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(72) Inventors:
• **Nieminen, Erkkä**
FI-33580 Tampere (FI)
• **Kronholm, Harri**
FI-33610 Tampere (FI)

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(74) Representative: **Laine, Terho Tapio et al**
Heinänen Oy
Patent Agency
Airport Plaza
Äyritie 8 D
01510 Vantaa (FI)

(71) Applicant: **Vaatho Paper Technology Oy**
15860 Hollola (FI)

(54) **Distribution channeling in connection with the headbox of a paper machine**

(57) Distribution channeling (4) for stock suspension, said distribution channeling being in connection with a headbox (1) of a paper machine, which distribution channeling is fed with a transverse input channel (9) for stock suspension, such as with an inlet pipe, and which distribution channeling (4) feeds stock suspension into an intermediate chamber (5) and onwards from the intermediate chamber to the slice channel (5') of a paper machine,

and the distribution channeling (4) is distribution channeling formed from a number of modular pieces (2) and is fitted to the headbox after the input channel, and that one or more distribution channels (3), such as a hole, for the stock suspension flowing through a modular piece are formed in the modular piece (2), and that the modular pieces are placed side by side such that an interspace (15) forms between them, from which interspace diluting water can be fed into the distribution channel (3).

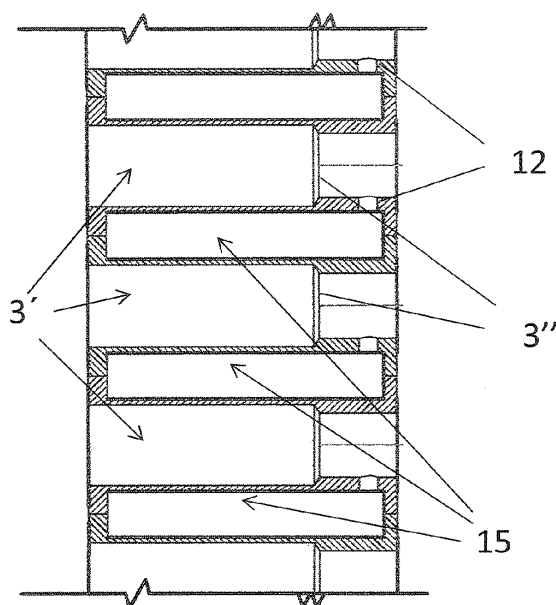


Fig. 11a

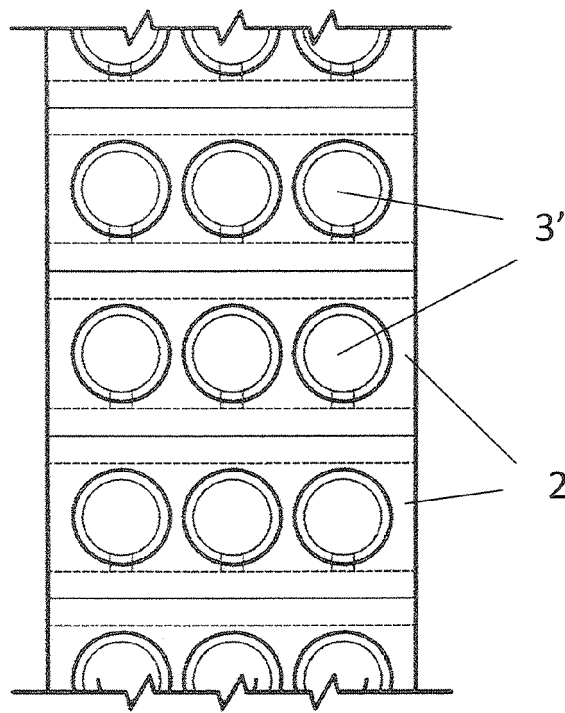


Fig. 11b

Description

Background of the invention

[0001] The object of the invention is distribution channeling, as defined in the preamble of claim 1, for stock suspension, said distribution channeling being in connection with the headbox of a paper machine.

[0002] Some solutions are known in the art for distribution channelings that are in connection with a headbox of a paper machine, the purpose of which distribution channelings is to feed the stock suspension fed from an inlet pipe to the distribution channeling onwards via the distribution channeling further into possible intermediate spaces and finally into the slice channel which feeds the stock onto the wire.

Prior art solutions

[0003] One prior-art solution is presented in publication F1120591B, which describes a method and an apparatus in connection with the headbox of a paper machine, and in which stock suspension is conducted along distribution pipes, and onwards at least to the formation wire.

[0004] Another prior-art solution is presented in publication FI98938, wherein an apparatus is described for combining a diluting flow with the stock flow passed out of the inlet header of a paper machine or board machine. One piece presented in the apparatus described in the publication is a throttle plate, which is the width of the headbox of the paper machine, and in which publication flow ducts that form most of the structure of the distribution channeling are presented.

[0005] Solutions according to prior art have certain drawbacks. A problem in solutions according to prior art is that since the distribution channeling is formed in one plate-shaped piece, which can also be of a different material than the headbox, managing the thermal expansion of it is awkward when the temperature of the stock varies.

[0006] Another problem in prior-art solutions is that many solutions comprising a separate distribution pipe, such as is presented in publication F1120591B, comprise a lot of pipes.

[0007] Another drawback of prior art is the expensiveness of the solutions, because solutions comprising many distribution pipes are usually expensive to fabricate, because generally metal-structured distribution channelings (e.g. of acid-resistant steel) require a lot of work to fabricate.

[0008] The aim of the present invention is to achieve a new type of solution, with which the problems occurring in prior-art solutions can be avoided.

Brief description of the invention

[0009] The solution according to the invention is characterized by what is disclosed in the characterization part

of the independent claim 1. Additionally, the solution according to the invention is characterized by what is disclosed in the dependent claims 2-17.

[0010] The solution according to the invention now being presented has some significant advantages when it is compared to solutions that are known and used.

[0011] With the solution now presented a type of distribution channeling is achieved that is effective, simple and that can be used in headboxes in which diluting fluid is used or also in those types of headboxes in which diluting fluid is not used. The solution according to the invention is also insensitive to malfunction, because it is durable.

[0012] Since in the solution according to the invention the distribution channels are formed into modular pieces, between which is an intermediate space from which diluting fluid can be fed into a distribution channel, the input of diluting fluid is therefore simple, and in the second place the modular pieces can easily be detached from the headbox and if necessary replaced.

[0013] Another advantage of the invention is that it is durable, easy to fabricate and implement, and it can be used in headboxes in which diluting water is used or in which diluting water is not used for diluting the stock suspension.

[0014] In the case of the solution according to the invention the use of cheap and easily machinable raw material (plastic material) brings large cost savings, which makes the invention an extremely competitive solution economically.

Brief description of the figures

[0015] In the following, the invention will be described in more detail by the aid some examples of its embodiment with reference to the drawings 1-12, wherein,

According to Figs. 1a-1c the invention presents by way of illustration modular distribution channeling for stock suspension, said channeling being in connection with the headbox of a paper machine.

Figs. 2a-4d present modular pieces from different perspectives

Figs. 5a-6c present from different perspectives a number of modular pieces placed side by side.

Figs. 7a-7c present from different perspectives modular pieces.

Figs. 8a-8e present from different perspectives a modular piece.

Fig. 9 contains by way of illustration a number of modular pieces 2 fitted to a headbox, as viewed from the machine direction.

Figs. 10a-10c present from different perspectives a modular piece.

Figs. 11a-11c present a type of solution for a modular piece wherein the modular pieces are attached to each other.

Fig. 12 presents a cross-sectional sketch of a modular piece.

Detailed description of the invention

[0016] According to Figs. 1a-1c the invention relates to distribution channeling 4 for stock suspension, said distribution channeling being in connection with the headbox 1 of a paper machine, which distribution channeling is fed with at least one transverse input channel 9, such as an inlet pipe (Fig. 1c), forming a feed chamber for stock suspension. The inlet pipe is marked with the reference number 10. The cross-sectional area of flow of the input channel narrows or remains constant in the transverse direction of the headbox (in the flow direction of the stock); in the solution according to Fig. 1c a narrowing input channel is presented. The shape of the input channel can have an effect on the distribution of the stock suspension when it goes into the distribution channeling 4 via a piece 7, such as e.g. a perforated plate, comprising holes or apertures 8. A second piece comprising holes or apertures is described with the reference number 7', which piece is fitted into the headbox after the modular pieces.

[0017] The distribution channeling 4 feeds stock suspension into an intermediate chamber 5 and onwards from the intermediate chamber to the slice channel 5' of a paper machine. The distribution channeling 4 is distribution channeling formed from one or more modular pieces 2 and is fitted to the headbox after the input channel, and one or more distribution channels 3, such as a hole, for the stock suspension flowing through a modular piece are formed in the modular piece 2.

[0018] A modular piece can comprise a number of distribution channels one above the other or side by side; in Figs. 1a and 1b a solution is described wherein each modular piece comprises a number of distribution channels one above another

[0019] The modular pieces 2 are placed at a desired distance apart from each other, in which case a gap remains between them, and the magnitude of the gap depends on each target of application. Via the aforementioned gap and a hole 12 in a modular piece, diluting fluid, such as water, can be fed into a distribution channel; this is presented e.g. in Fig. 10a.

[0020] According to Figs. 2a-2c and also 4a-4d, the modular pieces can comprise grooves 11' and/or protrusions 11, which protrusions (or grooves) can be of the desired lengths and shapes such as e.g. rectangular in cross-section (i.e. as viewed from the ends), with which the modular pieces can be fixed to each other and/or to

the headbox, because the frame 1' of the headbox correspondingly comprises protrusions and/or grooves 6 for fixing the modular pieces to the frame 1'. The grooves or protrusions can be the whole length of a modular piece (machine direction length), but they can also be shorter.

[0021] Figs. 2a-4d present modular pieces from different perspectives, such that a modular piece 2, comprising distribution channels 3, and elongated protrusions 11 on the edges, is seen in Fig. 2a, and Figs. 2b and 2c present the modular piece 2 from different perspectives, and the modular piece as viewed from the ends is seen in Figs. 2d and 2e, and from the figure it can be seen that the distribution channel comprises a widening inside it (or in other words the distribution channel widens, i.e. its diameter increases), because the outlet aperture 3' is larger in diameter than the second aperture, i.e. the input aperture 3, of the distribution channel. Figs. 3a-3d present a type of modular piece, which does not have any grooves or protrusions. Correspondingly, the modular piece presented by Figs. 4a-4d has grooves 11' formed in its edges. In Fig. 4c the widenings (widening of the flow cross-section) are marked with the reference number 3''.

[0022] Figs. 5a-6c present from different perspectives a number of modular pieces placed side by side, said modular pieces having a number of distribution channels 3 (the distribution channels are widening, because the outlet aperture 3' is larger than the mouth of the distribution channel), such that the modular pieces presented in Figs. 5a-5c do not have any grooves or protrusions on the edges, but correspondingly grooves 11' formed in the edges are presented in Figs. 6a-6c. A solution is also conceivable wherein the modular pieces 2 are placed in the headbox also one above the other and at the same time side by side, but this is not presented in the figures.

[0023] Figs. 7a-7c present from different perspectives modular pieces, such that in Fig. 7a, which is a cross-sectional sketch, distribution channels 3 are seen in which widenings 3'' are formed, and a space 13 (interspace) remains between the distribution channels, into which space diluting fluid (e.g. water) can be fed, which is let from the space 13 onwards along the input hole 12 into the distribution channel 3 (or into the outlet aperture 3' of the distribution channel or into the proximity of said aperture as in the figure). In Fig. 7b it is seen that the modular pieces are separate from each other (the modular pieces are at a distance from each other) and between them remains the aforementioned interspace 13. Fig. 7c further presents a sectional drawing, in which the input hole 12 formed in a distribution channel is seen.

[0024] Figs. 8a-8e present from different perspectives a modular piece, wherein the input holes 12 for diluting fluid in Fig. 8a are formed (near the inlet aperture 3 of the distribution channel) before the widening 3'' into the distribution channel 3 and correspondingly the input holes in Fig. 8b are formed in the other end of the distribution channel 3, in the inlet aperture 3. The placement of the input hole can be that desired, other than what is presented in the figures, e.g. near the input aperture or

outlet aperture or between them.

[0025] In the solution according to the invention the apertures 3 and 3' can be of the same size, 3 can be smaller in diameter than 3', or 3 can be larger in diameter than 3'. In the figure 3'' is presented as a widening, but it can also be a narrowing.

[0026] The apertures 3 and 3' can be round, rectangular, polygonal, oval, et *cetera*, the shape of them is not *per se* limited, but instead it depends on each application.

[0027] The cross-section of an aperture (both the basic shape and the size/area) can over the length of a modular piece change a number of times (not only just one widening/narrowing). The changes can occur stepwise or steplessly.

[0028] The cross-section of the apertures 3 and 3' made in the modules can be a different size at the different ends of the input channel 9/input pipe 10, i.e. if a narrowing cross-section of an input channel 9 is not optimally dimensioned from the viewpoint of the distribution of the flow of the headbox, the headbox can be provided with types of modular pieces 2 having holes of a size that rectifies the conical input channel 9 causing the aforementioned distribution error. In this case holes differing from each other in relation to diameter/area, i.e. different modules, are placed on one side of the headbox than those on the other.

[0029] Fig. 9 contains by way of illustration a number of modular pieces 2 fitted to a headbox 1, as viewed from the machine direction.

[0030] Figs. 10a-10c present from different perspectives a modular piece 2 and the interspace 13 is seen from the figure, from which interspace diluting fluid can be fed into the distribution channel via an input hole 12.

[0031] Figs. 11a-11c present a type of solution for a modular piece wherein the modular pieces 2 are attached to each other, but they are formed such that between them remains a space 15 (interspace) for diluting water, which is let into the distribution channels 3 via the input hole 12. In Fig. 11c the shape of a modular piece is clearly seen as a cross-section viewed from above (the edges of the modular piece are higher than the center part of it).

[0032] Fig. 12 presents a cross-sectional sketch of a modular piece 2, and in it the distribution channel 3 and the edge 16 of the widening is seen. The outlet aperture is marked with the reference number 3'. The edge 16 of the widening can be rounded or beveled. A type of alternative is also conceivable wherein there are a number of consecutive widenings and/or wherein the diameter of a distribution channel increases e.g. evenly or in another manner for the whole length of the distribution channel or for a part of the length of the distribution channel.

[0033] The modular piece can be of plastic, such as e.g. PE plastic, i.e. polyethylene plastic, or of PVC plastic, but it can also be of steel, such as stainless RST steel, or of ceramic material, or of composite material, or a combination of the aforesaid.

[0034] It is obvious to the person skilled in the art that the different embodiments of the invention are not limited

solely to the examples described above, and that they may therefore be varied within the scope of the claims presented below. The characteristic features possibly presented in the description in conjunction with other characteristic features can also, if necessary, be used separately to each other.

Claims

1. Distribution channeling (4) for stock suspension, said distribution channeling being in connection with a headbox (1) of a paper machine, which distribution channeling is fed with a transverse input channel (9), such as with an inlet pipe, for stock suspension and which distribution channeling (4) feeds stock suspension into an intermediate chamber (5) and onwards from the intermediate chamber to the slice channel (5') of a paper machine, **characterized in that** the distribution channeling (4) is distribution channeling formed from a number of modular pieces (2) and is fitted to the headbox after the input channel, and **in that** one or more distribution channels (3), such as a hole, for the stock suspension flowing through a modular piece are formed in the modular piece (2), and **in that** the modular pieces are placed side by side such that an interspace (15) forms between them, from which interspace diluting water can be fed into the distribution channel (3).
2. Distribution channeling according to claim 1, **characterized in that** a modular piece (2) comprises a number of distribution channels (3) one above the other or side-by-side.
3. Distribution channeling according to claim 1, **characterized in that** the modular pieces (2) are in contact with each other.
4. Distribution channeling according to claim 1, **characterized in that** the modular pieces (2) are at a distance from each other.
5. Distribution channeling according to claim 1, **characterized in that** the modular pieces comprise grooves (11') and/or protrusions (11), with which the modular pieces are fixed to each other and/or to the headbox (1).
6. Distribution channeling according to claim 1, **characterized in that** the frame (1') of the headbox comprises protrusions and/or grooves (6) for fixing the modular pieces.
7. Distribution channeling according to claim 1, **characterized in that** the diameter of the distribution channels is constant, or the diameter of them varies.

8. Distribution channeling according to claim 1, **characterized in that** the distribution channels comprise one or more widenings and/or narrowings (3").
9. Distribution channeling according to claim 1, **characterized in that** an input hole/input holes (12) is/are formed in the modular pieces (2) for feeding diluting water into a distribution channel/distribution channels (3). 5
10. Distribution channeling according to claim 9, **characterized in that** an input hole/input holes (12) is/are formed in the sides and/or edges of a modular piece (2). 10
11. Distribution channeling according to claim 1, **characterized in that** a piece (7,7'), such as a perforated plate, comprising one or more holes is arranged in connection with the modular piece (2). 15
12. Distribution channeling according to claim 1, **characterized in that** the modular piece is of the cassette type. 20
13. Distribution channeling according to claim 1, **characterized in that** the modular piece is, as viewed from its end, rectangular or of parallelogram shape or trapezoidal. 25
14. Distribution channeling according to claim 1, **characterized in that** the modular pieces are arranged in the headbox one or more side by side or one above the other. 30
15. Distribution channeling according to claim 1, **characterized in that** the modular piece is of plastic, such as e.g. PE plastic or HDPE plastic. 35
16. Distribution channeling according to claim 1, **characterized in that** the modular piece is of steel, such as stainless RST steel, or of ceramic material, or of composite material. 40
17. Distribution channeling according to claim 1, **characterized in that** the cross-sectional area of flow of an input channel (9) widens or remains constant in the transverse direction of the headbox. 45

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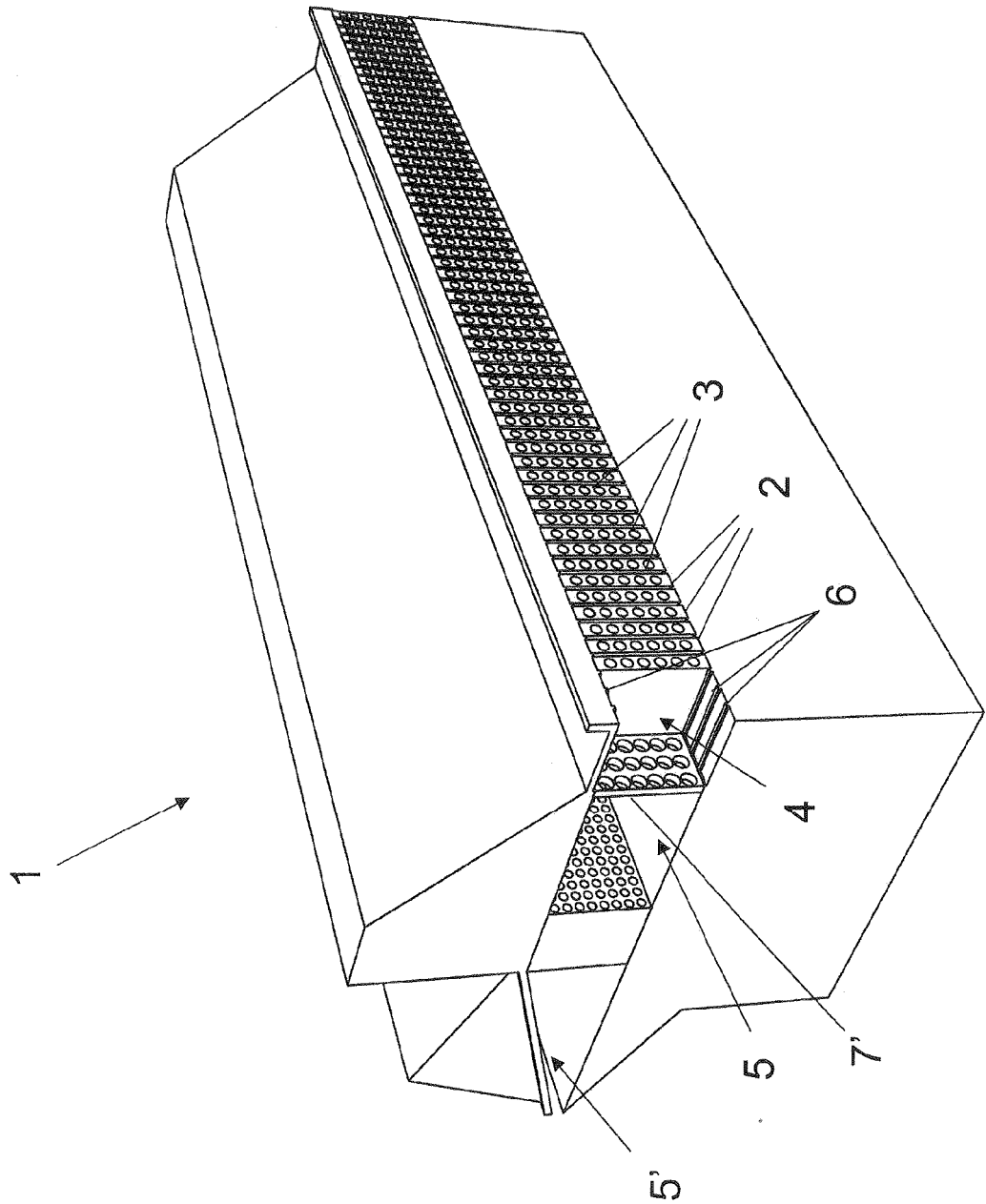


Fig. 1a

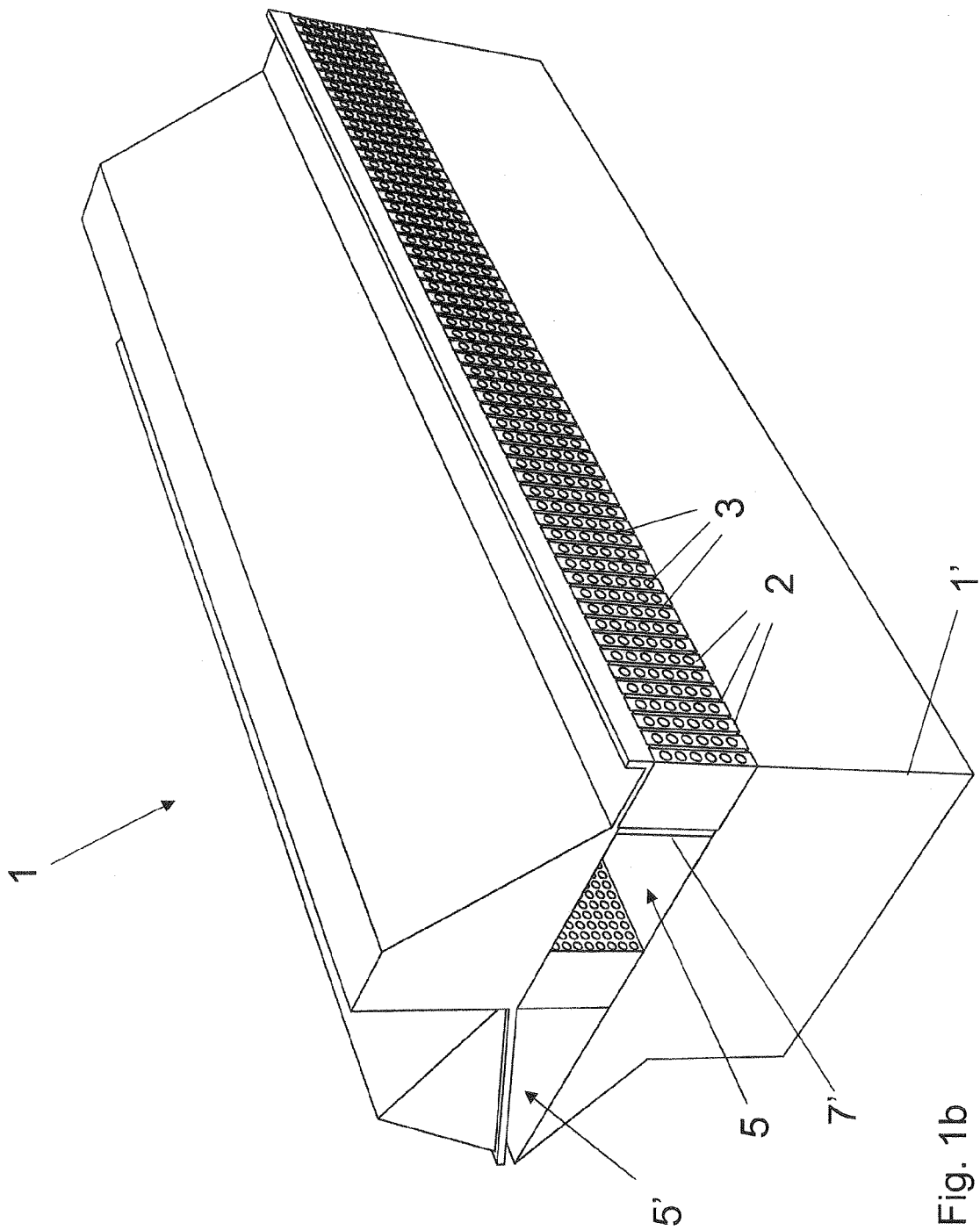


Fig. 1b

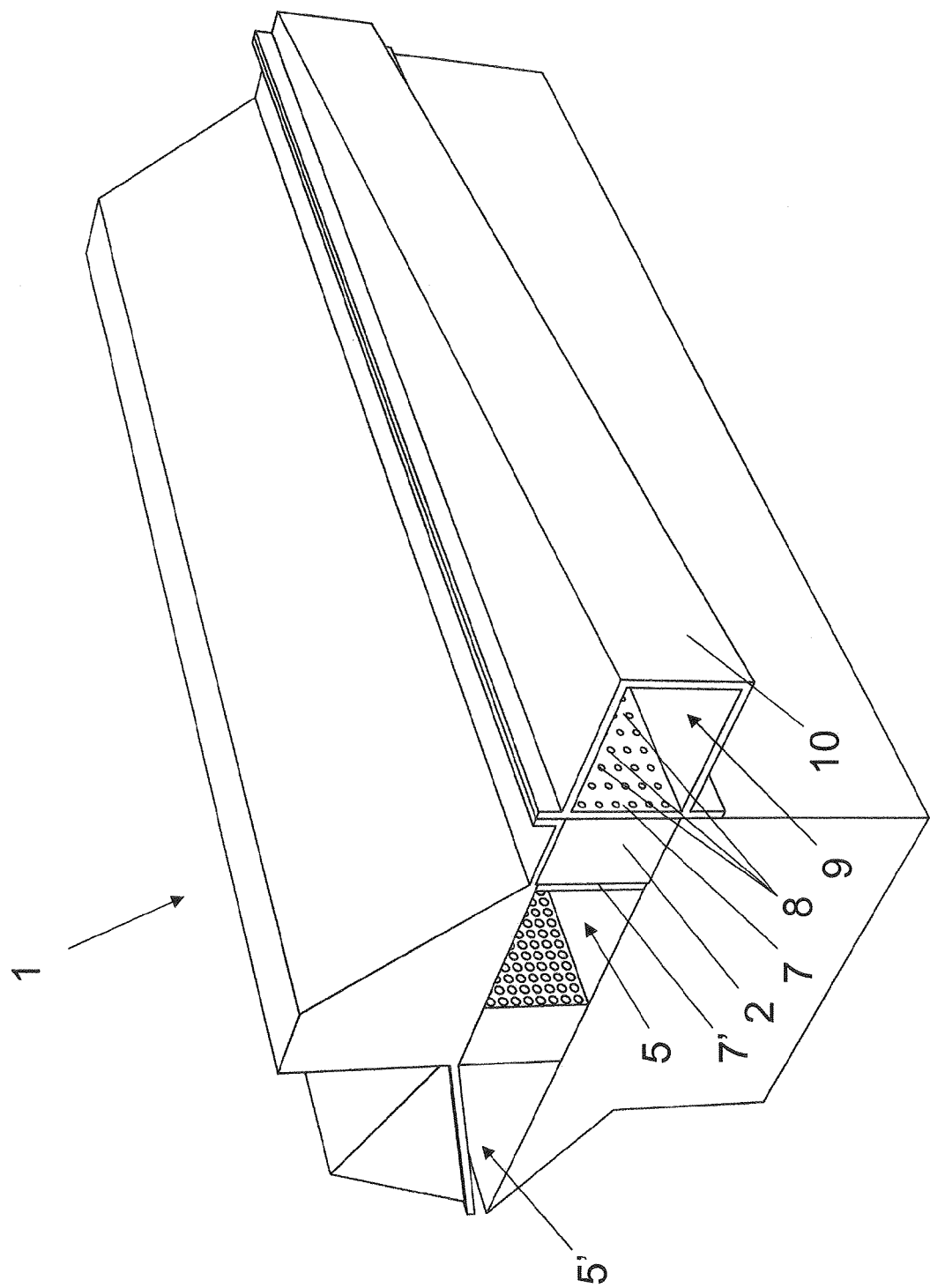
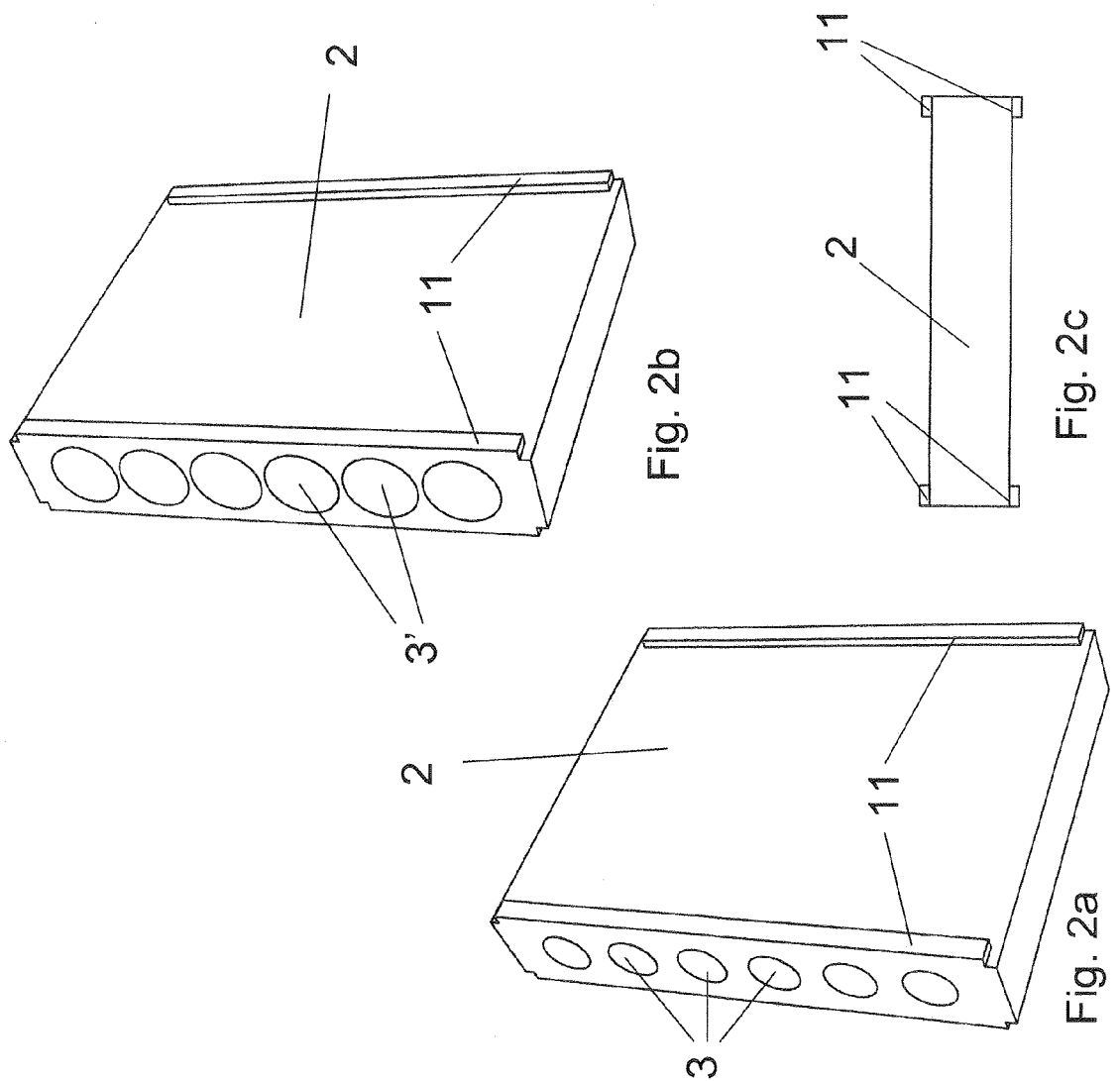
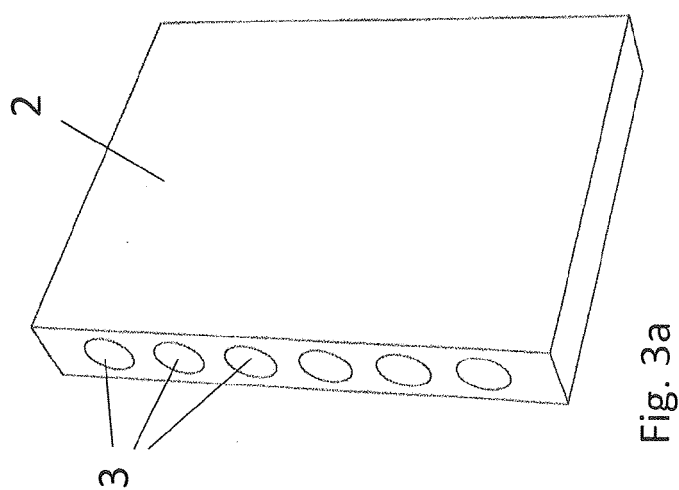
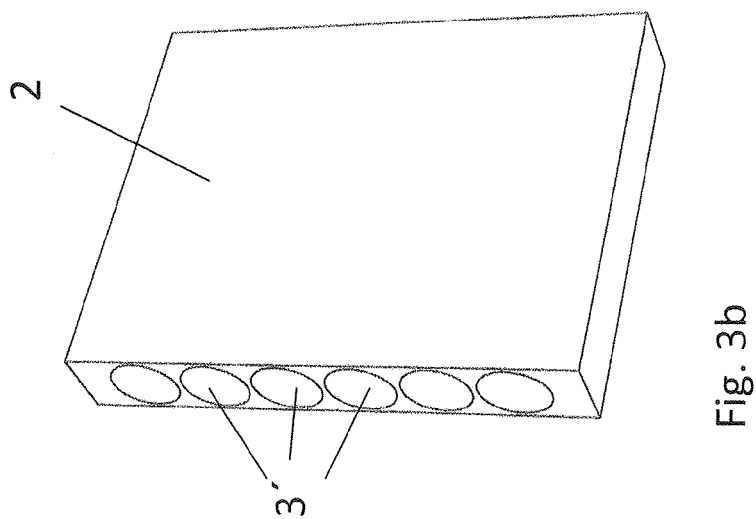
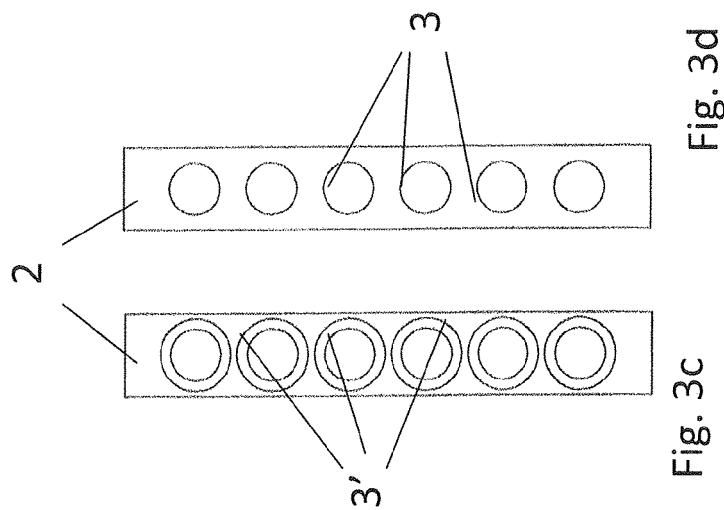
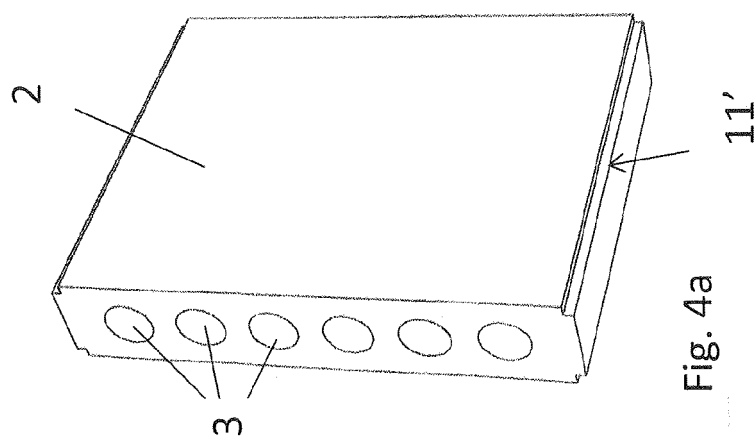
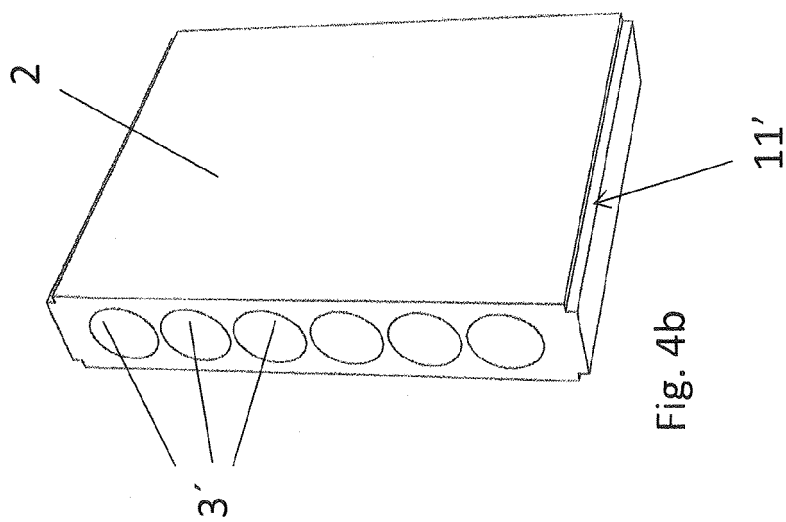
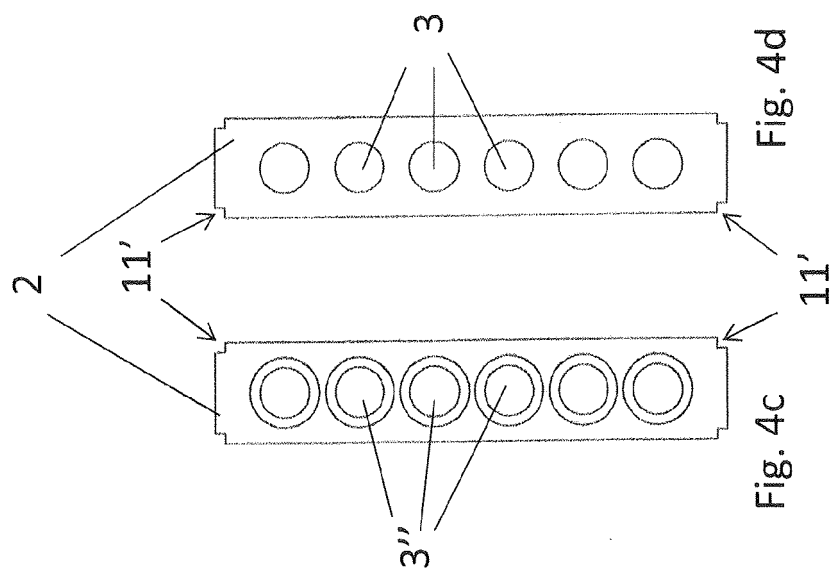
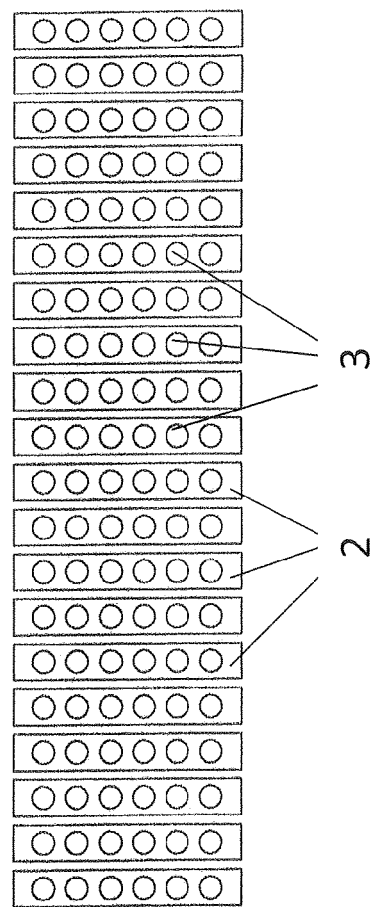
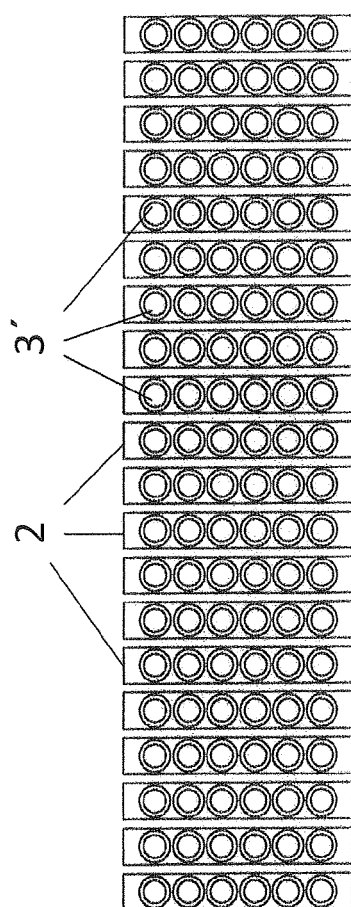
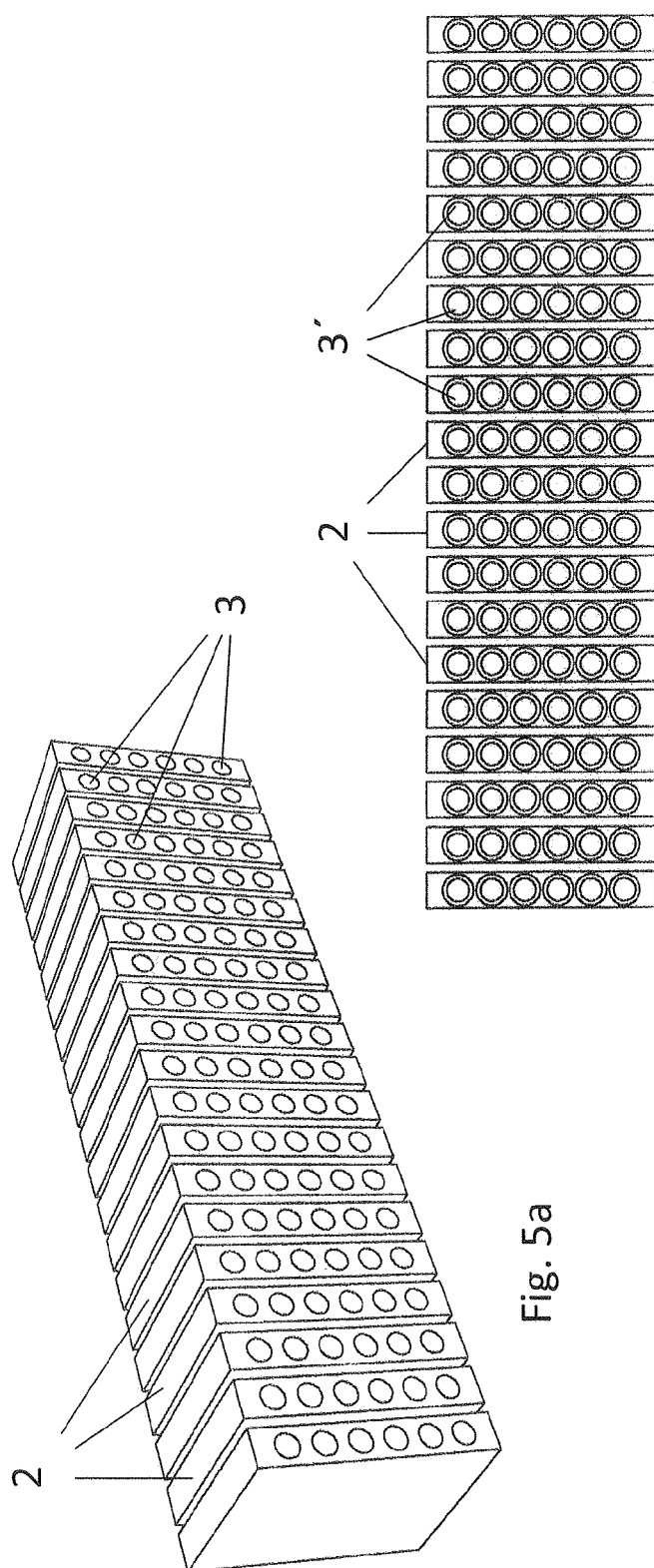


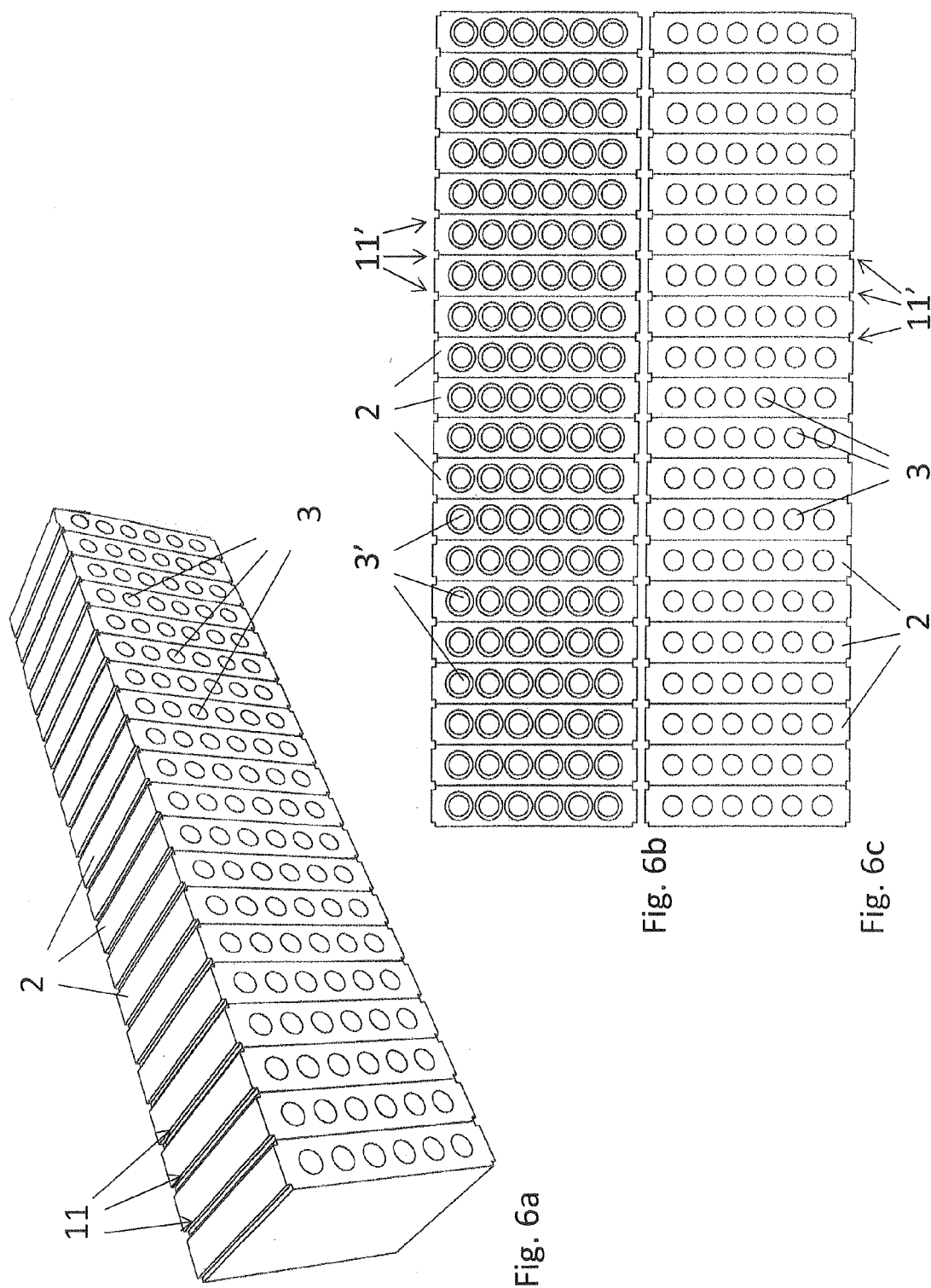
Fig. 1c

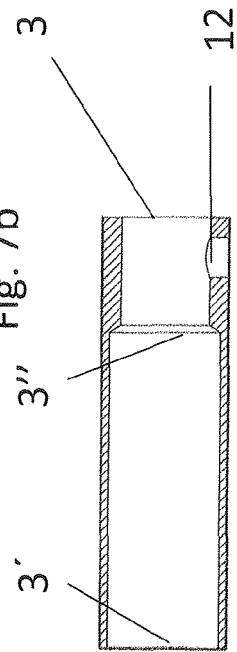
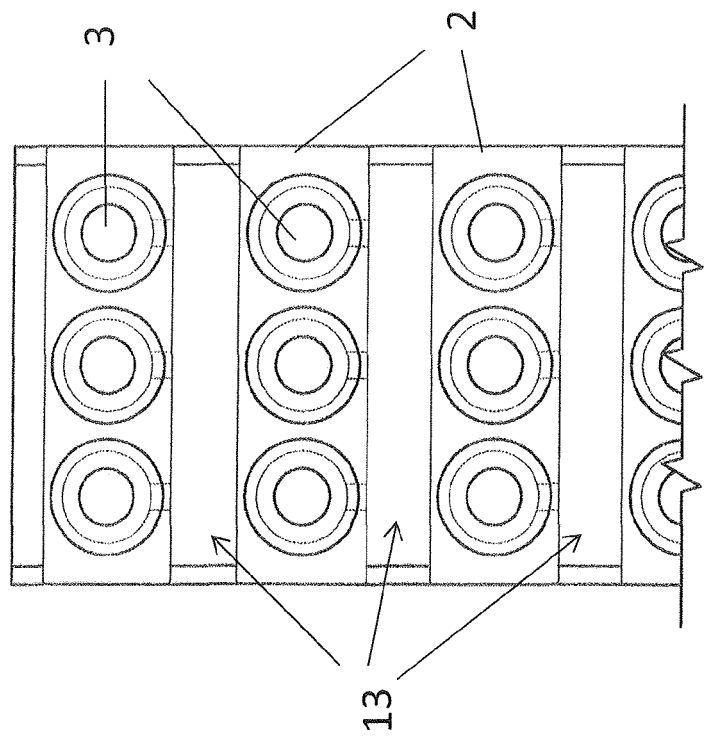
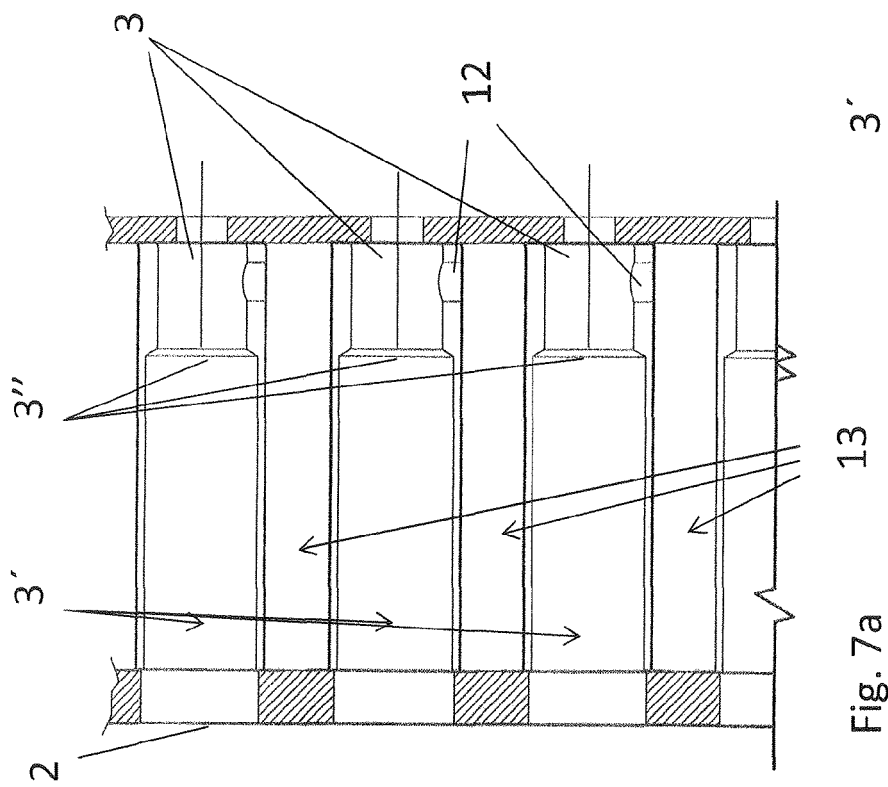












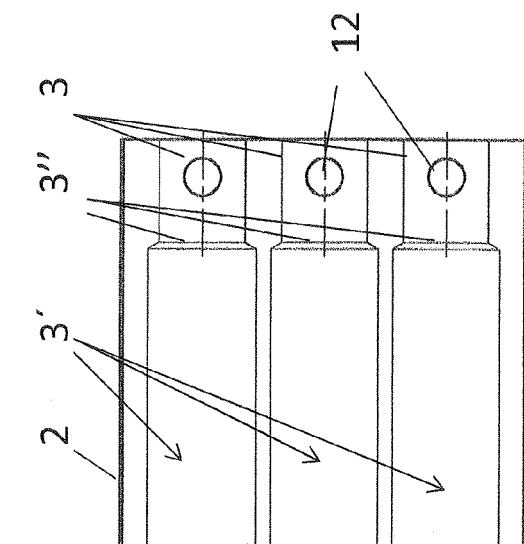


Fig. 8a

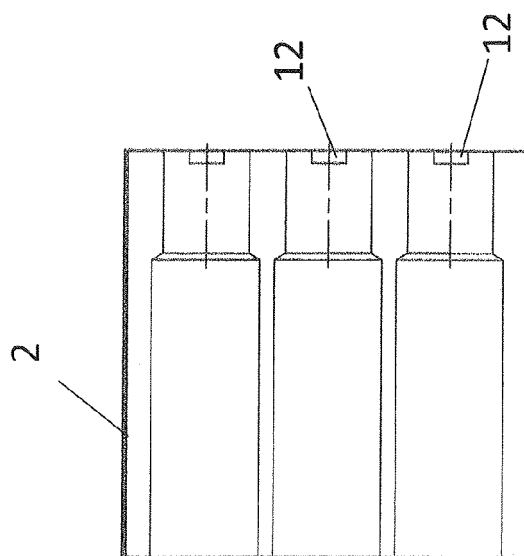


Fig. 8b

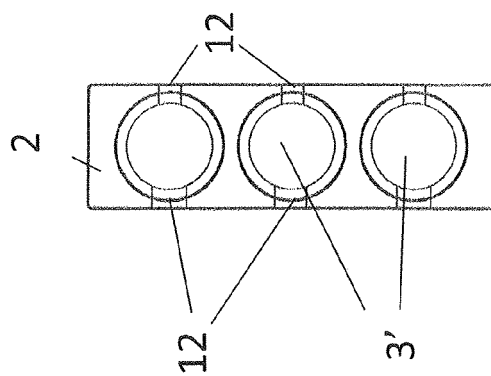


Fig. 8c

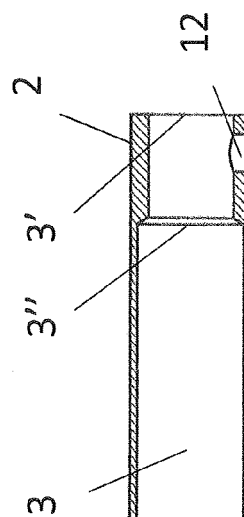


Fig. 8d

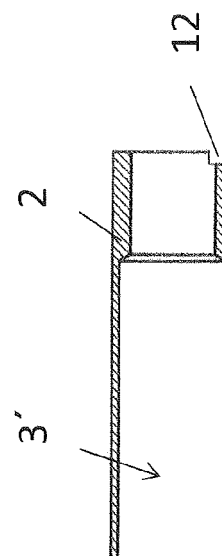


Fig. 8e

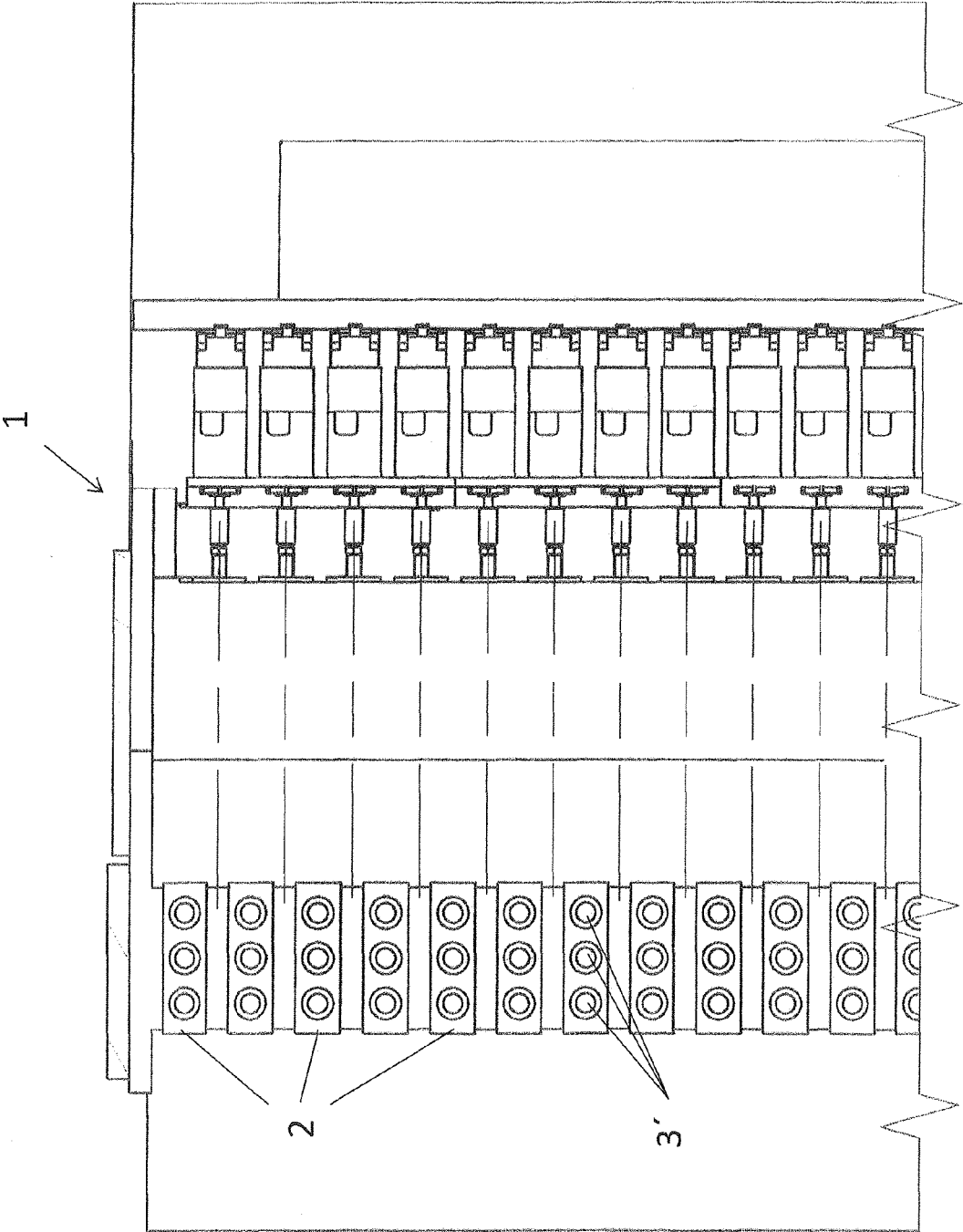
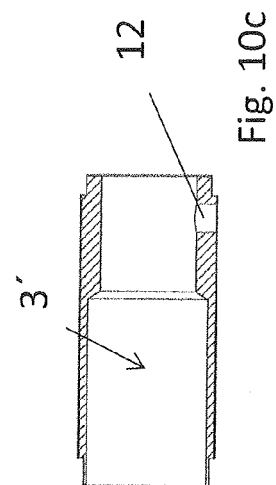
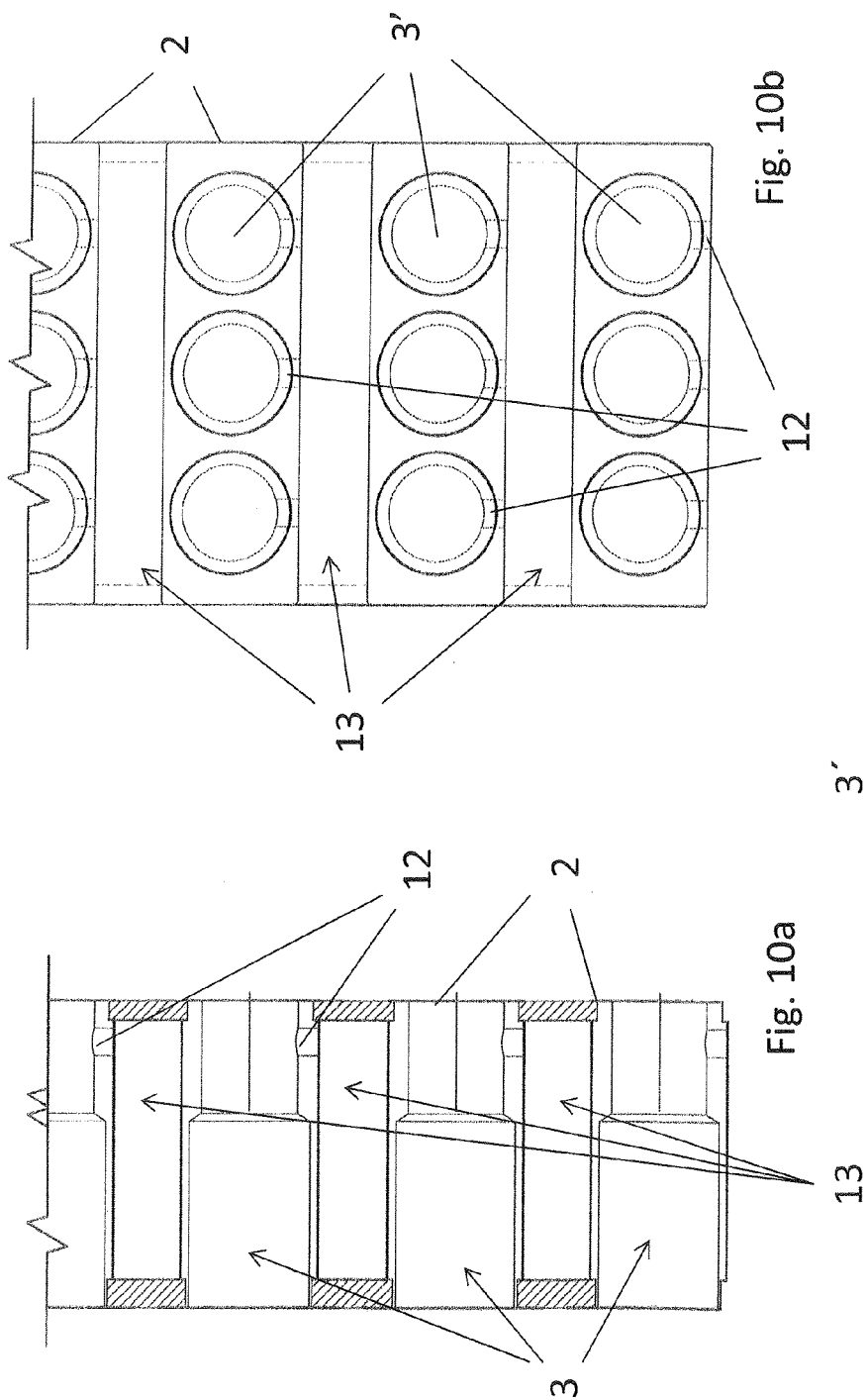


Fig. 9



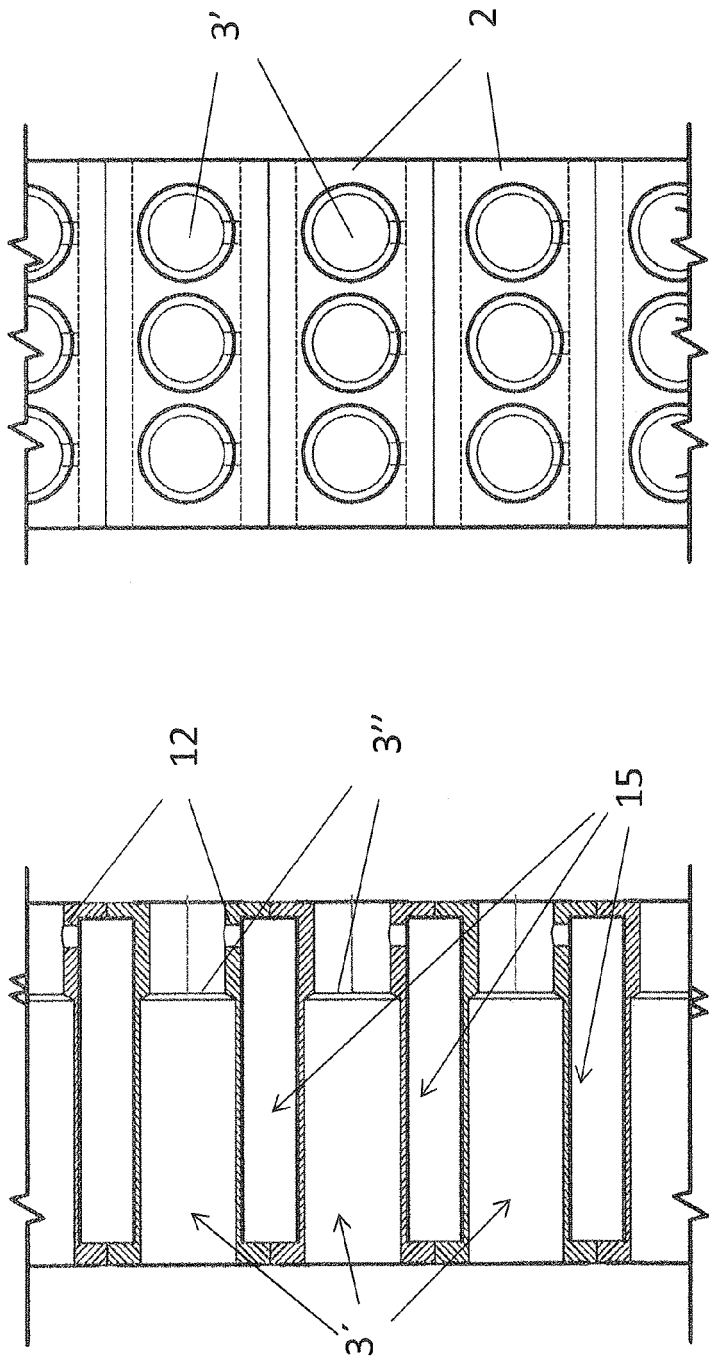


Fig. 11a

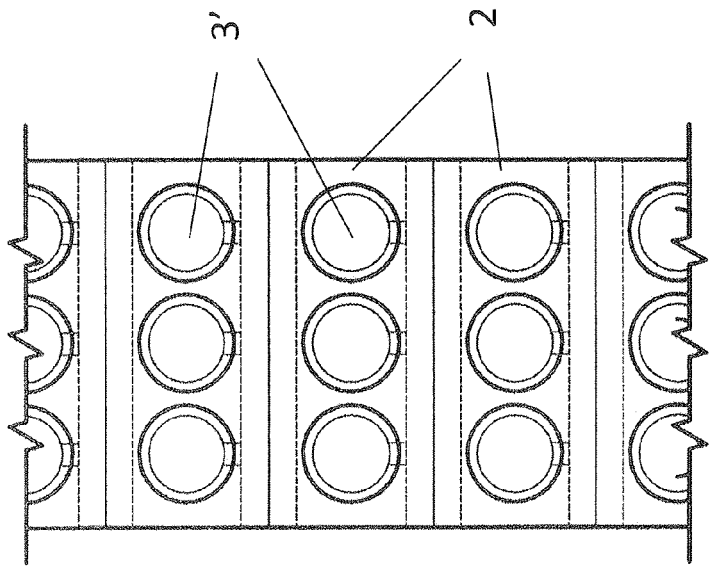


Fig. 11b

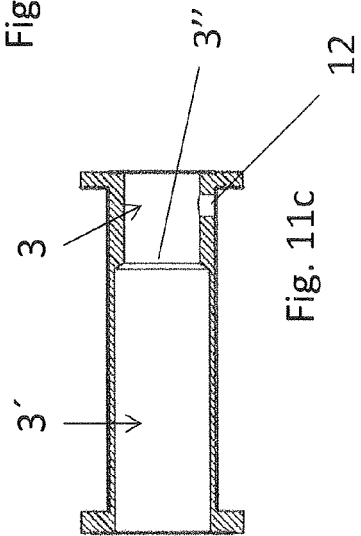


Fig. 11c

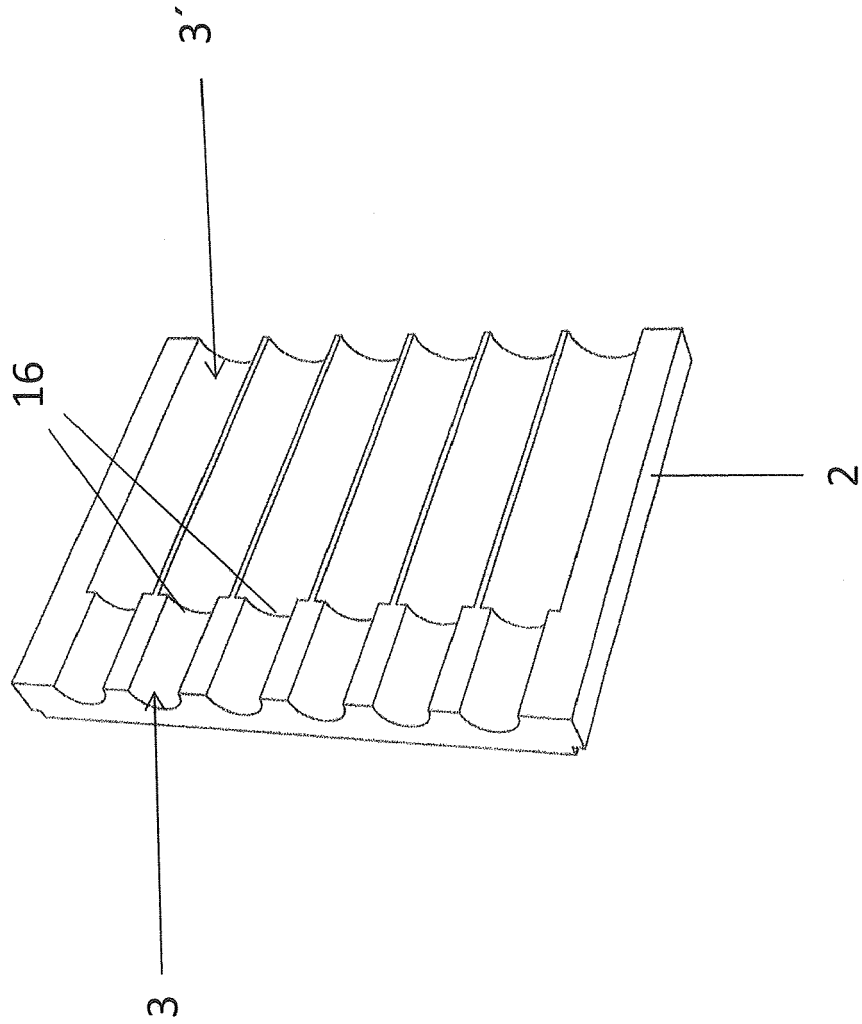


Fig. 12



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 3696

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	WO 97/48851 A1 (VALMET CORP [FI]; HUOVILA JYRKI [FI]) 24 December 1997 (1997-12-24)	1-3, 7-14,17	INV. D21F1/02
Y	* page 5, line 13 - page 8, line 24 * * page 9, lines 18-29 * * page 10, lines 9-11; figures 1,7A,7B *	4-6,15, 16	D21F1/08
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			TECHNICAL FIELDS SEARCHED (IPC)
			D21F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 August 2012	Examiner Maisonnier, Claire
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 3696

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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21-08-2012

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REFERENCES CITED IN THE DESCRIPTION

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