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(54) **INSULATION PRODUCT AND METHOD FOR PRODUCING THE SAME**
ISOLATIONSPRODUKT UND VERFAHREN ZU SEINER HERSTELLUNG
PRODUIT ISOLANT ET SON PROCEDE DE FABRICATION

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Description

[0001] The invention relates to an insulation product comprising a base material of cellulosic pulp wool and additionally a bonding agent bonded with an adhesive to the cellulosic pulp wool.

[0002] The invention also relates to a method for producing an insulation product, in which the base material for the insulation product is formed from cellulosic pulp wool, and a bonding agent to which the cellulosic pulp wool is bonded with an adhesive that is also applied in the method is employed to produce the insulation.

[0003] The known insulation product employing cellulosic pulp wool and the method for producing it are of a kind in which water is sprayed into the cellulosic pulp wool when a building element, such as a wall element, is produced. A significant problem is presented by the fact that the insulation will settle with time, and hence the insulation product will not show sufficient insulation performance. The insulation will settle during storage and transport, and also at the actual installation site. A further disadvantage is that the known approach requires a long time for drying on account of the use of water, which again necessitates large drying halls or other spaces. The building element with inner insulation must be removed from the production line to another location for drying for the time water dries off. Also insulation produced at a construction site requires time for drying on account of the use of water. It is obvious that the known method involves difficulties in production and thereby considerable economic losses. Patent applications DK-B-169 184, FI-A 912537 and WO-A-93/04239 disclose cellulose-based insulation elements, but in the applicant's observation, their materials, properties and methods for their production are not sufficiently effective and practicable, since the heat and moisture transfer capacity of the bonding agent and of the adhesive are not the same as with the base material. In the prior art solutions, the insulation material will not be sufficiently uniformly distributed. In addition to cellulosic pulp wool insulation products, mineral wool and glass wool insulation products are known, which may also be attended by bacterial problems.

[0004] It is an object of the present invention to provide a novel insulation product and a method for producing the same, avoiding the problems related with the prior art solutions.

[0005] This object is achieved with an insulation product of the invention, which is characterized in that the bonding agent is viscose fibre, and that also the adhesive is of a cellulose-based material.

[0006] Said object is achieved with a method in accordance with the invention, which is characterized in that viscose fibre is employed as a bonding agent in manufacturing the insulation product, and that a cellulose-based adhesive material is employed as an adhesive.

[0007] The insulation product and the method for pro-

ducing the same in accordance with the invention are based on the idea that the structure of cellulosic pulp wool is stiffened with a bonding agent adhered to the cellulosic pulp wool with an adhesive. Thus the bonding agent and the adhesive form a kind of a woven supporting structure in the insulation product, and thus the insulation product will not settle. A further basic idea is that all materials employed are ecological, natural materials, for example in such a way that together with a base material of cellulosic pulp wool, viscose fibre which is a cellulose-based material is employed as a bonding agent, and a cellulose-based adhesive, for instance viscose glue, is used as an adhesive. It is not necessary to employ a separate bonding agent and adhesive, but the bonding agent and adhesive may also be in combination when a viscose glue that is fiberized, i.e. forms fibres that serve as a bonding agent or supporting structure, is employed.

[0008] The insulation product and the method for producing the same in accordance with the invention afford several advantages. The insulation product and the method provide a novel, natural, ecological, wood-based, i.e. in practice cellulose-based, solution where-with a wide variety of insulations can be implemented. On account of the bonding, i.e. supporting, structure formed therein, the insulation product of the invention is drip-free, and it is unnecessary to apply water thereto, except for diluting the adhesive. Thus no bacterial growth can occur in the insulation product. The insulation product of the invention is implemented in such a way and with such materials that besides the cellulosic pulp wool also the bonding agent and the adhesive are based on the same material, i.e. cellulose, since in that case the bonding agent and the adhesive have the same heat and moisture transfer capacity as the base material, which will improve the properties of the insulation product. The invention is particularly suitable for implementing a flat insulating board and for realizing an insulation to be furnished within a building element, such as a wall element, but also for implementing an insulation to be produced at a construction site. The insulation material will also be uniformly distributed.

[0009] In the following the invention will be explained in greater detail with reference to the accompanying drawings, in which

Figure 1 is a schematic representation of an apparatus for producing insulating boards by the method of the invention,

Figure 2 is a schematic representation of an apparatus wherewith building elements are insulated by the method of the invention,

Figure 3 shows the construction of a planar insulation product,

Figure 4 shows the treatment of the ends of a planar insulation product,

Figure 5 shows the insulating of a building element in a top view,

Figure 6 shows the insulating of a building element in the direction of arrow A of Figure 5,

Figure 7 shows the construction of the end of an actuator of Figure 5.

[0010] In Figure 1, reference 1 denotes a blower through which a distributed cellulosic pulp wool-viscose fibre insulation material 2 is fed into a funnel 3. The bottom of the funnel 3 is made up by a wire 4 that rotates between rolls 5. Slabs defining the width of the insulating boards are provided on the wire 4 in the longitudinal direction thereof. A distributing conveyor 7 rotating at the speed of the screen conveyor 6 is located at the lower portion of the funnel 3 to rest on rollers 8. Pushers 9 of the distributing conveyor 7 are abutted against the surface of the wire 4 in their lowermost position. Adhesive is sprayed into the insulation mass through adhesive spraying nozzles 10. A lower viscose gauze 11 is supplied from roller 12 onto the wire 4. The cellulosic pulp wool-viscose fibre insulation 2 is sucked with blowers 13 and 14 into a smooth mat on top of the viscose gauze 11 onto which it is glued. The negative pressures produced by the blowers 13 and 14 are equalized with suction boxes 15 and 16 provided below the wire 4. The arrows show the direction of flow. A rotary brush 17 flattens out the thickness of the insulation layer 18. An upper viscose gauze 19 is supplied onto the insulation layer 18 from roller 20 with a screen conveyor 21. Wire 22 presses the viscose gauze 19 onto of the insulation layer 18, and the fabric is glued with adhesive sprayed from the spraying nozzle 10. The adhesive is a cellulose-based adhesive. The wire 22 is located between rolls 23. Air is circulated with a blower 24 through the insulation layer 18, thus effecting drying. The arrows show the flows in supply box 25 and suction box 26. In the flow direction, a condenser unit 28 wherewith water is separated from the air flow and a heater unit 29 heating the drying air are located in circulation conduit 27. The completed insulating board 30 is supplied to rollers 31 for packaging.

[0011] Figure 2 shows the insulation of an element with a cellulosic pulp wool insulation and the apparatus employed for the work, which has the same operating principle as the preceding embodiment. Reference 32 denotes a blower through which the cellulosic pulp wool-viscose fibre insulation 33 is fed into a feed funnel 34. Frame 35 for the element is assembled on table 36, wherefrom the frame 35 is transferred onto a pivoted wire member 37 beneath the feed funnel 34. The wire is denoted by reference 38 and the suction box beneath it by reference numeral 39. A negative pressure is sucked with a blower 40 beneath the wire 38, and the insulation layer for the element will be smoothed. A rotary valve 42 and a low-pressure chamber 43 are provided in conduit 41, by means of which a pulsating negative pressure is generated in the suction box 39. With the pulsating negative pressure, compacting of the cellulosic pulp wool insulation can be enhanced. A rotary

brush 44 moves reciprocally upon the frame 35 of the element and evens out the insulation layer. Extra insulation is sucked away with blower 45 along conduit 46 and is returned through blower 32 into conduit 47 for reuse. Once the insulation has been effected, the feed funnel 34 is lifted away and a lid is nailed or otherwise attached onto the frame of the element. Thereafter the frame 35 of the element is turned onto table 49 with the wire member 37 supported by pivot 48 for attachment of a bottom sheet, whereafter the insulation of the element is complete.

[0012] The insulation method of the invention operates as follows. An insulation based on cellulosic pulp wool with which viscose fibres or equivalent are admixed is distributed onto a wire with compressed air. With a negative pressure provided beneath the wire, the insulation layer is sucked into a smooth, homogeneous and resilient layer. By adapting the negative pressure to be pulsating, the compacting can be enhanced. The thickness of the insulation is evened out with a rotary brush, and extra insulation is removed. With the apparatus shown in Figure 1, insulating board 30 is produced in a continuous process. Cellulosic pulp wool-viscose fibre insulation 2 is blown onto a viscose gauze 11 laid on top of wire 4. Adhesive is sprayed through nozzles 10 into the insulation layer 18, and thus the insulation material adheres to the gauze 11. The insulation layer is cut on distribution conveyor 7 with pushers 9. The insulation layer 18 is evened out with a rotary brush 17, adhesive is sprayed onto the insulation layer with nozzles 10, and an upper viscose gauze 19 is glued on top. The wet insulating board 30 is dried with hot, dried air blown through the board 30. Air is circulated into condenser units 28 provided in conduit 27 and through heater unit 29 with blower 24. A heat pump may also be used for the task. The completed insulating board 30 is removed on rollers 31 for packaging.

[0013] In a second embodiment shown in Figure 2, insulation of a building element operates in principle as a batch process, one element at a time. The frame 35 of the element is assembled on table 36 and is transferred for insulation onto a wire member 37. Funnel 34 is lowered on top of the wire member 37. The negative pressure provided in the suction box 39 beneath the wire 38 will even out the insulation layer (cellulosic pulp wool and viscose) into all locations, also the corners. A vibration effect is produced in the insulation layer by a pulsating negative pressure, produced by rotary valve 42 provided in duct 41. Low-pressure chamber 43 intensifies the effect of the pressure impact. The pulsating negative pressure reduces the power requirement for blower 40. The insulation layer is evened out with a vertically adjustable, reciprocally moving rotary brush 44. Extra insulation is sucked away with blower 45. Feed funnel 34 is lifted into its uppermost position; conduits 46 and 47 are resilient for lifting. A lid is nailed on top of the insulated frame 35; adhesive can be applied to the lid, or adhesive can be sprayed on top of the insulation. The

frame 35 is turned on table 49 with the pivotable wire member, and the same operation is repeated for the bottom.

[0014] It is obvious to one skilled in the art that the insulation method of the invention can be implemented in a wide variety of applications. The amount of adhesive and bonding fibres may be varied. Also the location and number of the adhesive spray nozzles 10 may vary. Different conveyor and transfer solutions are naturally also possible. The surface materials of the insulating board may vary, or they may be entirely omitted. Also the brushes 17 and 44 may be of a type other than the rotary brushes disclosed in the present application.

[0015] Next, the structure of a planar insulation product 430 will be set forth with reference to Figures 3-4. Figure 3 shows an insulating board 430. The insulating board includes two wide side planes 431 and 432 and four smaller end planes 433-436. The insulating board 430 comprises a base material 437, 438 of cellulosic pulp wool in two layers. The insulation product 430 further comprises a bonding agent 439, 440, 441, bonded with an adhesive 442, 440 and 443 to the cellulosic pulp wool 437, 438. Thus the reference 440 denoting the middlemost bonding agent and the middle adhesive layer has two meanings, as the bonding agent and the adhesive may be in combination for example in such a way that viscose glue or other cellulose glue that is fiberized upon drying and thus forms a bonding structure, i.e. a supporting structure, is employed as the adhesive. However, viscose mesh 439 and 441 constitutes the actual bonding agent, i.e. bonding structures that are attached to the cellulosic pulp wool, i.e. cellulosic chips 437 and 438, through adhesive 442 and 443. The cellulosic pulp wool is cotton wood-like, wool-like wood fibre pulp.

[0016] In the invention, besides the cellulosic pulp wool also the bonding agent and the adhesive are of a cellulose-based material, since in such a case all materials of the insulation are based on the same material, and hence the heat and moisture transfer capacity of the bonding agent and of the adhesive are the same as with the base material, i.e. cellulosic pulp wool, thus improving the properties of the insulation. Viscose fibre is employed as a bonding agent, since it is a cellulose-based material and since it has a good insulating capacity. The viscose fibre employed as a bonding agent in the insulation product is viscose yarn, viscose mesh 439, 441, or viscose fibre dried of viscose glue, specifically 440, employed as an adhesive. In the embodiment of Figure 3, the uppermost bonding agent 439 and the lowermost bonding agent 441 are of viscose mesh, because this provides a good bonding structure, i.e. supporting structure, which supports the cellulosic pulp wool 437, 438 and also enables cutting of the insulation product 430. Viscose meshes 439, 441 also give a neat outer surface that withstands handling.

[0017] The adhesive 442, 440, 443 employed in the manufacture of the insulation product is a cellulose-based adhesive, preferably viscose glue, cmc glue or

equivalent. Specifically between the layers of cellulosic pulp wool 437, 438, the adhesive 440, i.e. bonding agent 440, made of viscose glue serves two purposes. Also the upper adhesive 443 and lower adhesive 442 can be contemplated to have two purposes, that is, they form viscose fibre upon drying and hence contribute to making up the bonding structure, i.e. supporting structure, and on the other hand adhere the fibres thereof and also the fibres of the viscose meshes 439, 441 to the cellulosic pulp wool 437, 438.

[0018] At its simplest, the insulation material between the side planes 431, 432 could comprise cellulosic pulp wool into which viscose glue has been sprayed or otherwise introduced, as in that case fibre and also adhesive wherewith the fibre and the cellulosic pulp wool are adhered to one another are simultaneously introduced into the insulation.

[0019] The insulation shown in Figures 3-4 is thus a planar insulating board 430, comprising two wide side planes 431, 432 and four smaller end planes 433-436. As a bonding agent 439, 441 the insulating board comprises at least two viscose meshes 439, 441 between the end planes in the direction of the side planes. Cellulosic pulp wool 437, 438 is provided in the area between said at least two viscose meshes 439, 441 in the insulation product. Adhesive 442 is provided between viscose mesh 439 and cellulosic pulp wool 437. Likewise, adhesive 443 is provided between viscose mesh 441 and cellulosic pulp wool 438.

[0020] In a preferred embodiment, viscose fibre is also provided between the viscose meshes 439, 441 among the cellulosic pulp wool. This can be achieved for example with layer 440. Said structure can also be produced in such a way that for instance viscose yarn is introduced into the cellulosic pulp wool 437, 438 as a continuous yarn or as shorter pieces of yarn. The viscose yarn or other fibre in the cellulosic pulp wool layer 437 and 438 is denoted by reference 450. By adjusting the amount of viscose fibres 450 to be laid in the area between the side planes 431, 432, i.e. in the area between the viscose meshes 439, 441, and by adjusting the amount of adhesive to be employed in connection with the viscose fibres, insulation products of varying grades of hardness can be produced.

[0021] In an embodiment of the invention, a planar insulating board 430 is produced. A viscose mesh made of viscose fibres is employed as a bonding agent 439, 441. Also adhesive layers 442, 440 and 443 serve as a bonding agent for their part, if they are viscose adhesive or other, preferably cellulose-based adhesive that becomes fiberized upon drying.

[0022] Referring now to Figures 3-4, manufacture of a planar insulation product, i.e. the first embodiment of the invention, is set forth. Implementing the apparatus of Figure 1, the insulating board of Figure 3 has been produced in such a way that in the method adhesive 442, preferably viscose glue or other cellulose glue, is applied to a first viscose mesh 439, i.e. bonding agent

439. The next step is to form a cellulosic pulp wool layer 437, i.e. a cellulosic pulp chip layer, on top of the adhesive 442. In that connection, viscose yarn 450 can be admixed with the cellulosic pulp layer 437 with adhesive to serve as a reinforcement, as stated in the foregoing. This is achieved in such a way that viscose fibre 450 treated with adhesive is admixed with the cellulosic pulp wool 437 and/or 438 that will be located between the viscose meshes 439, 441. As a next step, adhesive 440, which will thus also serve as a bonding agent between the layers of cellulosic pulp wool 437, 438, is applied to the cellulosic pulp wool 437. The next step is the forming of a cellulosic pulp wool layer 438, i.e. cellulosic pulp chip layer, upon the adhesive 440. As a next step, a second viscose mesh 441 is laid on top of the adhesive layer 443 as a bonding agent 441. The next step is cutting to size of the continuous insulation band with an actuator, into an insulating board 430 having a given length.

[0023] Figure 4 shows a step in which the ends 433-436 of the insulation product are coated by means of an actuator 460. In a preferred embodiment, the insulation product thus comprises ends 433-436 coated with adhesive, preferably a cellulose-based adhesive, such as viscose glue, and hence the insulation will withstand handling and have better properties. The coating is preferably performed after the cutting, to enable coating of the ends of the insulation product 430 transverse to the production line simultaneously with the lateral ends of the insulation that have the direction of the production line.

[0024] Figures 5-7 illustrate another embodiment of the invention. Figures 5-7 show a building element 100, such as a wall element 100. The building element comprises posts 101 of a frame structure, providing the frame of the building element. The building element further comprises boards 102, 103, closing the building element and forming therewithin a partitioned encased structure 104-107 into which the insulation, now reference numeral 130, can be blown or wherein the insulation can be formed otherwise. The insulation is denoted by reference 130. In Figures 5-6, the building element comprises five frame posts 101, and thus the element comprises four compartments 104-107, the two leftmost compartments 104 and 105 being already blown full of insulation material in Figures 5-6. The third compartment 106 is presently being filled, and the fourth compartment 107 is still empty. In Figure 5, the element is not shown entirely but is shown with the upper edge cut away.

[0025] In the second embodiment of the invention, the insulation 130 is an insulation formed within the encased building element 100.

[0026] In the second embodiment of the invention in Figures 5-7, the apparatus comprises a production line 201 upon which the insulation is built into the element. The production line comprises for instance conveyor belts 202 rotating between rolls 203 and producing a leftward movement in the direction of arrow C i Figure

6. The apparatus further comprises an actuator 210 wherewith the materials employed in the production of the insulation 130 can be blown in or otherwise introduced into the element 100. The actuator 210 comprises a transfer element 211 wherewith the actuator 210 can be transferred both in the longitudinal and in the transverse direction relative to the element 100 and the production line, in order for the insulation 130 to fill the inner space of the element 100 as well as possible, also the possible dead spaces. In Figure 5, the apparatus also comprises a compacting member 700 wherewith the insulation material blown into the building element can be compacted still further. The apparatus also comprises a feeding device 800 through which the materials can be fed into the actuator 210.

[0027] Both the first and the second embodiment involve a method for manufacturing an insulation product 430 or 130. The base material of the insulation product 430, 130 is thus constituted by cellulosic pulp wool. In the method, a bonding agent, such as viscose fibre directly in the form of fibres and/or in the form of viscose glue is employed in the manufacture of the insulation product. The cellulosic pulp wool is bonded to the bonding agent with adhesive employed in the method, which in fact may be the same bonding agent/adhesive that forms fibres upon drying.

[0028] In a preferred embodiment, viscose fibre or other cellulose-based bonding agent is employed as a bonding agent in the manufacture of the insulation product, such as 430, 130. Likewise, a cellulose-based adhesive, such as viscose glue, cmc glue or equivalent, that becomes fiberized upon drying is employed as an adhesive, and thus in simple versions of the invention no separate bonding agent, such as viscose yarn, need be employed, though the advantages of the invention are enhanced with the use of viscose yarn or other solid viscose fibre or an equivalent cellulosic fibre.

[0029] In Figures 5-7, the base material, i.e. the cellulosic pulp wool or cellulosic pulp chips, is denoted by reference 237, the bonding agent, such as viscose yarn, is denoted by reference 239, and the adhesive, such as viscose glue or other cellulose glue, is denoted by reference 240.

[0030] In Figure 7, the actuator 210 is such that it comprises a feeding device 212, such as a screw conveyor 212, for feeding cellulosic pulp wool 237, a second feeding device 213 for feeding bonding agent 239, such as viscose fibre 239, and a third feeding device 214 for feeding adhesive 240, such as viscose glue 240. The actuator 210 incorporates a rotary nozzle 210a centrally at the end of screw 212, through which nozzle the bonding agent 239 and adhesive 240 are fed, simultaneously rotating the nozzle 210a. Herein the method is preferably such that the bonding agent 239 and adhesive 240 are fed into the centre of the cellulosic pulp wool flow 237 in such a way that the flow of bonding agent 239, i.e. fibre flow 239, and the flow of adhesive 240 are rotated, which makes the materials to become scattered/dis-

tributed effectively.

[0031] The second embodiment of the invention in Figures 5-7 thus relates to the fact that in the method an insulation 130 is produced within the building element 100. The base material for the insulation 130 is formed from cellulosic pulp wool 237. A bonding agent 239, such as viscose fibre 239 in the form of a long or shorter yarn, to which the cellulosic pulp wool is bonded by adhesive 240 also applied in the method, is employed to produce the insulation. At its simplest, the method is such that the bonding agent 239, such as viscose yarn 239, is treated with adhesive 240 prior to its being blown into the cellulosic pulp wool 237. The fibre 239 is cut at the nozzle 210a.

[0032] The actuator 210, 210a is moved relative to the element 100 or vice versa, and thus the actuator 210, 210a weaves the bonding agent 239, utilizing adhesive 240, into the cellulosic pulp wool 237.

[0033] In Figures 5-7, initially adhesive 240 is applied to the interior of the building element 100, whereafter cellulosic pulp wool 237, bonding agent 239 and adhesive 240 are blown substantially simultaneously into the building element 100 with the actuator 210, 210a.

[0034] The initial application of adhesive to the empty element has the result that the insulation 130 comprises bonding sites 400 between the building element 100 and the insulation 130, which will prevent settling of the insulation 130 even better than heretofore.

[0035] Since compressed air is used for blowing the materials into the element 100, the overpressure, i.e. circulated air, must be removed using the same flow path and evacuation means 500. Cellulosic pulp wool dust can be collected from the circulated air and reused when necessary.

[0036] Also the embodiment of Figures 5-7 can utilize the arrangement of Figure 2, in which an air-pervious wire and negative pressure suction are used. In that case, the procedure is such that the boards 102, 103 or equivalent closing means are fastened to the element only as a last step, that is, after the insulation has been spread.

[0037] Even though the invention has been described in the foregoing with reference to examples in accordance with the accompanying drawings, it is obvious that the invention is not restricted to them, but it can be modified in a variety of ways within the scope of the inventive idea as defined by the attached claims.

Claims

1. An insulation product comprising a base material of cellulosic pulp wool (437, 439) and additionally a bonding agent (439, 440, 441) bonded with an adhesive (442, 440, 443) to the cellulosic pulp wool (437, 439), **characterized in that** the bonding agent is viscose fibre, and that also the adhesive is of a cellulose-based material.

2. An insulation product as claimed in claim 1, **characterized in that** the viscose fibre employed as a bonding agent in the insulation product is viscose yarn, viscose mesh, or viscose fibre dried of viscose glue employed as an adhesive.

3. An insulation product as claimed in any one of the preceding claims, **characterized in that** the cellulose-based adhesive employed in the production of the insulation product is viscose glue, cmc glue or equivalent.

4. An insulation product as claimed in any one of the preceding claims 1-3, **characterized in that** the insulation product is a planar insulating board (430) comprising two wide side planes (431, 432) and four smaller end planes (433-436), and that as a bonding agent the insulating board (430) comprises at least two viscose meshes (439, 441) between the end planes (433-436), having the direction of the side planes (431, 432), and that the insulation product has cellulosic pulp wool (437, 438) between said at least two viscose meshes (439, 441), and that adhesive (442) is provided between viscose mesh (439) and cellulosic pulp wool (437), and that viscose fibre (450, 440) is preferably also provided in the cellulosic pulp wool (437, 439) between the viscose meshes (439, 441).

5. An insulation product as claimed in any one of the preceding claims 1-3, **characterized in that** the insulation is an insulation (130) formed within a building element (100), that the insulation (130) comprises bonding sites (400) between the building element (100) and the insulation (130), said bonding sites being formed with adhesive (240).

6. A method for producing an insulation product, in which the base material for the insulation product is formed from cellulosic pulp wool (437, 438), and in the method for producing the insulation product a bonding agent (439, 440, 441) is used to which the cellulosic pulp wool (437, 438) is bonded with an adhesive (442, 440, 443) that is also applied in the method, **characterized in that** viscose fibre is employed as the bonding agent in manufacturing the insulation product, and that a cellulose-based adhesive material is employed as the adhesive.

7. A method as claimed in claim 6, **characterized in that** viscose glue, cmc glue or equivalent is employed as the adhesive.

8. A method as claimed in claim 6, in which the insulation is distributed as a smooth and homogeneous layer into the application to be insulated, such as an element or insulating board, **characterized by**

- spreading the insulation (2, 33) distributed by compressed air onto an air-pervious plane, such as a viscose gauze (11) and/or wire (4, 38), a negative pressure being generated therebeneath that distributes the insulation (2, 33) uniformly and produces a compression and friction between the fibres of the insulation (2, 33).
9. A method as claimed in claim 8, **characterized in that** the method employs an apparatus having upper and lower screen conveyors (21, 6) adapted as feed conveyors of an upper and lower viscose gauze (19, 11) or equivalent.
10. A method as claimed in claim 8, **characterized in that** said negative pressure is pulsating to enhance the application of the insulation (2, 33).
11. A method as claimed in claim 8, **characterized by**
- adjusting the thickness of the insulation layer with adjustment means, preferably a rotary brush or equivalent, having an adjustable vertical position, and removing the insulation (2, 33) separated by said adjustment means (17, 44) or evening out the insulation layer with said adjustment means.
12. A method as claimed in claim 8, **characterized in that** the insulation layer (18) including adhesive and surface layers attached thereto, such as viscose gauze (11, 19) or equivalent, are dried by conducting dried and/or heated air through them.
13. A method as claimed in claim 12, **characterized in that** the air drying of the insulating board (30) forms a closed circulation loop (24, 25, 26, 27, 28, 29).
14. A method as claimed in claim 8, **characterized in that** to compact the upper surface of the insulation, extra thickness is left which is compacted by compression by a wire, air pressure, a sheet/slab or an equivalent method.
15. A method as claimed in claim 6, **characterized in that** a planar insulating board (430) is produced in the process, and that a viscose mesh (439, 441) formed from viscose fibres is employed as the bonding agent, that in the process a first viscose mesh (439) is laid onto the production line for insulation, adhesive (440) and cellulosic pulp wool (437) are applied on top of this mesh, on top of which adhesive is again applied, on top of which a second viscose mesh (441) is applied.
16. A method as claimed in claim 15, **characterized in that** adhesive and viscose fibre (450, 440) are admixed with the cellulosic pulp wool (437) that will be

located between the viscose meshes (439, 441).

17. A method as claimed in claim 6, in which building elements or equivalent are insulated, and the method employs an apparatus that comprises feeding devices (32, 47) for insulation (33), blowers (32, 40, 45), tables (36, 49), a feed funnel (34) and a wire member (38), **characterized in that** an element frame (35) assembled on table (36) is fitted on the wire member (37), the negative pressure of a suction box (39) beneath the wire member distributing the insulation (33), and that the negative pressure is adapted to be pulsating by means of a rotary valve (42) disposed in conduit (41) and a low-pressure chamber (43).

18. A method as claimed in claim 17, **characterized in that** the method employs an apparatus in which the feed funnel (34) can be lifted up, and that the wire member (37) is articulated with a joint (48) to be turnable onto table (49) in order that a bottom sheet and a lid may be attached to the element frame (35).

Patentansprüche

1. Isolationsprodukt aufweisend ein Basismaterial aus Cellulosebrei (engl. cellulosic pulp wool) (437, 439) und zusätzlich ein Bindungsmittel (439, 440, 441), welches mit einem Kleber (442, 440, 443) an den Cellulosebrei (engl. cellulosic pulp wool) gebunden ist, dadurch gekennzeichnet, daß das Bindungsmittel eine Viskosefaser ist und daß der Kleber auch ein Material auf Cellulosebasis ist.
2. Isolationsprodukt, wie in Anspruch 1 beansprucht, dadurch gekennzeichnet, daß die als Bindungsmittel in dem Isolationsprodukt verwendete Viskosefaser ein Viskose-Garn, ein Viskose-Netz oder eine Viskose-Faser ist, wobei der Viskosekleber, der als Kleber verwendet wurde, durch Trocknen entfernt wurde.
3. Isolationsprodukt, wie in irgendeinem der vorangehenden Ansprüche beansprucht, dadurch gekennzeichnet, daß der zur Herstellung des Isolationsproduktes verwendete Kleber auf Cellulosebasis ein Viskose-Kleber, ein cmc-Kleber (engl. cmc glue) oder ein Äquivalent ist.
4. Isolationsprodukt, wie in irgendeinem der vorangehenden Ansprüche 1 - 3 beansprucht, dadurch gekennzeichnet, daß das Isolationsprodukt ein planares Isolationsbrett (430) ist, welches zwei breite Seitenflächen (431, 432) und vier kleinere Endflächen (433 - 436) aufweist, und daß das Isolationsbrett (430) als Bindungsmittel mindestens zwei Viskose-Netze (439, 441) zwischen den Endflächen

- (433 - 436) aufweist, die die Ausrichtung der Seitenflächen (431, 432) haben, und daß das Isolationsprodukt zwischen den mindestens zwei Viskose-Netzen (439, 441) Cellulosebrei (engl. cellulosic pulp wool) (437, 438) enthält und daß der Kleber (442) zwischen dem Viskose-Netz (439) und dem Cellulosebrei (engl. cellulosic pulp wool) (437) zur Verfügung gestellt wird, und daß die Viskose-Faser (450, 440) vorzugsweise auch im Cellulosebrei (engl. cellulosic pulp wool) (437, 439) zwischen den Viskose-Netzen (439, 441) zur Vertüfung gestellt wird.
5. Isolationsprodukt, wie in irgendeinem der vorangehenden Ansprüche 1 - 3 beansprucht, dadurch gekennzeichnet, daß die Isolation eine Isolation (130) ist, die innerhalb eines Gebäudeelementes (100) gebildet wird, und daß die Isolation (130) zwischen dem Gebäudeelement (100) und der Isolation (130) Bindungsstellen (400) aufweist, wobei die Bindungsstellen mit Hilfe des Klebers (240) gebildet werden.
 6. Verfahren zur Herstellung eines Isolationsproduktes, in welchem das Basismaterial für das Isolationsprodukt aus Cellulosebrei (engl. cellulosic pulp wool) (437, 438) gebildet ist, und in der Methode zur Herstellung des Isolationsproduktes ein Bindungsmittel (439, 440, 441) verwendet wird, an welches Cellulosebrei (engl. cellulosic pulp wool) (437, 438) mit einem Kleber (442, 440, 443) gebunden wird, der auch in dem Verfahren verwendet wird, dadurch gekennzeichnet, daß Viskose-Faser als das Bindungsmittel bei der Herstellung des Isolationsproduktes verwendet wird, und daß Kleber-Material auf Cellulosebasis als Kleber verwendet wird.
 7. Verfahren, wie in Anspruch 6 beansprucht, dadurch gekennzeichnet, daß Viskose-Kleber, cmc-Kleber (engl. cmc glue) oder Äquivalente als Kleber verwendet werden.
 8. Verfahren, wie in Anspruch 6 beansprucht, in welchem die Isolation als weiche und homogene Schicht in die zu isolierende Anwendung, wie ein Element oder Isolationsbrett, eingebracht wird, dadurch gekennzeichnet, daß
 - man die eingebrachte Isolation (2, 33) mittels Druckluft auf einer luftdurchlässigen Fläche, wie Viskose-Mull (11) und / oder Kabel (4, 38) aufträgt, wobei ein negativer Druck darunter erzeugt wird, der die Isolation (2, 33) einheitlich verteilt und eine Kompression und Friktion zwischen den Fasern der Isolation (2, 33) erzeugt.
 9. Verfahren, wie in Anspruch 8 beansprucht, dadurch gekennzeichnet, daß das Verfahren eine Vorrichtung verwendet, die obere und untere Abtrenn-Fördersysteme (21, 6) besitzt, die als Zuführ-Fördersysteme von einem oberen und unteren Viskose-Mull (19, 11) oder einem Äquivalent ausgelegt sind.
 10. Verfahren, wie in Anspruch 8 beansprucht, dadurch gekennzeichnet, daß der negative Druck pulsiert, um die Anwendung der Isolation (2, 33) zu verbessern.
 11. Verfahren, wie in Anspruch 8 beansprucht, dadurch gekennzeichnet, daß
 - man an die Dicke der Isolationsschicht mit Anpassungs-Hilfsmitteln anpasst, vorzugsweise einer rotierenden Bürste oder einem Äquivalent, die eine anpassbare vertikale Position haben, und die Isolation (2, 33), die durch die Anpassungs-Hilfsmittel (17, 44) abgetrennt wurden, entfernt oder die Isolationsschicht mit den Anpassungs-Hilfsmitteln nivelliert.
 12. Verfahren, wie in Anspruch 8 beansprucht, dadurch gekennzeichnet, daß man die Isolationsschicht (18) einschließlich Kleber und daran befestigten Oberflächen-Schichten, wie Viskose-Mull (11, 19) oder Äquivalenten, trocknet, indem man getrocknete und / oder erwärmte Luft durch sie leitet.
 13. Verfahren, wie in Anspruch 12 beansprucht, dadurch gekennzeichnet, daß die Luft zur Trocknung des Isolationsbrettes (30) einen geschlossenen Kreislauf (24, 25, 26, 27, 28, 29) bildet.
 14. Verfahren, wie in Anspruch 8 beansprucht, dadurch gekennzeichnet, daß man zur Kompaktierung der oberen Oberfläche der Isolation zusätzliche Dicke zurückläßt, welche durch Kompression mittels eines Kabels, Luftdruck, einer Schicht / einer Kautschukplatte oder einer äquivalente Methode kompaktiert wird.
 15. Verfahren, wie in Anspruch 6 beansprucht, dadurch gekennzeichnet, daß ein planares Isolationsbrett (430) in dem Verfahren produziert wird, und daß ein aus Viskose-Fasern hergestelltes Viskose-Netz (439, 441) als Bindungshilfsmittel verwendet wird, daß in dem Verfahren ein erstes Viskose-Netz (439) auf die Produktionslinie für die Isolation gelegt wird, Kleber (440) und Cellulosebrei (engl. cellulosic pulp wool) (437) oben auf dieses Netz aufgetragen werden, worauf dann wiederum Kleber aufgetragen wird, worauf dann ein zweites Viskose-Netz (441) aufgetragen wird.
 16. Verfahren, wie in Anspruch 15 beansprucht, dadurch gekennzeichnet, daß der Kleber und die Viskose-Faser (450, 440) mit dem Cellulosebrei (engl.

cellulosic pulp wool) (437) vermischt werden, der zwischen den Viskose-Netzen (439, 441) angeordnet sein wird.

17. Verfahren, wie in Anspruch 6 beansprucht, in welchem Gebäudeelemente oder Äquivalente isoliert werden, und das Verfahren eine Vorrichtung verwendet, die Zuführeinrichtungen (32, 47) für die Isolation (33), Ventilatoren (32, 40, 45), Tische (36, 49), einen Zuführtrichter (34) und ein Kabelteil (38) aufweist, dadurch gekennzeichnet, daß ein Rahmenelement (35), welches auf dem Tisch (36) angeordnet ist, auf das Kabelteil (37) gesteckt wird, der negative Druck eines Saugkastens (39) unter dem Kabelteil die Isolation (33) verteilt, und daß der negative Druck unter Verwendung eines rotierenden Ventils (42), welches in einem Rohr (41) angeordnet ist, und einer Niederdruckkammer (43) pulsierend angewendet wird.
18. Verfahren, wie in Anspruch 17 beansprucht, dadurch gekennzeichnet, daß die Methode eine Vorrichtung verwendet, bei welcher der Zuführtrichter (34) angehoben werden kann, und daß das Kabelteil (37) knickbar mit einer Verbindung (48) ist, die auf den Tisch (49) gedreht werden kann, damit eine Bodenschicht und ein Deckel an das Rahmenelement (35) angebracht werden können.

Revendications

1. Produit isolant comprenant un matériau de base de laine de pâte cellulosique (437, 439) et, en outre, un agent liant (439, 440, 441) lié avec un adhésif (442, 440, 443) à la laine de pâte cellulosique (437, 439), caractérisé en ce que l'agent liant est constitué de fibres de viscose et en ce que l'adhésif est également constitué d'un matériau à base de cellulose.
2. Produit isolant selon la revendication 1, caractérisé en ce que les fibres de viscose utilisées comme agent liant dans le produit isolant sont constituées de fils de viscose, de filets de viscose ou de fibres de viscose séchées en utilisant de la colle de viscose comme adhésif.
3. Produit isolant selon l'une quelconque des revendications précédentes, caractérisé en ce que l'adhésif à base de cellulose utilisé dans la production du produit isolant est de la colle de viscose, de la colle cmc ou une colle équivalente
4. Produit isolant selon l'une quelconque des revendications 1-3, caractérisé en ce que le produit isolant est un panneau isolant plan (430) comprenant deux plans latéraux larges (431, 432) et quatre plans

d'extrémité plus petits (433, 436), en ce que, comme agent liant, le panneau isolant (430) comprend au moins deux filets de viscose (439, 441) entre les plans d'extrémité (433-436), ayant la direction des plans latéraux (431, 432), en ce que le produit isolant a de la laine de pâte cellulosique (437, 438) entre lesdits au moins deux filets de viscose (439, 441), en ce qu'un adhésif (442) est appliqué entre le filet de viscose (439) et la laine de pâte cellulosique (437), et en ce que les fibres de viscose (450, 440) sont de préférence également appliquées dans la laine de pâte cellulosique (437, 439) entre les filets de viscose (439, 441).

5. Produit isolant selon l'une quelconque des revendications précédentes 1-3, caractérisé en ce que l'isolation est une isolation (130) formée dans un élément de construction (100), en ce que l'isolation (130) comprend des sites de liaison (400) entre l'élément de construction (100) et l'isolation (130), lesdits sites de liaison étant formés par de l'adhésif (240).
6. Procédé de production d'un produit isolant, dans lequel le matériau de base pour le produit isolant est formé de laine de pâte cellulosique (437, 438) et, dans le procédé de production du produit isolant, on utilise un agent liant (439, 440, 441) auquel la laine de pâte cellulosique (437, 438) est liée par un adhésif (442, 440, 443) qui est également appliqué dans le procédé, caractérisé en ce que des fibres de viscose sont utilisées comme agent liant dans la fabrication, du produit isolant, et en ce qu'un matériau adhésif à base de cellulose est utilisé comme adhésif.
7. Procédé selon la revendication 6, caractérisé en ce qu'on utilise comme adhésif de la colle de viscose, de la colle cmc ou une colle équivalente.
8. Procédé selon la revendication 6, dans lequel l'isolation est répartie sous la forme d'une couche lisse et homogène dans l'application à isoler, telle qu'un élément ou un panneau isolant, caractérisé par l'étape consistant :
 - à étaler l'isolation (2, 33) distribuée par de l'air comprimé sur un plan perméable à l'air, tel qu'une gaze (11) et/ou un filet de viscose (4, 38), une pression négative étant générée en dessous pour répartir l'isolation (2, 33) uniformément et produire une compression et une friction entre les fibres de l'isolation (2, 33).
9. Procédé selon la revendication 8, caractérisé en ce que le procédé utilise un appareil ayant des transporteurs à treillis supérieur et inférieur (21, 26) qui sont adaptés pour former des transporteurs d'ali-

mentation en gazes de viscose supérieure et inférieure (19, 11) ou équivalentes.

10. Procédé selon la revendication 8, caractérisé en ce que ladite pression négative est pulsée pour améliorer l'application de l'isolation (2, 33). 5
11. Procédé selon la revendication 8, caractérisé par l'étape consistant : 10
 - à ajuster l'épaisseur de la couche isolante par des moyens d'ajustement, de préférence une brosse rotative ou équivalente, ayant une position verticale ajustable, et à retirer l'isolation (2, 33) séparée par lesdits moyens d'ajustement (17, 44) ou à égaliser la couche isolante par lesdits moyens d'ajustement. 15
12. Procédé selon la revendication 8, caractérisé en ce que la couche isolante (18) y compris l'adhésif et les couches de surface qui lui sont fixées, telles que de la gaze de viscose (11, 19) ou équivalente, sont séchées en acheminant de l'air séché et/ou chauffé à travers celles-ci. 20
13. Procédé selon la revendication 12, caractérisé en ce que le séchage à l'air du panneau isolant (30) forme une boucle à circulation fermée (24, 25, 26, 27, 28, 29). 25
14. Procédé selon la revendication 8, caractérisé en ce que, pour compacter la surface supérieure de l'isolation, il reste une épaisseur supplémentaire qui est compactée par compression au moyen d'un treillis métallique, d'une pression d'air, d'une feuille/dalle ou d'un procédé équivalent. 30
15. Procédé selon la revendication 6, caractérisé en ce qu'un panneau isolant plan (430) est produit dans le procédé, en ce qu'un filet de viscose (439, 441) formé de fibres de viscose est utilisé comme agent liant, en ce que, dans le procédé, un premier filet de viscose (439) est déposé sur la chaîne de production de l'isolation, l'adhésif (440) et la laine de pâte cellulosique (437) sont appliqués par-dessus ce filet sur la partie supérieure duquel est à nouveau appliqué un adhésif, sur la partie supérieure duquel est appliqué un second filet de viscose (441). 40
16. Procédé selon la revendication 15, caractérisé en ce que l'adhésif et les fibres de viscose (450, 440), sont mélangées à la laine de pâte cellulosique (437) qui sera située entre les filets de viscose (439, 441). 45
17. Procédé selon la revendication 6, dans lequel des éléments de construction ou équivalents sont isolés et le procédé utilise un appareil qui comprend des dispositifs d'alimentation (32, 47) pour l'isolation 50

(33), des souffleries (32, 40, 45), des tables (36, 49), un entonnoir d'alimentation (34) et un élément en treillis (38), caractérisé en ce qu'un châssis élémentaire (35) assemblé sur la table (36) est ajusté sur l'élément en treillis (37), la pression négative d'une boîte aspirante (39) située en dessous de l'élément en treillis distribuant l'isolation (33), et en ce que la pression négative est adaptée à être pulsée au moyen d'une soupape rotative (42) disposée dans la conduite (41) et dans une chambre sous faible pression (43).

18. Procédé selon la revendication 17, caractérisé en ce que le procédé utilise un appareil dans lequel l'entonnoir d'alimentation (34) peut être relevé et en ce que l'élément de treillis (37) est articulé avec un joint (48) de manière à pouvoir tourner sur la table (49) afin qu'une feuille inférieure et un couvercle puissent être fixés au châssis élémentaire (35). 55

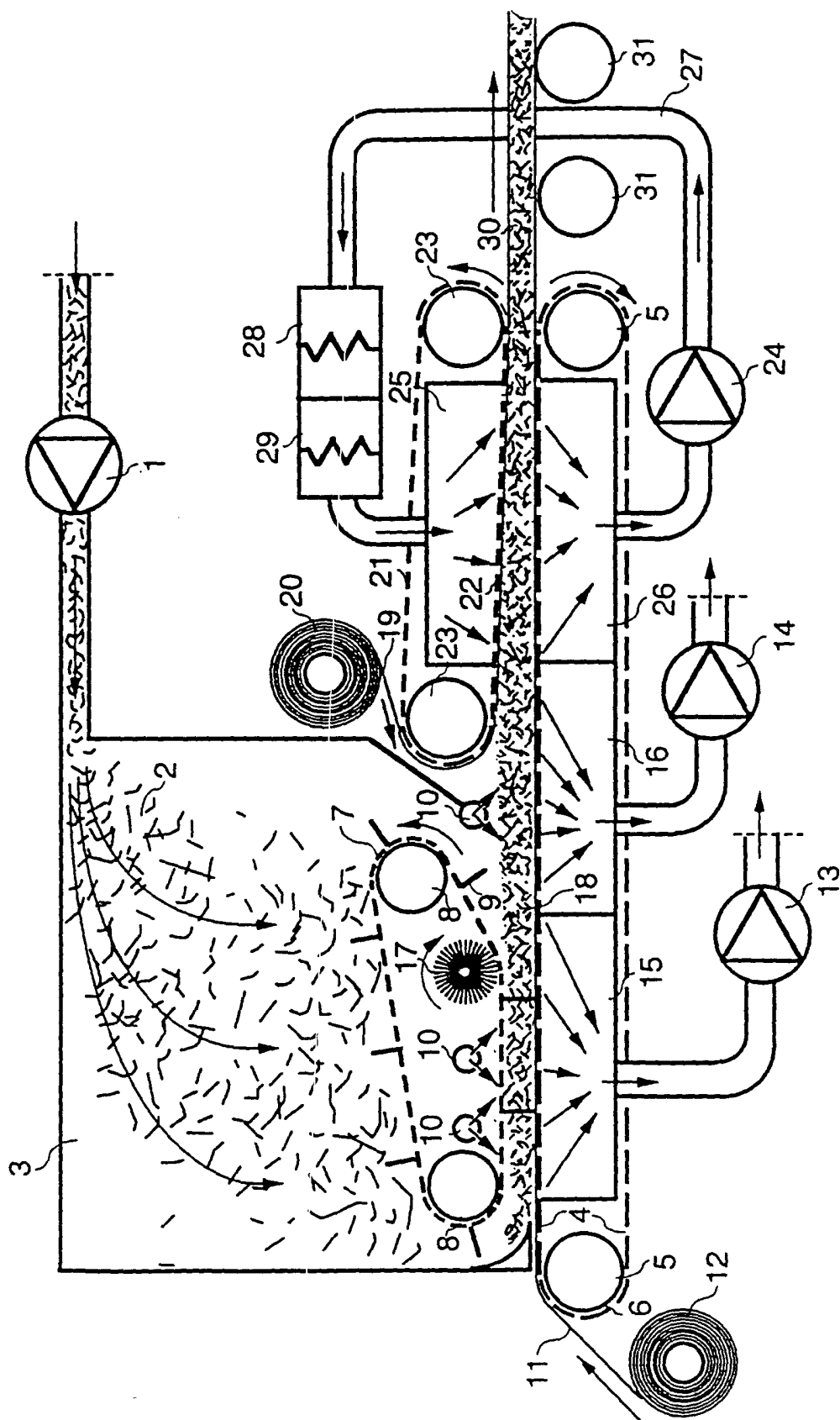
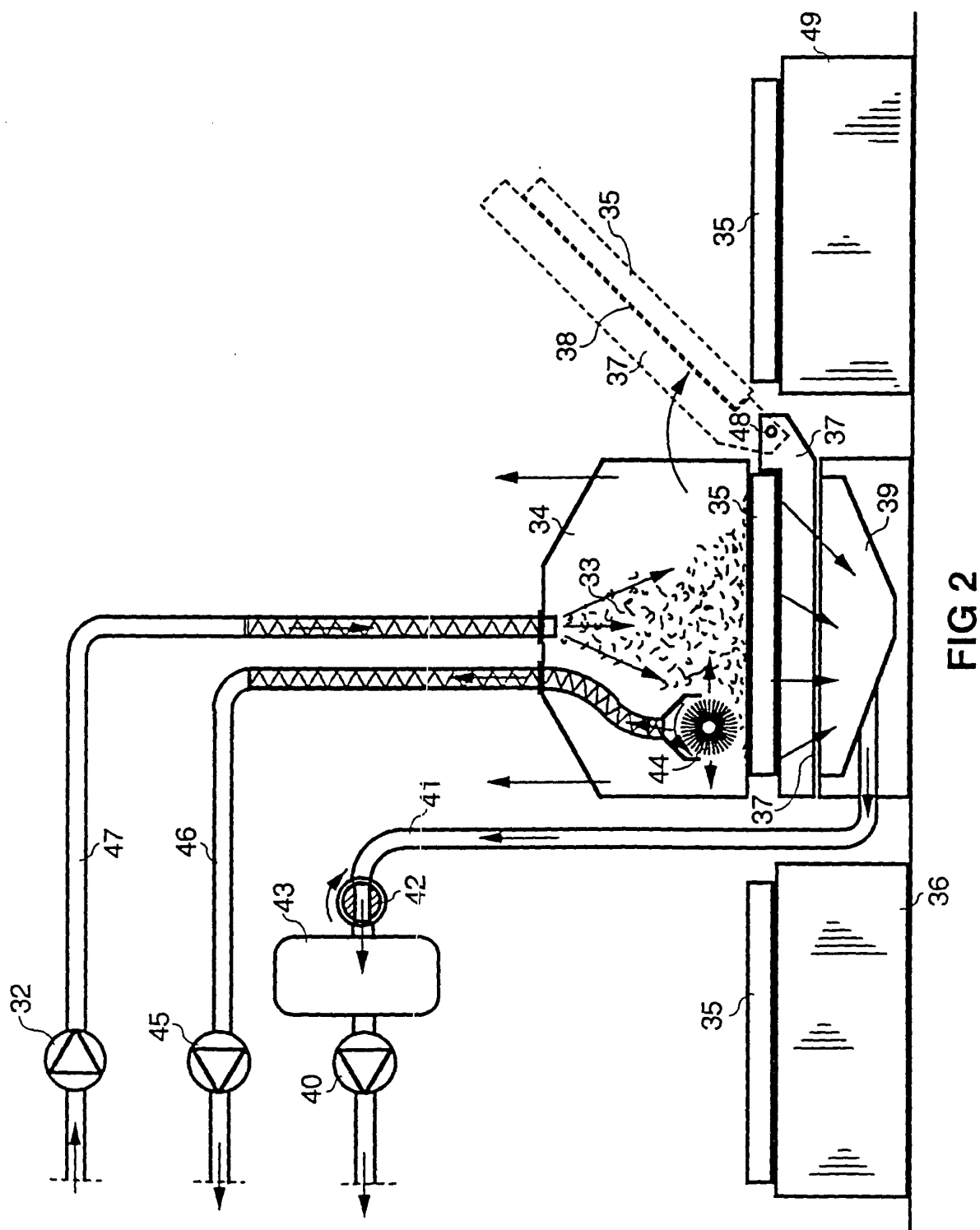


FIG 1



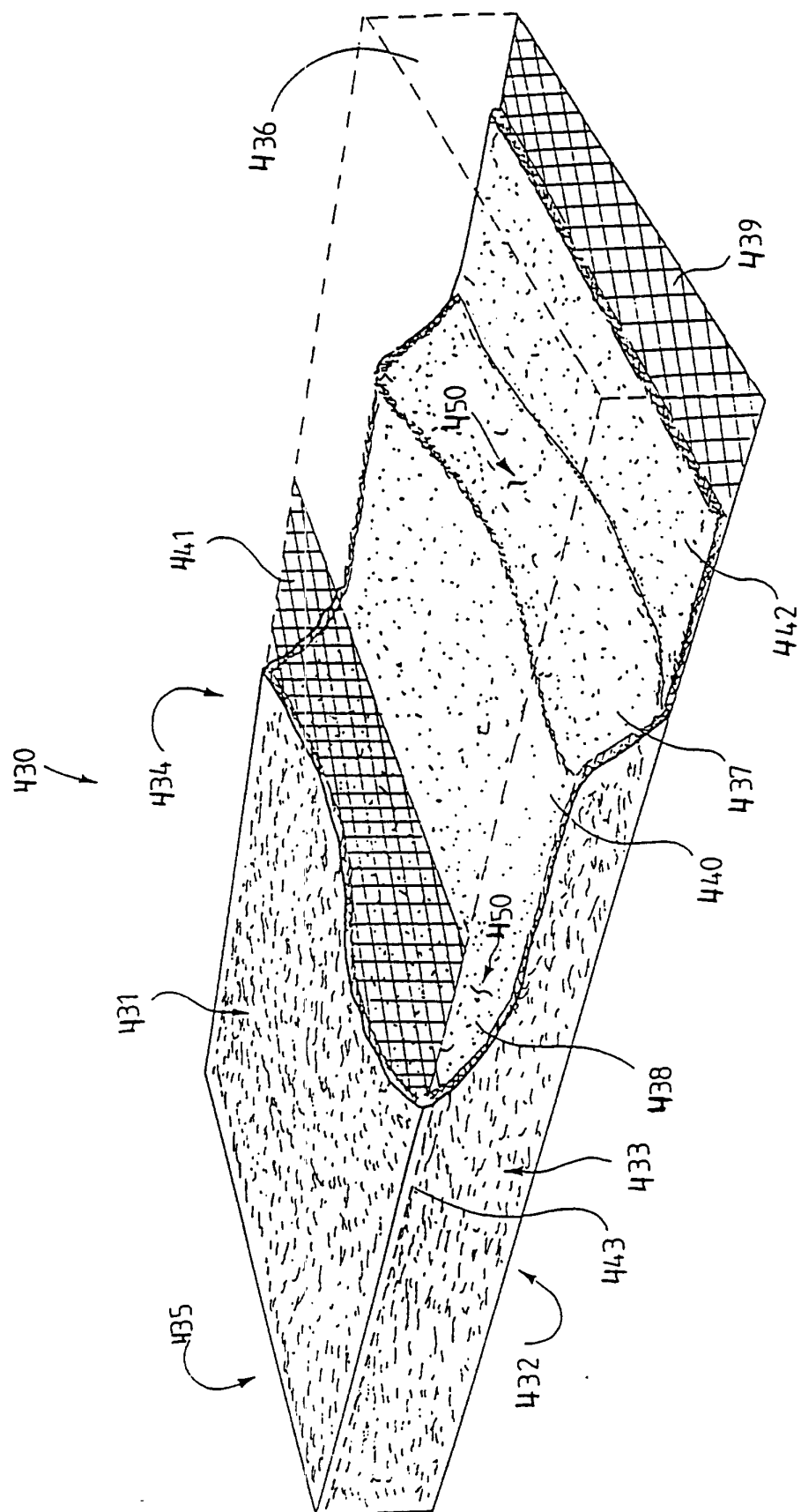


FIG. 3

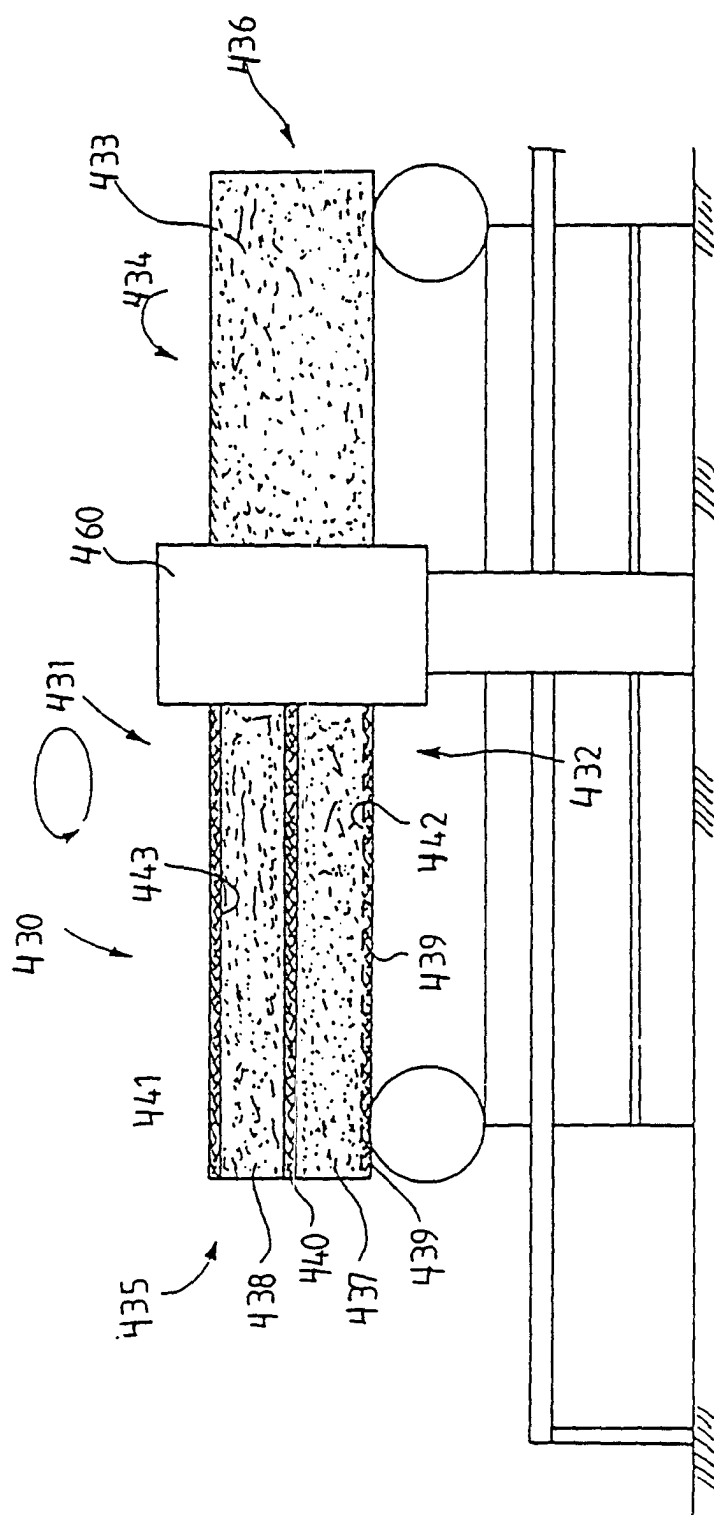


FIG. 4

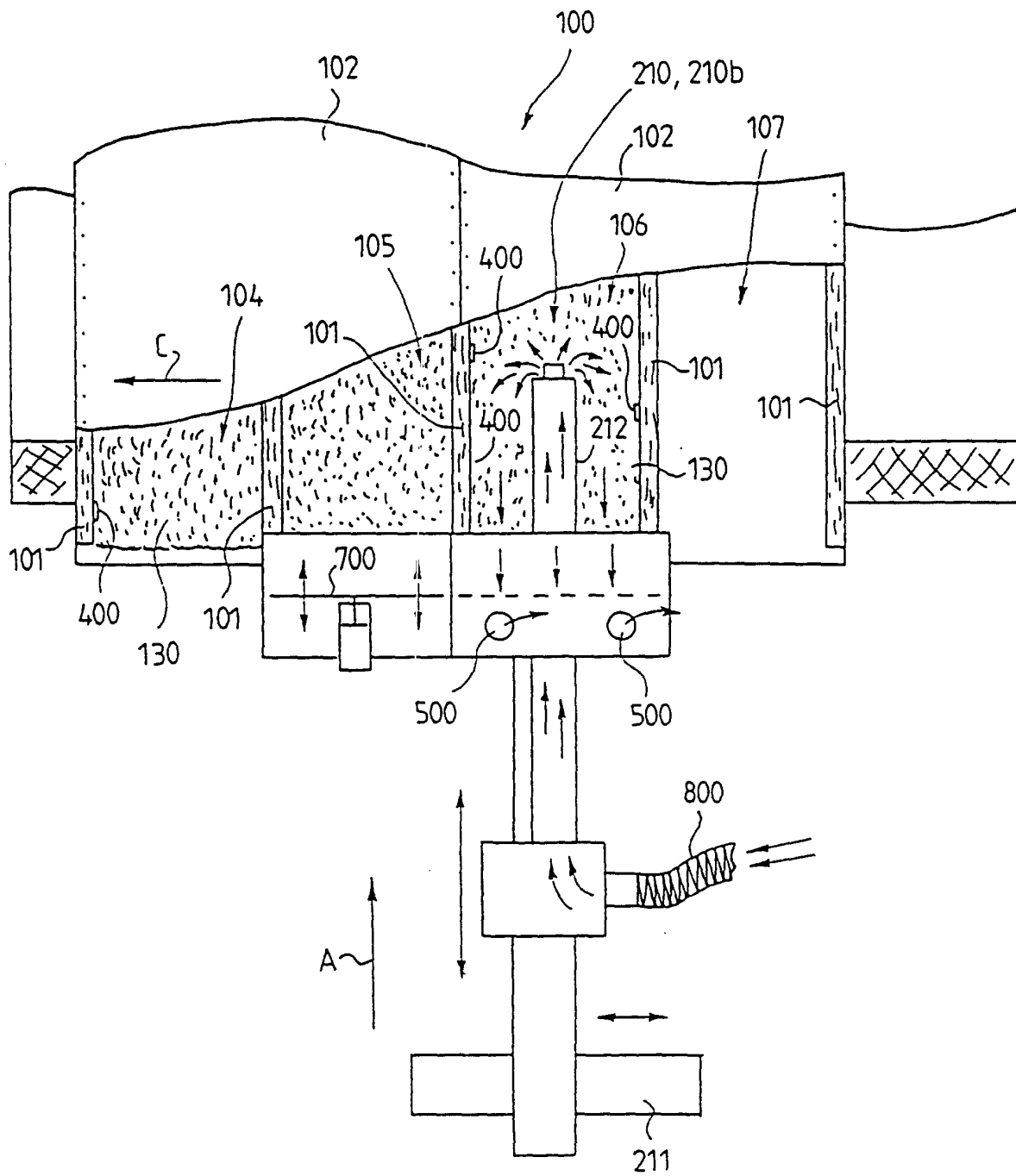


FIG. 5

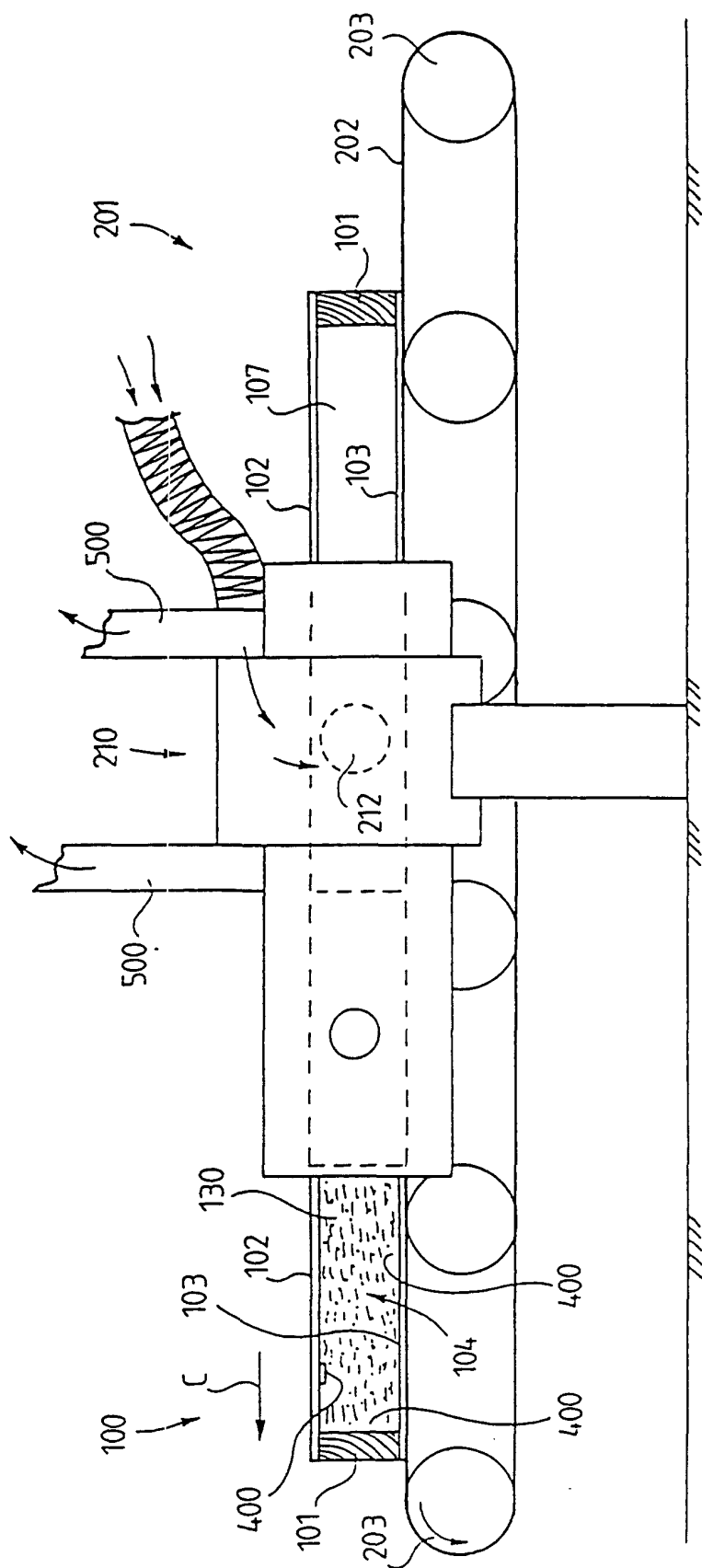


FIG. 6

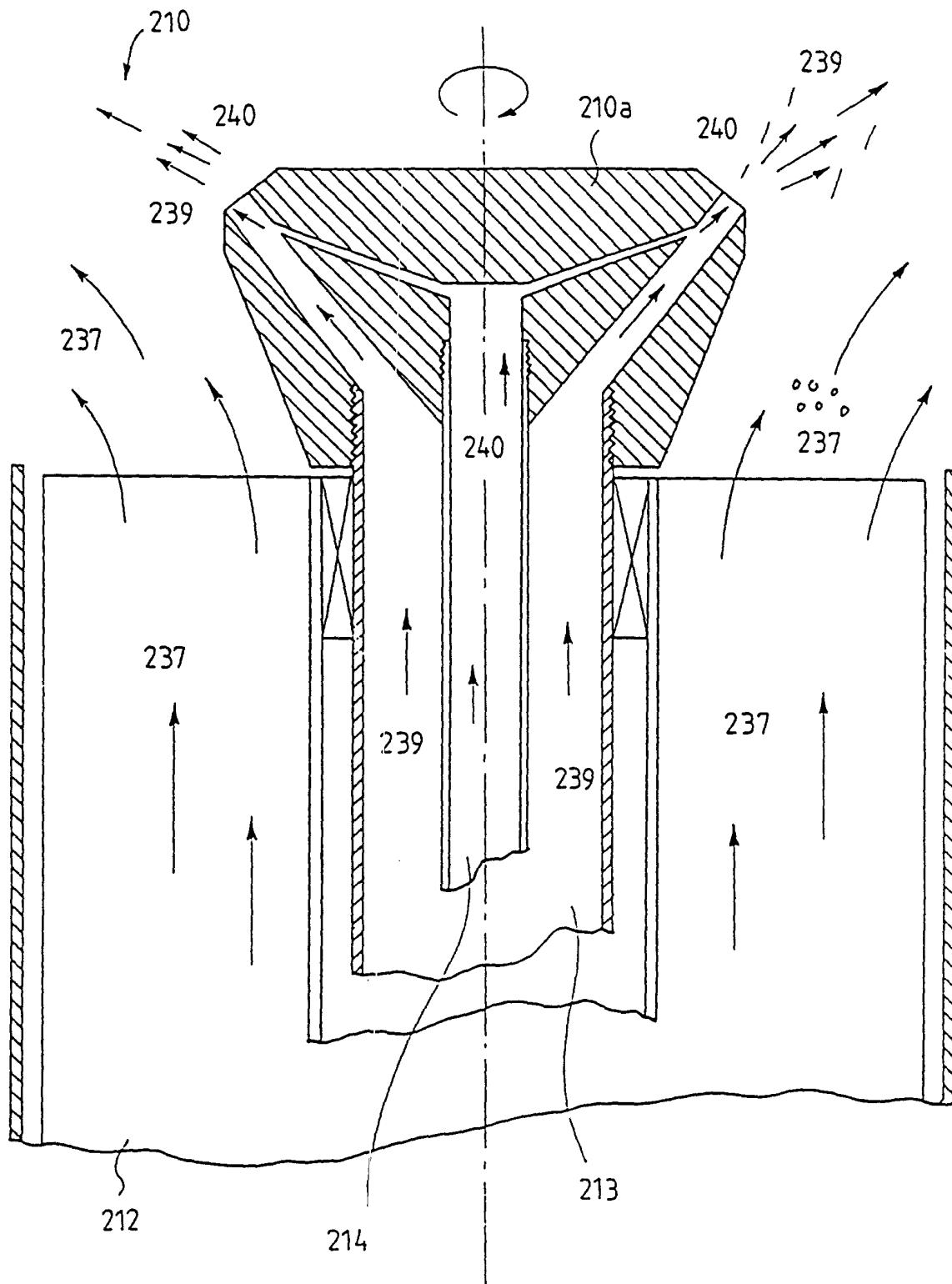


FIG. 7