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(71) Applicant: **MARMOT MOUNTAIN, LLC** [US/US];  
5789 State Farm Drive, Suite 100, Rohnert Park, CA 94928 (US).

(72) Inventors: **VAUGHN, Aubrey**; 5789 State Farm Drive, Rohnert Park, CA 94928 (US). **LOVELESS, Brian**; 5789 State Farm Drive, Rohnert Park, CA 94928 (US).

(74) Agent: **DILL, S., Myers**; Husch Blackwell LLP, 190 Carondelet Plaza, Suite 600, St. Louis, MO 63105 (US).

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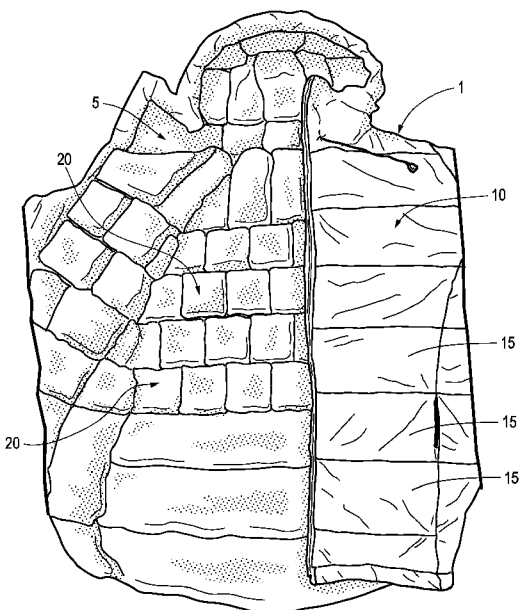
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(54) Title: WARMING CELL PATTERN FOR GARMENTS AND OTHER OUTDOOR EQUIPMENT

FIG. 1



(57) Abstract: A warming cell pattern is provided that may be arranged on an interior portion of a garment or other outdoor equipment to improve the warming qualities of the garment or equipment. The warming cells may take on a number of shapes, sizes, and patterns, but they are preferably cube-shaped and arranged in a "running-bond" or offset brick-like pattern so that vertical and horizontal channels are formed between adjacent cells. When the garment is worn or the equipment is used, an air-filled space may be formed by the channels and the user's body. Because air is a strong insulator, the air-filled pockets retain heat so that the jacket or garment including the warming cell pattern will have improved warming properties.



**WARMING CELL PATTERN FOR GARMENTS AND OTHER OUTDOOR  
EQUIPMENT**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

5 [0001] This Application claims priority to U.S. Provisional Patent Application No. 62/754,506, filed November 1, 2018, entitled “WARMING CELL PATTERN FOR GARMENTS AND OTHER OUTDOOR EQUIPMENT,” currently pending. The entire disclosure, including the specification and drawings, of the above-referenced application is incorporated herein by reference.

10

**FIELD OF INVENTION**

[0002] The present invention relates generally to garments and/or other outdoor equipment, and more particularly to a pattern of warming cells that may be used to improve the heat retention and warming properties of garments and/or other outdoor equipment.

15

**BACKGROUND OF INVENTION**

[0003] Both down insulation and synthetic insulation are often used as heat insulators in coats, pants, gloves, comforters, sleeping bags, and the like. Such insulation can affect warmth, weight, water resistance, compressibility, and price of garments and/or sleeping bags.

20

[0004] Down insulation is made up of the plumage found underneath the exterior feathers on waterfowl such as ducks and geese. The down insulation consists of soft, fluffy, wispy filaments, and not feathers, although some products use a blend of down and feathers. Down insulates by trapping air and is desired because it is lightweight, easy to compress, long-lasting, and breathable.

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[0005] Synthetic insulation is popular for its strong overall performance and lower price compared to down. Synthetic insulation is typically made of polyester, is quick-drying, and insulates even if it is wet. Furthermore, synthetic insulation is durable and hypoallergenic.

5 [0006] Some manufacturers make garments and/or sleeping bags with a combination of down and synthetic insulations. Such a hybrid construction can provide the benefits of both materials while limiting each material's imperfections.

[0007] In garments and/or sleeping bags, down and/or synthetic insulation is often quilted in a grid-like fashion where different "pockets" of down material are sewn apart from  
10 one another but adjacent to one another. Alternatively, in garments and/or sleeping bags that are made in the "puffer-style," elongated sections, or baffles, of quilted down are sewn adjacent to one another. This design is often provided on both the interior and exterior of a garment and/or outdoor equipment. For example, both the interior and exterior of a jacket or a sleeping bag may be of the "puffer-style."

15 [0008] For garments or sleeping bags with such quilted down patterns, when the garment is worn or the sleeping bag is slept in, portions of the quilted sections may be compressed. With the particular sections compressed, whether they are fashioned as square, diamond, or other shapes, or if they are provided as elongated sections, the insulation associated with any particular section is also compressed. Compressed sections of insulation  
20 make the layer between a person wearing or using the garment or sleeping bag thinner and thus less insulating in quality. Thinner sections of the garment caused by compression are thus colder than other sections, decreasing the overall performance of the garment or sleeping bag.

[0009] Such decreases in performance are further exacerbated by the down sections  
25 being exposed to each of the interior and exterior of the garment or sleeping bag. When a

down section is compressed, that section places only a thin barrier of material between the wearer and the cold atmosphere. A solution is desired that keeps a wearer or user of a down-insulated garment or other outdoor equipment warm, but is less susceptible to the decrease in performance caused by compression in a down section that is present on the interior and exterior of a garment or sleeping bag.

### SUMMARY OF THE INVENTION

[0010] The invention disclosed herein improves upon prior art systems designed to increase the warmth of garments and other outdoor equipment. More particularly, the invention uses a number of warming cells arranged in a pattern to warm and insulate the interior portion of a jacket, sleeping bag, or the like.

[0011] In a first embodiment, the warming cells are formed as three dimensional cubes having four equal sides. The cube-shaped warming cells are preferably independently formed and are spaced apart from one another such that an air channel is formed completely around each cell. The warming cells may be provided in a range of heights from about  $\frac{1}{4}$  inch to 3 inches, and they may be the same height within a single product. Each of the warming cells is preferably stuffed with goose or duck down, a featherless material, synthetic material, or a combination thereof.

[0012] When pressure is applied by a wearer or user, the cube-shaped warming cells preferably lose less heat than the long baffles of the prior art. They are better able to keep the down in place because the individual warming cells are formed as smaller cells, and as such, even if one cell is compressed, other surrounding cells are not necessarily compressed.

[0013] The cube-shaped warming cells are preferably arranged in a "running bond" brick-like pattern. More particularly, the warming cells are placed end to end in a particular row, with vertical channels formed between the sides of warming cells next to one another

within that same row. In any particular row, the vertical channels align with the middle of a warming cell on a row above or below the particular row.

[0014] This “running bond” pattern is a well-known and understood pattern in other industries including the brick and tile laying industries and creates an offset arrangement  
5 between adjacent cells positioned and located both above and below a particular cell. Horizontal channels are also formed between the sides of cube-shaped warming cells in adjacent rows to one another. While the channels may be a variety of widths, they are preferably between  $3/8$  and  $1/4$  inches wide.

[0015] Both the vertical and horizontal channels play an important role in the  
10 warming properties of the warming cell pattern. When a wearer’s or a user’s body covers the channels, an air-filled space or pocket is formed by the channels and the person’s body. The air pockets may trap and contain body heat therein to add to the warmth of the garment or outdoor equipment. Because air has strong heat retaining properties, the air pockets improve the heating performance of the interior including the warming cells.

15 [0016] In alternative embodiments, other cell shapes may be used such as rectangular, triangular, diamond, hexagonal (and other polygons), and the like. Similarly, a combination of differently shaped warming cells may be provided, and the warming cells may be arranged in other patterns, including the warming cells having variable thicknesses. In any given embodiment, the shapes and patterns should produce the channels that form air pockets when  
20 the garment is worn or the equipment is used.

### DESCRIPTION OF THE DRAWINGS

[0017] For a better understanding of the various embodiments of the present invention, reference may be made to the accompanying drawings in which:

[0018] Fig. 1 is a top plan view of a jacket including an interior warming cell pattern constructed according to the teachings of the present invention;

[0019] Fig. 2 is a first perspective view of the interior warming cell pattern of Fig. 1;

[0020] Fig. 3 is a second perspective view of the interior warming cell pattern of Figs.  
5 1 and 2;

[0021] Fig. 4 is a top plan view of a first alternative warming cell pattern for garments and other outdoor equipment;

[0022] Fig. 5 is a top plan view of a second alternative warming cell pattern for garments and other outdoor equipment; and

10 [0023] Fig. 6A is a plan view of a first panel of a garment having an additional embodiment of a warming cell pattern.

[0024] Fig. 6B is a plan view of a second panel of a garment having the warming cell pattern of Fig. 6A.

[0025] Fig. 6C is a plan view of a third panel of a garment having the warming cell  
15 pattern of Figs. 6A and 6B.

[0026] Fig. 7A is a cross-section view taken across line 7A—7A in Fig. 6A.

[0027] Fig. 7B is a cross-section view taken across line 7B—7B in Fig. 6B.

[0028] Fig. 7C is a cross-section view taken across line 7C—7C in Fig. 6C.

[0029] Fig. 8 is a perspective view of the garment illustrated in Figs. 6A—6C and  
20 7A—7C assembled and worn by a user.

[0030] While the disclosure is susceptible to various modifications and alternative forms, several but not all specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the drawings and detailed description presented herein are not intended to limit the disclosure to  
25 any particular embodiment disclosed, but to the contrary, the intention is to cover all

modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

### DETAILED DESCRIPTION OF THE INVENTION

5 [0031] The invention will now be described with reference to the drawing figures, in which like reference numerals refer to like parts throughout. For purposes of clarity in illustrating the characteristics of the present invention, proportional relationships of the elements have not necessarily been maintained in the drawing figures.

[0032] Referring to the drawings, Fig. 1 illustrates a jacket 1 having an interior  
10 portion 5 and an exterior portion 10. As shown in Fig. 1, the exterior portion 10 of the jacket 1 includes quilted elongated down or synthetic sections 15 like those described in the prior art, though in the case of this particular jacket 1, the down sections 15 do not serve as the principal insulator. The exterior portion 10 is preferably made of a synthetic material that is commonly used as a “shell layer.”

15 [0033] The interior portion 5 of the jacket 1 preferably includes a plurality of warming cells 20 that are arranged relative to one another to form a pattern that preferably increases the heating properties of the interior portion 5 of the jacket 1. While the warming cells 20 are illustrated in Figs. 1-3 on the interior portion 5 of the jacket 1, in other  
20 embodiments, the warming cells 20 may be provided on the interior of garments including, but not limited to, pants, gloves, hats, etc., as well as the interior of outdoor equipment including, but not limited to, sleeping bags, camp pillows, comforters, etc. Furthermore, in yet alternative embodiments, each or only one of the interior portion 5 and the exterior portion 10 may include the warming cells 20.

[0034] Turning to Figs. 2 and 3, the warming cells 20 and a first embodiment of a  
25 pattern formed by the plurality of warming cells 20 of the interior portion 5 of the jacket 1 are

illustrated in greater detail. In the illustrated embodiments, most of the warming cells 20 are formed as three dimensional cubes, meaning sides 25 that make up each of the warming cells 20 are equal in length. In the illustrated embodiment, the warming cells 20 have sides 25 that measure approximately 4 inches long, but in alternative embodiments, the sides 25 may be a  
5 limitless number of different lengths depending on the application for which the pattern of warming cells 20 is being used.

[0035] While the height of individual warming cells 20 is not explicitly illustrated, the cells 20 may be at a height from about  $\frac{1}{4}$  inch to 3 inches, and they may be the same height within a single product. Each of the warming cells 20 are preferably stuffed with  
10 goose or duck down, a featherless material, synthetic material, or any combination thereof. The warming cells 20 are preferably constructed of a material that is down- and fiber-proof, meaning neither down nor synthetic fibers is able to leak through the fabric.

[0036] Unlike the long down baffles described in the prior art, the warming cells 20 preferably keep the down in place when pressure is applied because the individual cells 20  
15 are formed as smaller cells that are near to one other. As such, even if one warming cell 20 is compressed, the dramatic temperature drop generated by a compressed baffle is not present. Moreover, a thermal effect is created when an outer shell or layer made of synthetic material (or a down, or comparable, outer layer) such as is provided for the exterior portion  
20 10 is combined with an inner shell/layer of down such as the interior portion 5 including the pattern of warming cells 20. There is a dead air chamber formed between these two layers that fills with warm air and thereby maintains a warmer temperature.

[0037] It should be noted however, that it is possible to use only the warming cells 20 without the outside synthetic layer. In such an embodiment, the additional warming effect provided by the air chamber formed between the outer synthetic layer and the shell/inner  
25 layer of down may be absent. Additional heating properties are created by the presence of

the space formed between adjacent warming cells 20. Such properties are described in greater detail herein below.

[0038] The warming cells 20 are illustrated in Figs. 2 and 3 as arranged in a “running bond” brick-like pattern. More particularly, the warming cells 20 are placed end to end in a particular row, with vertical channels 30 formed between the sides 25 of adjacent warming cells 20 within that same row. The purpose of the vertical channels 30 and the benefits they provide are described in greater detail below. For a given row, the vertical channels 30 align with the middle of a warming cell 20 on a row above or below the given row. For example, in row 35, the vertical channel 30a formed next to a side 25a of the warming cell 20a aligns with a middle 40 of a warming cell 20b of a row 45 above the row 35 (see Fig. 2). It is recognized and anticipated that the vertical channels 30 can align with any portion of the above or below warming cell.

[0039] Between adjacent rows such as the rows 35, 45, horizontal channels 50 are formed between the sides 25 of warming cells 20. Unlike the vertical channels 30, the horizontal channels 50 may abut one another so that they form one continuous channel between adjacent rows. In a preferred embodiment, the channels 30, 50 are between 1/4 and 3/8 inches wide, but in alternative embodiments, the channels 30, 50 may be wider or even somewhat narrower, or they may be variable in width. Moreover, while the cells 20 are described as being in the “running bond” pattern, in alternative embodiments the warming cells 20 may be arranged in an altogether different pattern.

[0040] When the interior portion 5 and more particularly the warming cells 20 abut a wearer or user (for example when the jacket 1 is worn), the wearer’s body covers the channels 30, 50 such that the channels 30, 50 and the wearer’s body form an air-filled space or pocket (not illustrated) between the cells 20. This space preferably traps and contains body heat therein that adds to the warmth of the garment or outdoor equipment, in this case,

the jacket 1. Because air is a better insulator than the down itself, the air pockets formed by the channels 30, 50 increase the warming qualities of the pattern of warming cells on the interior portion 5.

[0041] In a preferred embodiment, the horizontal channels 50 are formed as  
5 continuous rather than the vertical channels 30 because air escaping the horizontal channels 50 is more likely retained in the interior portion 5 than in the vertical channels 30, where air is more likely to escape from the neck or waist openings provided in a jacket such as the jacket 1. Even still, in a non-limiting alternative embodiment, the pattern shown in Figs. 2 and 3 may be rotated by 90 degrees (not illustrated) so that the vertical channels form a  
10 continuous channel rather than the horizontal channels.

[0042] Other cell shapes may be used such as rectangles, triangles, diamonds, and the like to form warming cells. For example, at an upper portion 55 of the jacket 1, rectangular warming cells 60 are provided above a row of cube-shaped warming cells 20. Those rectangular warming cells 60 are arranged above the uppermost row of cube-shaped warming  
15 cells 20 in the “running bond” brick-like pattern described above. Thus in some embodiments, including the embodiment illustrated in Figs. 1-3, a combination of differently shaped warming cells may be provided. In other embodiments, only one shape of warming cells may be provided.

[0043] In Figs. 4 and 5, two alternative warming cell shape patterns are provided that  
20 may be utilized in an interior portion of a garment or outdoor equipment such as the interior portion 5 of the jacket 1. Turning first to Fig. 4, a portion of a warming cell pattern 65 is provided that is made up of a plurality of three dimensional triangle-shaped warming cells 70 each including three sides 75. Three rows 80a, 80b, and 80c of warming cells 70 are shown in the portion of the warming cell pattern 65. As illustrated, each row 80a, 80b, and 80c

includes each of warming cells 70a where the triangle's vertex is pointing upwardly and warming cells 70b where the triangle's vertex is pointing downwardly.

[0044] As was the case for the pattern of warming cells 20 described above, channels that form air-filled spaces or pockets when a garment or other outdoor equipment is worn or  
5 used are located between adjacent cells 70. More particularly, angled channels 85 are formed between adjacent triangle-shaped warming cells 70 in the same row and horizontal channels 90 are formed between triangle-shaped warming cells 70 in one row and triangle-shaped warming cells 70 in a row above or below a given row. Channels 85 are offset relative to those in adjacent rows 80a, 80b, and 80c, as illustrated in Fig. 4.

10 [0045] As was the case for the warming cells 20, when the warming cells 70 about a wearer or user (for example when the jacket 1 is worn), the wearer's body covers the channels 85, 90 so as to form an air-filled space or pocket (not illustrated) between the cells 70. This space preferably traps and contains body heat in order to increase the warmth of the garment or outdoor equipment, such as the jacket 1.

15 [0046] Yet another portion of a warming cell pattern 95 is provided in Fig. 5 that may be utilized in an interior portion of a garment or outdoor equipment such as the interior portion 5 of the jacket 1. The warming cell pattern 95 is composed of a number of hexagon-shaped warming cells 100, each of which includes six sides 105. The warming cells 100 are preferably spaced in the pattern 95 using a known method to place a column 110 of cells 100  
20 offset relative to an adjacent column 115. This column arrangement may alternate continuously in either direction to form the portion of the pattern 95. In any event, a number of channels 120 that run in six different directions are formed around and between adjacent sides 105 of adjacent cells 100. Like the warming cells 20, 70, when the warming cells 100 about a wearer or user (for example when the jacket 1 is worn), the channels 120 are blocked  
25 by the wearer to form an air-filled space or pocket (not illustrated) between the cells

100. This space, like the spaces associated with the above described patterns of warming cells, preferably traps and contains body heat to increase the warmth of the garment or outdoor equipment being worn or utilized.

[0047] Figs. 6A, 6B, and 6C illustrate three garment panels 125A, 125B, and 125C  
5 that when attached to one another may form a vest-shaped garment that may be worn alone or integrated into a garment such as a jacket or coat. As illustrated in Figs. 6A, 6B, and 6C, columns 130A, 130B, and 130C may be located near the center of a wearer when the panels 125A, 125B, and 125C are assembled. The cells 135A, 135B, 135C that make up the columns 130A, 130B, and 130C, respectively, are nearly rectangular in shape. From an  
10 upper portion 140A, 140B, and 140C toward a lower portion 145A, 145B, and 145C of the panels 125A, 125B, 125C, respectively, the panels 135A may become somewhat smaller in area. In alternative embodiments, the cells 135A, 135B, 135C may be the same size or even increase in size from the upper portions 140A, 140B, 140C toward the lower portions 145A, 145B, 145C.

[0048] Second columns 150A, 150B, 150C and third columns 155A, 155B, 155C  
15 may also be provided within each panel 125A, 125B, 125C, respectively. The cells 160A, 160B, 160C and 165A, 165B, 165C that make up the columns 150A, 150B, 150C and 155A, 155B, 155C, respectively, may be substantially quadrilateral. The cells 160A, 160B, 160C also decrease in size from the top portions 140A, 140B, 140C toward the lower portions  
20 145A, 145B, 145C. The cells 165A, 165B, 165C may also be quadrilaterals, but in a preferred embodiment, as illustrated in Figs. 7A, 7B, and 7C, are elongated as compared to the other cells that make up the panels 125A, 125B, 125C.

[0049] The panels 125A, 125B, 125C generally include each of horizontal channels  
170A, 170B, 170C and vertical channels 175A, 175B, and 175C, respectively. The channels  
25 170 and 175 that make up the panels 125A, 125B, and 125C may be less linear than those

provided in other embodiments. This is because the cells that make up the panels 125A, 125B, 125C may be asymmetrical quadrilaterals such as those illustrated in Figs. 6A, 6B and 6C. Nevertheless, the channels 170A, 170B, and 175C may function in substantially the same manner as the channels described hereinabove.

5 [0050] In the illustrated embodiment, the panels 6A and 6C are substantially mirror images of one another, and the panel 6B is symmetrical about its vertical axis. In alternative embodiments, this may not be the case, and the panels 6A and 6C may differ relative to one another more substantially.

[0051] Turning now to Figs. 7A, 7B, and 7C, example embodiments of warming cells  
10 from the panels 125A, 125B and 125C are illustrated. Unlike the cells described above, the cells 135, 160, and 165 that make up the panels 125 may vary in thickness. For example, as provided in Fig. 7A, the cell 135A is thicker than the cell 160A, which in turn is thicker than the cell 165A. In Fig. 7B, the cell 135B is thicker than the cells 160B, which are thicker than the cells 165B. In Fig. 7C, the cell 135C is thicker than the cell 160C, which is thicker than  
15 the cell 165C in substantially the same manner as Fig. 7A, though in mirror-image form. The variable shape and thicknesses of the cells 135, 160, and 165 may be physiologically mapped to the body to conform more easily therewith.

[0052] Fig. 8 illustrates a garment 180 that a wearer 185 has donned. The garment  
180 is embodied as a vest, though it may be just a portion of a larger garment such as a jacket  
20 or coat that has integrated the garment 180 into its assembled structure. In the garment 180, a plurality of warming cells 190 are provided as quadrilaterals having four sides (though alternative geometries are foreseeable and envisioned). In some of the cells 190 such as cell 190A, an upper edge 195 may be at least partially curved. In at least some embodiments of the garment 180, more edges such as the edge 195 may be curved, or fewer edges such as the  
25 edge 195 may be curved.

[0053] In the garment 180, a variety of horizontal channels 200 and vertical channels 205 are provided. The channels 200, 205 provide substantially the same function as the channels for the above described embodiments. Unlike the previously described channels, however, the channels 200, 205 have variable widths across their lengths. Such variation  
5 may act to facilitate flow of air upwards or from side to side, so as to increase the heat retaining properties of the garment 180.

[0054] The warming cells described herein may be attached to the fabric of a garment or other outdoor equipment in a variety of methods. More particularly, the warming cells may be attached to a strip of fabric before they are attached to the garment or other outdoor  
10 equipment, or they may be sewn directly onto the garment or other outdoor equipment. The lower portions of the cells may be attached to the garment or other outdoor equipment (directly or indirectly) at a turned edge, using an edge stitch. The corners of the cells are also preferably darted. Notwithstanding the above, other foreseeable sewing methods to attach the warming cells to a garment or other outdoor equipment are contemplated herein.

15 [0055] The description above identifies the warming cells as being cube, triangle, or hexagon shaped. However, the cells in any particular pattern may take on a number of cross-sectional shapes including diamonds, rectangles, octagons (and other polygons), stars, circles, parallelograms, and many others, as well as any combination of shapes. In any event, channels are preferably formed between and around any shaped cells that are utilized so that  
20 those channels may be covered when a garment or other outdoor equipment is worn or utilized. As such, air-filled spaces or pockets are formed by the channels and a user's body traps and warms the air in such channels thereby increasing the warmth of the garment being worn or equipment being utilized.

[0056] The description generally provides that warming cells may be in the "core" of  
25 a jacket or garment. It should be noted that warming cells substantially similar to those

described above may also be present in a jacket or garment's hood, sleeves, or anywhere else on a garment. Moreover, as set forth above, the warming cells may also be utilized in equipment such as sleeping bags, blankets, and the like.

[0057] From the foregoing, it will be seen that the various embodiments of the present invention are well adapted to attain all the objectives and advantages hereinabove set forth together with still other advantages which are obvious and which are inherent to the present structures. It will be understood that certain features and sub-combinations of the present embodiments are of utility and may be employed without reference to other features and sub-combinations. Since many possible embodiments of the present invention may be made without departing from the spirit and scope of the present invention, it is also to be understood that all disclosures herein set forth or illustrated in the accompanying drawings are to be interpreted as illustrative only and not limiting. The various constructions described above and illustrated in the drawings are presented by way of example only and are not intended to limit the concepts, principles and scope of the present invention.

[0058] As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples illustrated herein, and it is therefore contemplated that other modifications and applications, or equivalents thereof, will occur to those skilled in the art. The terms "having" and "including" and similar terms as used in the foregoing specification are used in the sense of "optional" or "may include" and not as "required."

[0059] Many changes, modifications, variations and other uses and applications of the present constructions will, however, become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit

and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

**CLAIMS**

What is claimed is:

1. A cell pattern for a garment or other outdoor equipment, the cell pattern comprising:  
a portion of a garment or other outdoor equipment;
- 5 a cell pattern arranged on said portion, said cell pattern including a plurality of individual cells positioned in a spaced apart relationship across said portion so as to form an air channel completely around each cell, each cell being three-dimensional in shape and filled with an insulating material.
2. The cell pattern of claim 1, wherein the individual cells are offset from adjacent cells  
10 positioned above and below a particular cell.
3. The cell pattern of claim 1, wherein each cell is of a height from about  $\frac{1}{4}$  inch to about 3 inches.
4. The cell pattern of claim 1, wherein the air channel around each cell is of a width from about  $\frac{1}{4}$  inch to about  $\frac{3}{8}$  inch.
- 15 5. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is square in shape.
6. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is rectangular in shape.
7. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is diamond  
20 in shape.
8. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is triangle in shape.
9. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is polygonal in shape.

10. The cell pattern of claim 1, wherein the cross-sectional shape of each cell is circular in shape.
11. A cell pattern for use in a garment or other outdoor equipment, the cell pattern comprising:
- 5 a plurality of individual cells positioned in a spaced apart relationship to one another to form at least one of a horizontal air channel and a vertical air channel between adjacent cells, each cell being three-dimensional in shape and filled with an insulating material.
12. The cell pattern of claim 11, wherein the individual cells are offset from adjacent cells positioned above and below a particular cell.
- 10 13. The cell pattern of claim 11, wherein each cell is of a height from about  $\frac{1}{4}$  inch to about 3 inches.
14. The cell pattern of claim 11, wherein the air channel around each cell is of a width from about  $\frac{1}{4}$  inch to about  $\frac{3}{8}$  inch.
15. The cell pattern of claim 11, wherein the cross-sectional shape of each cell is square
- 15 in shape.
16. The cell pattern of claim 11, wherein the cross-sectional shape of each cell is rectangular in shape.
17. The cell pattern of claim 11, wherein the cross-sectional shape of each cell is diamond in shape.
- 20 18. The cell pattern of claim 11, wherein the cross-sectional shape of each cell is triangle in shape.
19. The cell pattern of claim 11, wherein the cross-sectional shape of each cell is polygonal in shape.
20. The cell pattern of claim 19, wherein the cross-sectional shape of each cell is circular
- 25 in shape.

FIG. 1

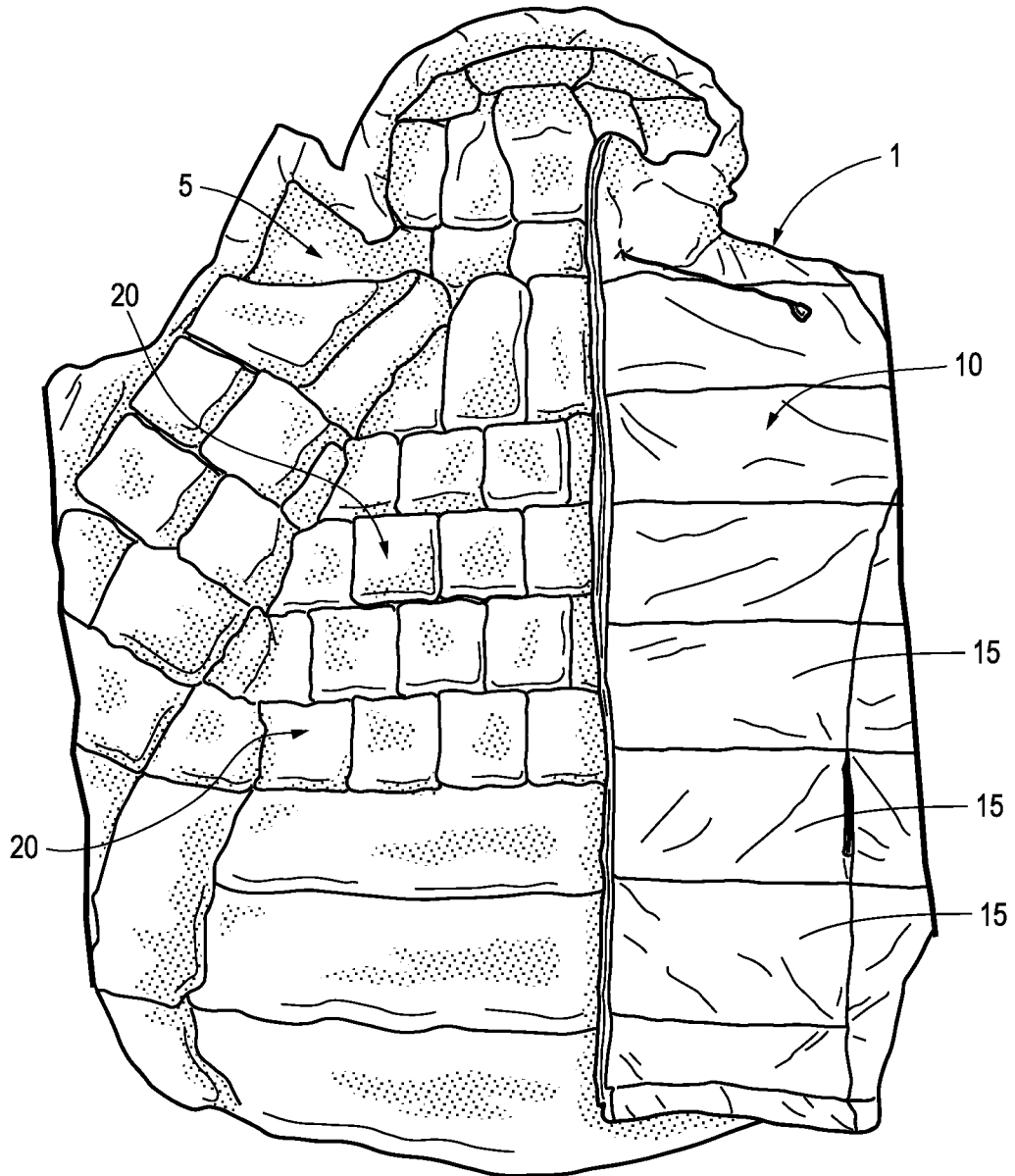
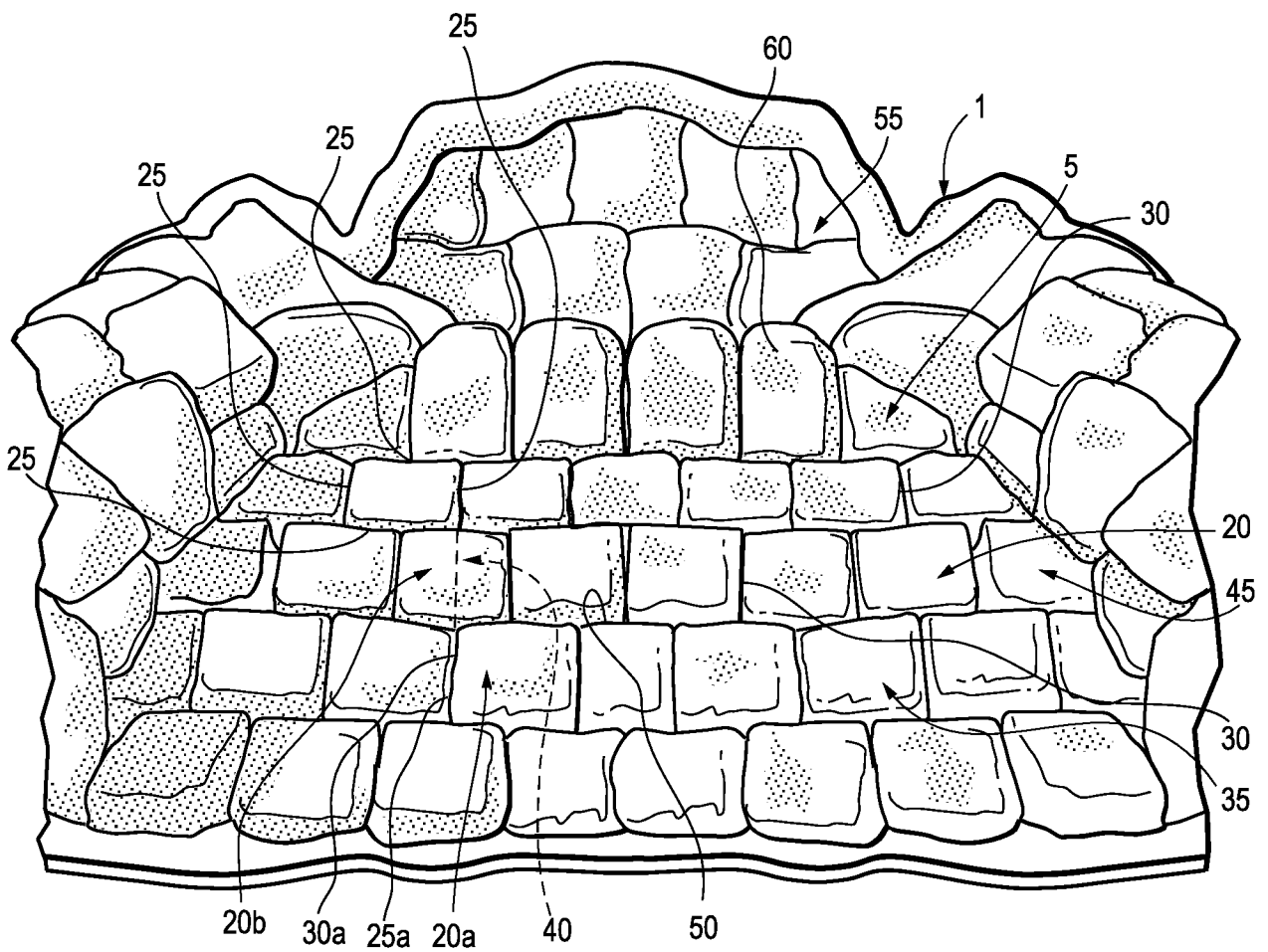


FIG. 2



**FIG. 3**

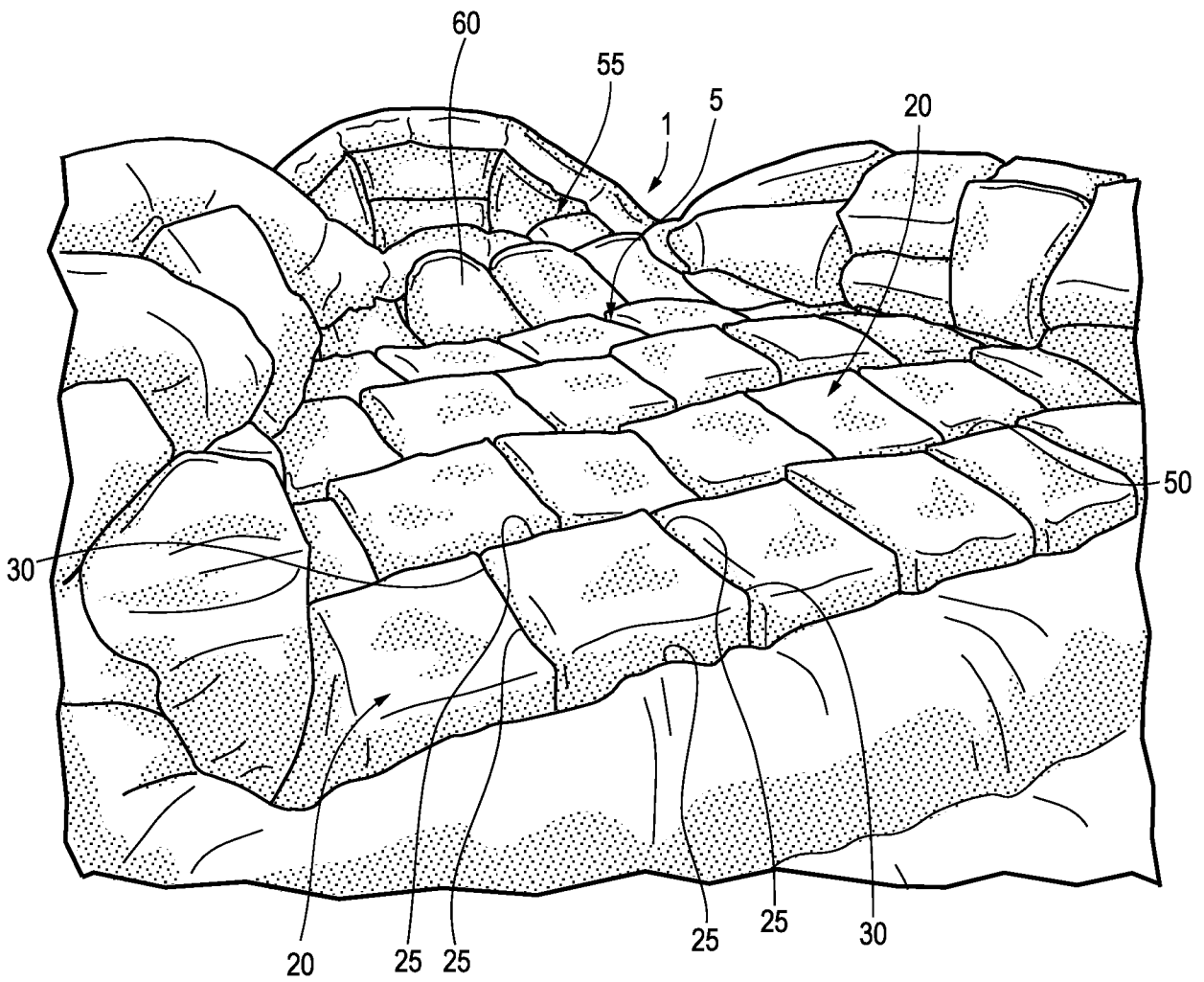
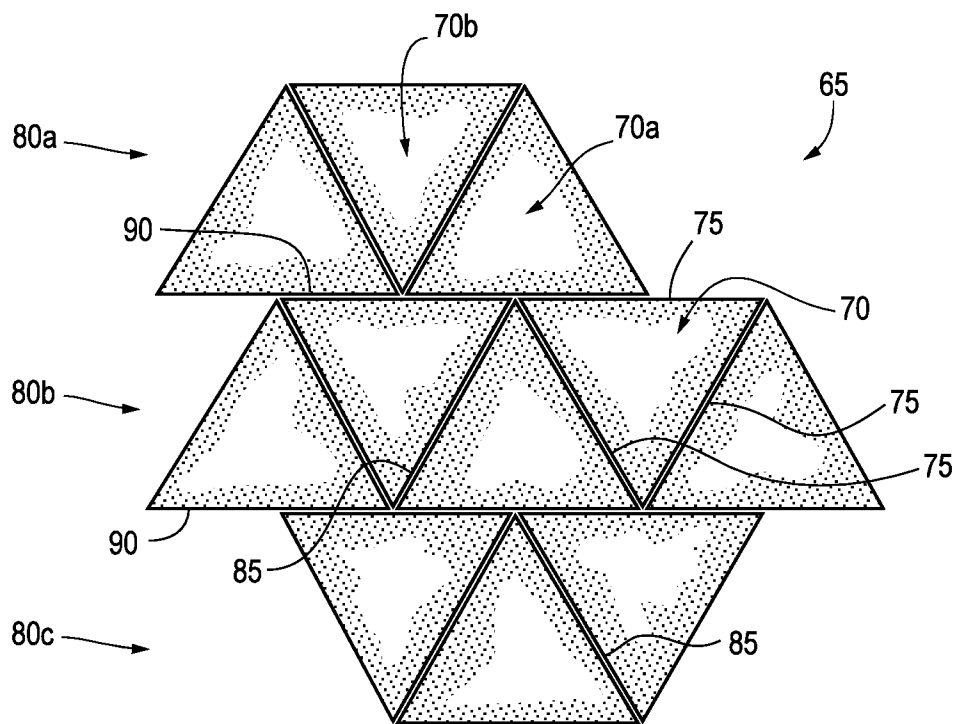
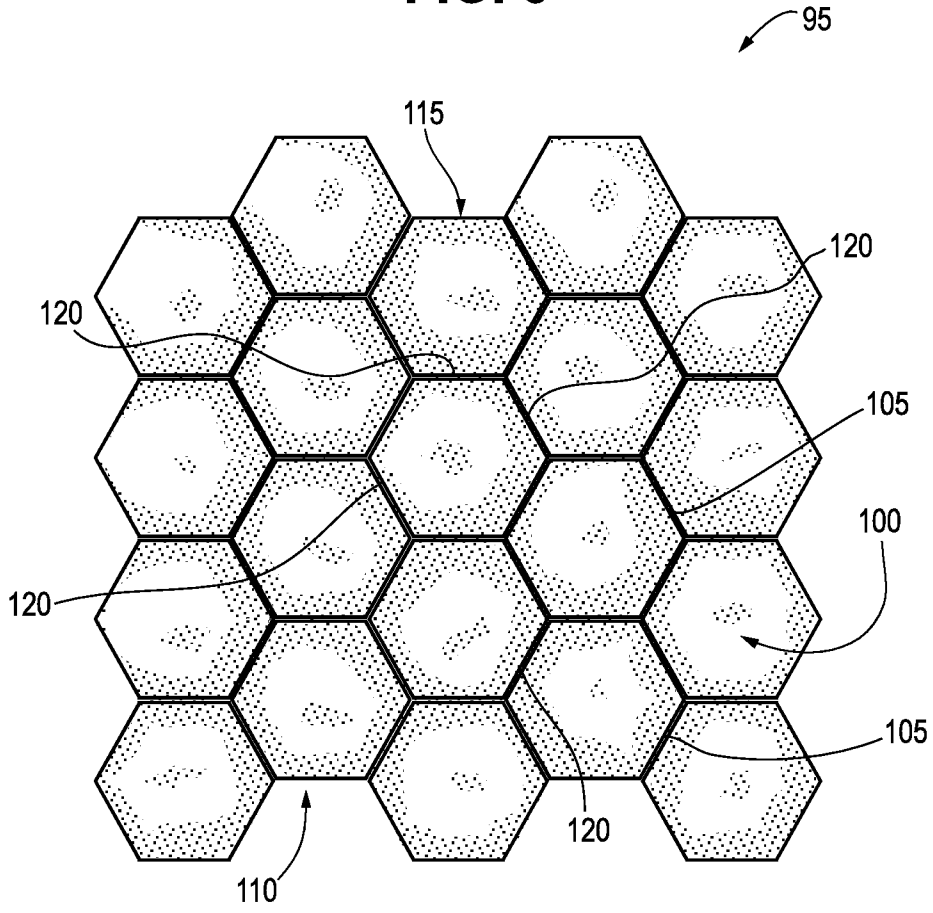
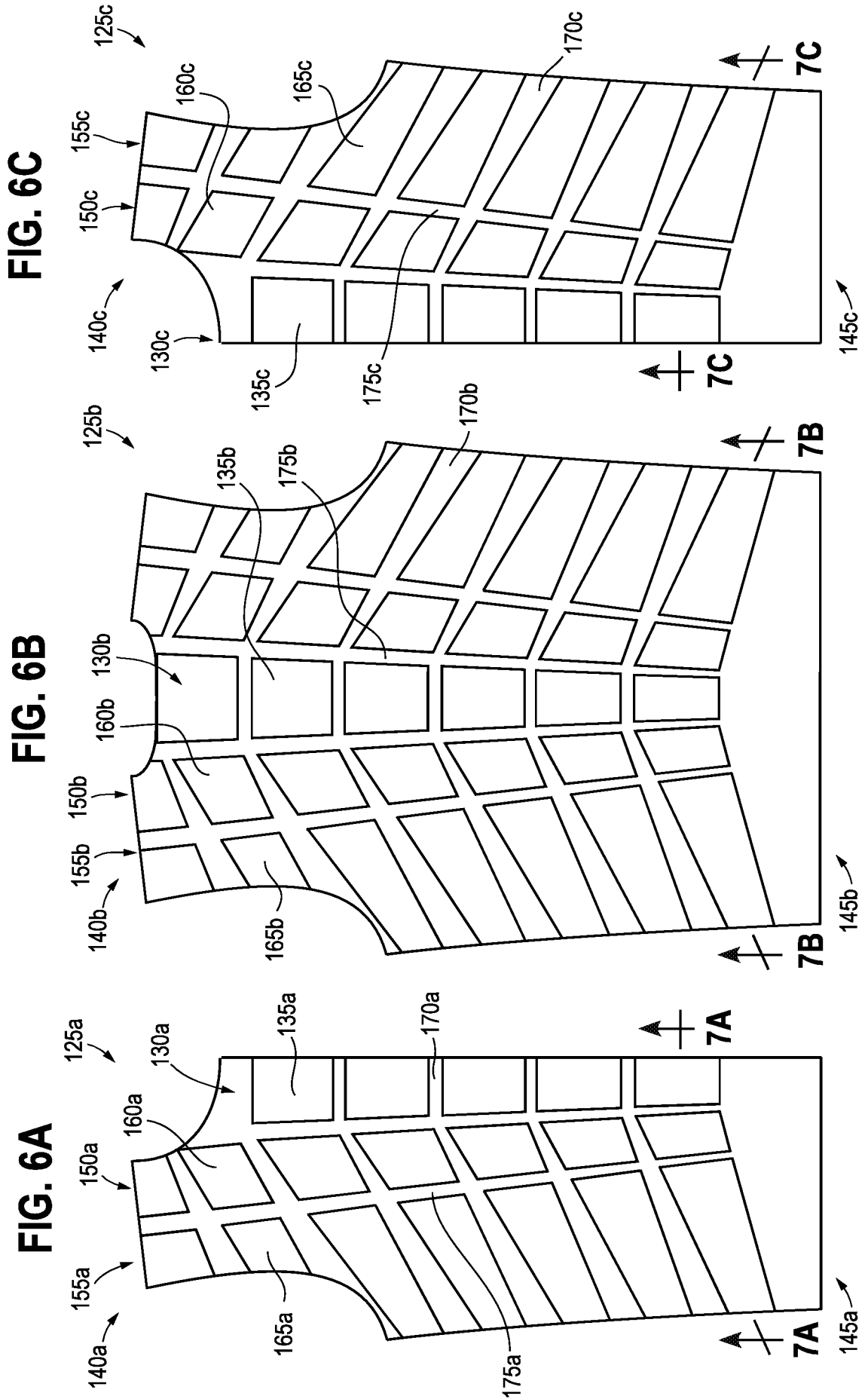


FIG. 4

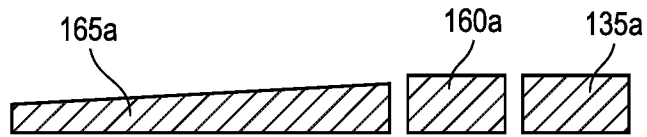


**FIG. 5**

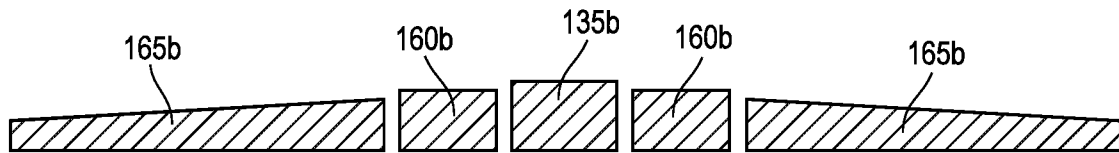




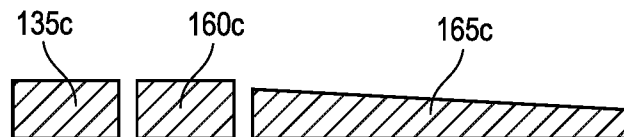
**FIG. 7A**



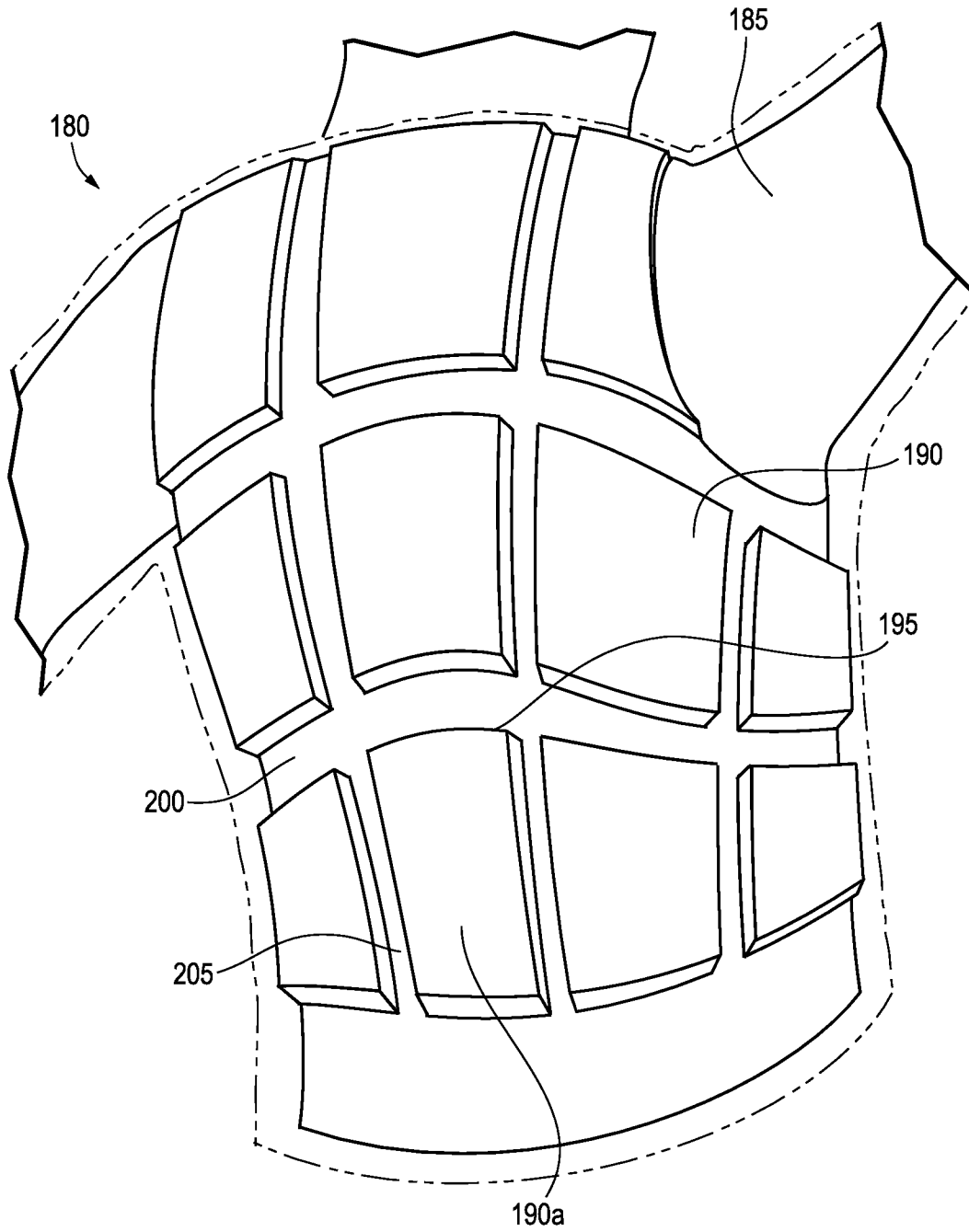
**FIG. 7B**



**FIG. 7C**



**FIG. 8**



## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2019/059335****A. CLASSIFICATION OF SUBJECT MATTER****A41D 31/06(2019.01)i, A41D 13/005(2006.01)i**

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A41D 31/06; A41D 13/00; A41D 27/02; A41D 3/02; A41D 3/04; A41D 31/00; B32B 3/30; B32B 5/02; D06B 1/00; A41D 13/005

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

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords:cell pattern, garment, air channel, insulating

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009-0260126 A1 (ROCK, M. et al.) 22 October 2009 claims 1, 8, 9; paragraphs [0025], [0031], [0032], [0034], [0083]; figure 4	1-20
Y	US 5692245 A (REUBEN, R.) 02 December 1997 column 3, lines 21-27	1-20
A	US 2015-0223533 A1 (UNDER ARMOUR, INC.) 13 August 2015 abstract; claims 10, 14; figure 1C	1-20
A	US 2013-0042390 A1 (COLUMBIA SPORTSWEAR NORTH AMERICA, INC.) 21 February 2013 abstract; claim 20	1-20
A	US 5150476 A (STATHAM, D. N. et al.) 29 September 1992 abstract; claims 1, 12, 15	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

08 April 2020 (08.04.2020)

Date of mailing of the international search report

**10 April 2020 (10.04.2020)**

Name and mailing address of the ISA/KR

International Application Division  
Korean Intellectual Property Office  
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

MIN, In Gyou

Telephone No. +82-42-481-3326



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Information on patent family members

International application No.

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