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(54) **APPARATUS FOR HEATING MATS BASED ON INCOHERENT WOOD MATERIAL**

VORRICHTUNG ZUR BEHEIZUNG VON MATTEN AUF BASIS VON LOSEM HOLZMATERIAL

APPAREIL PERMETTANT DE CHAUFFER DES TAPIS BASÉS SUR UN PRODUIT LIGNEUX INCOHÉRENT

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Description

Technical field

[0001] The present invention relates to an apparatus according to claim 1 for heating mats based on incoherent wood material.

Background Art

[0002] It is known that the production cycle of panels of incoherent wood material (hardboard, MDF, OSB etc.) involves a step of forming a mat of wood particles mixed with suitable thermosetting or thermoplastic glues and a subsequent step of hot pressing or baking of the mat to obtain the finished panel.

[0003] It is also known to include a step of heating the mat before the baking step in order to increase the productivity of the cycle.

[0004] This heating step is generally implemented by means of the insertion, along the production line, upstream of the press or occasionally right inside of it, of apparatuses for injecting steam at at least one of the main faces of the mat, the mat itself being made to advance in the horizontal position resting on its underside.

[0005] An example of this apparatus is known from DE 4015142 A1 which involves the application of the steam directly in the press and has the lower plate of the press provided with a plurality of nozzles for the outflow of the steam at the upper surface of the plate on which the mat rests, connected with a plurality of steam supply holes defined inside the plate itself and connected to a distribution device.

[0006] The plate furthermore has inner heating channels defined in proximity to the lower surface, in order to even out its temperature and prevent thermal deformations thereof.

[0007] Another example is provided by DE 10207573 C1 which discloses an apparatus that has, at the input to the press, at least one plate for injecting steam at one of the faces of the mat, preceded by an extractor hood for removing the air held by the particles of the mat and facilitating the subsequent penetration of the steam. Yet another example of a steam heating apparatus is disclosed in document US 4 923 555.

[0008] However, these apparatuses of known type are not free from drawbacks, including the fact that the condensation formed from the cooling of the steam as it passes through the dispensing devices risks being carried along by the flow of steam and coming into contact with the mats being processed, thus causing the formation of defects (stains, bubbles etc.) in the baking step and, therefore, the production of panels that must be discarded.

[0009] This drawback is particularly exacerbated following each stoppage in production, since every time operation of the apparatus is started there is a major carrying along of condensation until the operating temperature is reached.

[0010] A first attempt to solve such problems was proposed in EPA 09425027.1, in the name of the same Applicant, which discloses an apparatus for injecting dry saturated steam on a mat upstream of the point of input to a press, provided with at least one dispensing assembly provided with a plurality of outlets of the steam at one of the main faces of the mat. Such assembly basically consists of one or more steam supply channels connected with the outlets and comprises a monolithic body made of heat-conducting material for supporting the channels which is crossed by one or more ducts for the passage of a heating fluid, the purpose of which is to yield heat to the channels in order to inhibit the formation of condensation inside them and, therefore, reduce the risk of the mat's coming into contact with condensation resulting in the formation of defective mats.

[0011] However, in practice it has been found that this solution is not entirely effective, in that the heat yielded by the heated supporting body to the walls of the channels and, therefore, to the steam inside them does not compensate for the cooling that the steam undergoes, as a result of the heat taken away by the mat itself in transit as well, and so it is still possible for condensation to form along the channels and be carried along to the mat.

Disclosure of the Invention

[0012] The aim of the present invention is to eliminate the above mentioned drawbacks in the background art, by providing an apparatus for heating mats based on incoherent wood material by means of steam injection, that makes it possible to dispense exclusively dry or superheated saturated steam, thus avoiding excessively wetting the mat or carrying along condensation in contact therewith.

[0013] Within this aim, an object of the present invention is to obtain, for the same steam supplied, an increase in the heat energy yielded to the mat and a reduction in the water content thereof compared to known apparatuses and, therefore, an increase in the productivity of the subsequent baking step of the panel in a press.

[0014] A further object of the present invention is to provide a simple structure, that is easy and practical to implement, safe in use and effective in operation, and low cost.

[0015] This aim and these and other objects which will become better apparent hereinafter are achieved by the present apparatus for heating mats based on incoherent wood material, comprising at least one assembly for dispensing a fluid heating medium comprising dry saturated steam, which is provided with a plurality of outlets for said fluid medium which are adapted to be positioned at at least one of the main faces of a mat based on incoherent wood material in transit along an advancement direction, the dispensing assembly comprising at least one body for delimiting at least one chamber for propagation of the fluid medium, which is associated and connected with

said outlets, characterized in that said outlets are associated directly with a wall of said body and in that it comprises means for heating said wall which are associated with said body and are arranged inside said chamber directly in contact with said wall, so as to achieve saturation of the steam contained in the fluid medium in output from the outlets, in the event of reduction in the titer in passing through the dispensing assembly, or its superheating.

Brief description of the drawings

[0016] Further characteristics and advantages of the present invention will become better apparent from the detailed description of preferred, but not exclusive, embodiments of an apparatus for heating mats based on incoherent wood material, which are illustrated for the purposes of nonlimiting example in the accompanying drawings wherein:

Figure 1 is a schematic cross-sectional view of an apparatus for heating mats based on incoherent wood material according to the invention;
Figure 2 is a schematic cross-sectional view of a first embodiment of a steam dispensing assembly of the apparatus according to the invention;
Figure 3 is a schematic cross-sectional view of a second embodiment of the steam dispensing assembly of the apparatus according to the invention;
Figure 4 is a schematic longitudinal sectional view from above of the first body of the dispensing assembly of Figure 3;
Figure 5 is a schematic cross-sectional perspective view of a longitudinal portion of the dispensing assembly of Figure 2;
Figure 6 is a schematic cross-sectional perspective view of a longitudinal portion of the dispensing assembly of Figure 3.

Ways of carrying out the Invention

[0017] With reference to the figures, the reference numeral 1 generally designates an apparatus for heating mats based on incoherent wood material.

[0018] The apparatus 1 is designed to be used along production lines of panels of wood material, upstream of the input to the baking device, in order to obtain a preheating of the mats, or directly inside them. Furthermore, the apparatus 1 can be combined with a perforated presser belt P of the type conventionally used upstream of the input to the press, as shown in Figure 1, and with an optional further perforated supporting belt arranged below the mat, i.e. to constitute a self-contained device.

[0019] The apparatus 1 uses a fluid heating medium substantially in the gaseous state and comprising dry saturated steam optionally mixed with superheated steam and/or hot air.

[0020] The apparatus 1 comprises at least one assembly 2 for dispensing the fluid heating medium provided with a plurality of outlets 3 thereof which are adapted to be arranged at at least one of the faces of a mat M in transit along an advancement direction A.

[0021] Preferably, the shape of each outlet 3 is convergent with the direction of travel of the fluid medium, having an inlet that is wider than the outlet. In this way a diffused progression of the jet of fluid heating medium is obtained, thus preventing the furrowing of the mat M in transit, and the fouling, and hence the risk of clogging, of the outlets 3 is reduced.

[0022] It should be noted that the term "mat" designates a semi-finished product obtained from the formation of a mixture of wood particles mixed with suitable thermosetting or thermoplastic glues. The mat M is essentially parallelepiped in shape and is made to advance along the production line in the horizontal position. The term "faces" is thus used to designate the two largest surfaces of the mat, one arranged above and the other below in the advancement configuration.

[0023] The dispensing assembly 2 comprises at least one body for delimiting at least one chamber for propagation of the fluid medium, which is associated and connected with the outlets 3.

[0024] In particular, the outlets 3 are directly associated with a wall 8 of the body that is adapted to be placed in contact with the mat M in transit and the apparatus 1 comprises heating means 9 associated with the body and arranged inside the respective chamber directly in contact with the wall 8, so as to achieve the saturation of the steam contained in the fluid medium in output from the outlets 3, in the event of reduction in the titer in passing through the dispensing assembly 2, or its superheating.

[0025] Preferably, the dispensing assembly 2 comprises at least one first body 4 for delimiting at least one first chamber 5 for the inflow and propagation of the fluid medium associable with means for feeding thereof, not shown since they are of the traditional type, and at least one second body 6 for delimiting at least one second chamber 7 for the propagation and outflow of the fluid medium associated and connected with the outlets 3. The first and the second chamber, respectively, 5 and 7 are mutually in fluid communication and the second chamber has a greater volume than the first so as to obtain an isenthalpic expansion of the steam contained in the fluid heating medium in the passage from one to the other with consequent increase in the titer of the steam, according to the known properties of saturated steam as per the Mollier Diagram, in the event of reduction in the titer in passing through the first chamber 5.

[0026] However, the possibility is not ruled out that the dispensing assembly 2 can comprise a different structure for example constituted by a single body for delimiting a single chamber for propagation of the fluid medium, communicating both with the supply means and with the outlets 3.

[0027] The first and the second body, respectively, 4 and 6 are box-like in shape and are made of heat-con-

ducting material.

[0028] Advantageously, the outlets 3 are obtained directly at a wall 8 of the second body 6 that is thin, so as to render the second chamber 7 immediately communicating with the outside environment and, therefore, with the mat M and obtain a diffused and non-linear progression of the jets of steam flowing out from the outlets 3.

[0029] The heating means 9 are associated with the second body 6 inside the second chamber 7 and comprise at least one duct 10 for the passage of a second fluid heating medium arranged in contact with the wall 8 and connected thereto by means of fastening elements 11 interposed between the duct 10 and the wall, which are made of heat-conducting material and are elastically deformable even after heat stresses (harmonic steel). In this way the fastening elements 11 are always kept in contact with the duct 10, from which they absorb heat, and with the wall 8, to which they yield heat.

[0030] In particular, each fastening element 11 is constituted by a central portion 11 a, which is arched so as to define a seat for accommodating the duct 10 and which envelops so as to adhere to a sectional portion of the duct, and by two rectilinear end portions 11b, arranged at opposite ends of the central portion 11a and connected thereto, which are positioned so as to adhere to the wall 8 and are fixed thereto by means of mechanical connection elements, welding or the like, not shown. The end portions 11b must be fixed to the inward side of the wall 8 of the second chamber 7 so as not to create breaks in continuity on the outward side of the wall in contact with the mat M. Substantially, the central portion 11 a of each fastening element 11 absorbs heat from the duct 10 and transfers it to the end portions 11b which yield it to the wall 8, so as to increase the exchange of heat with respect to that which would occur between the duct 10 alone and the wall, since the fastening elements 11 make it possible to recover and transfer to the wall 8 part of the heat which otherwise would be dispersed in the second chamber 7 and not yielded directly to the wall.

[0031] The duct 10 is also made of heat-conducting material in order to ensure the transmission of the heat to the wall 8 and, specifically, in proximity to the peripheral region of the outlets 3, so that the outflowing steam is necessarily heated thus increasing its titer, if in passing through the dispensing assembly 2 the saturated steam contained in the fluid medium has undergone a reduction in the titer, or becoming superheated, if the saturated steam had been maintained in the dry state.

[0032] In this way, for the same amount of steam supplied to the apparatus 1, it is possible to optimize the quantity of heat yielded to the mat M and, therefore, the efficiency of the process, that is to say for the same thermal energy yielded to the mat M it is possible to reduce the share of humidity supplied to the mat itself compared to treatments carried out using known apparatuses.

[0033] The duct 10 is coiled so as to cover the wall 8 in an irregular manner. Alternatively there could be a plurality of ducts 10.

[0034] The outlets 3 are distributed in one or more rows that are transversal to the advancement direction A in the regions of the wall 8 that are free from the duct 10 and from the fastening elements 11.

[0035] Also, the second fluid heating medium used can be steam, supplied and drained through a circuit that is separate from the one used in the dispensing assembly 2 for heating the mat M, or water, diathermic oil or the like. In Figures 2 and 3, arrows show the path of the second fluid heating medium through the duct 10.

[0036] It should be noted that the positioning of the duct 10 close to the wall 8 is particularly advantageous in that it makes it possible to prevent cooling and, therefore, reduction in the titer of the steam flowing out from the outlets 3 as a consequence of the removal of heat taken away by the mat M in transit and by the optional interposed belt N.

[0037] Alternatively the heating means 9 could comprise at least one electric resistor associated in contact with the wall 8 and fixed by means of connector elements of the type described above.

[0038] Furthermore, the apparatus 1 comprises at least one vent 12 connecting the first chamber 5 to the second chamber 7 and diffuser means 13 associated with the vent for distributing the steam inside the second chamber 7.

[0039] The apparatus 1 can comprise a single dispensing assembly 2 arranged in contact with one of the faces, upper or lower, of the mat M or, more preferably, it can be provided with two dispensing assemblies 2 of which one below 2a and one above 2b arranged with the respective walls 8 provided with outlets 3 in contact, respectively, with the the lower and upper faces of the mat M in transit, the walls 8 being flat.

[0040] Advantageously, the two dispensing assemblies 2, although incorporating the above concepts, are designed with particular contrivances for enabling the collection by gravity and evacuation of any quantities of condensation formed inside the chambers 5 and 7 for the lower dispensing assembly 2a and for preventing the formation of condensation which by gravity would risk falling on the mat M through the outlets 3 for the upper dispensing assembly 2b.

[0041] In particular, in the lower dispensing assembly 2a (Figures 1, 2, 5) the first and the second chamber, respectively, 5 and 7 are substantially linear in extension.

[0042] The first and the second body, respectively, 4 and 6 are constituted by respective box-like elements that are parallelepiped in shape and arranged with the longitudinal axis thereof horizontal and transversal to the advancement direction A. The first body 4 is arranged inside the second body 6 and has a plurality of vents 12 constituted by respective openings defined at the upper portion thereof and distributed along its length.

[0043] The diffuser means 13 comprise a mesh 14 for covering each vent 12 and a diaphragm 15 shaped like a pan and supported by the first body 4 inside the second chamber 7 at each vent 12, so as to obtain a diffusion of

the steam inside the second chamber with consequent expansion, to prevent the steam from flowing out from the outlets 3 directly. Furthermore, the diffuser means 13 make it possible to fragment any drops of condensation contained in the fluid medium thus favoring their re-evaporation. For this reason the diaphragms 15 can also be made at least partially from mesh.

[0044] The first body 4 is provided, in proximity to the lower face, with slits 16 for the outflow of any condensation that has formed inside the first chamber 5 and collected on the bottom thereof. Through the slits 16 the condensation falls on the bottom of the second chamber 7 from which it can then be evacuated.

[0045] The upper dispensing assembly 2b (Figures 1, 3, 4, 6), on the other hand, comprises at least one chamber 17 that is heated and arranged in contact with at least one between the first and the second body, respectively, 4 and 6 and isolated, in terms of fluid dynamics, from the first and from the second chamber, respectively, 5 and 7.

[0046] The chamber 17 is crossed by a third fluid heating medium, which can be steam, supplied and drained through a circuit that is separate from the one used in the dispensing assembly 2 for heating the mat M, water, diathermic oil or the like.

[0047] The supply and draining circuit can coincide with the one for the second fluid heating medium used by the heating means 9.

[0048] Preferably the chamber 17 is interposed between the first and the second body, respectively, 4 and 6 so as to yield heat to both the chambers 5 and 7 and to the steam contained in them. The vents 12 are constituted by respective ducts passing through the chamber 17.

[0049] The apparatus 1 comprises redirection means arranged inside the vents 12 to give a helical motion to the steam along each of them. In this way, as a result of the centrifugal effect, any condensation carried along by the steam in passing through the vents 12 is driven against the walls thereof, which are heated by the chamber 17, thus determining their re-evaporation.

[0050] The diffuser means 13 are constituted by pan-shaped diaphragms 18 supported inside the second chamber 7 at each vent 12 in order to favor the propagation of the steam inside the second chamber 7 with consequent expansion, thus preventing the immediate outflow through the outlets 3, and the fragmentation of any drops of condensation thus favoring their re-evaporation.

[0051] The first body 4 is constituted by a plurality of tubular sections 19 that are mutually connected to define a first chamber 5 with non-rectilinear development and a steam path following an open line. Furthermore, the tubular sections 19 are adjacent to the chamber 17. In this way, in passing through the first chamber 5 heat is yielded to the steam along all of the path, thus reducing the formation of condensation.

[0052] The vents 12 are defined along the end tubular sections 19a.

[0053] In the embodiment shown in Figure 4, there are two identical first bodies 4 defining respective first chambers 5 connected with a single second chamber 7.

[0054] Also, the tubular sections 19 can be circular in cross-section (Figure 1) and thus define a region of contact with the wall delimiting the chamber 17 that is limited to one generating line, or prismatic in cross-section (Figures 3, 4, 6), for example square, and can each be placed with a respective longitudinal face in contact with the wall so as to enlarge the area of contact and increase the transmission of heat.

[0055] Along the tubular sections 19, baffle elements (not shown) can be provided, accommodated inside the first chambers 5 so as to impart a turbulent motion to the steam inside them, thus forcing it to strike the chamber 17 so as to increase the transmission of heat to the steam.

[0056] Operation of the present invention is the following.

[0057] In the lower dispensing assembly 2a, the steam is fed into the first chamber 5 and from this it propagates to the second chamber 7 through the vents 12, undergoing an isenthalpic expansion with consequent increase in titer if the dry saturated steam has undergone a reduction in titer in passing through the first chamber 5. Before exiting through the outlets 3 the steam receives heat from the heating means 9 thus further increasing its titer, if necessary, or becoming superheated.

[0058] In the upper dispensing assembly 2b, on the other hand, the steam is fed into the two first chambers 5, travelling through the tubular sections 19 heated by the chamber 17 until it reaches the end tubular sections 19a, to then enter along the vents 12, which are also heated, and exit into the second chamber 7, also heated, and expanding.

[0059] The baffle elements positioned along the tubular sections 19 and the redirection means provided along the vents 12 force the steam to strike the walls heated by the chamber 17 thus increasing the absorption of heat by the steam.

[0060] Here too, before exiting through the outlets 3 the steam receives heat from the heating means 9 thus further increasing its titer, if necessary, or becoming superheated.

[0061] It should be noted that in an alternative embodiment the apparatus 1 could have a single dispensing assembly 2 arranged below, or two identical dispensing assemblies 2 of the type of the upper dispensing assembly 2b described previously and provided with a chamber 17.

[0062] In practice it has been found that the invention as described achieves the intended aim and objects and, in particular, attention is drawn to the fact that the apparatus according to the invention makes it possible to prevent the carrying along of condensation to the mat and to optimize, for the same amount of dry saturated steam supplied, the share of heat yielded thereto compared to known apparatuses, in that the outflowing steam is in the saturated dry or superheated state.

[0063] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An apparatus (1) for heating mats based on incoherent wood material, comprising at least one assembly (2a, 2b) for dispensing a fluid heating medium comprising dry saturated steam, which is provided with a plurality of outlets (3) for said fluid medium which are adapted to be positioned at at least one of the main faces of a mat (M) based on incoherent wood material in transit along an advancement direction (A), the dispensing assembly (2a, 2b) comprising at least one body (4; 6) for delimiting at least one chamber (5; 7) for propagation of the fluid medium, which is associated and connected with said outlets, said outlets (3) being associated directly with a wall (8) of said body (6) and **characterized in that** the apparatus (1) further comprises means (9) for heating said wall (8) which are associated with said body (6) and are arranged inside said chamber (7) directly in contact with said wall (8), so as to achieve saturation of the steam contained in the fluid medium in output from the outlets (3), in the event of reduction in the titer in passing through the dispensing assembly (2a, 2b), or its superheating.

2. The apparatus (1) according to claim 1, **characterized in that** said dispensing assembly (2a, 2b) comprises at least two of said bodies (4; 6), of which at least one first body (4) for delimiting at least one first chamber (5) for the inflow and propagation of said fluid medium associable with means for feeding said fluid medium and at least one second body (6) for delimiting at least one second chamber (7) for the propagation and outflow of said fluid medium, associated and connected with said outlets (3) and inside which said heating means (9) are provided, the first chamber (5) and the second chamber (7) being mutually connected and the second chamber (7) having a larger volume than the first chamber (5) so as to obtain an isenthalpic expansion of the steam contained in the fluid heating medium in passing from one chamber to the other chamber, with a consequent increase in the titer of said steam if the titer is reduced in crossing the first chamber (5),

3. The apparatus (1) according to claim 2, **characterized in that** said heating means (9) are supported in contact with said wall (8) by means of fixing elements (11), which are made of a heat-conducting and elastically deformable material and are interposed between the heating means (9) and the wall (8) so as to obtain an additional transfer of heat toward said wall.

4. The apparatus (1) according to claim 2 or 3, **characterized in that** said heating means (9) comprise at least one duct (10) for the passage of a second fluid heating medium arranged in contact with said wall (8).

5. The apparatus (1) according to claim 2 or 3, **characterized in that** said heating means (9) comprise at least one electric resistor placed in contact with said wall (8).

6. The apparatus (1) according to claim 1, **characterized in that** it comprises at least one vent (12) for connecting said first chamber (5) to said second chamber (7) and diffuser means (13) which are associated with said vent (12) for the distribution of the fluid medium within said second chamber.

7. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said first and second bodies (4, 6) have a substantially box-like structure and are made of heat-conducting material.

8. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said first and second chambers (5, 7) have a substantially linear extension, the first body (4) being arranged inside the second body (6) and being provided with a plurality of vents (12) constituted by respective openings distributed along its length.

9. The apparatus (1) according to claims 6 and 8, **characterized in that** said diffuser means (13) comprise a mesh (14) for covering each vent (12) and a diaphragm (15) arranged inside the second chamber (7) at each vent (12).

10. The apparatus (1) according to claim 8 or 9, **characterized in that** said dispensing assembly (2a) is adapted to be arranged so that the corresponding outlets (3) are in contact with the lower face of said mat (M) in transit.

11. The apparatus (1) according to claims 8 and 10, **characterized in that** said first body (4) is provided with at least one slit (16) for discharging any condensation that has formed inside it on the bottom of said second body (6).

12. The apparatus (1) according to one or more of claims 1-7, **characterized in that** said dispensing assembly (2b) comprises at least one heated chamber (17),

which is arranged in contact with at least one between said first and second bodies (4, 6) and is isolated, in terms of fluid dynamics, from said first and second chambers (5, 7).

13. The apparatus (1) according to claim 12, **characterized in that** said chamber (17) is interposed between said first and second bodies (4, 6) and **in that** said vents (12) are constituted by respective ducts that pass through said heated chamber.

14. The apparatus (1) according to claim 13, **characterized in that** it comprises redirection means arranged within said vents (12) so as to impart a substantially helical motion to the flow of fluid medium along each one of said vents.

15. The apparatus (1) according to claim 12 or 13, **characterized in that** said first body (4) is constituted by a plurality of tubular portions (19), which are mutually connected so as to define a first chamber (5) with a non-rectilinear extension.

16. The apparatus (1) according to one or more of claims 12-15, **characterized in that** it comprises a plurality of baffle elements which are accommodated inside said first chamber (5) so as to impart a turbulent motion to the flow of the fluid medium inside it.

17. The apparatus (1) according to one or more of claims 12-16, **characterized in that** said dispensing assembly (2b) is adapted to be positioned so that the corresponding outlets (3) are arranged at the upper face of said mattress (M) in transit.

18. The apparatus (1) according to one or more of the preceding claims, **characterized in that** each one of said outlets (3) has a shape that converges in the direction in which it is crossed by said fluid heating medium.

Patentansprüche

1. Eine Vorrichtung (1) zur Beheizung von Matten auf Basis von losem Holzmaterial, die mindestens einen Aufbau (2a, 2b) zur Abgabe eines Fluid-Heizmediums umfasst, das trocken gesättigten Dampf umfasst, der mit einer Vielzahl von Ausgängen (3) für das Fluidmedium ausgestattet ist, welche ausgebildet sind, um an mindestens einer der Hauptflächen einer Matte (M) auf Basis von losem Holzmaterial im Transit entlang einer Vorschubrichtung (A) positioniert zu werden, wobei der Abgabeaufbau (2a, 2b) mindestens einen Körper (4; 6) zur Begrenzung mindestens einer Kammer (5; 7) für die Ausbreitung des Fluidmediums umfasst, die mit den Ausgängen assoziiert und verbunden ist, wobei die Ausgänge (3) direkt mit einer Wand (8) des Körpers (6) verbunden sind, und **dadurch gekennzeichnet, dass** die Vorrichtung (1) weiter Mittel (9) zur Heizung der Wand (8) umfasst, die mit dem Körper (6) verbunden und innerhalb der Kammer (7) direkt in Kontakt mit der Wand (8) angeordnet sind, um eine Sättigung des Dampfs zu erzielen, der im Fluidmedium enthalten ist, das aus den Ausgängen (3) austritt, im Falle der Reduktion des Titers, der durch den Abgabeaufbau (2a, 2b) strömt, oder seiner Überhitzung.

2. Die Vorrichtung (1) gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Abgabeaufbau (2a, 2b) mindestens zwei der Körper (4; 6) umfasst, mindestens einen ersten Körper (4) davon zur Begrenzung mindestens einer ersten Kammer (5) für das Einströmen und die Ausbreitung des Fluidmediums, verbindbar mit Mitteln für die Zufuhr des Fluidmediums, und mindestens einen zweiten Körper (6) zur Begrenzung mindestens einer zweiten Kammer (7) für die Ausbreitung und das Ausströmen des Fluidmediums, assoziiert und verbunden mit den Ausgängen (3) und in der Heizmittel (9) bereitgestellt sind, wobei die erste Kammer (5) und die zweite Kammer (7) miteinander verbunden sind und die zweite Kammer (7) ein größeres Volumen hat als die erste Kammer (5), um eine isenthalpe Expansion des im Fluid-Heizmedium enthaltenen Dampfs beim Übergang von der einen Kammer in die andere Kammer zu erzielen, mit einer daraus folgenden Erhöhung des Titers des Dampfs, wenn der Titer beim Durchqueren der ersten Kammer (5) vermindert wird.

3. Die Vorrichtung (1) gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Heizmittel (9) in Kontakt mit der Wand (8) durch Befestigungselemente (11) gestützt werden, die aus einem wärmeleitenden und elastisch verformbaren Material bestehen und zwischen den Heizmitteln (9) und der Wand (8) angeordnet sind, um einen zusätzlichen Transfer von Wärme zu der Wand hin zu erzielen.

4. Die Vorrichtung (1) gemäß Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die Heizmittel (9) mindestens eine Leitung (10) für den Durchfluss eines zweiten Fluid-Heizmediums umfassen, angeordnet in Kontakt mit der Wand (8).

5. Die Vorrichtung (1) gemäß Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die Heizmittel (9) mindestens einen elektrischen Widerstand, platziert in Kontakt mit der Wand (8), umfassen.

6. Die Vorrichtung (1) gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie mindestens eine Entlüftung (12) zur Verbindung der ersten Kammer (5) mit der zweiten Kammer (7) und Diffusormittel (13) umfasst, die zur Verteilung des Fluidmediums innerhalb der

zweiten Kammer mit der Entlüftung (12) verbunden sind.

7. Die Vorrichtung (1) gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** die ersten und zweiten Körper (4, 6) eine im Wesentlichen kastenähnliche Struktur haben und aus wärmeleitendem Material bestehen.

8. Die Vorrichtung (1) gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** die ersten und zweiten Kammern (5, 7) eine im Wesentlichen lineare Ausdehnung haben, wobei der erste Körper (4) innerhalb des zweiten Körpers (6) angeordnet und mit einer Vielzahl von Entlüftungen (12) ausgestattet ist, die in entsprechenden Öffnungen bestehen, welche entlang seiner Länge verteilt sind.

9. Die Vorrichtung (1) gemäß den Ansprüchen 6 und 8, **dadurch gekennzeichnet, dass** die Diffusormittel (13) ein Maschengitter (14) zur Bedeckung jeder Entlüftung (12) und eine Membran (15) umfassen, die innerhalb der zweiten Kammer (7) an jeder Entlüftung (12) angeordnet ist.

10. Die Vorrichtung (1) gemäß Anspruch 8 oder 9, **dadurch gekennzeichnet, dass** der Abgabeaufbau (2a) ausgebildet ist, um so angeordnet zu werden, dass die entsprechenden Ausgänge (3) in Kontakt mit der unteren Fläche der Matte (M) im Transit sind.

11. Die Vorrichtung (1) gemäß den Ansprüchen 8 und 10, **dadurch gekennzeichnet, dass** der erste Körper (4) mit mindestens einem Schlitz (16) zum Ablassen eventueller Kondensation versehen ist, die sich in ihm auf dem Boden des zweiten Körpers (6) gebildet hat.

12. Die Vorrichtung (1) gemäß einem oder mehreren der Ansprüche 1-7, **dadurch gekennzeichnet, dass** der Abgabeaufbau (2b) mindestens eine erwärmte Kammer (17) umfasst, die in Kontakt mit mindestens einem der ersten und zweiten Körper (4, 6) angeordnet und in Bezug auf Strömungslehre von der ersten und der zweiten Kammer (5, 7) isoliert ist.

13. Die Vorrichtung (1) gemäß Anspruch 12, **dadurch gekennzeichnet, dass** die Kammer (17) zwischen dem ersten und dem zweiten Körper (4, 6) angeordnet ist, und dadurch, dass die Entlüftungen (12) in entsprechenden Leitungen bestehen, die durch die erwärmte Kammer verlaufen.

14. Die Vorrichtung (1) gemäß Anspruch 13, **dadurch gekennzeichnet, dass** sie in den Entlüftungen (12) angeordnete Umleitungsmittel umfasst, um der Strömung von Fluidmedium entlang jeder der Entlüftungen eine im Wesentlichen schraubenförmige Bewegung zu verleihen.

15. Die Vorrichtung (1) gemäß Anspruch 12 oder 13, **dadurch gekennzeichnet, dass** der erste Körper (4) aus einer Vielzahl rohrförmiger Abschnitte (19) besteht, die miteinander verbunden sind, um eine erste Kammer (5) mit einer nicht geradlinigen Ausdehnung zu bestimmen.

16. Die Vorrichtung (1) gemäß einem oder mehreren der Ansprüche 12-15, **dadurch gekennzeichnet, dass** sie eine Vielzahl von Drosselelementen umfasst, die innerhalb der ersten Kammer (5) untergebracht sind, um der Strömung des Fluidmediums in ihrem Inneren eine Durchwirbelung zu verleihen.

17. Die Vorrichtung (1) gemäß einem oder mehreren der Ansprüche 12-16, **dadurch gekennzeichnet, dass** der Abgabeaufbau (2b) ausgebildet ist, um so positioniert zu werden, dass die entsprechenden Ausgänge (3) an der oberen Fläche der Matratze (M) im Transit angeordnet sind.

18. Die Vorrichtung (1) gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** jeder der Ausgänge (3) eine Form hat, die in die Richtung zusammenläuft, in der er von dem Fluid-Heizmedium durchströmt wird.

Revendications

1. Appareil (1) de chauffage de mats à base de matériau en bois non consolidé, comprenant au moins un ensemble (2a, 2b) de distribution d'un milieu chauffant fluide comprenant de la vapeur sèche saturée, qui est pourvu d'une pluralité de refoulements (3) pour ledit milieu fluide qui sont adaptés pour être positionnés au niveau d'au moins l'une des faces principales d'un mat (M) à base de matériau en bois non consolidé en transit le long d'une direction d'avancement (A), l'ensemble de distribution (2a, 2b) comprenant au moins un corps (4 ; 6) de délimitation d'au moins une chambre (5 ; 7) pour la propagation du milieu fluide, qui est associé et raccordé auxdits refoulements, lesdits refoulements (3) étant associés directement à une paroi (8) dudit corps (6) et **caractérisé en ce que** l'appareil (1) comprend en outre des moyens (9) de chauffage de ladite paroi (8) qui sont associés audit corps (6) et agencés à l'intérieur de ladite chambre (7) directement en contact avec ladite paroi (8), de façon à parvenir à une saturation de la vapeur contenue dans le milieu fluide en sortie des refoulements (3), dans le cas d'une réduction du titre en passant à travers l'ensemble de distribution (2a, 2b) ou de sa surchauffe.

2. Appareil (1) selon la revendication 1, **caractérisé en ce que** ledit ensemble de distribution (2a, 2b) comprend au moins deux desdits corps (4 ; 6), dont au moins un premier corps (4) de délimitation d'au moins une première chambre (5) pour l'arrivée et la propagation dudit milieu fluide associable aux moyens d'apport dudit milieu fluide et au moins un second corps (6) de délimitation d'au moins une seconde chambre (7) pour la propagation et l'écoulement dudit milieu fluide, associé et raccordé auxdits refoulements (3) et à l'intérieur desquels lesdits moyens de chauffage (9) sont disposés, la première chambre (5) et la seconde chambre (7) étant mutuellement raccordées et la seconde chambre (7) ayant un volume plus grand que la première chambre (5) de façon à obtenir une détente isenthalpique de la vapeur contenue dans le milieu chauffant fluide en passant d'une chambre à l'autre, avec une augmentation résultante du titre de ladite vapeur si le titre est réduit en traversant la première chambre (5).

3. Appareil (1) selon la revendication 2, **caractérisé en ce que** lesdits moyens de chauffage (9) sont supportés en contact avec ladite paroi (8) au moyen d'éléments de fixation (11), qui sont réalisés en un matériau thermoconducteur et élastiquement déformable et sont intercalés entre les moyens de chauffage (9) et la paroi (8) de façon à obtenir un transfert supplémentaire de chaleur vers ladite paroi.

4. Appareil (1) selon la revendication 2 ou 3, **caractérisé en ce que** lesdits moyens de chauffage (9) comprennent au moins un conduit (10) pour le passage d'un second milieu chauffant fluide agencé en contact avec ladite paroi (8).

5. Appareil (1) selon la revendication 2 ou 3, **caractérisé en ce que** lesdits moyens de chauffage (9) comprennent au moins une résistance électrique placée en contact avec ladite paroi (8).

6. Appareil (1) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins un évent (12) de raccordement de ladite première chambre (5) à ladite seconde chambre (7) et des moyens diffuseurs (13) qui sont associés audit évent (12) pour la répartition du milieu fluide au sein de ladite seconde chambre.

7. Appareil (1) selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdits premier et second corps (4, 6) ont une structure sensiblement en forme de boîte et sont réalisés en matériau thermoconducteur.

8. Appareil (1) selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdites première et seconde chambres (5, 7) ont un prolongement sensiblement linéaire, le premier corps (4) étant agencé à l'intérieur du second corps (6) et étant pourvu d'une pluralité d'évents (12) constitués d'ouvertures respectives réparties sur sa longueur.

9. Appareil (1) selon les revendications 6 et 8, **caractérisé en ce que** lesdits moyens diffuseurs (13) comprennent un treillis (14) de recouvrement de chaque évent (12) et un diaphragme (15) agencé à l'intérieur de la seconde chambre (7) au niveau de chaque évent (12).

10. Appareil (1) selon la revendication 8 ou 9, **caractérisé en ce que** ledit ensemble de distribution (2a) est adapté pour être agencé de sorte que les refoulements correspondants (3) soient en contact avec la face inférieure dudit mat (M) en transit.

11. Appareil (1) selon les revendications 8 et 10, **caractérisé en ce que** ledit premier corps (4) est pourvu d'au moins une fente (16) d'évacuation de toute condensation qui s'est formée à l'intérieur de celui-ci au fond dudit second corps (6).

12. Appareil (1) selon une ou plusieurs des revendications 1 à 7, **caractérisé en ce que** ledit ensemble de distribution (2b) comprend au moins une chambre chauffée (17), qui est agencée en contact avec au moins l'un desdits premier et second corps (4, 6) et est isolée, en termes de dynamique de fluide, desdites première et seconde chambres (5, 7).

13. Appareil (1) selon la revendication 12, **caractérisé en ce que** ladite chambre (17) est intercalée entre lesdits premier et second corps (4, 6) et **en ce que** lesdits évents (12) sont constitués de conduits respectifs qui passent à travers ladite chambre chauffée.

14. Appareil (1) selon la revendication 13, **caractérisé en ce qu'**il comprend des moyens de réorientation agencés au sein desdits évents (12) de façon à communiquer un mouvement sensiblement hélicoïdal au flux de milieu fluide le long de chacun desdits évents.

15. Appareil (1) selon la revendication 12 ou 13, **caractérisé en ce que** ledit premier corps (4) est constitué d'une pluralité de portions tubulaires (19), qui sont raccordées mutuellement de façon à définir une première chambre (5) avec un prolongement non rectiligne.

16. Appareil (1) selon une ou plusieurs des revendications 12 à 15, **caractérisé en ce qu'**il comprend une pluralité d'éléments déflecteurs qui sont logés à l'intérieur de ladite première chambre (5) de façon à communiquer un mouvement turbulent à l'écoulement du milieu fluide à l'intérieur de celle-ci.

17. Appareil (1) selon une ou plusieurs des revendications 12 à 16, **caractérisé en ce que** ledit ensemble de distribution (2b) est adapté pour être positionné de sorte que les refoulements correspondants (3) soient agencés au niveau de la face supérieure dudit matelas (M) en transit.

18. Appareil (1) selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** chacun desdits refoulements (3) a une forme qui converge dans la direction dans laquelle il est traversé par ledit milieu chauffant fluide.

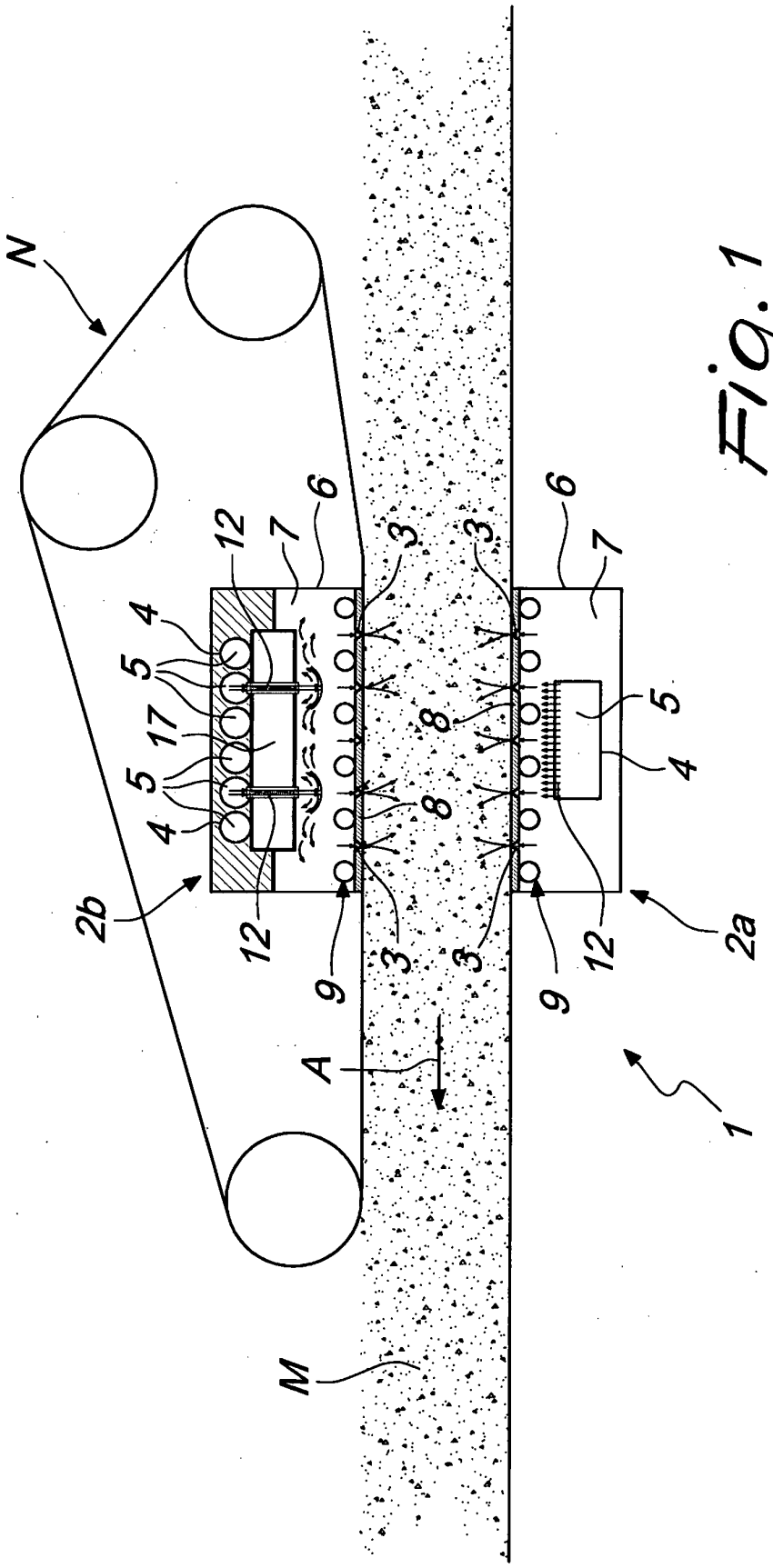


Fig. 1

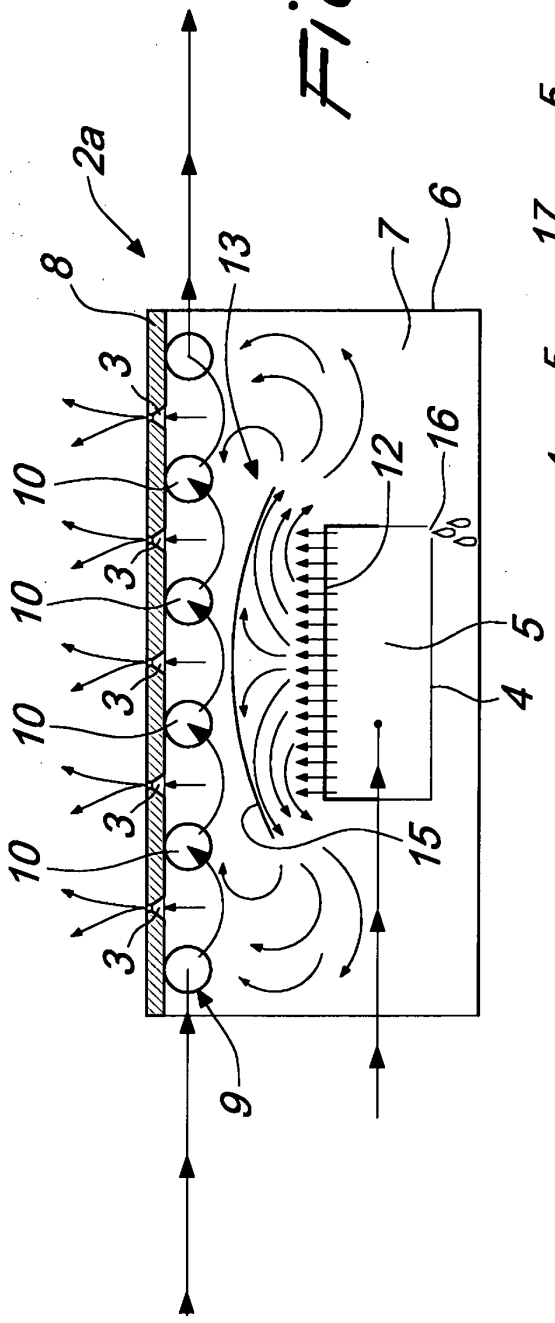


Fig. 2

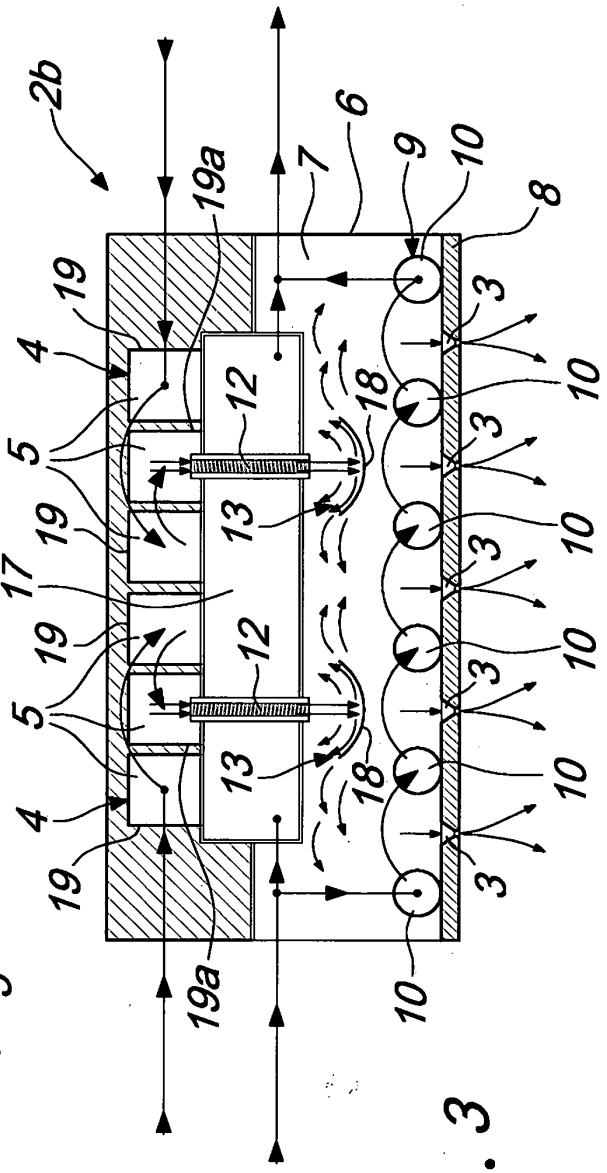


Fig. 3

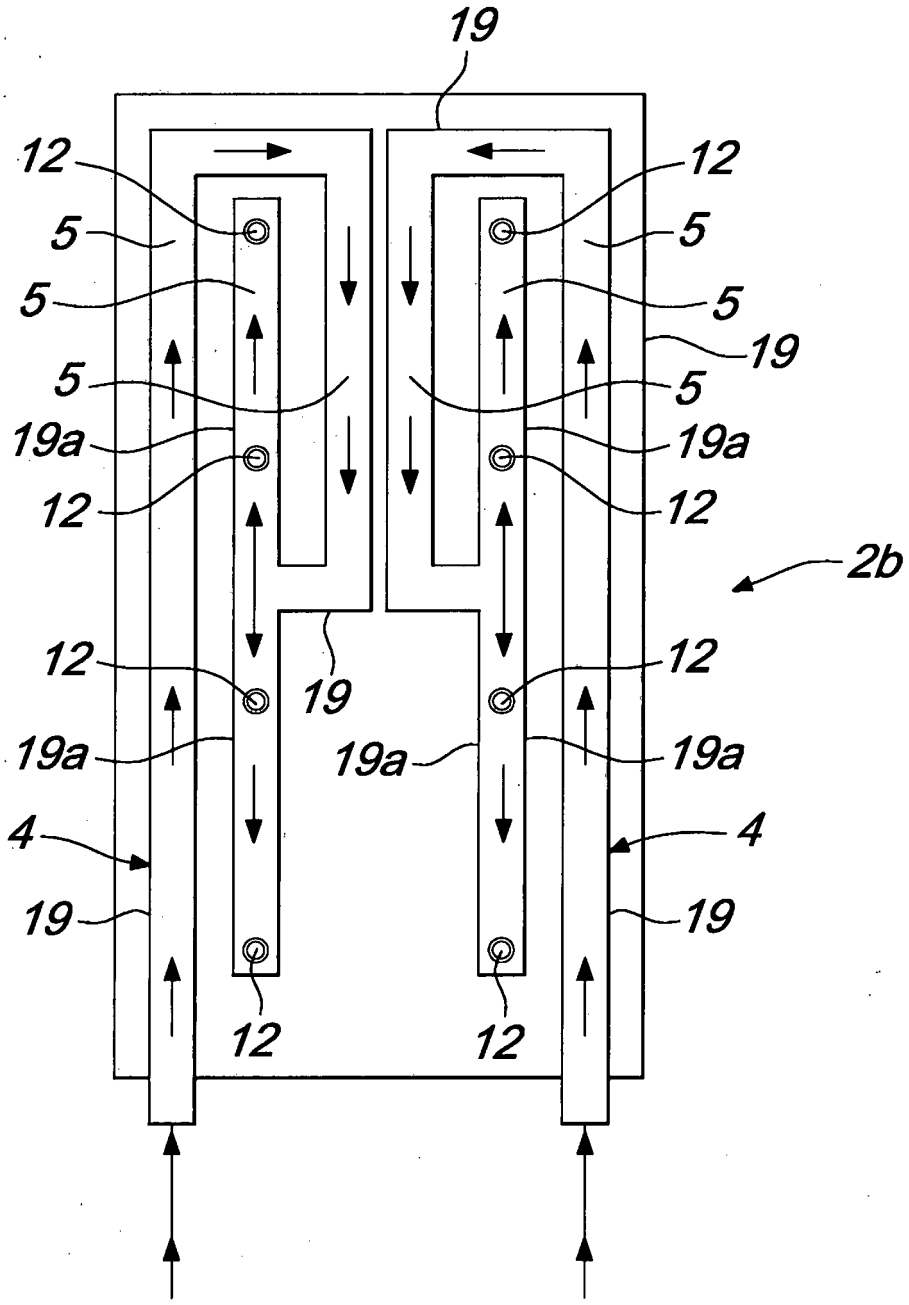

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Fig. 4

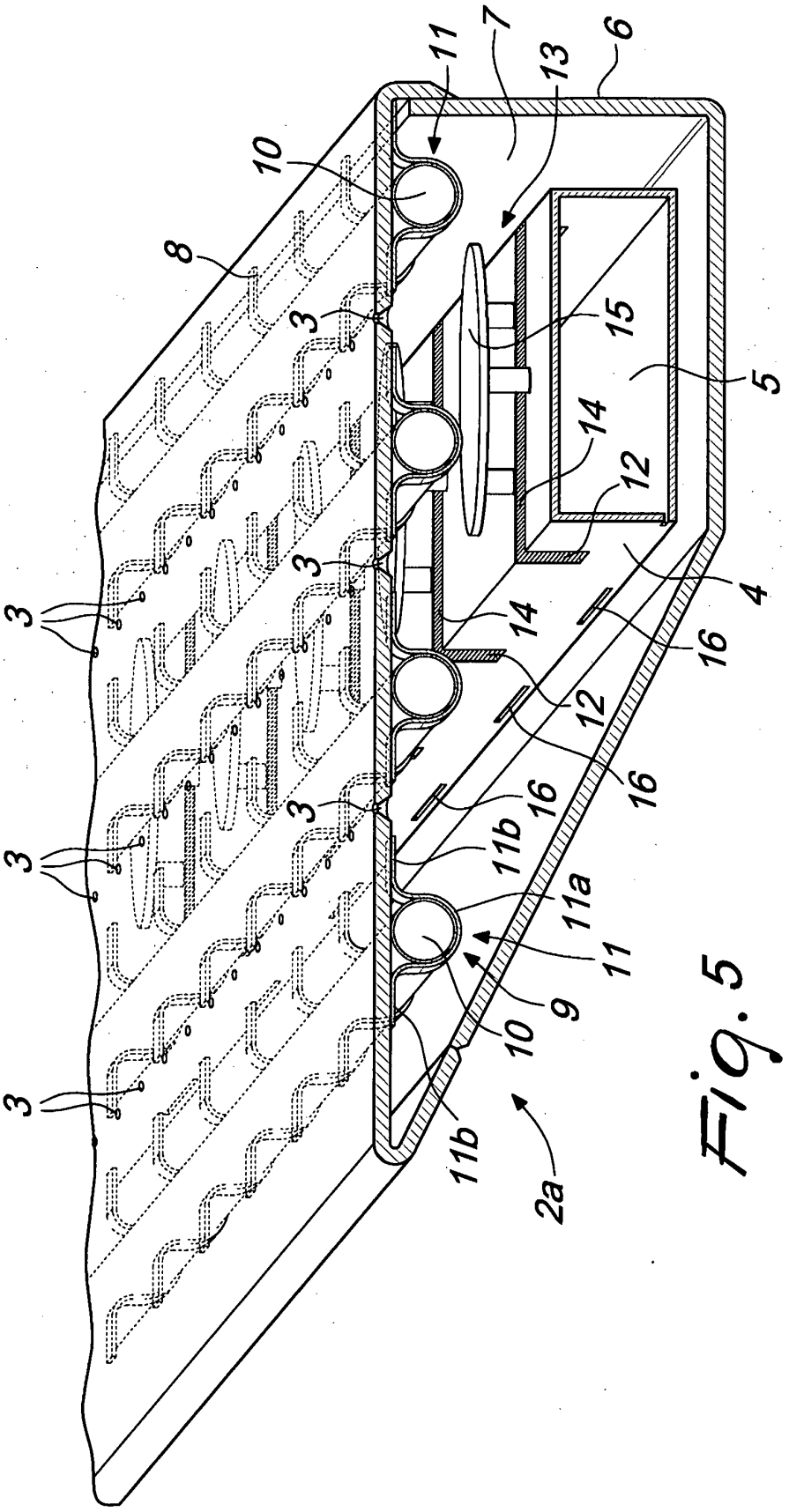


Fig. 5

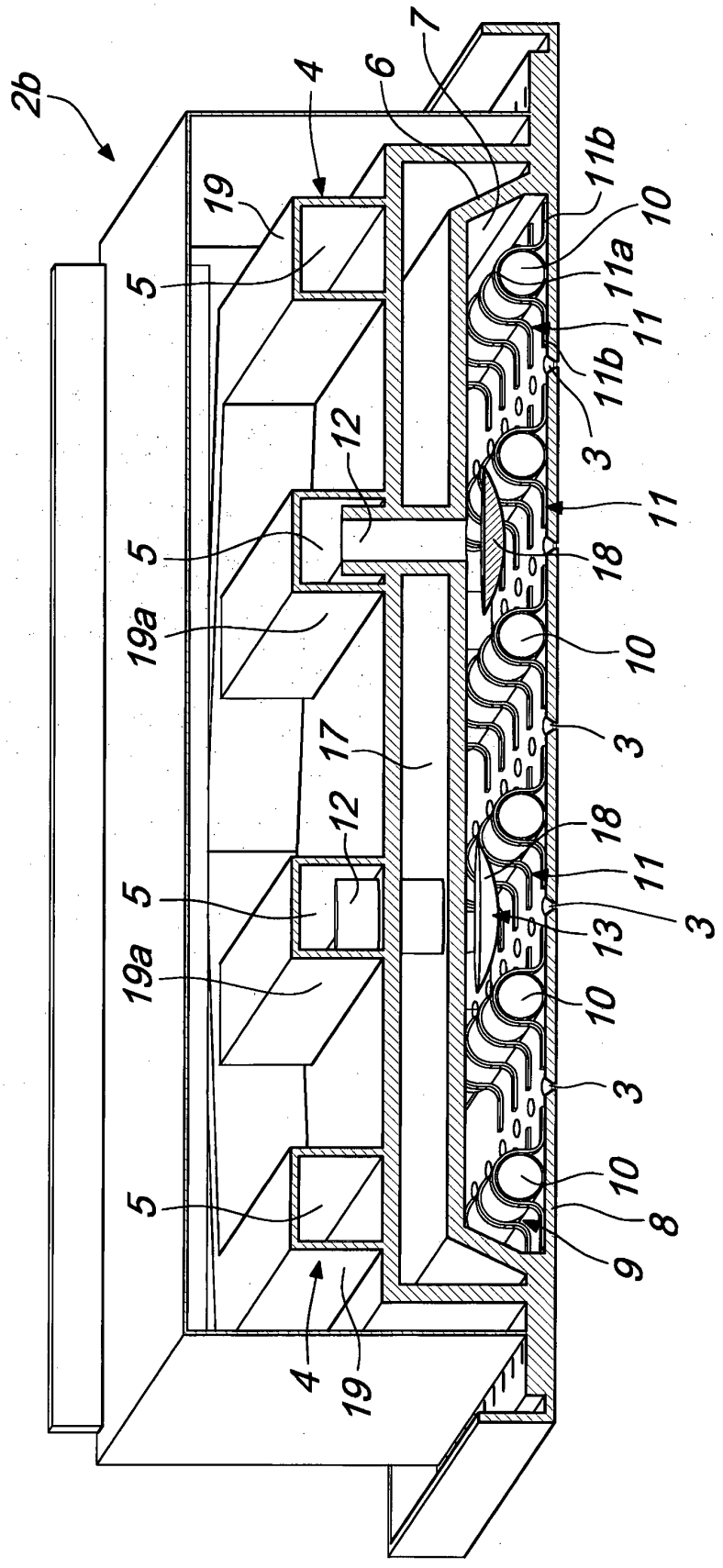


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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