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(54) Ventilator and ventilating structure using the same

(57) The invention makes smooth ventilation available at low cost with common body-worn articles. A ventilating structure α includes a vent 110 formed to keep moisture low inside a rainwear item 100, and a ventilator 1 fixed to the rainwear item 100 such as to cover the vent 110. The ventilator 1 includes a ventilator body 10. The ventilator body 10 includes a base 11 and at least one tube 12 provided on the base 11. The tube 12 includes an air hole 13, formed in its open end 122, and walls 124, being provided on the inside of the tube 12 and functioning as a water intrusion prevention means. The base 11 includes an opening 114 for allowing the tube 12 to open at least partially on a back face side of the base. The opening 114 communicates with the vent 110.

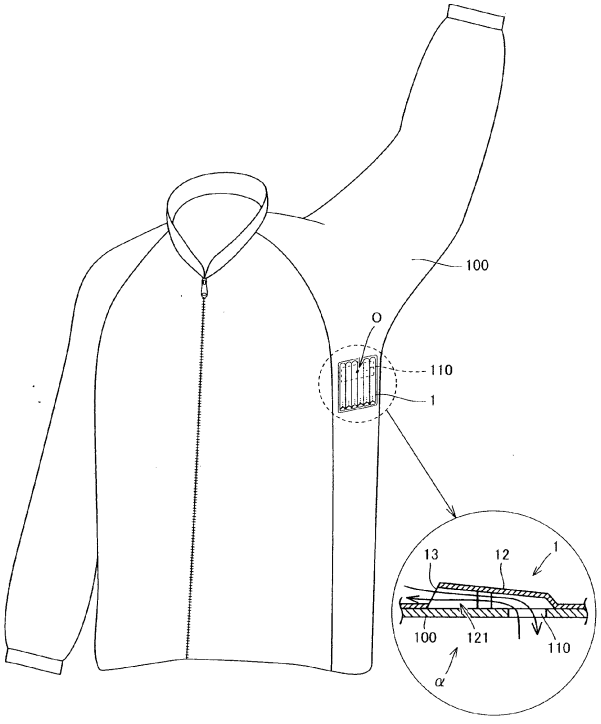

FIG.1

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Description

[0001] The present invention relates to ventilators and ventilating structures applicable to body-worn articles such as clothing, headwear and footwear for keeping moisture low and maintaining a comfortable condition inside the articles.

[0002] A conventional ventilating structure of this type is disclosed in Japanese Unexamined Patent Publication No. 2005-29914. The ventilating structure is provided to make a jacket breathable by producing constant and favorable airflow when a wearer drives a two-wheeled vehicle. The ventilating structure includes a vent formed in a shoulder part or other part of a jacket and a hood part covering the vent and having a configuration suitable for taking in outside airflow. Such a ventilating structure does not require a substantial change in the production process itself of the jacket and therefore has a cost advantage.

[0003] However, the ventilating structure described above is primarily directed to ensure good ventilation, without any consideration of use in wet conditions. This structure is therefore suitable only for a limited use, i.e., for use in fine weather only, and it would be difficult to apply the structure can hardly be applied to commonly used body-worn articles such as other garments, hats, footwear and the like.

[0004] The present invention was devised under the circumstances described above. The invention provides a ventilator and a ventilating structure that make smooth ventilation available at low cost with common body-worn articles.

[0005] A ventilator according to the present invention comprises a ventilator body, the ventilator body including a base having a front face and a back face and a tube extending along the front face of the base, the tube including a moist air passage being an inner space of the tube and an air hole formed in the tube, the air hole communicating with the moist air passage, wherein the base is provided with an opening for allowing the tube to open at least partially on the back face side of the base.

[0006] The ventilator body is adapted to be secured to a body-worn article and to overlie a vent provided in the body-worn article.

[0007] This ventilator can provide good ventilation of the body-worn article and prevent intrusion of water into the body-worn article when in use under wet conditions because the air hole is disposed at a different position and open in a different direction from that of the vent of the body-worn article. The use of such a ventilator can provide easy and low-cost ventilation with commonly used body-worn articles such as garments, hats, footwear and the like.

[0008] The ventilator body may include a plurality of tubes.

[0009] According to this aspect of the invention, the increased number of tubes can reduce the opening areas of the tubes, contributing more reliable prevention of water from entering the tubes

[0010] The ventilator body may further include a water intrusion prevention means provided inside the tube.

[0011] According to this aspect of the invention, the water intrusion prevention means can block intruding water, so that the ventilator can minimize water intrusion.

[0012] An example of the water intrusion prevention means is a wall for partially blocking the moist air passage. A plurality of such walls may be provided inside the tube. The walls may be staggered in spaced relation to each other along a lengthwise direction of the tube.

[0013] In accordance with either of these aspects of the invention, the ventilator can achieve both good ventilation of the body-worn article and prevention of water intrusion into the body-worn article.

[0014] The tube may further include an outer wall with a through hole.

[0015] According to this aspect of the invention, amount of ventilation can be optimized by adjusting the inner diameter, number or the like of the through hole. Therefore, the ventilator can provide improved and more effective ventilation with the body-worn article

[0016] The tube may further include an open end on a lengthwise end side of the tube, the open hole being formed in the open end, a closed end on the other lengthwise end side of the tube, and a sloped surface sloping down from the open end toward the closed end.

[0017] According to this aspect of the invention, a flow of outside air into the tube creates a negative pressure inside the tube. As a result, air flow is maintained for a relatively long period of time, and thereby enhancing the ventilating effect.

[0018] The ventilator body may be made of a sewable material so as to be attachable around the vent of the body-worn article.

[0019] The ventilator according to this aspect of the invention has a cost advantage because of the easy and reliable attachment to the body-worn article.

[0020] The tube may be bent in a middle portion thereof.

[0021] According to this aspect of the invention, the bent portion of the tube makes the ventilator more attractive. The bent portion of the tube can also function as a water intrusion prevention means for collecting water entering the tube.

[0022] A ventilating structure according to the invention includes a vent formed in a body-worn article for keeping humidity low inside the body-worn article; and the ventilator according to any aspect of the invention as described above. The ventilator may be fixed to the body-worn article in such a manner as to cover the vent.

[0023] According to this aspect of the invention, the ventilator covers the vent of the body-worn article. The ventilating structure, similarly to the ventilator described above, can achieve favorable ventilation of the body-worn article, as well as lessen the problem of water intrusion into the article in wet conditions. Consequently, the ventilating structure can provide easy ventilation at

low cost with commonly used body-worn articles such as garments, hats, footwear and the like.

[0024] The ventilator body may be fixed to the body-worn article such that the air hole of the tube opens downwards when the body-worn article is in its normal orientation during wearing. For example, a ventilator body fixed to the chest portion of a rainwear garment is oriented such that the air hole of the tube opens downwards towards a waist region of a wearer.

[0025] According to this aspect of the invention, as the air hole of the tube opens downwards, raindrops falling from above are unlikely to enter the tube through the air hole. Therefore, the ventilating structure can further prevent water intrusion into the tube.

[0026] If the moist air passage of the tube is entirely open on the back face side of the base, the ventilator body may be fixed to the body-worn article such that the air hole of the tube is spaced apart from the vent.

[0027] According to this aspect of the invention, the air hole of the ventilator is spaced apart from the vent of the body-worn article, so that the ventilating structure can prevent water intrusion into the body-worn article further effectively.

[0028] The invention will now be described by way of example only and without limitation by reference to the drawings, in which:

Fig. 1 is a schematic perspective view of rainwear and a ventilator fixed thereto according to an embodiment of the invention, including a partial enlarged schematic longitudinal cross-section view of the ventilator.

Fig. 2A is a front view of the ventilator.

Fig. 2B is a back view of the ventilator.

Fig. 2C is a plan view of the ventilator.

Fig. 2D is a bottom view of the ventilator.

Fig. 2E is a right side view of the ventilator.

Fig. 2F is a left side view of the ventilator.

Fig. 2G is a cross-section view taken along 2G-2G in Fig. 2A of the ventilator.

Fig. 2H is a cross-section view taken along 2H-2H in Fig. 2A of the ventilator.

Fig. 2I is a perspective view of the front, top, and right side of the ventilator.

Fig. 2J is a perspective view of the back, bottom, and left side of the ventilator.

Fig. 3A is a front view of a first modified example of the ventilator.

Fig. 3B is a back view of the first modified example of the ventilator.

Fig. 4A is a front view of a second modified example of the ventilator.

Fig. 4B is a back view of the second modified example of the ventilator.

Fig. 5A is a front view of a third modified example of the ventilator.

Fig. 5B is a back view of the third modified example of the ventilator.

[0029] An exemplary embodiment of the present invention will be described below with reference to Fig. 1 to Fig. 2J. As shown in Fig. 1, a ventilating structure α described here as an example includes a pair of vents 110 formed in rainwear item 100, which is a type of clothing (corresponding to a body-worn article), for keeping the moisture and temperature inside the rainwear item 100 low, and a pair of ventilators 1 fixed onto an outer surface of the rainwear item 100 in such a manner as to cover the vents 110. Note that Fig. 1 illustrates only one of the ventilators 1 with the associated one of the vents 110, and that the following description is provided for one of the ventilators 1 and one of the vents 110 for the convenience of description.

[0030] In this embodiment, the vent 110 of the ventilator 1 consists of a rectangular hole opened a certain distance below an armpit portion of the rainwear item 100 and a piece of mesh fabric attached to the margins of the rectangular hole to cover the hole.

[0031] Ventilation is achieved by releasing water (moisture) excreted from the upper body of the wearer of the rainwear item 100 to the outside through the vents 110 and by allowing outside air into the rainwear item 100 through the vents 110. Such ventilation is aided by the ventilators I fixed around the vents 110 of the rainwear 100.

[0032] The ventilator 1 includes a ventilator body 10 to cover the vent 110. The ventilator body 10 in the embodiment is made of semi-transparent material such as synthetic resin so as to be visually unobtrusive. The material is as flexible (pliable) as the fabric forming the rainwear item 100 and sewable around the vent 110 of the rainwear item 100. The ventilator body 10 is fabricated integrally using a die. In other words, the ventilator body 10 has a shape suitable for being made by punching.

[0033] The ventilator body 10 is fixed to the rainwear item 100 such that air holes 13 at open ends 122 of tubes 12 (to be described) are open downwards, i.e. in the rainfall direction when the rainwear item is in its normal orientation during wearing. For example, in Fig. 1 the ventilator 1 is shown positioned below the attachment point of the sleeve of the rainwear item 100 adjacent to the chest portion, and is oriented such that the air holes 13 open downwards towards the bottom of the rainwear item. The ventilator body 10 is fixed to the rainwear 100 such that the air holes 13 of the tubes 12 are offset in a direction away from the center O of the vent 110. In other words, the ventilator body 10 may be attached to any position of the rainwear 100 as long as the air holes 13 of the tubes 12 are positioned a distance away from the vent 110.

[0034] The ventilator body 10 includes a plate-like base 11, a plurality of tubes 12, a plurality of air holes 13, a plurality of walls 124 (corresponding to water intrusion prevention means), and a plurality of through holes 125 as shown in Fig. 2A to Fig. 2J.

[0035] The base 11 includes a front face 111, a back face 112, frame-like edge 113 (see Fig. 2B), and a plu-

rality of openings 114. The front face 111 of the base 11 is proved with the plurality of tubes 12 aligned along a widthwise direction of the base.

[0036] In this embodiment, there are six tubes 12 aligned along the widthwise direction. The openings 114 are through-holes passing from the front face to the back face of the base 11, arranged in correspondence with the tubes 12. The edge 113 is sewn to the rainwear 100 with thread or the like.

[0037] Other embodiments (not shown) may have a different number of tubes 12.

[0038] Each tube 12 is a generally tuboid member cut in half longitudinally such as to have an opening 114 opening on the side of the back face 112 of the base 11. As shown in Fig. 2D, Fig. 2E, and Fig. 2F, a lengthwise end (open end 122) of each tube 12 has a beveled opening (air hole 13). As shown in Fig. 2C, Fig. 2E, and Fig. 2F, the other lengthwise end (closed end 123) of the tube 12 is curved and closed.

[0039] The space inside each tube 12 forms a moist air passage 121. The moist air passage 121 extends in the lengthwise direction of the tube 12. In this embodiment, as shown in Fig. 2B, the tubes 12 (moist air passages 121) are entirely open as the openings 114 of the base 11 on the back face 112 of the base 11. The air holes 13 in the open ends 122 of the tubes 12 each communicate with an end of the associated moist air passage 121. These ends of moist air passages 121 release moisture through the air holes 13 and take in outside air therefrom (see Fig. 1).

[0040] The walls 124 are provided in each tube 12. The walls 124, as shown in Fig. 2B, are blades to partly block the moist air passage 121 inside the tube 12. In this embodiment, each tube 12 has a total of four walls 124 that are arranged alternately on the left and right and spaced apart in the lengthwise direction on the inside of the tube 12 (arranged in a staggered and spaced relation to each other inside the tube along a lengthwise direction of the tube 12). The tube 12 may be formed to have at least one wall 124 therein.

[0041] The moist air passages 121 of the tubes 12 are entirely open as the openings 114 of the base 11 as mentioned above. It should be noted that, as shown in Fig. 1, with the ventilator 1 fixed on the rainwear 100, regions of the openings 114 between the air holes 13 and the vent 110 are covered by the front side of the fabric of the rainwear 100. The remaining regions of the openings 114 (regions facing the vent 110) communicate with the vent 110. The walls 124 serve to block a large part of water entering the moist air passages 121 from the air holes 13. However, as the walls 124 block the moist air passages 121 only partially, they do not inhibit air circulation in the moist air passages 121.

[0042] Each tube 12 also has a sloped surface 126 as shown in Fig. 2E sloping down from the open end 122 toward the closed end 123 for facilitating intake of outside air. A flow of outside air received on the sloped surface 126 creates a negative pressure inside the tube 12, as a result of which the air flow is maintained for a relatively long period of time. The slope angle of the sloped surface 126 may be set in accordance with how much ventilation is desirable.

[0043] A plurality of through holes 125 (apertures) is formed in the outer wall of each tube 12 for aiding ventilation, more particularly between the air hole 13 and the walls 124 as shown in Fig. 2A and Fig. 2B. In this embodiment, each tube 12 has a total of three through holes 125 spaced apart in the lengthwise direction of the tube 12. The diameter and number of each through hole 125 may be suitably set to achieve a desired internal pressure of the moist air passage 121.

[0044] The ventilating structure α described above has the ventilators 1 to cover the vents 110 of the rainwear 100, favorably providing ventilation with the rainwear 100 more effectively than ventilation provided by a conventional moisture-permeable rainwear. Moreover, the structure α keeps the inside of the rainwear 100 dry and comfortable because of invulnerability to water intrusion as described in detail below. The ventilating structure α also has a huge cost advantage because the ventilators 1 are formed in one piece and attachable to the rainwear 100 by sewing in the course of production of the rainwear 100.

[0045] The ventilating structure α provides the invulnerability to intrusion of water such as raindrops by the combination of the following features (1) to (5):

(1) The air holes 13 are arranged at different positions and open in different directions from those of the vents 110 of the rainwear 100;
(2) The tubes 12 are shaped such as to have the air holes 13 of relatively small opening areas;
(3) The tubes 12 are each provided with the water intrusion prevention means;
(4) The straight line distances from the air holes 13 to the associated vents 110 are relatively long; and
(5) The air holes 13 open downwards when a user wears the rainwear 100.

[0046] In addition, the walls 124 used as the water intrusion prevention means can prevent water intrusion without inhibiting air circulation in the moist air passages 121.

[0047] To further enhance the water intrusion preventing effect, the ventilator body 10 may be designed to further have a bent middle portion 127 (bent once or twice or more in a zigzag fashion), as with ventilators 1', 1", 1'" according to first, second, and third modified examples as shown in Fig. 3 to Fig. 5. How water that has entered the moist air passages 121 collects depends on the direction or the number of times of bending in the middle portion 127, and therefore changing these factors can further enhance the water intrusion preventing effect. The modified examples mentioned above are configured basically the same as the previously described embodiment except for the middle portion 127 of the ventilator body

10, and therefore will not be described again.

[0048] The ventilator and the ventilating structure according to the present invention are applicable not only to rainwear but also to any other commonly used body-worn articles (such as inner wear and other garments including hooded jackets, trousers and the like, hats, and footwear). The position, shape and other configurations of the vents to be formed in such body-worn articles may be suitably selected in accordance with the types of the articles. The vent may be modified into just an opening, an opening provided with a piece of mesh fabric, or an opening enforced with a grommet-like member. The ventilating structure may include at least one vent and at least one ventilator.

[0049] The base of the ventilator body may be variously changed in shape and design depending on how it is attached to a body-worn article. For example, the base may be modified such that its edge is in such a shape as to be more suitable for the attachment to the body-worn article by thermal compression bonding. The tubes may be provided in any number (one, two or more). The tubes may be modified in shape to have circular, square, or any other cross-sectional shapes. The tubes may be modified to have curved, bent, zigzag, crossed, or any other lengthwise shapes. The tubes may be all oriented in the same direction, or some or all of the tubes may be oriented in different directions. The air holes of the tubes may be formed sideways or any other part of the tubes. The inner spaces of the tubes may be entirely open on the back face side of the base or may be partly open (i.e. the openings of the base are formed as partial openings of the tubes). The tubes may be open at both longitudinal ends to form air holes. The tubes may not necessarily include the water intrusion prevention means. The water intrusion prevention means may be curved or bent moist air passages themselves serving as the water intrusion prevention means, or compartments or the like provided in the passages for collecting intruding water, or passageways provided in the passages for draining water outside.

Reference Signs List

[0050]

α ventilating structure

100 rainwear (body-worn article)
110 vent

1 ventilator
10 ventilator body
11 base
111 front face
112 back face

12 tube
121 moist air passage
122 open end
123 closed end
124 wall (water intrusion prevention means)
125 through hole
126 sloped surface
127 middle portion

13 air hole

Claims

1. A ventilator (1) comprising:

a ventilator body (10) adapted to cover a vent (110) of a body-worn article (100), the ventilator body including:

a base (11) having a front face(111) and a back face (112), and
a tube (12) extending along the front face of the base, the tube including:

a moist air passage (121) being an inner space of the tube, and
an air hole (13) formed in the tube, the air hole communicating with the moist air passage,

wherein the base is provided with an opening (114) for allowing the tube to open at least partially on the back face of the base.

2. The ventilator (1) according to claim 1, wherein the tube (12) comprises a plurality of tubes.

3. The ventilator (1) according to claim 1 or 2, wherein the ventilator body (10) further includes a water intrusion prevention means (124) provided inside the tube (12).

4. The ventilator (1) according to claim 3, wherein the water intrusion prevention means includes a wall (124) for partially blocking the moist air passage (121).

5. The ventilator (1) according to claim 4, wherein the wall (124) comprises a plurality of the walls provided inside the tube (12), the walls being staggered in spaced relation to each other along a lengthwise direction of the tube.

6. The ventilator (1) according to any one of claims 1 to 5, wherein
the tube (12) further includes an outer wall with a through hole (125).

7. The ventilator (1) according to any one of claims 1

to 5, wherein the tube (12) further includes:

an open end (122) on a lengthwise end side of the tube, the open hole (13) being formed in the open end,
a closed end (123) on the other lengthwise end side of the tube, and
an sloped surface (126) sloping down from the open end toward the closed end.

8. The ventilator (1) according to any one of claims 1 to 5, wherein
the ventilator body (10) is made of a sewable material so as to be attachable around the vent (110) of the body-worn article (100).

9. The ventilator (1) according to any one of claims 1 to 5, wherein the tube (12) is bent in a middle portion (127) thereof.

10. A ventilating structure (α), comprising:

a vent (110) formed in a body-worn article (100) for keeping humidity low inside the body-worn article; and
the ventilator (1) according to any one of claims 1 to 9, the ventilator being fixed to the body-worn article in such a manner as to cover the vent.

11. The ventilating structure (α) according to claim 10, wherein
the ventilator body (10) is fixed to the body-worn article (100) such that the air hole (13) of the tube (12) opens downwards.

12. The ventilating structure (α) according to claim 10, wherein
the moist air passage (121) of the tube (12) is entirely open on the back face (112) of the base (11), and
the ventilator body (10) is fixed to the body-worn article (100) such that the air hole (13) of the tube (12) is spaced apart from the vent (110).

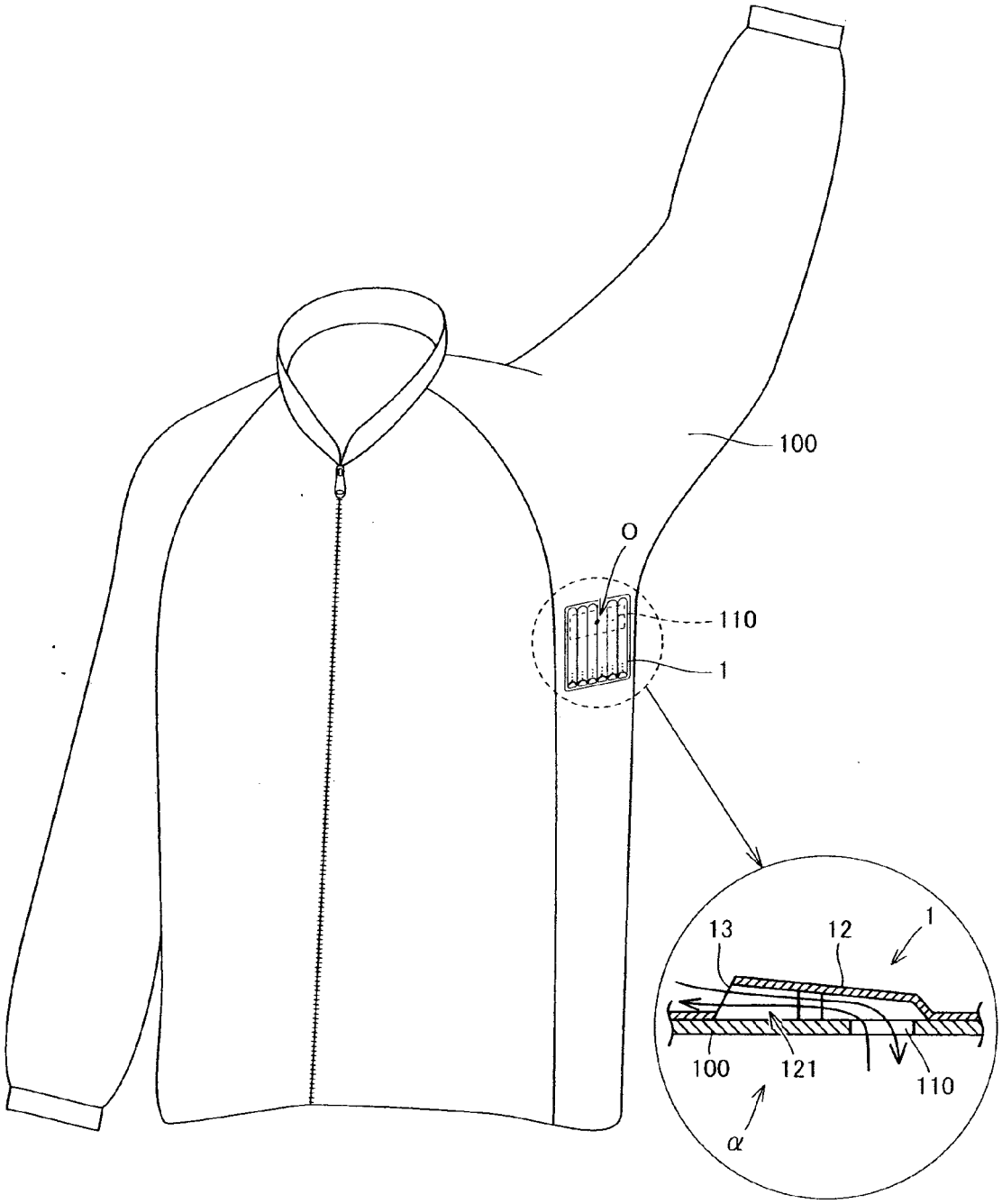


FIG.1

FIG.2A

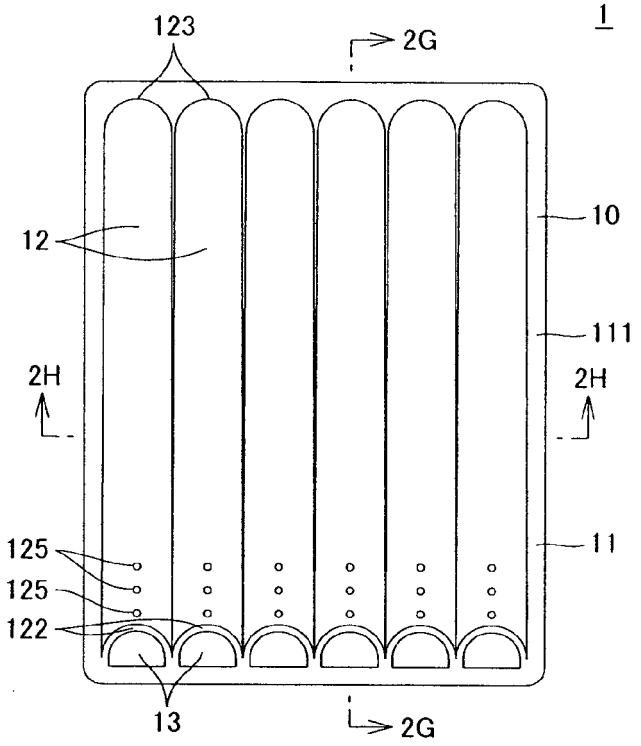
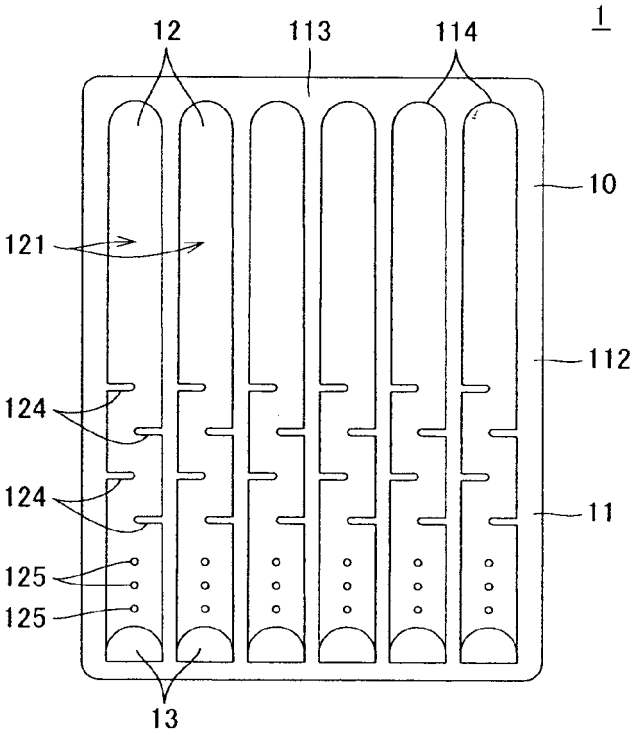

1
123
2G
12
10
111
2H
2H
125
125
122
11
13
2G

FIG.2B


1
12
113
114
10
121
112
124
124
11
125
125
13

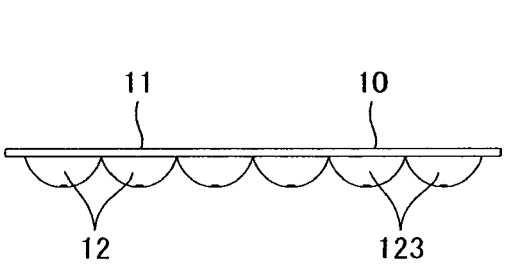


FIG.2C

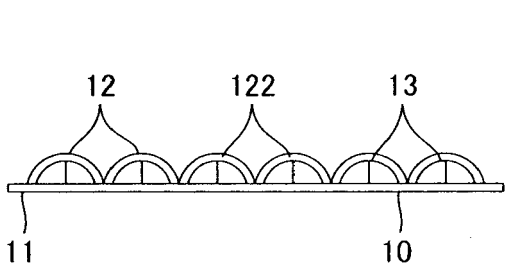


FIG.2D

FIG.2E

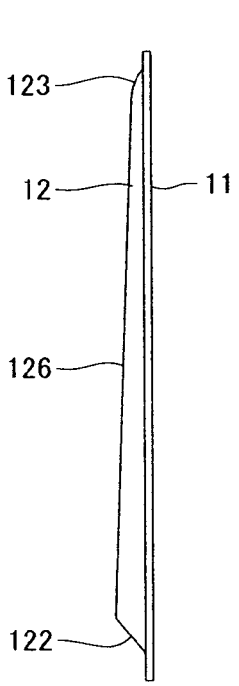
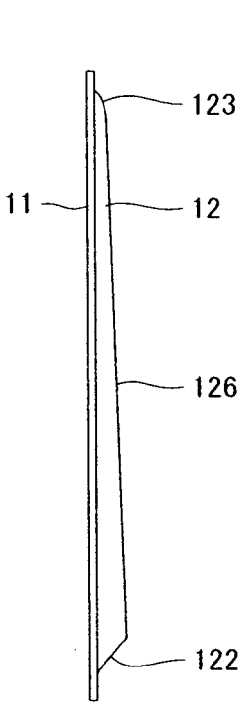


FIG.2F



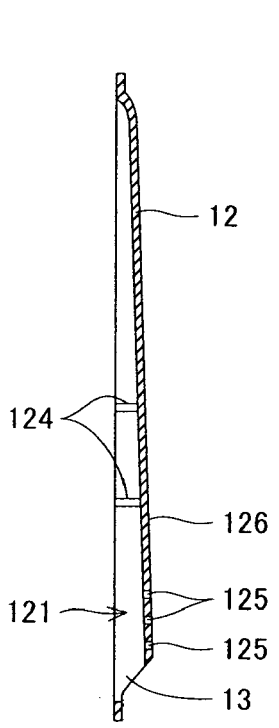


FIG.2G

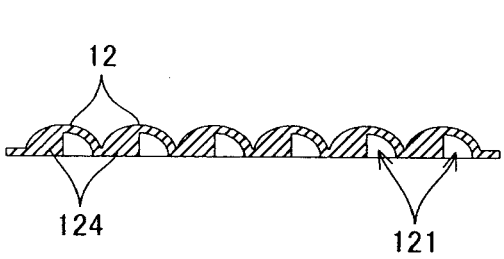


FIG.2H

FIG.2I

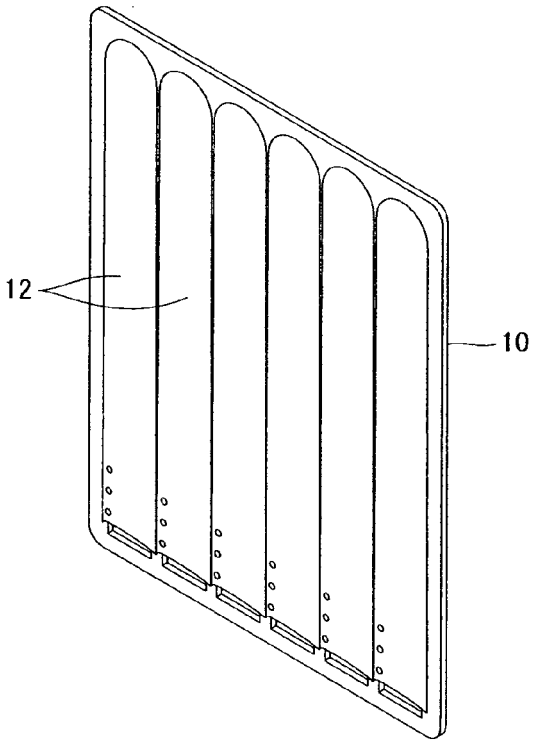


FIG.2J

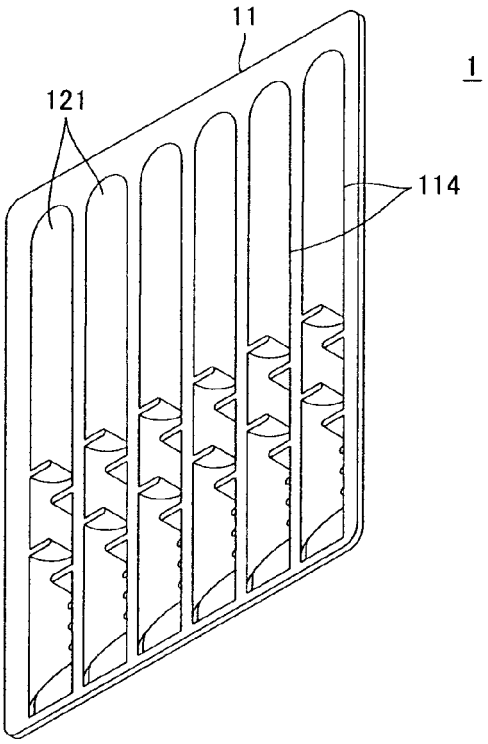


FIG.3A

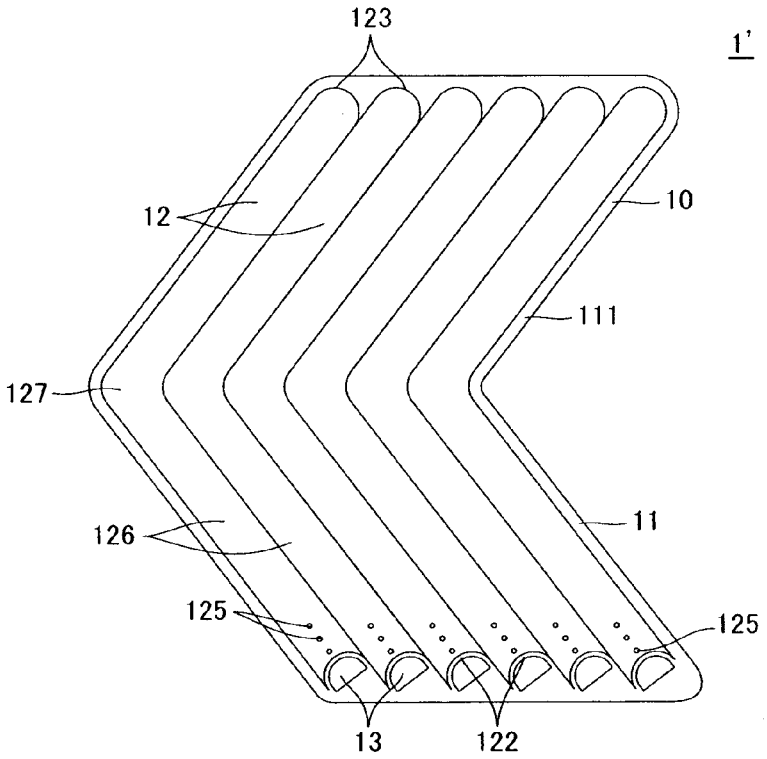

123
1'
12
10
111
127
11
126
125
125
13
122

FIG.3B

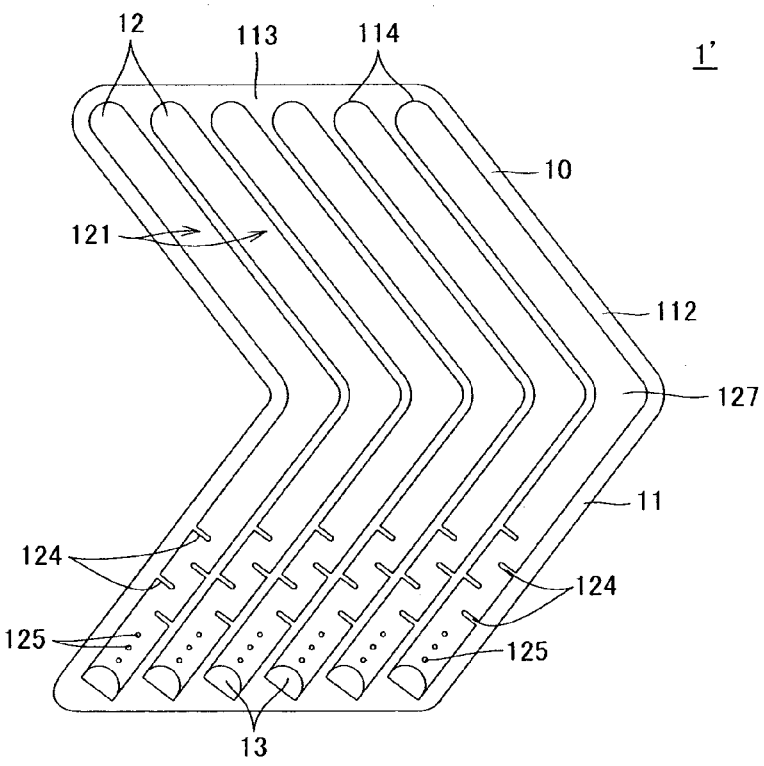
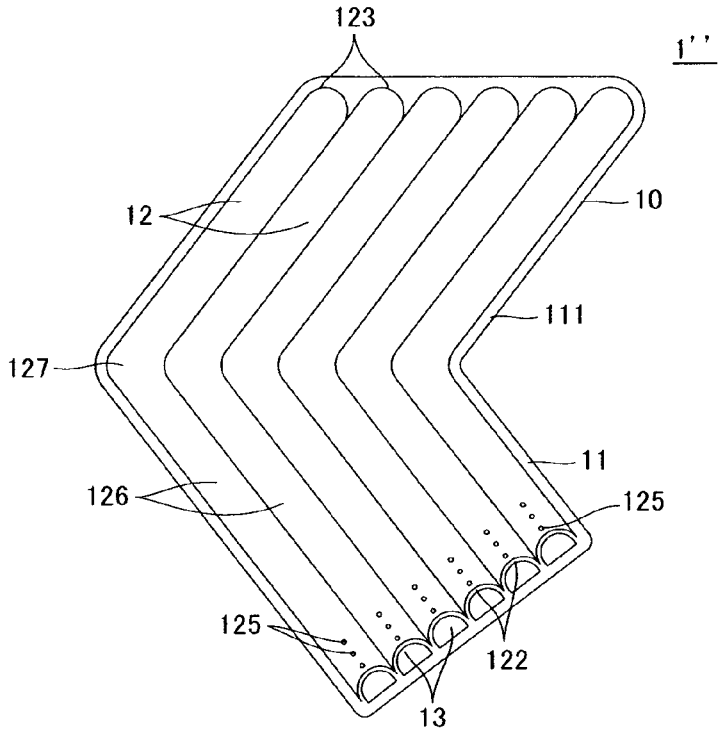

12
113
114
1'
10
121
112
127
11
124
124
125
125
13

FIG.4A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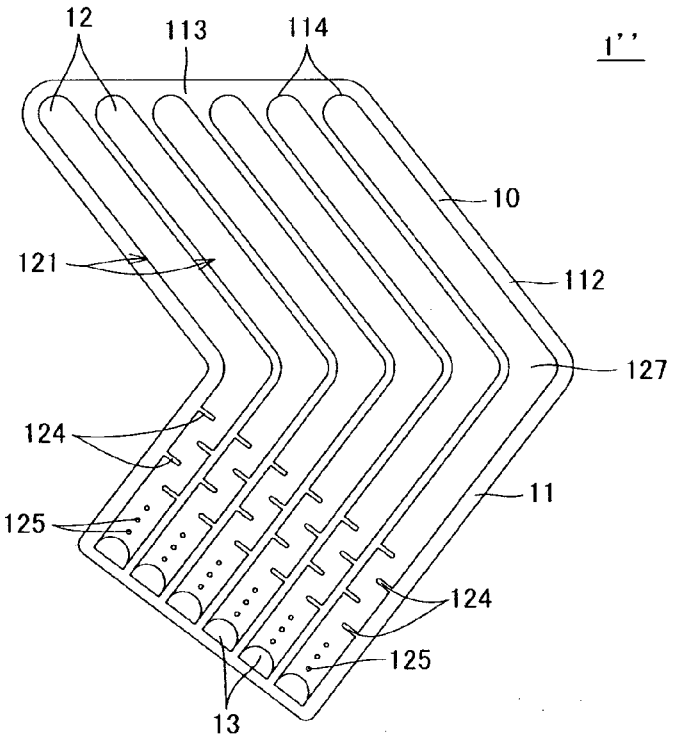
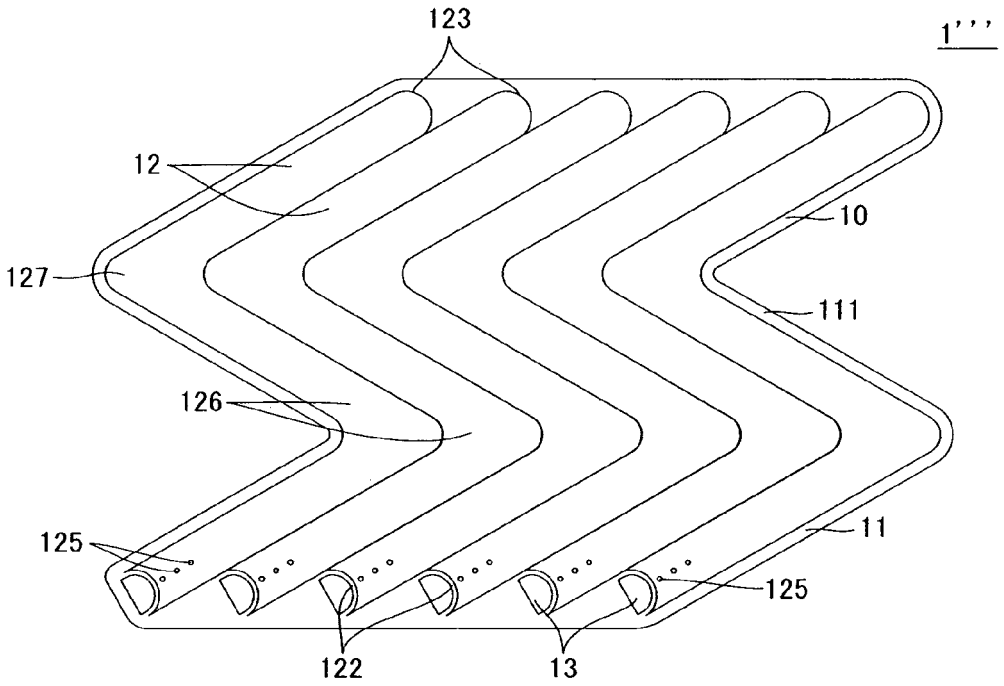
1''
12
10
111
127
11
126
125
125
122
13

FIG.4B


12
113
114
1''
10
121
112
127
124
11
125
124
125
13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12
10
127
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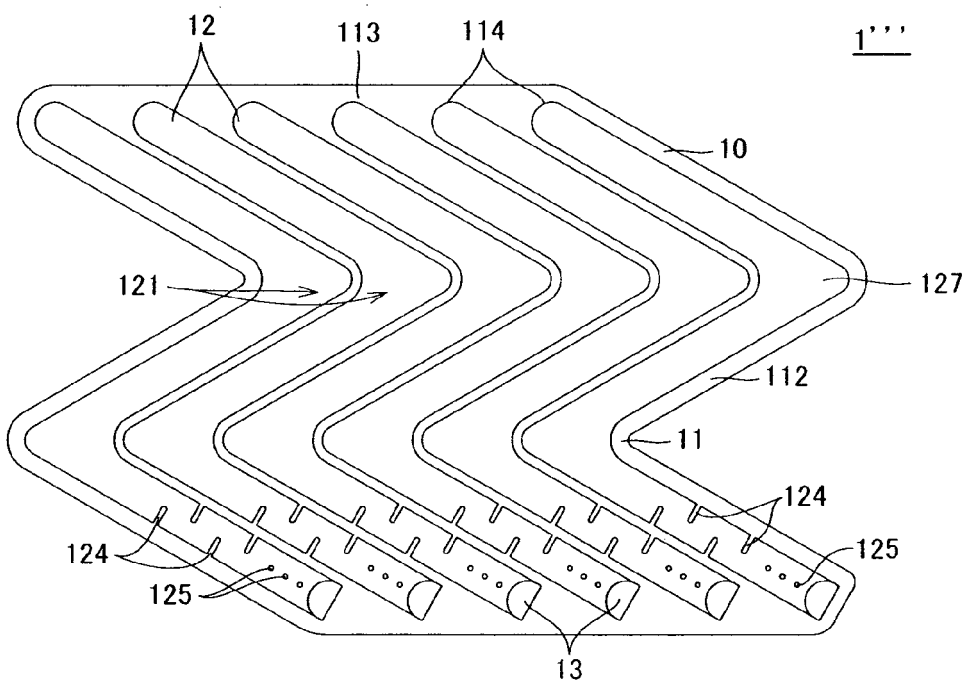
126
125
11
125
122
13

FIG.5A


12
113
114
1'''
10
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112
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124
124
125
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FIG.5B

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EUROPEAN SEARCH REPORT

Application Number
EP 12 25 0108

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			A41D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 May 2013	Debard, Michel

CATEGORY OF CITED DOCUMENTS

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29-05-2013

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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