings container, so that the length of the working part of pickup teeth decreases as the pickup is moved upwards, until the pickup teeth are entirely withdrawn from between the grate bars when the pickup reaches a position near the top edge of the grate.

[0008] The advantage of a screening grate formed in accordance with the invention consists in the avoidance of earlier mentioned inconvenience of the necessity of periodical removal of deposited screenings by providing a mechanism of cyclic self-cleaning. Resulting from that, high device reliability can be achieved and its maintenance minimised.

[0009] The invention will now be described by way of example and with reference to accompanying drawings in which:

Figure 1 is a vertical cross section in the plane of liquid flow direction, showing the principle of device arrangement and operation.

Figure 2 is a horizontal cross section along a single pickup, illustrating the inter-operation between the pickup teeth and the grate bars.

[0010] Figure 1 shows screening grate 1, which is made of a rectangular frame with parallel round bars and a clearance between them chosen properly to the trash size that has to be stopped. The bars are attached with their ends to the bottom and top edges of the frame and have no joints between them along all their length. Grate 1 is favourably out of plumb with its top edge down the liquid flow.

[0011] Before the grate, above the surface of in-flowing raw liquid, screenings container 7 is arranged, whose one side wall is so fixed that it can rotate around its bottom edge while its top edge sticks to grate 1. After the grate, on the clean liquid outflow side, a drive system of two rubber carrier belts 2 is provided, driven by a pair of toothed wheels 4. The drive system and the grate are mounted on common supporting structure 5.

[0012] Screenings pickups 3 are mounted to carrier belts 2 at some regular distances between them, stretched between the belts across the bars of grate 1. Screenings pickup 3 is made in form of a sheet-metal section with the bottom of the section made wider; the crosswise recesses in the bottom of the pickup take the form of a comb whose teeth enter the clearances between the grate bars, and protrude into the opposite side of grate 1, making the working part of screenings pickup 3. The plane of the working part of screenings pickup 3 makes favourably an obtuse angle with the plane of that part of grate 1 which is above the particular screenings

pickup.

**[0013]** Supporting-and-fixing plate 8 is secured to the surface of screenings pickup 3, having recesses on one of its longer sides so shaped as to match the cross section of the grate bars. Supporting-and-fixing plates 8 of several adjacent screenings pickups 3 are in touch with grate 1 at a time, thus making a support for its bars and fixing the clearance between the bars, which is especially important when grates are built of long bars, which are susceptible to bending by water flow carrying a large amount of rubbish.

**[0014]** Carrier belts 2 are guided by means of slide ways 6 that run along the side edges of grate 1 up to the level of screenings container 7 and around the bottom arc. The length of the working part of screenings pickup 3 remains constant during its upward travel along the grate section that is below screenings container 7, but it gradually shortens as screenings pickup 3 continues to move along the grate section over screenings container 7, which is because of the deflection of the way of carrier belts 2 from the surface of grate 1, until the entire withdrawal of the teeth of screenings pickup 3 from between the grate bars, which occurs when it nears the topmost position.

**[0015]** The device according to this invention operates as follows. Screenings deposited on grate 1 during the liquid screening process are cyclically pushed up along the grate bars by screenings pickups 3 and picked up over the raw liquid level. When a pickup 3, on its way upwards, reaches the level of screenings container 7, it pushes the rotary wall of the latter off grate 1 and continues to carry a portion of screenings over the level of screenings container 7. At the grate section located over screenings container 7, the teeth of screenings pickup 3 are gradually withdrawn from between the grate bars as it travels upwards, which results in screenings sliding down freely along the grate bars and falling into screenings container 7 whose rotary wall sticks with its upper edge to grate 1. The properly adjusted obtuse angle between the plane of the working teeth of screenings pickup 3 and the part of grate plane 1 which is above the screenings pickup facilitates the process of cleaning the immersed part of grate 1 by creating a force component that tears screenings off the grate surface.

### Claims

1. A self-cleaning device, especially for trash screening, comprising a screening grate (1) in the form of a frame with a set of parallel bars running in one plane from the bottom to the top, favourably out of plumb with its top edge down the liquid flow, a screenings container (7), and a set of screenings pickups (3) mounted at their ends to a system of carrier belts (2), the said system of carrier belts (2) being placed after said grate (1), on the clean liquid side, and said screenings pickups (3) having the

shape of combs whose teeth enter between the bars of said grate (1), **characterised in that** the plane in which lie the teeth of said screenings pickup (3), protruding into the opposite side of said grate (1), makes an obtuse angle with that part of the surface of said grate (1) which is above said screenings pickup (3), and **in that** said carrier belts (2) are deflected from the plane of said grate (1) in their section over said screenings container (7) so that the length of the screenings pickup teeth protruding into the opposite side of said grate (1) decreases with the increasing height of the position of said screening pickup (3).

### Patentansprüche

1. Selbstreinigende Vorrichtung, insbesondere für Abwasserrechen, die einen Einlaufrechen (1) in Form eines Rahmens mit einem Satz in einer Ebene von unten nach oben parallel verlaufenden, vorzugsweise aus Blei bestehenden Stangen aufweist, deren obere Kante im Flüssigkeitsstrom liegt, sowie einen Rechbehälter (7) und einen Satz Rechenaufnehmer (3), deren Enden auf einem System von Trägerriemen (2) angebracht sind, umfaßt, wobei das System von Trägerriemen (2) hinter dem Einlaufrechen (1) auf der Reinflüssigkeitsseite liegt und die Rechenaufnehmer (3) in Form von Kämmen, deren Zähne zwischen den Stangen des Einlaufrechens (1) eintreten, gelegen ist, **dadurch gekennzeichnet, daß** die Ebene, in der die Zähne der Rechenaufnehmer (3) in Gegenrichtung zum Einlaufrechen (1) liegen, einen stumpfen Winkel mit dem Teil der Oberfläche des Einlaufrechens (1) bildet, die über dem Rechenaufnehmer (3) liegt, und daß die Trägerriemen (2) von der Ebene des Einlaufrechens (1) in den Teil über den Rechbehälter (7) abgelenkt werden, so daß die Länge der in Gegenrichtung zum Einlaufrechen (1) vorstehenden Rechenaufnehmerzähne mit Zunahme der Positionshöhe der Rechenaufnehmer (3) abnimmt.

### Revendications

1. Un dispositif autonettoyant, destiné spécialement au criblage des déchets, comprenant une grille de criblage (1) en forme de cadre comprenant un ensemble de barres parallèles s'étendant dans un plan du bas vers le haut, de préférence hors d'aplomb avec son extrémité supérieure dirigée dans le sens du flux du liquide, un conteneur de déchets de criblage (7) et un ensemble de collecteurs de déchets de criblage (3), leurs extrémités étant montées sur un système de courroies d'entraînement (2), ledit système de courroies d'entraînement (2) étant placé derrière ladite grille (1), du côté du

liquide propre, et lesdits collecteurs de déchets de criblage (3) ayant la forme de peignes dont les dents passent entre les barres de ladite grille (1), **caractérisé en ce que** le plan sur lequel se trouvent les dents desdits collecteurs de déchets de criblage (3), dépassant du côté opposé de ladite grille (1), crée un angle obtus avec cette partie de la surface de ladite grille (1) qui est au-dessus desdits collecteurs de déchets de criblage (3), et **en ce que** lesdites courroies d'entraînement (2) sont déviées du plan de ladite grille (1) dans la section au-dessus dudit conteneur de déchets de criblage (7), de façon à ce que la longueur des dents du collecteur de déchets de criblage dépassant du côté opposé de ladite grille (1) diminue avec l'augmentation de la hauteur de la position dudit collecteur de déchets de criblage (3).

5

10

15

20

25

30

35

40

45

50

55

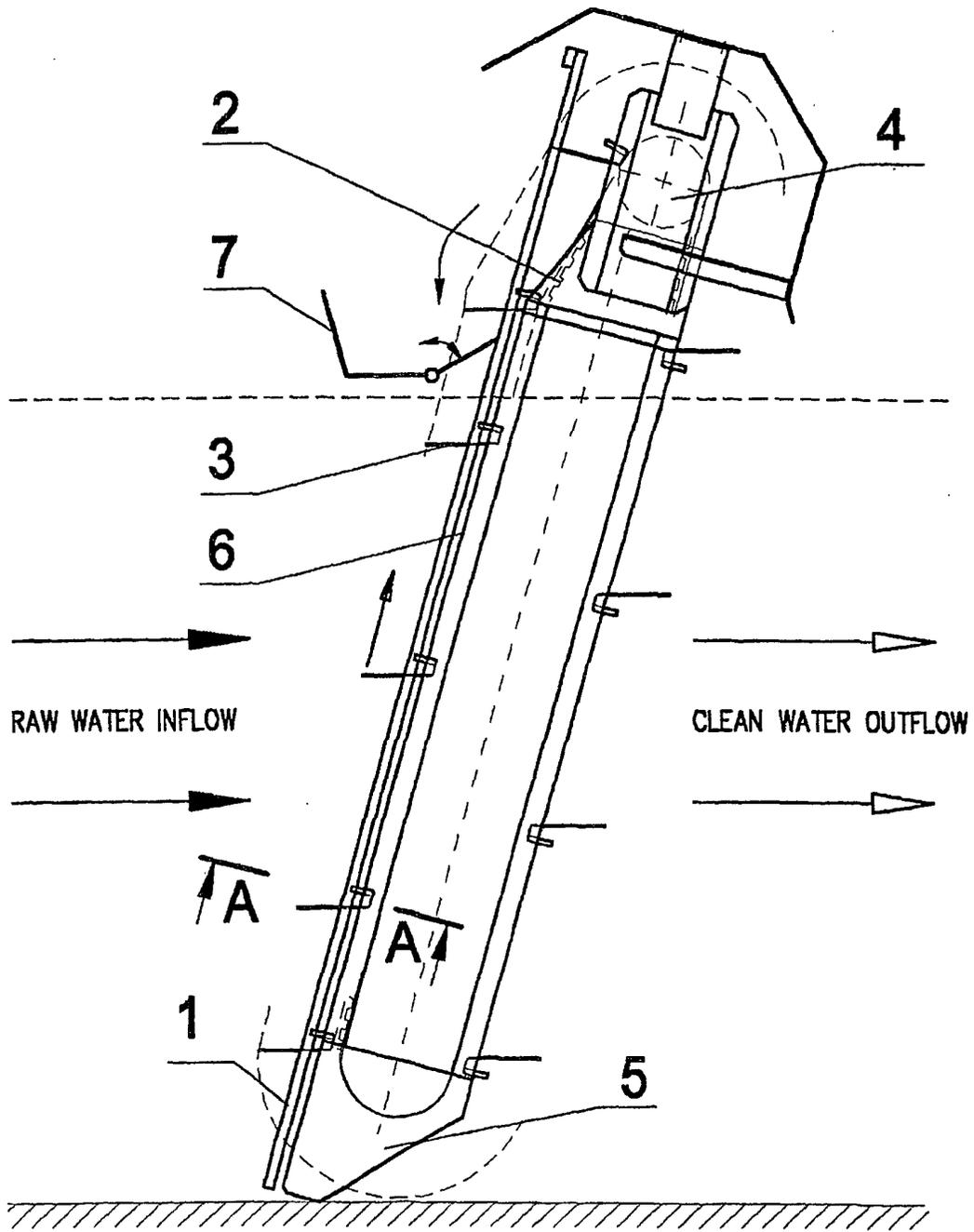


Fig.1

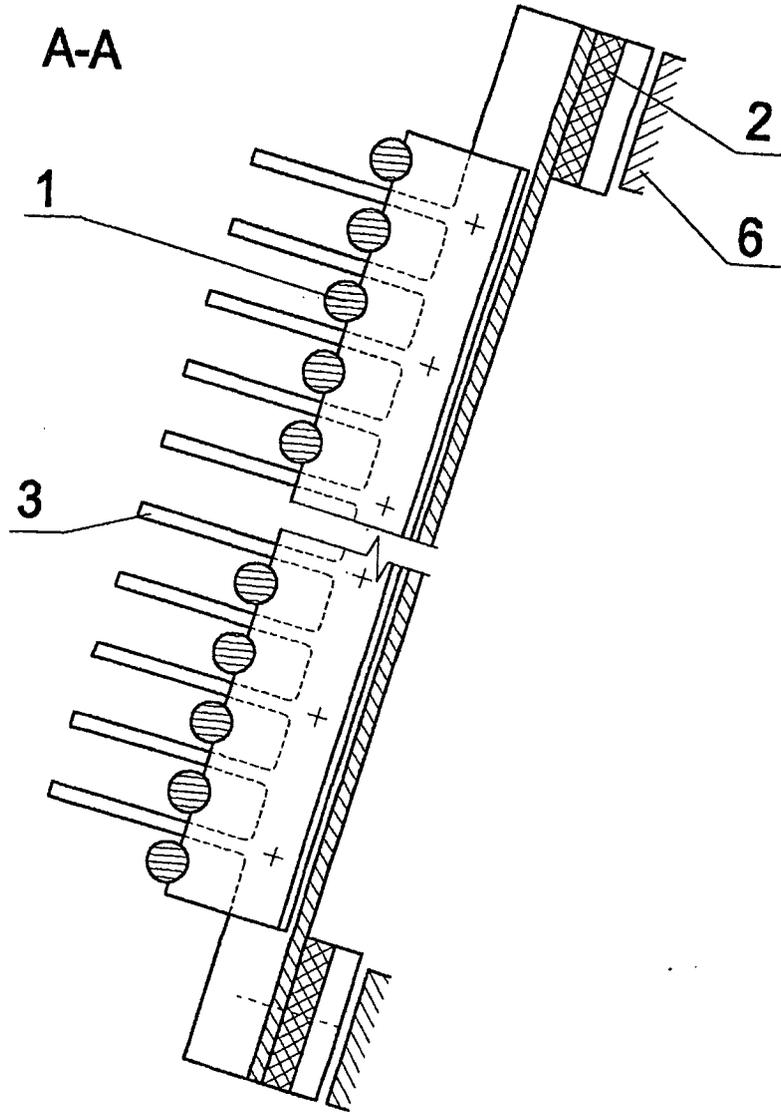


Fig.2