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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) **Title:** DETACHABLE WEAR STRIP FOR USE IN THE VACUUM BELT FILTER DEVICE

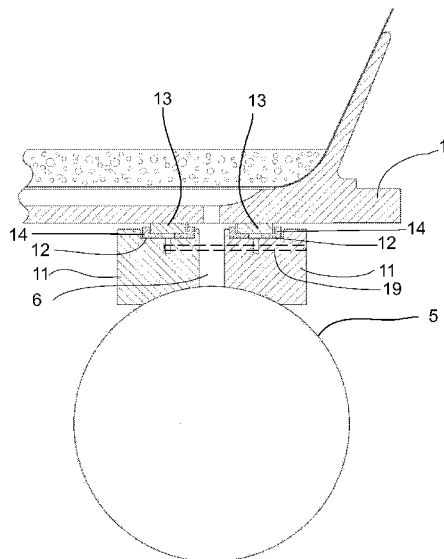


FIG 6

(57) **Abstract:** The invention relates to a detachable wear strip for an endless seal belt (13) of a vacuum belt filter device. The detachable wear strip (14) is configured to be arranged in a first groove (12) of a guide part (11) between the endless seal belt (13) and the guide part (11), wherein the endless seal belt (13) is configured to run in the first groove (12) in contact with a low pressure side of an endless moving filter belt (1) of the vacuum belt filter device, wherein the guide part (11) being arranged between a vacuum box (5) of a vacuum arrangement (25) and the low pressure side, and wherein by the vacuum arrangement (25) being configured to produce a suction at a low pressure side of the endless moving filter belt (1) at a working zone (7) of the vacuum belt filter device.



— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

DETACHABLE WEAR STRIP FOR USE IN THE VACUUM BELT FILTER DEVICE

Field of the invention

5 The invention relates to a detachable wear strip for use in the vacuum belt filter device as defined in the preamble of independent claim 1.

Objective of the invention

10 The object of the invention is to provide a detachable wear strip for use in the vacuum belt filter device.

Short description of the invention

 The detachable wear strip for use in the vacuum belt filter device is characterized by the definitions of independent claim 1.

15 Preferred embodiments of the detachable wear strip for use in the vacuum belt filter device are defined in the dependent claims 2 to 14.

 The invention relates also to use of a detachable wear strip according to any of the claims 2 to 14 in a vacuum belt filter device

20 List of figures

 In the following the invention will be described in more detail by referring to the figures, which

 Figure 1 shows a vacuum belt filter device according to an embodiment,
 Figure 2 shows in cut view a vacuum belt filter device according to another embodiment,
25 Figure 3 shows a detail of the vacuum belt filter device shown in figure 2,
 Figure 4 shows a detail of the vacuum belt filter device shown in figure 2,
 Figure 5 shows a detail of the vacuum belt filter device shown in figure 2,
 Figure 6 shows in cut view a detail of the vacuum belt filter device,
 Figure 7 shows in cut view a detail of the vacuum belt filter device,
30 Figure 8 shows a first embodiment of the wear strip, and
 Figure 9 shows a second embodiment of the wear strip.

Detailed description of the invention

35 In the following, the detachable wear strip for an endless seal belt 13 of a vacuum belt filter device and some embodiment and variants of the detachable wear strip will be described in greater detail.

 The detachable wear strip 14 has an elongated base portion 16 having lateral side edges (not marked with a reference numeral) and longitudinal side flanges 17 at each lateral side edge

so that a second groove 18 for the endless seal belt 13 is formed on the elongated base portion 16 between the longitudinal side flanges 17. The longitudinal side flanges 17 may be upstanding longitudinal flanges.

The detachable wear strip 14 is configured to be arranged, preferable immovable
5 arranged during normal operation of the vacuum belt filter device, in a first groove 12 of a guide part 11 between the endless seal belt 13 and the guide part 11. The guide part 11 may comprise several guide part sections (not shown in the figures). The guide part 11 may be made of polymer, rubber, metal, ceramic or a combination of at least two of polymer, rubber, metal, and ceramic.

10 The guide part 11 may be an integral part of a vacuum box 5 of a vacuum arrangement 25 or a separate part of a vacuum box 5 of a vacuum arrangement 25 of the vacuum belt filter device. The vacuum arrangement 25 shown in figure 2 comprises also vacuum tubing 23 and a manifold arrangement 24.

15 The endless seal belt 13 may be configured to run in the second groove 18 of the detachable wear strip 14 in the moving direction A of an endless moving filter belt 1 of the vacuum belt filter device in contact with a low pressure side (not marked with a reference numeral) of the endless moving filter belt 1 of the vacuum belt filter device (not marked with a reference numeral). The endless moving filter belt 1 may have transversal grooves 4 on the high pressure side of the endless moving filter belt 1.

20 The endless moving filter belt 1 may be configured to revolve around at least a first roller 2 and a second roller 3.

The vacuum filter belt device may comprise an endless moving filter cloth 8, which may revolve around at least a third roller 9 and a fourth roller 10 and which is arranged in contact with a high pressure side of the endless moving filter belt 1 at the working zone 7 of the vacuum
25 belt filter device.

In the vacuum filter belt device, the guide part 11 is arranged between the vacuum box 5 and the low pressure side of the endless moving filter belt 1.

In the vacuum filter belt device, the vacuum box 5 has suction openings 6, for example longitudinally arranged suction openings extending in the moving direction A of the endless
30 moving filter belt 1. The vacuum arrangement 25 is configured to produce a suction at the low pressure side of the endless moving filter belt 1 at a working zone 7 of the vacuum belt filter device.

The detachable wear strip 14 may be perforated for allowing lubricating fluid and/or sealing such as water to flow through the detachable wear strip 14.

35 The elongated base portion 16 of the detachable wear strip 14 may be perforated so that the perforations form openings in the elongated base portion 16 of the detachable wear strip 14.

If the elongated base portion 16 of the detachable wear strip 14 comprises openings, the total cross-section area of the openings may be between 1 and 50 %, preferably between 5 and 30

%, more preferable between 7 and 20 %, even more preferable between 8 and 15 % of the area of the area of the elongated base portion 16.

If the elongated base portion 16 of the detachable wear strip 14 comprises openings, each opening may have a cross-section area between 5 mm² and 800 mm², preferably between 20 mm² and 500 mm², more preferably between 50 mm² and 300 mm² such as 200 mm².

The detachable wear strip 14 may comprise a plurality of wear strip parts 15 releasably connected together to form the detachable wear strip 14, as shown in figure 9. Alternatively, the detachable wear strip 14 may be being in one-part form, as shown in figure 8.

The detachable wear strip 14 may be made of at least one of the following: polymer, metal, or ceramic.

The detachable wear strip 14 may have a width between 25 mm and 60 mm, preferably between 35 mm and 45 mm, more preferably between 39 mm and 43 mm, such as 41 mm.

The detachable wear strip 14 may have a thickness between 2 mm and 7 mm, preferably between 3 mm and 6 mm, more preferably between 4 mm and 5 mm.

The depth of the second groove 18 may be between 2 mm and 11 mm, preferably between 3 mm and 8 mm, more preferably between 4 mm and 6 mm, such as 5 mm.

The vacuum filter belt device may comprise guide 19, a filtrate manifold 22 and a filtrate hose 21 between the vacuum box 5 and the filtrate manifold 22, and a belt support 20 for supporting the endless moving filter belt 1. The detachable wear strip 14 is preferably, but not necessarily, configured to be arranged in a first groove 12 of a guide part 11 between the endless seal belt 13 and the guide part 11, wherein the guide part 11 is a separate part of the vacuum box 5 and is attached to a vacuum box 5 of a vacuum arrangement 25 of the vacuum belt filter device, and wherein the guide part 11 is located between the vacuum box 3 and the endless seal belt 13, and the thickness of the elongated base portion 16 of the detachable wear strip 14 is preferably, but not necessarily, smaller than the thickness of the guide part 11. The thickness of the elongated base portion 16 of the detachable wear strip 14 can for example be between 5 and 15 % of the thickness of the guide part 11.

The invention relates also to the use of a detachable wear strip 14 in a vacuum belt filter device having an endless moving filter belt 1, a vacuum arrangement 25 having a vacuum box 5 comprising suction openings 6 and which vacuum arrangement 25 is configured to produce a suction at a low pressure side of the endless moving filter belt 1 at a working zone 7 of the vacuum belt filter device, a guide part 11 on opposite sides of the suction openings 6 of the vacuum box 5, wherein each guide part 11 is arranged between the vacuum box 5 and the low pressure side of the endless moving filter belt 1, and wherein each guide part 11 has a first groove 12 extending in the moving direction A of the endless moving filter belt 1, and an endless seal belt 13 configured to run in the first groove 12 of each guide part 11 in the moving direction A of the endless moving filter belt 1 in contact with the low pressure side of the endless moving filter belt 1, by arranging a detachable wear strip 14 in the first groove 12 of each guide part 11

between the endless seal belt 13 and the guide part 11. The guide parts 11 on opposite sides of the suction opening 6, between the vacuum box 5 and the low pressure side of the endless moving filter belt 1 may be integral parts of a guide member (not shown in the figures).

5 It is apparent to a person skilled in the art that as technology advanced, the basic idea of the invention can be implemented in various ways. The invention and its embodiments are therefore not restricted to the above examples, but they may vary within the scope of the claims.

Claims

1. A detachable wear strip for an endless seal belt (13) of a vacuum belt filter device, **characterized**

by the detachable wear strip (14) having an elongated base portion (16) having lateral side edges and longitudinal side flanges (17) at each lateral side edge so that a second groove (18) for the endless seal belt (13) is formed on the elongated base portion (16) between the longitudinal side flanges (17), and

by the detachable wear strip (14) being configured to be arranged in a first groove (12) of a guide part (11) between the endless seal belt (13) and the guide part (11).

2. The detachable wear strip (14) according to claim 1, **characterized**

by the endless seal belt (13) being configured to run in the second groove (18) of the detachable wear strip (14) in a moving direction A of an endless moving filter belt (1) in contact with a low pressure side of an endless moving filter belt (1) of the vacuum belt filter device,

by the guide part (11) being arranged between a vacuum box (5) of a vacuum arrangement (25) and the low pressure side of the endless moving filter belt (1),

by the vacuum box (5) comprises suction openings (6),

by the vacuum arrangement (25) being configured to produce a suction at a low pressure side of the endless moving filter belt (1) at a working zone (7) of the vacuum belt filter device.

3. The detachable wear strip (14) according to claim 1 or 2, **characterized** by the elongated base portion (16) of the detachable wear strip (14) being perforated for allowing lubricating fluid and/or sealing fluid such as water to flow through the detachable wear strip (14).

4. The detachable wear strip (14) according to claim 3, **characterized** by the elongated base portion (16) being perforated so that the perforations form openings such as circular openings in the elongated base portion (16).

5. The detachable wear strip (14) according to claim 4, **characterized** by the total cross-section area of the openings being between 1 and 50 %, preferably between 5 and 30 %, more preferable between 7 and 20 %, even more preferable between 8 and 15 % of the area of the area of the elongated base portion (16).

6. The detachable wear strip (14) according to claim 4 or 5, **characterized** by each opening have a cross-section area between 5 mm² and 800 mm², preferably between 20 mm² and 500 mm², more preferably between 50 mm² and 300 mm² such as 200 mm².

7. The detachable wear strip (14) according to any of the claims 1 to 6, **characterized** by the detachable wear strip (14) comprising a plurality of wear strip parts (15) releasable connected together to form the detachable wear strip (14).

8. The detachable wear strip (14) according to any of the claims 1 to 7, **characterized** by the detachable wear strip (14) being in one-part form.

9. The detachable wear strip (14) according to any of the claims 1 to 8, **characterized** by the detachable wear strip (14) being made of at least one of the following: polymer, metal, or ceramic.

10. The detachable wear strip (14) according to any of the claims 1 to 9, **characterized** by the detachable wear strip (14) having a width between 25 mm and 60 mm, preferably between 35 mm and 45 mm, more preferably between 39 mm and 43 mm, such as 41 mm.

11. The detachable wear strip (14) according to any of the claims 1 to 10, **characterized** by the detachable wear strip (14) having a thickness between 2 mm and 7 mm, preferably between 3 mm and 6 mm, more preferable between 4 mm and 5 mm.

12. The detachable wear strip (14) according to any of the claims 1 to 11, **characterized** by the depth of the second groove (18) being between 2 mm and 11 mm, preferably between 3 mm and 8 mm, more preferably between 4 mm and 6 mm, such as 5 mm.

13. The detachable wear strip (14) according to any of the claims 1 to 12, **characterized** by the detachable wear strip (14) being configured to be arranged in a first groove (12) of a guide part (11) between the endless seal belt (13) and the guide part (11), wherein the guide part (11) is a separate part of the vacuum box (5) and is attached to a vacuum box (5) of a vacuum arrangement (25) of the vacuum belt filter device, and wherein the guide part (11) is located between the vacuum box (3) and the endless seal belt (13), and

by the thickness of the elongated base portion (16) of the detachable wear strip (14) being smaller than the thickness of the guide part (11).

14. The detachable wear strip (14) according to claim 13, **characterized** by the thickness of the elongated base portion (16) of the detachable wear strip (14) being between 5 and 15 % of the thickness of the guide part (11).

15. Use of a detachable wear strip (14) according to any of the claims 1 to 14 in a vacuum belt filter device having

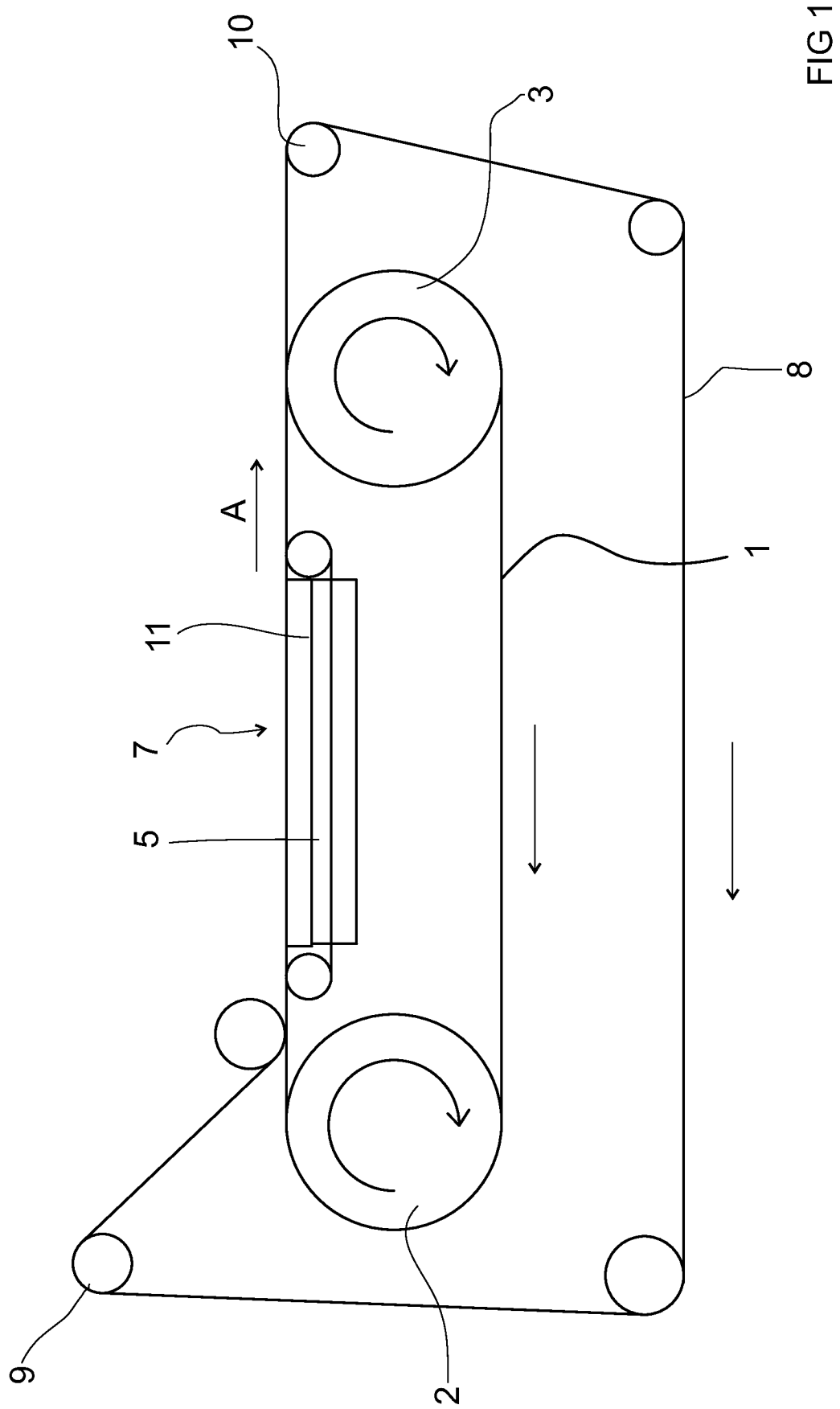
an endless moving filter belt (1),

a vacuum arrangement (25), which comprises a vacuum box (5) having suction openings (6) and which is configured to produce a suction at a low pressure side of the endless moving filter belt (1) at a working zone (7) of the vacuum belt filter device,

5 a guide part (11) on opposite sides of the suction openings (6) of the vacuum box (5), wherein each guide part (11) is arranged between the vacuum box (5) and the low pressure side of the endless moving filter belt (1), and wherein each guide part (11) has a first groove (12) extending in the moving direction A of the endless moving filter belt (1),

10 an endless seal belt (13) configured to run in the first groove (12) of each guide part (11) in the moving direction A of the endless moving filter belt (1) in contact with the low pressure side of the endless moving filter belt (1), and

by arranging a detachable wear strip (14) in the first groove (12) of each guide part (11) between the endless seal belt (13) and the guide part (11).



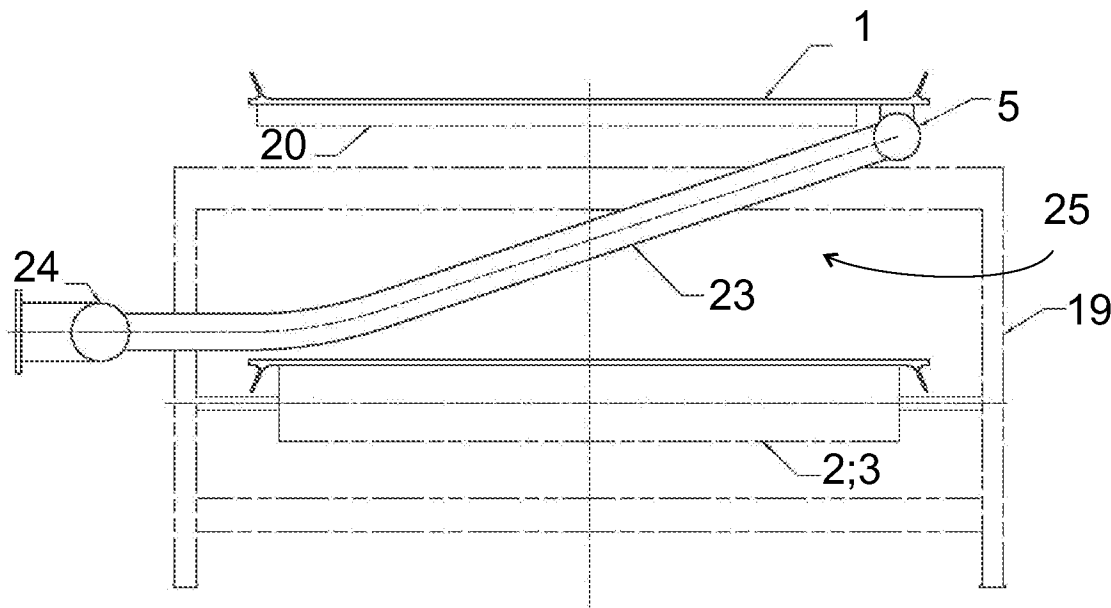


FIG 2

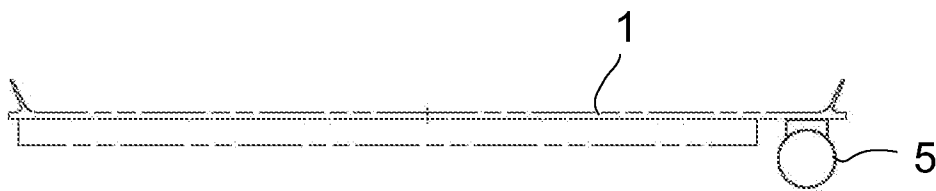


FIG 3

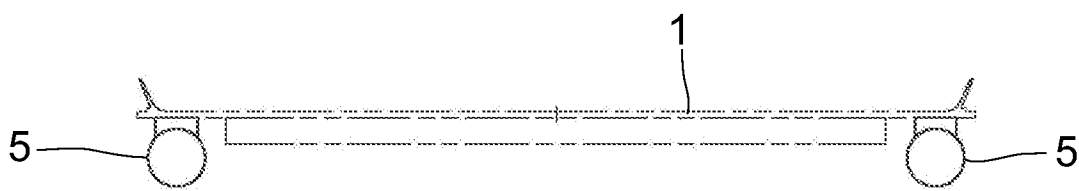


FIG 4

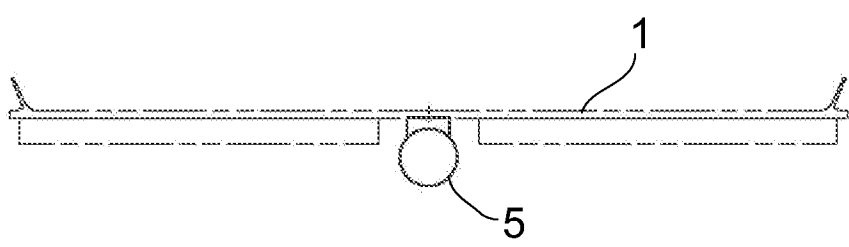


FIG 5

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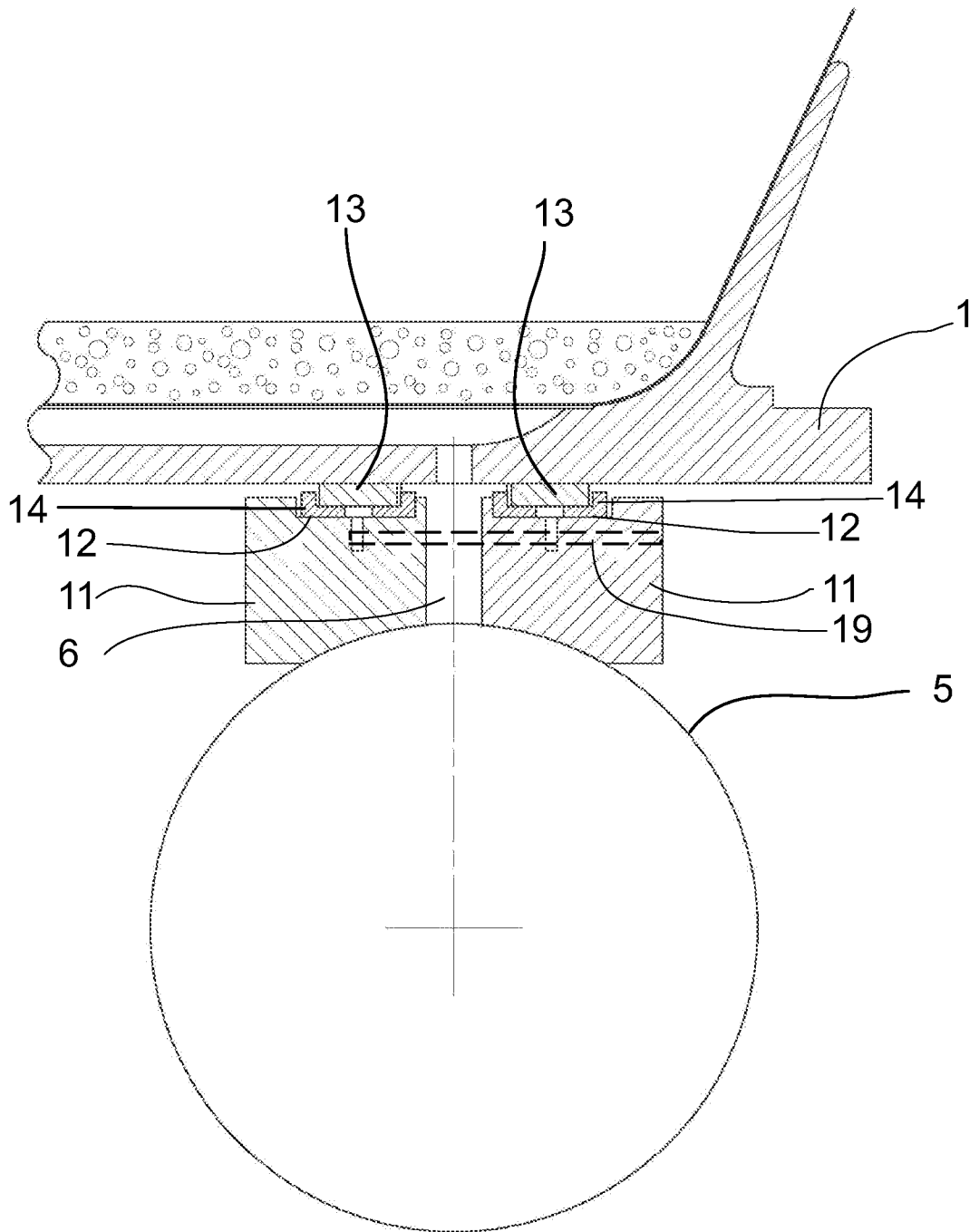


FIG 6

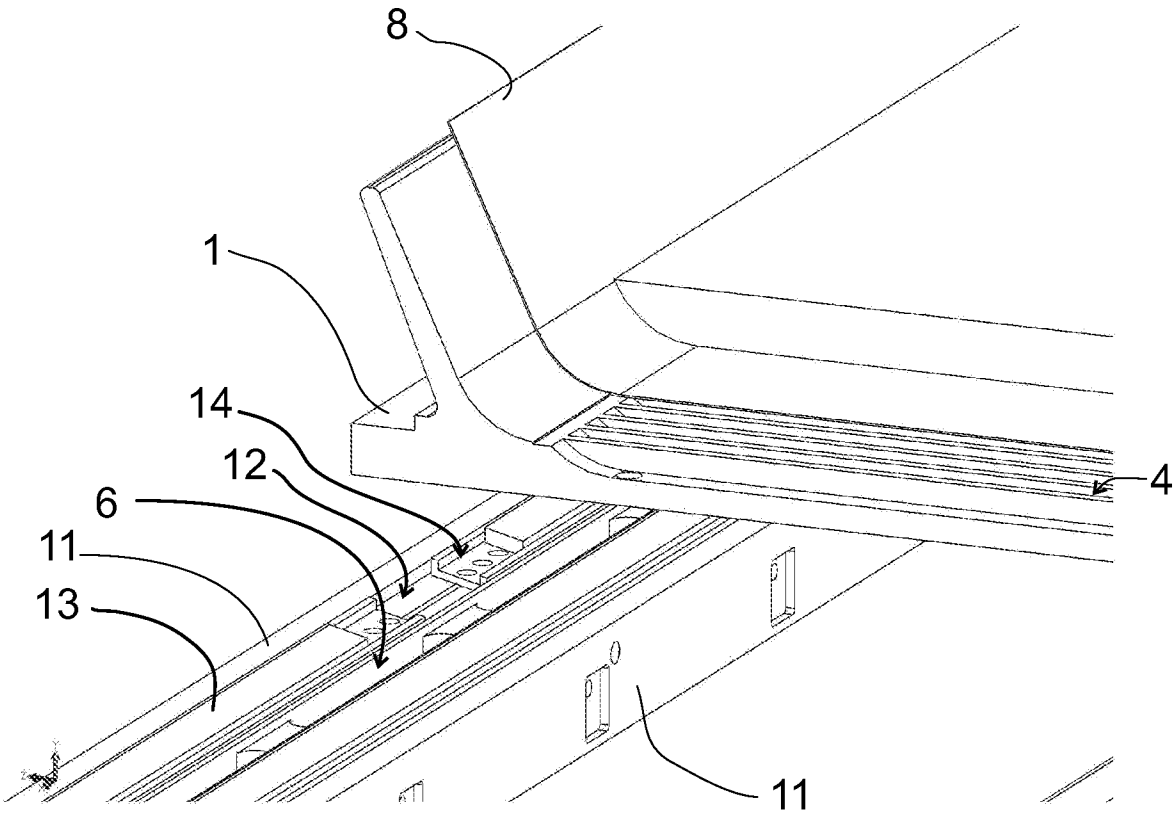


FIG 7

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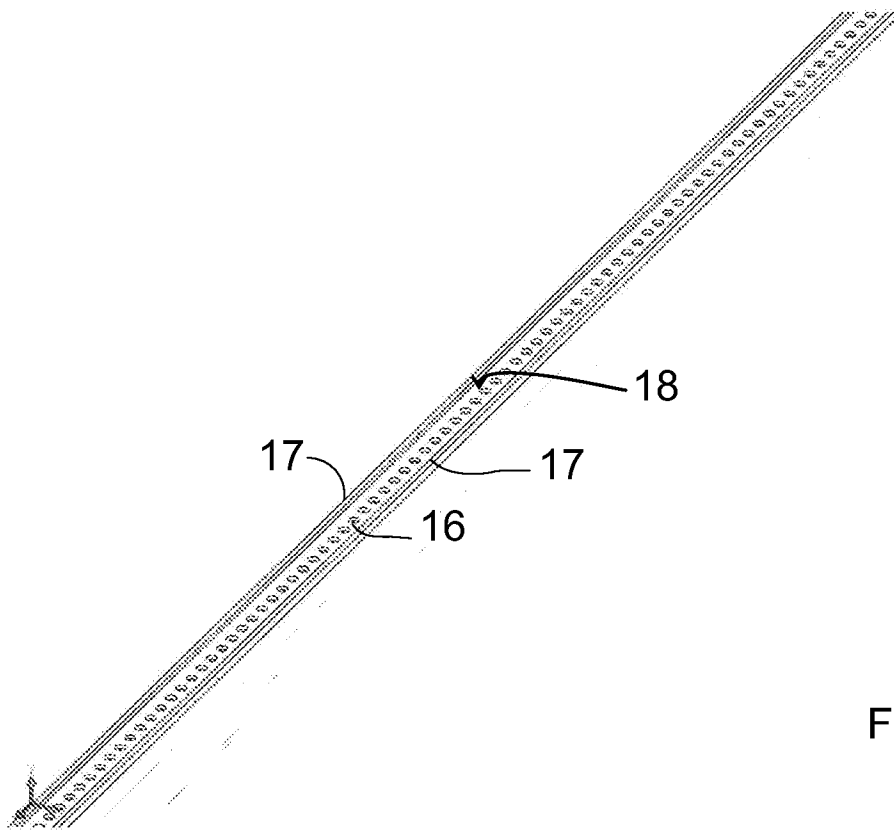


FIG 8

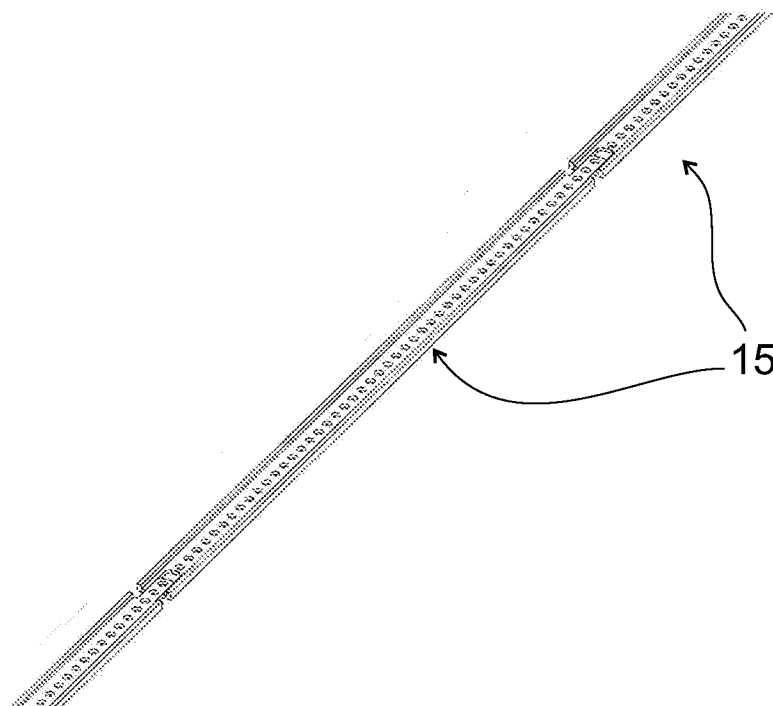


FIG 9

INTERNATIONAL SEARCH REPORT

International application No

PCT/FI2016/050185

A. CLASSIFICATION OF SUBJECT MATTER

INV. B01D33/04 B01D33/056
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 055 091 A (MORRIS JR CARL A [US] ET AL) 8 October 1991 (1991-10-08) column 3, line 23 - line 25; figures 3,5 -----	1,2,4-6, 8,10-14
X	FR 2 309 265 A1 (BERLINE SYLVAIN [FR]) 26 November 1976 (1976-11-26) figure 2 -----	1-6,8, 10-14
X	GB 2 064 974 A (QUEYROIX C; LAUTRETTE JEAN CLAUDE) 24 June 1981 (1981-06-24) figures 2,3 -----	1,2,5-7, 9-15
X	EP 0 172 013 A2 (BAKER INT LTD [GB]) 19 February 1986 (1986-02-19) figure 2 -----	1,2,5,6, 10-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

1 June 2016

Date of mailing of the international search report

15/06/2016

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2016/050185

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5055091	A	08-10-1991	NONE
FR 2309265	A1	26-11-1976	NONE
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EP 0172013	A2	19-02-1986	EP 0172013 A2 19-02-1986 GB 2163668 A 05-03-1986