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(54) SCREENING DEVICE COMPRISING A SET OF ANTI-CLOGGING ELEMENTS

(57) The present invention relates to a screening device (1) for separating waste, comprising a number of rotatable bodies which are spaced apart and arranged parallel to each other, wherein each body comprises a number of screen elements (3), which are spaced apart and arranged along said body, and a number of freely rotatable anti-clogging elements (4), each of which is provided between two adjacent screen elements (3), wherein said anti-clogging elements (4) are hook-shaped for attachment of the anti-clogging element (4) over the rotatable body.

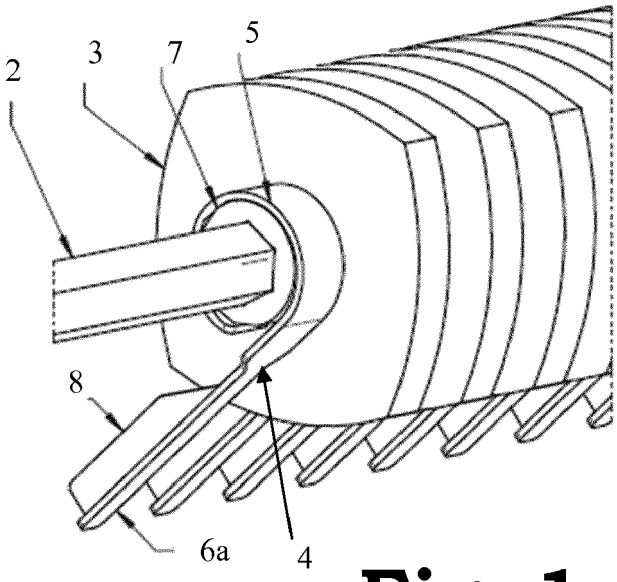

Fig. 1

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Description

[0001] The present invention relates, on the one hand, to a screening device for separating a heterogeneous mixture of solid waste products, comprising a number of rotatable bodies which are spaced apart and arranged parallel to each other, wherein each body comprises a number of screen elements which are spaced apart and arranged along said body, and a number of freely rotatable anti-clogging elements, each of which is provided between two adjacent screen elements. On the other hand, the present invention relates to an anti-clogging element which can be attached in a freely rotatable manner over a rotatable body comprising screen elements, of a screening device for separating waste. Furthermore, the present invention relates to the use of such anti-clogging elements while separating waste on a screening device according to the present invention.

[0002] The present invention relates in particular to a screening device for separating and sorting a heterogeneous mixture of solid waste products. This mixture may comprise all kinds of solid materials, such as for example brittle materials (e.g. stones, wood, ...), elastic materials (e.g. plastic, paper, cardboard, ...), sticky materials (e.g. paint, organic material), tough materials (e.g. leather), etc.

[0003] The present screening devices comprise one or more spaced-apart rotary shafts or rotary rollers provided with screen elements which are in the form of profiled or star-shaped discs, over which solid products or mixed waste is moved (conveyed). While being moved over the shafts (rollers) and the screen elements, the finer parts are separated from the coarser parts. Due to the force of gravity, the finer parts fall between the rotating shafts or rollers provided with screen elements.

[0004] However, in many cases, the waste to be separated is a heterogeneous mixture, which may comprise all kinds of materials, such as for example brittle materials (e.g. stones, wood, ...), elastic materials (e.g. plastic, paper, cardboard, ...), sticky materials (e.g. paint, organic material), tough materials (e.g. leather), etc..., so that when waste is separated and sorted, swirls of mainly tough, soft, elongate or ribbon-like material (e.g. steel wire, ribbons, tape, pieces of string, ...) result around the rotating shafts or rollers. Such swirls may co-rotate with the rotating shafts or rollers and become larger (snowball effect), as result of which:

- the openings between the screen elements with respect to each other and with respect to the rotating shafts or rollers will become smaller, as a result of which the dimensions of the fine parts falling through the openings become increasingly small and change over time;
- the screen elements and the opposite rotating shafts or rollers which are wrapped in waste come into contact with each other, resulting in a significant increase in wear due to permanent friction.

[0005] In order to prevent the formation of such swirls, a number of solutions have been proposed in the prior art. Thus, European patent publication EP 1 106 264 describes a screen for sorting solid waste, provided with rollers comprising a shaft on which screen elements in the form of plates extend parallel to each other and at right angles to the shaft of the roller, in which a freely moveable anti-clogging element is situated between the various rollers in the form of a cylindrical tube whose diameter is greater than that of the shaft and smaller than the diameter of the screen elements. The rotating part of the shaft is covered by the cylindrical tube, so that the formation of swirls is prevented.

[0006] However, the screening device described in EP 1 106 264 has the drawback that it tends to become soiled very easily, as a result of which the action of the screen can no longer be guaranteed. Fine constituents which are present in material to be separated, such as e.g. sand and (moist) soil, will end up in the cylindrical tube during screening, as a result of which the free space between the rotary shaft and the tube sleeve is filled to such an extent that, after some time, the tube will start to co-rotate with the rotary shaft again, as a result of which the swirl will then form around the cylindrical tube (anti-clogging element).

This problem often occurs with screening devices which are designed to separate finer fractions, in which the rotating shafts or rollers and the screen elements are arranged close together, so that the openings between the screen elements themselves and between the screen elements and the rotating shafts or rollers are also smaller. Due to the fact that the screen elements are closer together, the tubular anti-clogging elements are also shorter and lighter, as a result of which these will already start to co-rotate with the rotary shafts when they encounter a little resistance, e.g. caused by soiling, leading to the above-described drawback. In order to prevent this, a variant screen has been developed in which a stabilising body (weight) is provided in the tubular anti-clogging element. Such a screen is described in European patent publication EP 2 488 306. However, despite this modification, it has been found that the anti-clogging elements still continue to co-rotate with the shaft or roller during its rotation in case of significant soiling.

[0007] In addition to the above-described drawback, the devices described in EP 1 106 264 and EP 2 488 306 have the drawback that round or angular materials, such as e.g. stones, small electric motors and the like, remain behind on the tubular anti-clogging elements. Objects which remain behind lead to clogging of the device and to increased wear. In addition, when the devices in question become damaged or broken, the entire shaft or roller has to be removed from the device, after which all screen elements have to be removed up to the location where the damage has occurred. Obviously, this is time-consuming and labour-intense work.

[0008] British patent publication GB 2 313 284 and German patent publications DE 568 334 and DE 566 682

each describe a device for separating homogeneous mixtures, in particular mixtures which comprise moist and sticky materials. The publications in question describe ways to remove the material which sticks to the screen elements by means of scraping elements. However, the solutions described are not suitable for preventing swirls and, in addition, cannot be used to separate and sort heterogeneous mixtures.

[0009] It is now an object of the present invention to provide a screening device whose anti-clogging elements, also referred to as unravelling elements, are much less prone to soiling.

[0010] The object of the invention is achieved by providing a screening device for separating a heterogeneous mixture of solid waste products, comprising a number of rotatable bodies which are spaced apart and arranged parallel to each other, wherein each body comprises a number of screen elements which are spaced apart and arranged along said body, and a number of freely rotatable anti-clogging elements, each of which is provided between two adjacent screen elements, wherein said anti-clogging elements comprise an attachment part for attaching the anti-clogging element over the rotatable body in a freely rotatable manner and comprise at least one elongate tail part which extends beyond the screen elements. The screen elements are preferably disc-shaped and/or star-shaped or polygonal. In particular, the elongate tail part is arranged so as to be movable to and fro. As a result thereof, the tail part will perform a swinging (oscillating) movement in use. This will cause the attachment part to also move to and fro, as a result of which no round or angular materials, such as e.g. stones, small electric motors and the like, remain behind on the anti-clogging elements. The elongate part is preferably longer than the radius of the screen elements. The attachment part is in particular wider than the tail part. As a result thereof, the tail part will not come into contact with the screen elements during use.

[0011] The rotatable body is preferably polygonal or tubular. In a preferred embodiment, the rotatable body is driven by a rotatable shaft.

[0012] The respective anti-clogging elements which, due to the specific shape of the attachment part (hook-shaped end or U-shaped), are hung over the rotatable bodies and which, in contrast to the known anti-clogging elements, do not have a closed interior space, have the advantage that no dirt remains behind on or in the anti-clogging elements.

[0013] In a first preferred embodiment of the screening device according to the invention, one end of said anti-clogging elements forms the attachment part and is hook-shaped and the other end forms part of the elongate tail part which extends beyond the screen elements.

[0014] In a second alternative embodiment, the attachment part is U-shaped and said anti-clogging elements furthermore comprise two elongate tail parts between which a releasable connecting element is provided. The two elongate parts preferably extend beyond the screen elements. Such an embodiment makes it readily possible to remove the anti-clogging elements from the screening device without first having to remove the rotatable bodies.

[0015] As the anti-clogging elements extend beyond the dimensions of the screen elements, the anti-clogging elements are prevented from making an entire revolution. In addition, the elongate part provides the necessary weight and leads to a stabilising effect, as a result of which the anti-clogging elements will not co-rotate during rotation of the shaft.

[0016] In a variant embodiment, for example with a screening device having very narrow (5 to 30 mm) screen elements, additional weight may be attached to the elongate part of said anti-clogging elements in order to improve the stabilising character of the anti-clogging elements.

[0017] In a more preferred embodiment of the screening device according to the invention, the rotatable body furthermore comprises intermediate elements which are provided between said screen elements, wherein said anti-clogging elements are placed over these intermediate elements. The anti-clogging elements are in particular hung over the connecting means.

[0018] In a first preferred embodiment, said intermediate elements are fixedly connected to the rotatable body in a concentric manner.

[0019] In an alternative embodiment of the screening device according to the invention, said intermediate elements are fixedly connected to the rotatable body in an eccentric manner.

The eccentric connection will ensure that the anti-clogging elements which are hung over the intermediate elements constantly move up and down during rotation of the body. This movement will ensure that objects which remain behind on the anti-clogging elements or stick to the anti-clogging elements during processing of the waste are dislodged and removed from the screening device.

[0020] According to a particular embodiment of the screening device according to the invention, the intermediate elements comprise a spacer sleeve, provided to keep the screen elements on the body a fixed distance apart.

[0021] In a more particular embodiment of the screening device according to the invention, the anti-clogging elements are made from a metal alloy, plastic or spring steel. By making the anti-clogging elements from such a material, they can easily be mounted and dismounted without rotatable bodies having to be removed.

[0022] Another subject matter of the present invention relates to an anti-clogging element suitable for attachment over a rotatable body comprising screen elements of a screening device for separating a heterogeneous mixture of solid waste products, in which the anti-clogging element comprises a hook-shaped attachment part for attachment over the rotatable body in a freely rotatable manner and at least one elongate tail part. The anti-clogging element according to the present invention is in par-

ticular suitable for attaching to a screening device according to the invention, as described above.

[0023] The present invention will now be explained in more detail by means of the following detailed description of preferred embodiments of a screening device for separating waste according to the present invention. The sole aim of this description is to give illustrative examples and to indicate further advantages and features of this device and can therefore by no means be interpreted as a limitation of the area of application of the invention or of the patent rights defined in the claims.

[0024] In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- ***Fig. 1*** *shows a perspective view of a rotatable body (roller) of a screening device according to the invention, in which the separate anti-clogging elements comprising a hook-shaped attachment part and an elongate tail part are placed over fixed and concentric intermediate elements which are connected to the shaft;*
- ***Fig. 2*** *shows a transverse view of the illustration shown in Fig. 1;*
- ***Fig. 3*** *shows a cross section of a rotatable body (roller) of a screening device according to the invention, in which the separate anti-clogging elements comprising a hook-shaped attachment part and an elongate tail part are placed over fixed and concentric intermediate elements which are connected to the shaft;*
- ***Fig. 4*** *shows a perspective view of a rotatable body (roller) of a screening device according to the invention, in which the separate anti-clogging elements comprising a hook-shaped attachment part and an elongate tail part are placed over fixed and eccentric intermediate elements which are connected to the shaft;*
- ***Fig. 5*** *shows a cross section of a rotatable roller of a screening device according to the invention, in which the separate anti-clogging elements comprising a hook-shaped attachment part and an elongate tail part are placed over fixed and eccentric intermediate elements which are connected to the shaft;*
- ***Fig. 6*** *shows a perspective view of a rotatable body (roller) of a screening device according to the invention, in which the separate anti-clogging elements comprising a U-shaped attachment part, two elongate tail parts and a releasable connecting part are placed over fixed and concentric intermediate elements which are connected to the shaft;*
- ***Fig. 7*** *shows a cross section of a rotatable body (roller) of a Screening device according to the invention, in which the separate anti-clogging elements comprising a U-shaped attachment part, two elongate tail parts and a releasable connecting part are placed over fixed and concentric intermediate elements which are connected to the shaft;*
- ***Fig. 8*** *shows a perspective view of a Screening device according to the invention.*

[0025] The screening device (1) according to the present invention and as illustrated in attached Fig. 8 is suitable for separating a heterogeneous mixture of solid waste products, and comprises a number of parallel, spaced-apart, rotatable bodies and a number of screen elements (3) which are spaced apart and arranged on said bodies. The bodies are driven by a rotatable shaft (2). The screen elements (3) extend parallel to each other and generally at right angles to the shaft (2) itself.

[0026] The screen elements (3) are often disc-shaped or star-shaped. Obviously, other embodiments, e.g. polygonal, petal-shaped are also possible.

[0027] Anti-clogging elements (4) which are freely rotatable about the shaft (2) are provided between the various screen elements (3) in order to prevent the formation of swirls. In a first variant and as illustrated in Figs. 1 to 3, the freely rotatable anti-clogging elements (4) are placed over fixed concentric intermediate elements (7) which are connected to the shaft (2). In a second variant, as illustrated in Figs. 4 and 5, the freely rotatable anti-clogging elements (4) are placed over fixed eccentric intermediate elements (7) which are connected to the shaft (2). In practice, the intermediate elements (7) comprise a spacer sleeve which is provided to keep the screen elements (3) on the shaft (2) a mutual fixed distance apart.

[0028] In a variant embodiment of the invention, the screen elements (3) may be provided on the shaft (2) eccentrically, as a result of which the product on the screening device is shaken more during rotation of the shaft (body).

[0029] As the attached figures show, the anti-clogging elements (4) in each case have an attachment part (5) and one or two elongate parts (6a, 6b), with the elongate parts (6a, 6b) being longer than the dimensions (radius) of the screen elements (3).

In a first embodiment of the anti-clogging element (4) which is illustrated in Figs. 1 to 5, there is only one elongate tail part (6a), and one end of the anti-clogging element forms the attachment part (5) and this end is hook-shaped in order to achieve attachment. The other end of the anti-clogging element (4) forms part of the elongate tail part (6a) and extends beyond the screen elements.

[0030] In a second embodiment of the anti-clogging element (4) which is illustrated in Figs. 6 and 7, there are two elongate tail parts (6a and 6b) and the attachment part (5) is U-shaped. In addition, a releasable connecting element is provided between the two elongate tail parts. This releasable connecting element (9) prevents the attachment part (5) from being able to move upwards and break free from the screening device (1) and deform. The two elongate parts preferably extend beyond the screen elements (3). Such an embodiment makes it readily possible to remove the anti-clogging elements from the screening device without first having to remove the rotatable bodies.

[0031] Due to their specific shape, the anti-clogging elements (4) have no closed interior space, so that dirt and impurities cannot accumulate. The dead weight of the elongate part (6a) is sufficient to ensure that the anti-clogging element remains in position and does not co-rotate with the shaft (2) during processing of waste. If necessary, the weight of the elongate part (6a) may be increased further, for example by attaching a stabilising body (8) to the elongate part. The long shaft (the elongate part) of the anti-clogging element (4) has a length which is such that it will prevent the anti-clogging element from being able to perform a complete revolution. The opposite screen elements (3) then come into contact with this shaft and in this way prevent the anti-clogging element (4) from performing a complete revolution.

[0032] In both embodiments of the anti-clogging element (4), the attachment part (5) is wider than the tail part (6a, 6b). As a result thereof, during operation of the screening device, no contact is made with the screen elements of the same shaft (2) between which the anti-clogging element (4) is provided.

[0033] In the second variant (see Figs. 4 and 5), in which the intermediate elements (7) are fitted eccentrically on the shaft (2), the anti-clogging elements (4) will constantly move to and fro during rotation of the shaft (2), as a result of which any objects which remain stuck on the anti-clogging elements (4) or screening device or have become stuck thereto are detached and discharged.

[0034] The anti-clogging elements (4) are made from a metal alloy (e.g. spring steel or stainless steel) or an elastic plastic. An elastic material is preferred, so that the anti-clogging elements (4) can be fitted, replaced and removed in a simple manner without having to remove the rotary rollers.

[0035] In a further embodiment (not shown), the screen elements (3) may be thinner in the area around the central shaft (2) and the anti-clogging elements (4) are wider in this area and narrower along the remainder of their length. This serves to reduce the ingress of fine material between the intermediate elements (7) and the anti-clogging elements (4).

Claims

1. Screening device (1) for separating a heterogeneous mixture of solid waste products, comprising a number of rotatable bodies which are spaced apart and arranged parallel to each other, wherein each body comprises a number of screen elements (3) which are spaced apart and arranged along said body, and a number of freely rotatable anti-clogging elements (4), each of which is provided between two adjacent screen elements (3), **characterized in that** said anti-clogging elements (4) comprise an attachment part (5) for attaching the anti-clogging element (4) over the rotatable body in a freely rotatable manner and comprise at least one elongate tail part (6a, 6b) which extends beyond the screen elements (3).

2. Screening device (1) according to Claim 1, **characterized in that** the elongate tail part (6a, 6b) is arranged so as to be movable to and fro.

3. Screening device (1) according to Claim 1 or 2, **characterized in that** the attachment part (5) is wider than the tail part (6a, 6b).

4. Screening device (1) according to any of the preceding claims, **characterized in that** said body is driven by a rotatable shaft (2).

5. Screening device (1) according to any of the preceding claims, **characterized in that** the elongate part (6) is longer than the radius of the screen elements (3).

6. Screening device (1) according to any of the preceding claims, **characterized in that** one end of said anti-clogging elements (4) forms the attachment part (5) and is hook-shaped and that the other end forms part of the elongate tail part (6a) and extends beyond the screen elements (3).

7. Screening device (1) according to any of Claims 1 to 5, **characterized in that** the attachment part (5) is U-shaped and said anti-clogging elements (4) furthermore comprise two elongate tail parts (6a, 6b) between which a releasable connecting element (9) is provided.

8. Screening device (1) according to any of the preceding claims, **characterized in that** the rotatable body furthermore comprises intermediate elements (7) which are provided between said screen elements (3), wherein said anti-clogging elements (4) are placed over these intermediate elements.

9. Screening device (1) according to Claim 8, **characterized in that** the intermediate elements (7) are fixedly connected to the rotatable body in a concentric manner.

10. Screening device according to Claim 8, **characterized in that** said intermediate elements (7) are fixedly connected to the rotatable body in an eccentric manner.

11. Screening device (1) according to any of Claims 8 to 10, **characterized in that** the intermediate elements (7) comprise a spacer sleeve, provided to keep the screen elements (3) on the body a fixed distance apart.

12. Screening device (1) according to any of the preced-

ing claims, **characterized in that** the screen elements (3) are disc-shaped or star-shaped.

13. Screening device (1) according to any of the preceding claims, **characterized in that** the anti-clogging elements (4) are made from a metal alloy, plastic or spring steel.

14. Anti-clogging element (4) suitable for attachment over a rotatable body comprising screen elements (3) of a screening device (1) for separating a heterogeneous mixture of solid waste products, **characterized in that** the anti-clogging element (4) comprises an attachment part for attachment over the rotatable body in a freely rotatable manner and at least one elongate tail part.

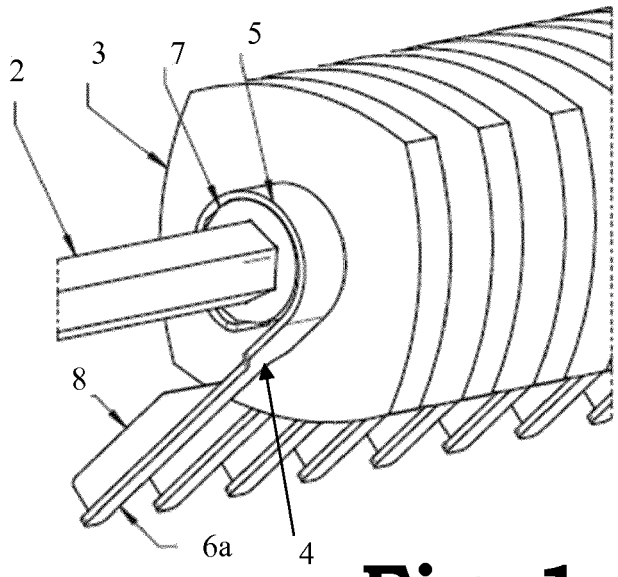

Fig. 1

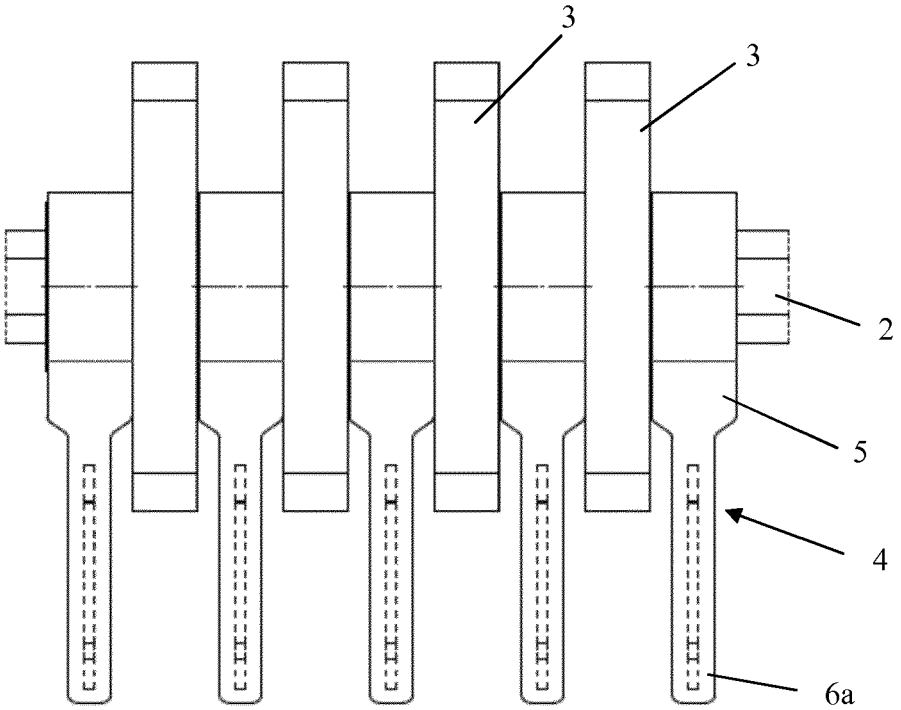

Fig. 2

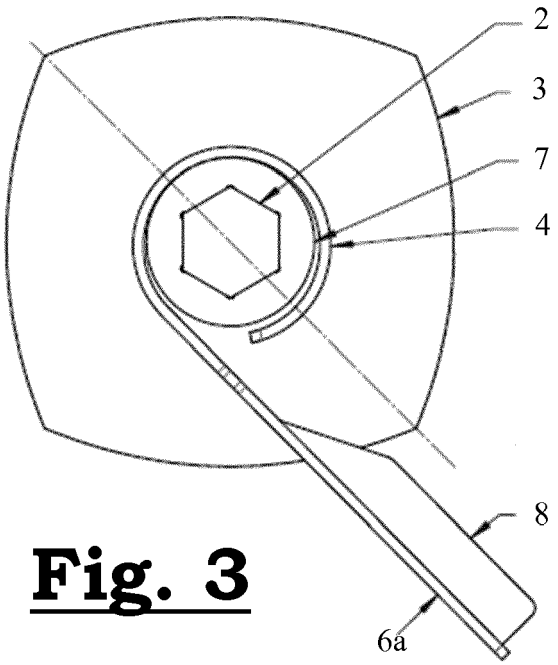

Fig. 3

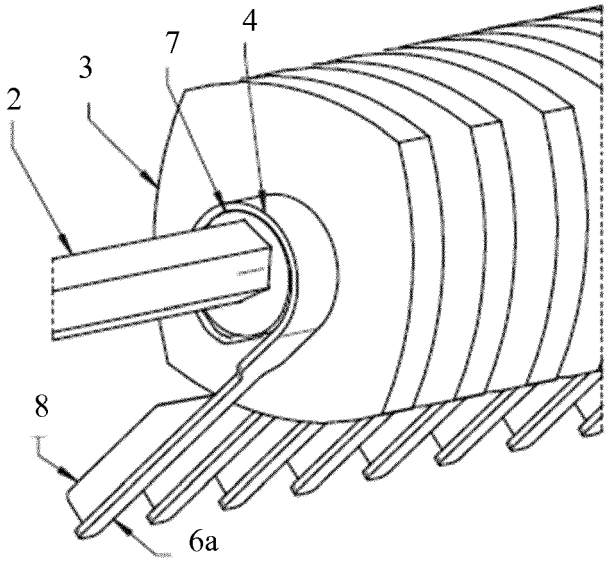

Fig. 4

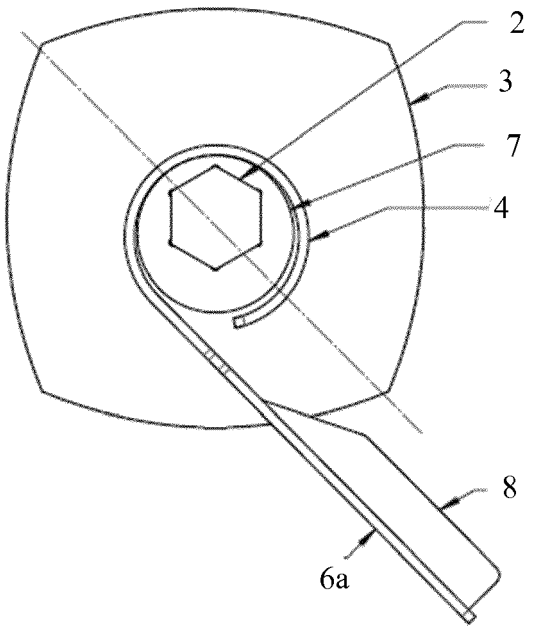

Fig. 5

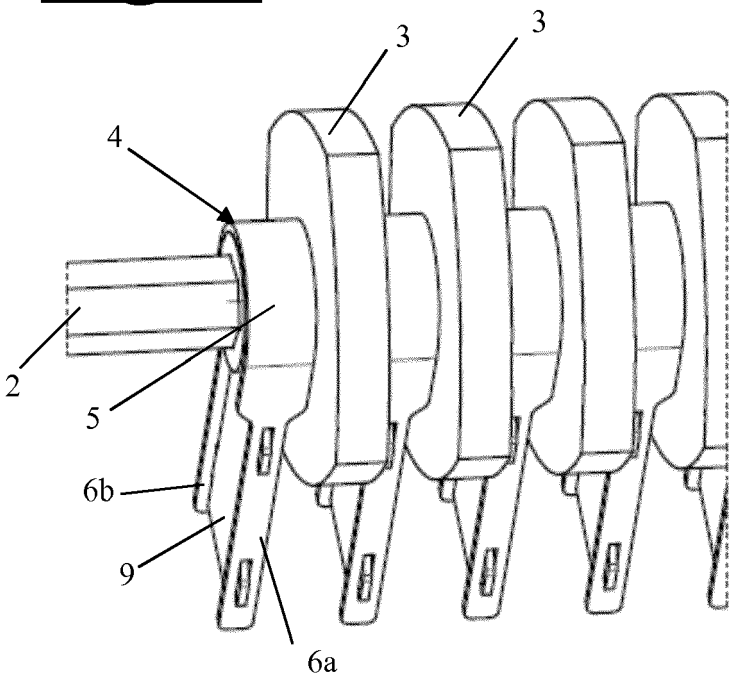

Fig. 6

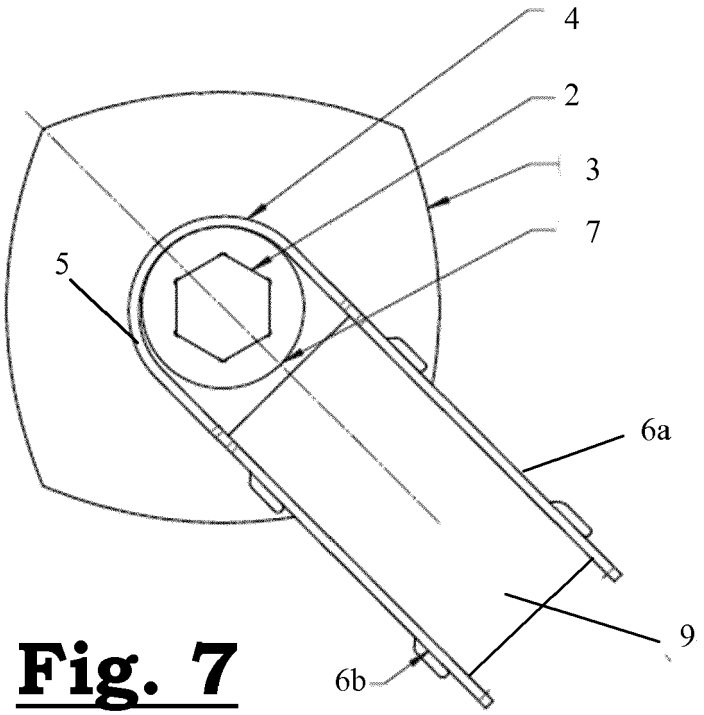

Fig. 7

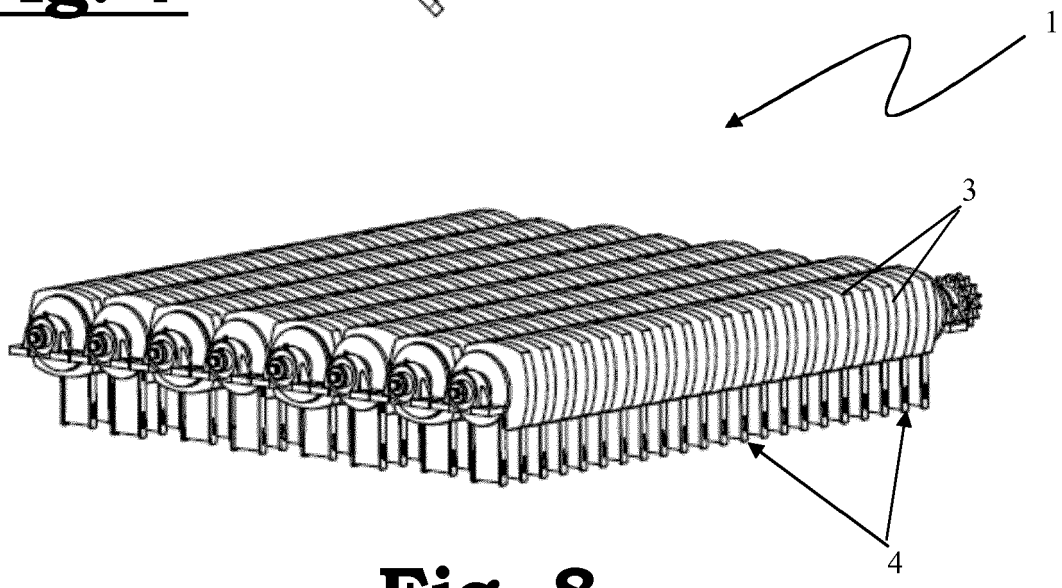

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7132

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	DE 568 334 C (KRUPP FRIED GRUSONWERK AG) 18 January 1933 (1933-01-18) * page 1, line 1 - line 10 * * page 1, line 30 - page 2, line 49 * * claims * * figures *	1,2,4-6, 8-14	INV. B07B1/15 B07B1/52
X,D	GB 2 313 284 A (PEARSON RICHARD LTD [GB]) 26 November 1997 (1997-11-26) * abstract * * page 1, line 1 - line 3 * * page 2, line 7 - line 13 * * page 4, line 24 - page 6, line 21 * * claims * * figures *	1,2,4-6, 8-14	
X A	DE 566 682 C (KRUPP FRIED GRUSONWERK AG) 23 December 1932 (1932-12-23) * page 1, line 1 - line 10 * * page 1, line 47 - line 64 * * claims * * figures *	1,2,4-6, 8-14 7	
X A	EP 2 926 915 A1 (PROMECO ENERGY & PLANTS SRL [IT]) 7 October 2015 (2015-10-07) * abstract * * paragraph [0001] * * paragraph [0027] * * paragraph [0034] * * paragraph [0037] * * paragraph [0041] - paragraph [0045]; claims * * figures *	1-5,8,9, 12-14 6,7,11	
X	DE 587 635 C (KRUPP FRIED GRUSONWERK AG) 6 November 1933 (1933-11-06) * the whole document *	1,4-9, 11-14	

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TECHNICAL FIELDS SEARCHED (IPC)
B07B
A01D
D21B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 March 2018	van der Zee, Willem

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT

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A,D	EP 2 488 306 B1 (ECOSTAR SRL [IT]) 6 November 2013 (2013-11-06) * paragraph [0001] - paragraph [0003] * * paragraph [0038] - paragraph [0055] * * paragraph [0060] - paragraph [0063] * * claims * * figures * -----	1,4,8,9, 11,12,14	
A,D	EP 1 106 264 A2 (ECOSTAR SRL [IT]) 13 June 2001 (2001-06-13) * abstract * * paragraph [0001] * * paragraph [0027] - paragraph [0035] * * claims * * figures * -----	1,4,8,9, 11,12,14	
			TECHNICAL FIELDS SEARCHED (IPC)

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The Hague	5 March 2018	van der Zee, Willem

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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 19 7132

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05-03-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 568334 C	18-01-1933	NONE	
GB 2313284 A	26-11-1997	DE 69701396 D1	13-04-2000
		DE 69701396 T2	19-10-2000
		EP 0907426 A1	14-04-1999
		GB 2313284 A	26-11-1997
		NO 985397 A	21-01-1999
		WO 9744143 A1	27-11-1997
DE 566682 C	23-12-1932	NONE	
EP 2926915 A1	07-10-2015	NONE	
DE 587635 C	06-11-1933	NONE	
EP 2488306 B1	06-11-2013	BR 112012008210 A2	08-03-2016
		DK 2488306 T3	10-02-2014
		EP 2488306 A1	22-08-2012
		ES 2445654 T3	04-03-2014
		IT 1396412 B1	19-11-2012
		JP 5561501 B2	30-07-2014
		JP 2013505829 A	21-02-2013
		KR 20120064690 A	19-06-2012
		PT 2488306 E	17-02-2014
		SI 2488306 T1	31-03-2014
		US 2012325729 A1	27-12-2012
		WO 2011045656 A1	21-04-2011
EP 1106264 A2	13-06-2001	AT 287297 T	15-02-2005
		DE 60017535 D1	24-02-2005
		DE 60017535 T2	23-03-2006
		DK 1106264 T3	25-04-2005
		EP 1106264 A2	13-06-2001
		ES 2235745 T3	16-07-2005

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1106264 A **[0005] [0006] [0007]**
- EP 2488306 A **[0006] [0007]**
- GB 2313284 A **[0008]**
- DE 568334 **[0008]**
- DE 566682 **[0008]**