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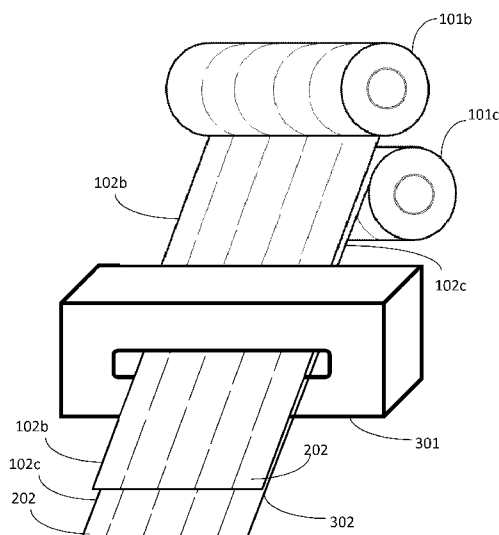


FIG. 3

(57) Abstract: A universal feedstock of strand packing with cohesive is provided for a machine not typically intended for dispensing strand packing materials. The feedstock is in the form of a sheet wound into a roll. The sheet is pre-slit intermittently in a length direction and does not require the dispensing machine to slit it into strands at the time it is being dispensed. The strands are randomly crumpled to bring cohesive portions into contact with each other at adhesion sites.

UNIVERSAL FEEDSTOCK OF STRAND PACKING MATERIAL WITH COHESIVE

Field Of The Invention

5 The present invention relates generally to packing materials and, more particularly, to packing materials used for void fill, blocking, and bracing.

Background

10 When shipping an article from one location to another, the article is typically placed in a container along with protective packaging material to fill the voids about the article, to cushion the article and or to brace the article during the shipping process. Methods using paper, foam and other materials are in use.

15 Various types of paper may be used as a packing material. Some examples of this are tissue, news print and kraft paper. Paper is less durable than foam products and foam "peanut" products generally lacks the ability to prevent migration of articles in a box, in addition to the fact that the plastic in foam products is not easily biodegradeable, and that foam products often also require as much room for storage as they take up in use.

20 Cohesive coated products may be used when more protection is needed than paper alone can provide. When a cohesive-coated material contacts another cohesive-coated material, the respective cohesive-coated portions adhere to each other. Traditionally the use of cohesive coated strand packing material require a heavy and expensive machine that slits the raw packing material on demand. In some variations, such as Canadian Patent Nos. 25 2,521,161 and 2,521,308, a machine cuts the paper into strands as it is dispensed. Such material may be referred to as cohesive-coated strand paper. The machines needed to dispense this paper are heavy, and contain expensive slitting blades that provide only a single fixed width of strands.

30 Packaging equipment manufacturers make machines that are designed to convert sheet paper into a packaging material for packaging applications. Currently the conversion machines typically are not capable of dispensing strand packaging material as they do not have the ability to slit paper into strands on demand, limiting their versatility.

Summary

This summary is provided to introduce a selection of concepts in a simplified form, the concepts being further described below in the detailed description. This summary is not intended to identify key features or essential
5 features of this disclosure, nor is it intended to limit the scope of the invention.

According to some embodiments of the present invention a supply of universal feedstock of pre-slit strand packing material that can be used in a majority of existing dunnage dispensing machines made by various manufactures may be composed of a sheet stock material intermittently slit in a
10 lengthwise direction in a plurality of laterally-spaced longitudinal rows that define strands therebetween, with at least one face of the sheet being coated with a cohesive. For example, cohesive paper with non-continuous slits cut into the paper parallel to a length dimension of the paper, with the paper wound into a roll. The paper may be composed of 50 pound basis-weight kraft paper
15 approximately 7.5 inches wide (about 19 cm), coated on one side with a cohesive, such as a latex cohesive, with a number of non-continuous slits present in the paper sectioning the paper into strands approximately 1.5 inches wide (about 3.8 cm). Each slit being interrupted in approximately 4.25 inch (about 10.8 cm) increments. The interruption may be approximately 0.125 inches
20 (about .3 cm) in length and forms a bridge that connects adjacent strands together. The interruption in the slits may be equally staggered between the strands and continuously repeated along the length of the roll. An operator loads a roll of pre-slit strand packaging material onto a machine, not typically associated with dispensing cohesive strand packaging material, and feeds it
25 through the machine. The machine's features may include a paper feeding mechanism, a guillotine cutter, safety mechanisms, paper shaping mechanisms and features, and a user interface and/or computer to aid in dispensing strand packing material from the machine.

Within the machine or by an operator after material is dispensed
30 the machine or the operator may randomly tangle the strands. The cohesive-coated strands may be randomly tangled to come into contact with other cohesive-coated strands. When a cohesive-coated strand comes in contact with another cohesive-coated strand they cohesively adhere to each other. Many

locations of adhesion are formed as the paper is manipulated. The formation of adhesion sites give structure and resiliency to the packing material and allows it to retain a molded shape. The material may be formed into the rough size and shape relative to packaging needs and then may be further shaped by the article
5 to be protected and the box in which both the article and the packaging material are placed. The mass of paper with many interconnected cohesive adhesion sites protects the article from physical surface abrasion and general structural damage.

In some embodiments of the present invention two or more sheets
10 from two or more rolls may be loaded into the machine. In this embodiment the amount of paper dispensed is increased and the density of the packing material can also be increased. The addition of sheets increases the compressive load-carrying ability of the resulting packing material.

In some embodiments of the present invention a single roll of paper
15 or multiple rolls of paper, or one of multiple rolls of paper may have volatile corrosion inhibitors present.

In some embodiments of the present invention the width of the roll may be adjusted to make it more suitable for the particular machine it is to be dispensed through.

20 In some embodiments of the present invention the width of the strands may be about one sixteenth of an inch or greater up to about half the width of the sheet. In this range of embodiments the number of slits may be adjusted to suit specific packaging needs. In general, as the number of slits or strands increase the compressive load carrying ability of the packing material
25 decreases making it more formable and more apt to protect delicate products. As the number of slits decreases the compressive load carrying ability of the packing material increases making it better suited for heavy objects.

In some embodiments of the present invention the size of the uncut bridge portions between slits may vary. Increasing the size of the bridges
30 increases the compressive load carrying ability of the packing material making it better for heavy objects. Decreasing the size of the bridges makes the material more formable and more suited to protect delicate products.

In other embodiments the pattern of bridges between the strands may be other patterns such as chevron or a straight transverse line.

In some embodiments of the present invention the frequency of bridges may vary. Increasing the frequency of the bridges increases the compressive load carrying ability of the packing material. Decreasing the frequency of the bridges makes the material more formable and more suitable to protect delicate products.

In some embodiments of the present invention plastic sheet, foam sheet, bubble wrap or other sheet good may be used instead of paper. In this embodiment the width of strands, frequency of bridges and length of bridges may be adjusted for the media, intended article to be packed, and the box it is to be placed in.

In other embodiments the plastic or foam sheet may be made from petroleum, from renewable sources or otherwise may be biodegradable.

In other embodiments the paper may range from about one inch wide (about 2.5 cm) to a few feet wide (about 91 cm). Narrower widths being better suited for small items. Widths of a few feet wide being better suited for large industrial components or machines. Wider widths have the additional advantage of decreasing the time needed to pack an article.

In some embodiments of the present invention the basis weight of the paper may range from about 13 pounds (about 6 kg) to about 80 pounds (about 36 kg). The heavier weight paper being stiffer and increasing the compressive load carrying ability of the packing material making it better for heavy objects. The lighter weight paper being more formable and more suitable to protect delicate products.

In some embodiments other grades or types of paper such as recycled, linear, bag and dunnage may be used

In some embodiments of the present invention the paper may be wound on a roll and in others it may be fan folded or otherwise packaged so that a continuous web can be dispensed into a machine

In some embodiments of the present invention The sheet of universal feedstock of strand packing material with cohesive may be perforated at regular intervals of about 12 inches (about 30.5 cm) to make is

more compatible with existing paper dispensing machines that may not have a cutting mechanism.

In some embodiments of the present invention the perforations can range from about 1 inch (about 2.5 cm) to 20 feet (about 6 m) apart

5 In other embodiments the perforations may be a repeating pattern of various lengths. For example a perforated section 2 feet (about 61 cm) long, a perforated section 3 feet (about 91 cm) long and a perforated section 4 feet (about 122 cm) long which is then repeated along the length of the roll.

In some embodiments a machine may be built intentionally for use
10 with rolls of pre-slit strand cohesive paper allowing the overall cost and or complexity of existing machines for dispensing strand packing with cohesive to be decreased. Such a machine could replace the expensive slitting mechanism with more cost effective feed rollers. The simplification would not only decrease the cost of parts but would also decrease the time required to build and service
15 the machine. In other embodiments the machine may be powered or manually operated.

In some embodiments a box with cohesive on the interior surfaces may be used in conjunction with presplit strand packing material with cohesive. In this embodiment not only does the shape of the wad of packing material
20 relative to the box and the article hold it in place but also the cohesion between the wad of packing material and the interior of the box further limiting migration of all items in the box.

According to some embodiments of the present invention, a method of using a universal feedstock of strand packing material for block and
25 brace protection may include loading a roll of universal feedstock of strand packing material into a paper dispensing machine lacking the ability to slit strand packing material on demand and using the machine to dispense strand packing material. The machine may be motorized or manually operated. After being dispensed an operator then receives strand packing material from the machine
30 and begins shaping the stand packing material into a bundle, pad or wad of interconnected strands forming a semi-rigid support structure.

The wads of strand packing material may be formed by loosely mixing strands after they are received by the operator from a dispensing

machine and shaping the strands into a wad of the approximate size needed relative to the size and weight of the part and the size of the box.

The wad typically may have a roughly spherical shape, but may be elongated or be other shapes. The wad is placed at corners, edges, ends and or
5 other critical points of an article to support and or suspend it in a box. As the wads are placed, on the article and in the box, they deform and conform to the article and the box forming a semi-rigid support structure between the article and the box. In the case of packing a cylindrical shaped article two wads may be used to support either end of the article and the center section of the article left
10 unexposed. When packing cylindrical articles this way the wads on either end may be called end caps and they support the article preventing it from structural damage during shipping.

In another embodiment of the method the number of wads may be adjusted so that they collectively support the article in the box, and may prevent
15 the article from touching any sides of the box. For example, if the article is roughly cubic in shape eight wads may be used to support the eight corners of the article. The intent is to support the article at critical points preventing its unintentional movement. Supporting the article at critical points allows for cost effective use of material.

Aspects of the invention described with respect to one embodiment
20 may be incorporated in a different embodiment although not specifically described relative thereto. That is, all embodiments and/or features of any embodiment can be combined in any way and/or combination. Applicant reserves the right to change any originally filed claim or file any new claim
25 accordingly, including the right to be able to amend any originally filed claim to depend from and/or incorporate any feature of any other claim although not originally claimed in that manner. These and other objects and/or aspects of the present invention are explained in detail below.

30 **Brief Description Of The Drawings**

The accompanying drawings, which form a part of the specification, illustrate some exemplary embodiments. The drawings and description together serve to fully explain the exemplary embodiments.

FIG. 1 is a front perspective view of a roll of universal feedstock of strand packing material with cohesive.

FIG. 2 is a top view of a section of strand packing material dispensed from a roll of universal feedstock of strand packing with cohesive.

5 FIG. 3 is a front perspective view of a machine for dispensing rolls of universal feedstock of strand packing material.

FIG. 4A is a front view of a spherical wad of cohesive strand packing material according to some embodiments of the present invention.

10 FIG. 4B is a front view of a cylindrical wad of cohesive strand packing material according to some embodiments of the present invention.

FIG. 5A is a front cross-sectional view of two spherical wads of cohesive strand packing material serving as end caps according to some embodiments of the present invention.

15 FIG. 5B is a front cross-sectional view of four spherical wads of cohesive strand packing material deformed at four of the corners of a cubic object according to some embodiments of the present invention.

FIG. 6 is a front cross-sectional view of a box with cohesive on the interior surfaces according to some embodiments of the present invention.

20 **Reference Numerals**

FIG. 1

101	Roll of universal feedstock of strand packing material with cohesive
102	Sheet of universal feedstock of strand packing material with cohesive

25 **FIG. 2**

201	Section of strand packing material with cohesive
202	A strand of strand packing material with cohesive
203	Uncut section of paper making a bridge between strands
204	Slit in packing material
30 W1	width of paper
W2	width of strand
L1	length of slit
L2	Length of bridge

L3 Length of offset between bridges

FIG. 3

101b First roll of universal feedstock of strand packing material with cohesive

5 101c Second roll of universal feedstock of strand packing material with cohesive

102b First sheet of universal feedstock of strand packing material with cohesive

102b Second sheet of universal feedstock of strand packing material with cohesive

10 301 Machine for dispensing universal feedstock of strand packing material

302 Two-ply strand packing material with cohesive.

FIG. 4A and FIG. 4B

15 401a Spherical wad of strand packing material with cohesive

401b Cylindrical wad of strand packing material with cohesive

FIG. 5A and FIG 5B

501a Deformed spherical wad of cohesive strand packing material with cohesive

20 501b Deformed spherical wad of cohesive strand packing material with cohesive

502 Cylindrical article

503 Box

504 Unfilled space

25 505 Cubic article

FIG. 6

601 Cohesive on interior surfaces of box

Detailed Description

30 The present invention now is described more fully with reference to the accompanying drawings, in which some embodiments of the invention are shown. This invention may be embodied in many different forms, however, and should not be construed as limited to the embodiments shown and described; rather, these embodiments are provided so that this disclosure will be thorough

and complete, and will fully convey the scope of the invention to those skilled in the art.

Like numbers refer to like elements throughout. In the figures, the thickness of certain lines, layers, components, elements or features may be
5 exaggerated for clarity.

Referring now specifically to the drawings and initially to FIG. 1 and FIG. 2, showing one embodiment of the present invention, a sheet of universal feedstock of strand packing material with cohesive 102 is composed of a cohesive-coated kraft paper with a basis weight about 50 pounds (about 23 kg)
10 and width W1 of about 7.5 inches (about 19 cm) wound to form a roll of universal feedstock of strand packing material with cohesive 101. The sheet 102/201 is intermittently longitudinally slit in a plurality of longitudinally-extending rows of slits 204. The rows are laterally spaced across the width of the sheet, and generally are parallel. The rows of slits 204 define separate strands 202.

15 One face of the sheet is coated with a cohesive. A cohesive-coated sheet sticks to other cohesive-coated portions of the sheet, but does not attach well to other things not coated with the cohesive. For example, an exemplary cohesive may be a synthetic or natural latex that has attached itself to the sheet, and once cured in place on the surface will have a strong propensity
20 to attach to other surfaces coated with the cohesive, but generally will not attach to the base sheet, machine parts, packaging containers, or the products being packaged. Other non-latex cohesives may be acceptable alternatives.

Turning particularly to FIG. 2, which shows a section of a sheet of universal feedstock of strand packing material with cohesive 201, the length L1
25 of each slit 204 may be about 4.25 inches (about 10.8 cm) and is interrupted by an uncut section of paper between slits 204 that forms a bridge 203 connecting adjacent strands of packing material 202. The bridge 203 may have a length L2 of about 0.125 inch (about 0.3175 cm). The bridge 203 connecting two adjacent strands and the next set of adjacent strands may be offset by a longitudinal
30 distance or length L3, which may be about 1 inch (about 2.5 cm). The pattern of offset L3 between adjacent strands extending horizontally from one edge of the sheet to the opposite edge generally may be continuously repeated along the length of the sheet. The connected strands form a sheet of universal feedstock

of strand packing material with cohesive. While these are exemplary values, other dimensions may be employed, and the dimensions may vary within a given sheet of universal feedstock.

5 In use, an operator loads a roll of pre-slit strand packaging material onto a machine, not typically associated with dispensing cohesive strand packaging material, and feeds it through the machine. The machine's features may include a paper feeding mechanism, a guillotine cutter, safety mechanisms, paper shaping mechanisms and features, and a user interface and/or computer to aid in dispensing strand packing material from the machine.

10 Within the machine or by an operator after material is dispensed the machine or the operator may randomly tangle the strands. The latex coated strands may be randomly tangled to come into contact other latex coated strands. When a latex coated strand comes in contact with another latex coated strand they cohesively adhere to each other. Many locations of adhesion are
15 formed as the paper is manipulated. The formation of adhesion sites give structure and resiliency to the packing material and allows it to retain a molded shape. The material may be formed into the rough size and shape relative to packaging needs and then may be further shaped by the article to be protected and the box in which both the article and the packaging material are placed. The
20 mass of paper with many interconnected latex cohesive adhesion sites protects the article from physical surface abrasion and general structural damage.

In some embodiments of the present invention the length L1 of slit 204 may vary from about 0.25 inches (about 0.6 cm) to about 24 inches (about 61 cm).

25 In some embodiments of the present invention the length L2 of bridge 203 may vary from about 0.0625 to about 2 inches (about 0.2 cm to about 5 cm).

In some embodiments of the present invention the length L3 of offset between slits may vary from about 0.25 inches (about 0.6 cm) to about 24
30 inches (about 61 cm).

In some embodiments of the present invention the width W1 of section of strand packing material 201 may vary from about 2 inches (about 5

cm) to about 48 inches (about 122 cm) and the width of component sheets 103 and 106 may differ.

In some embodiments of the present invention the width W2 of strand 202 of packing material 201 may vary from about 0.25 inches (about 0.6
5 cm) to about one half the width of the un-slit paper.

In some embodiments of the present invention the basis weight of the paper sheet 102 may vary from about 13 pounds (about 6 kg) to about 80 pounds (about 36 kg).

In some embodiments of the present invention the type of sheet
10 good used to form a sheet of universal feedstock of strand packing material with cohesive 102 may be changed. Various types of natural and synthetic, woven and non woven sheet goods may be used. An example is plastic sheet, foam sheet, and bubble wrap. The specific type of sheet good also may be selected that is recyclable and/or biodegradable.

15 In some embodiments of the present invention the regular offset pattern of bridges shown in FIG. 2 may be other regular patterns such as a curve or chevrons or a random pattern.

In another embodiment of the present invention one or more sheets of material may be used with a machine.

20 In another embodiment of the present invention a single sheet of material may be coated with volatile corrosion inhibitors (VCI) chemicals.

In some embodiments of the present invention sheet 102 is perforated at regular intervals of about 12 inches (about 30.5 cm).

In other embodiments of the present invention a cohesive other
25 than latex may be used. In addition the cohesive may be replaced with various types of adhesives such as pressure sensitive adhesive.

In other embodiments the roll of sheet goods may be replaced by a stack of fan folded paper or other arrangement that allows sheet goods to freely enter the rear of a machine.

30 Referring to FIG. 5A, FIG. 5B and FIG. 6 another embodiment includes cohesive on the interior surfaces 601 of the box 503. In this embodiment wads of pre-slit strand packing material with cohesive 401A and 401B are cohesively connected to the interior surfaces 601 of box 503.

Referring to FIG. 3, which shows an embodiment of a method of using the present invention. First and second sheets 102b and 102c are loaded into the rear of a paper dispensing machine. Sheets 102b and 102c join together in abutting contact before entering the rear of machine 301 with the cohesive-coated faces facing away from each other. A two-ply composite strand packing material 302 exits the machine 301 in abutting contact. Strands 202 of sheets of universal feedstock of strand packing material with cohesive 102b and 102c then are randomly intermixed and tangled with themselves and each other to form a spherical wad 401a of cohesive strand packing material. The spherical wad 401a is then deformed to conform around either end of an article 502 and a box 503 making it into a deformed spherical wad 501a. The unfilled space 504 is formed by the box 503, the article 502, and a deformed spherical wad of cohesive strand packing material 501a.

Alternatively the method may be revised so that the spherical wad 401a is then deformed to conform around the corners of an article 505 and in a box 503 making it into a deformed spherical wad 501b. The unfilled space 504 is formed by the box 503, a cubic article 505, and a deformed spherical wad of cohesive strand packing material 501b.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, steps, operations, elements, components, and/or groups thereof. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items and may be abbreviated as "/".

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries,

should be interpreted as having a meaning that is consistent with their meaning in the context of the specification and relevant art and should not be interpreted in an idealized or overly formal sense unless expressly so defined herein. Well-known functions or constructions may not be described in detail for brevity
5 and/or clarity.

The term "about", as used herein with respect to a value or number, means that the value or number can vary by +/- twenty percent (20%).

It will be understood that when an element is referred to as being "on", "attached" to, "connected" to, "coupled" with, "contacting", etc., another
10 element, it can be directly on, attached to, connected to, coupled with or contacting the other element or intervening elements may also be present. In contrast, when an element is referred to as being, for example, "directly on", "directly attached" to, "directly connected" to, "directly coupled" with or "directly contacting" another element, there are no intervening elements present. It will
15 also be appreciated by those of skill in the art that references to a structure or feature that is disposed "adjacent" another feature may have portions that overlap or underlie the adjacent feature.

Spatially relative terms, such as "under", "below", "lower", "over", "upper" and the like, may be used herein for ease of description to describe one
20 element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of a device in use or operation in addition to the orientation depicted in the figures. For example, if a device in the figures is inverted, elements described as "under" or "beneath" other elements or features
25 would then be oriented "over" the other elements or features. Thus, the exemplary term "under" can encompass both an orientation of "over" and "under". The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly. Similarly, the terms "upwardly", "downwardly", "vertical", "horizontal"
30 and the like are used herein for the purpose of explanation only unless specifically indicated otherwise.

The foregoing is illustrative of the present invention and is not to be construed as limiting thereof. Although a few exemplary embodiments of this

invention have been described, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the teachings and advantages of this invention.

Accordingly, all such modifications are intended to be included
5 within the scope of this invention as defined in the claims. The invention is defined by the following claims, with equivalents of the claims to be included therein.

Claims

1. A supply of universal feedstock of pre-slit strand packing, comprises a sheet stock material intermittently slit in a lengthwise direction in a plurality of laterally-spaced longitudinal rows that define strands therebetween, at least one face of the sheet being coated with a cohesive.

2. The supply of universal feedstock as set forth in claim 1, where
the width of the sheet is from about 2 inches to about 48 inches,
the width each strand is from about 0.125 inches to about one half the width of the sheet,
the length of each slit is from about 0.25 inches to about 24 inches,
the length of an uncut bridge portion between slits is from about 0.0625 inches to about 2 inches,
the length of the longitudinal offset between bridges in adjacent rows of slits is from about 0.25 inches to about 24 inches.

3. The supply of universal feedstock as set forth in claim 1, where the sheet stock material is wound into a roll about an axis transverse the lengthwise direction of the sheet stock material.

4. A box with cohesive on its interior surfaces for use in conjunction with the supply of universal feedstock of strand packing with cohesive as set forth in claim 1.

5. A method of using a strand packing material with cohesive for protecting the physical structure of an article, the method comprising the steps of:

receiving the strand packing material of claim 1 from a machine,
and

after the receiving step, randomly intermingling the strand sections such that the strands form a wad with cohesive portions binding together at multiple points of contact.

6. The method of claim 5, where after the random intermingling step, deforming the wad by the article to be protected and a box in which the article is placed, such that the deformed wad conforms to the shapes of the article and of the box and supports the article at a location spaced from an inside surface of the box to create exposed and unfilled regions in the box.

7. The method of claim 5, where after the random intermingling step, placing the wads at critical points relative to the article and a box such that the article is supported and protected at a location spaced from an inside surface of the box.

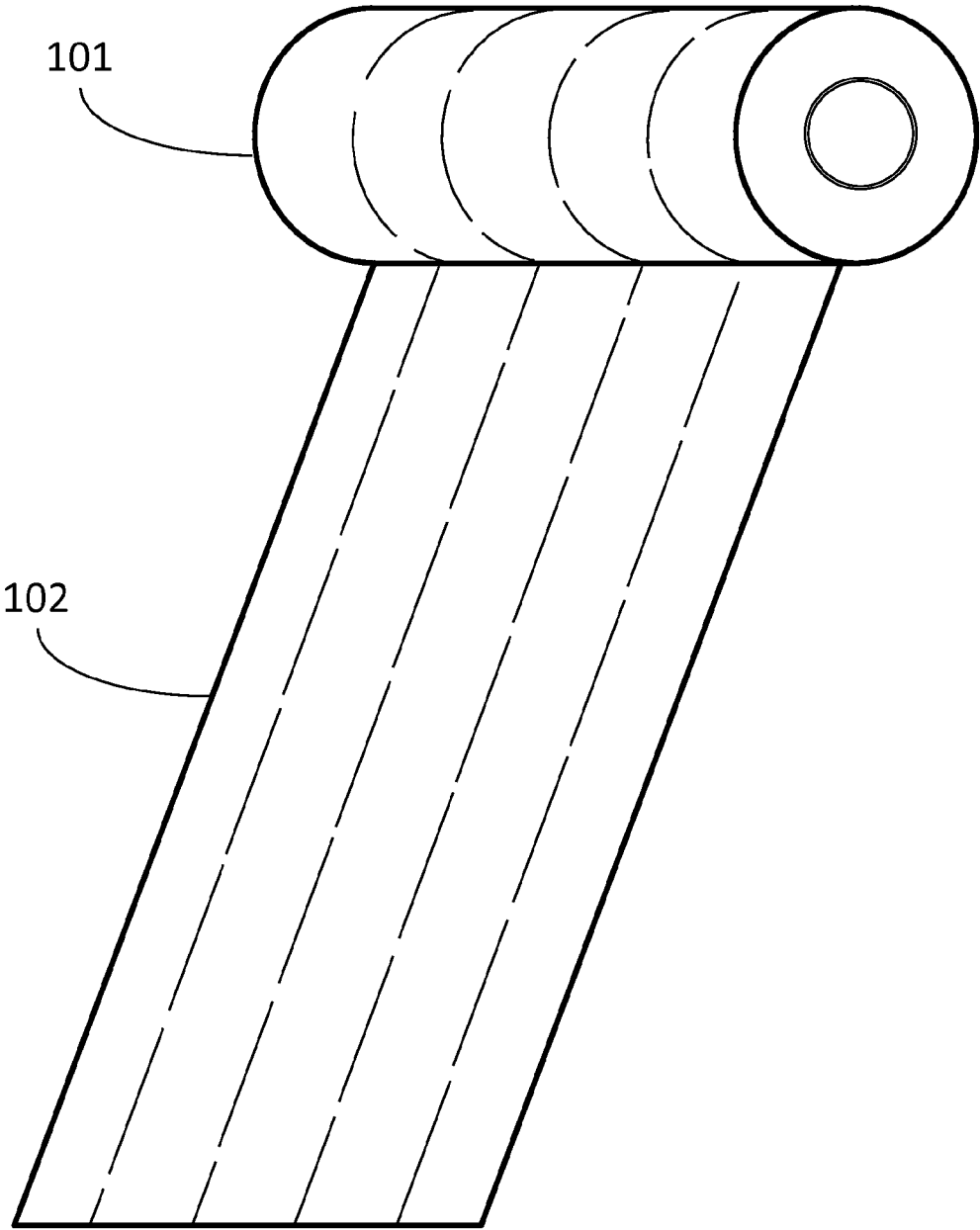


FIG. 1

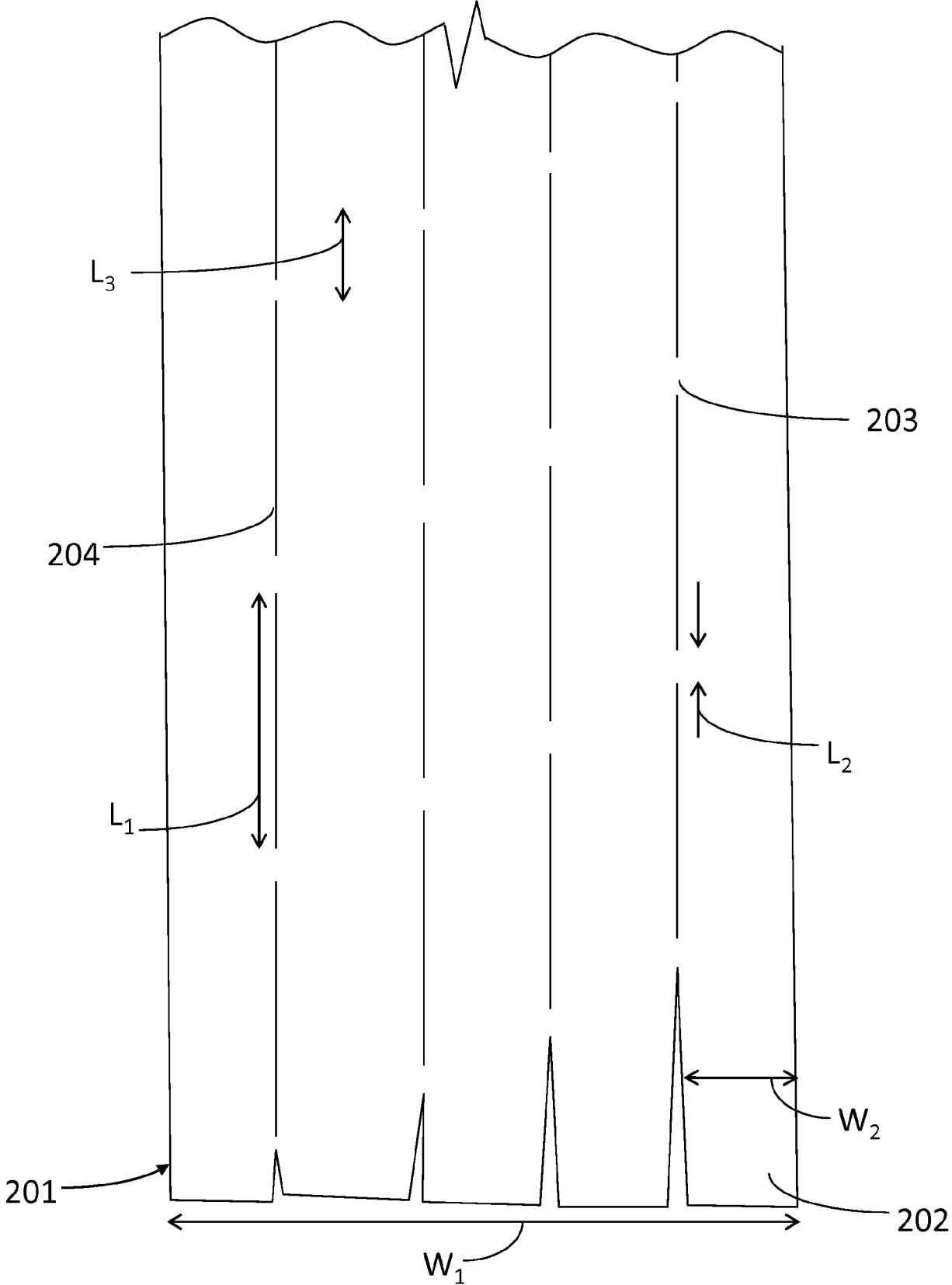


FIG. 2

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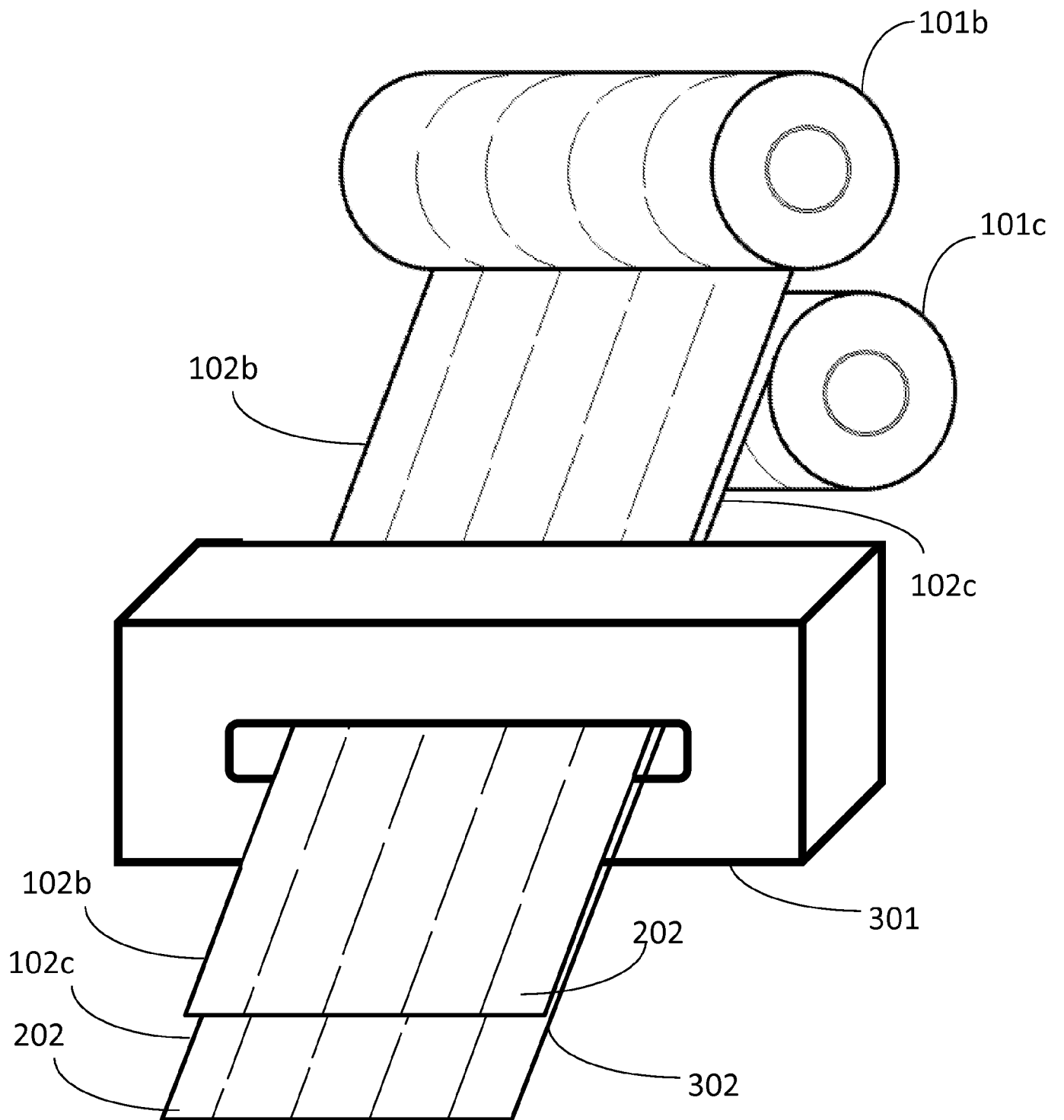


FIG. 3

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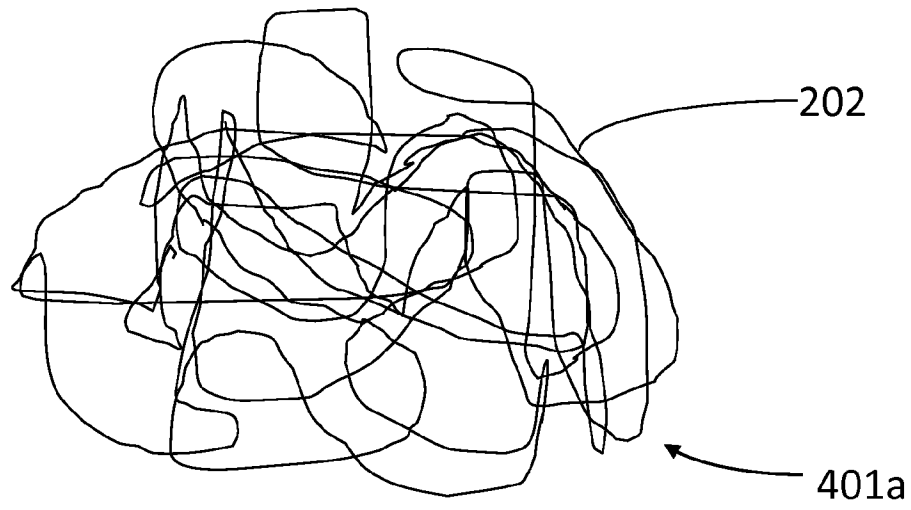


FIG. 4A

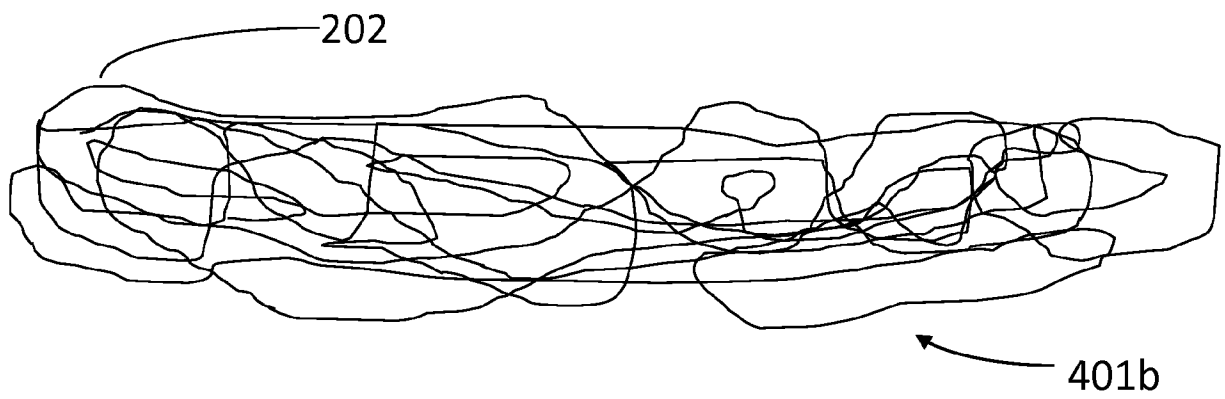
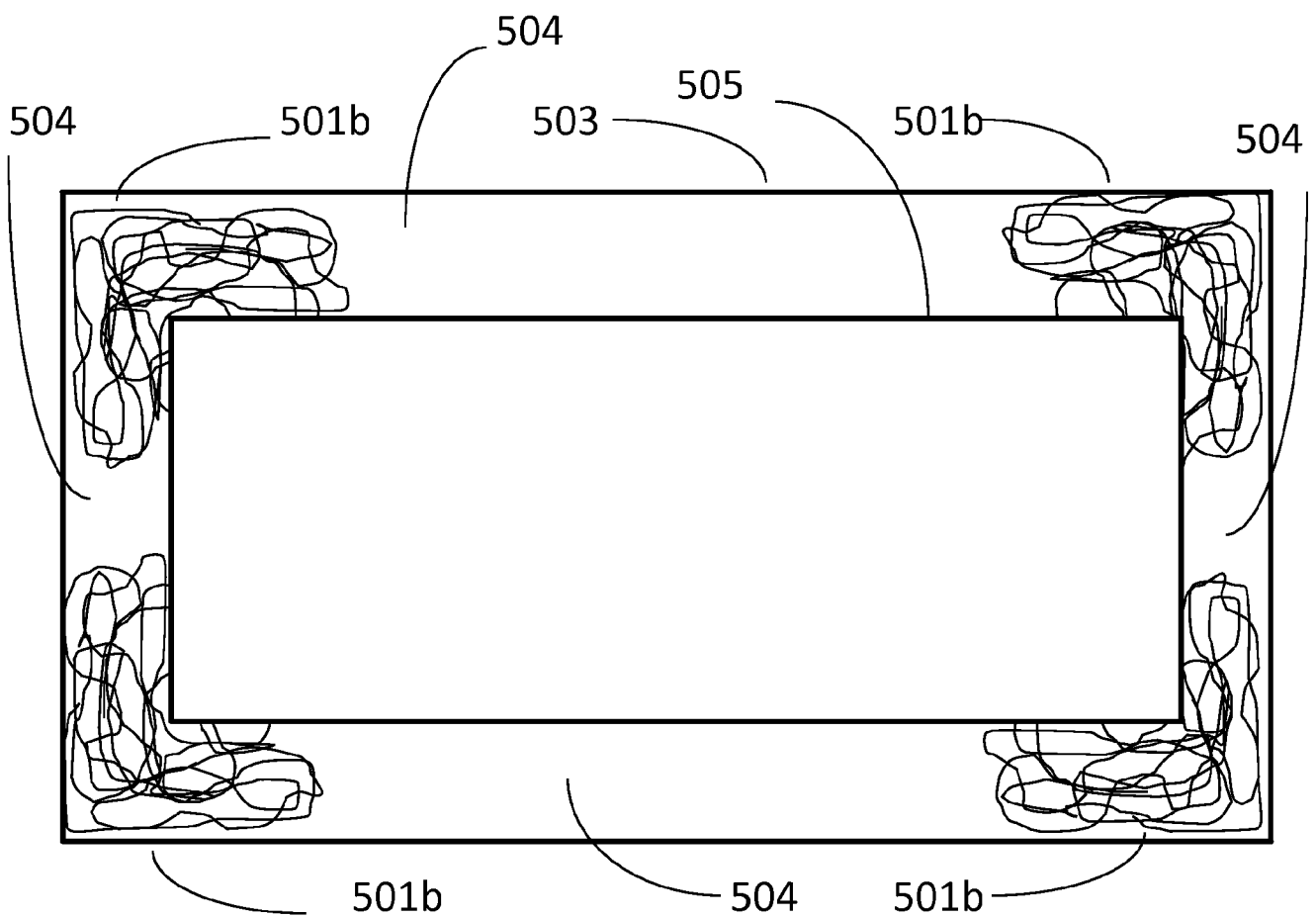
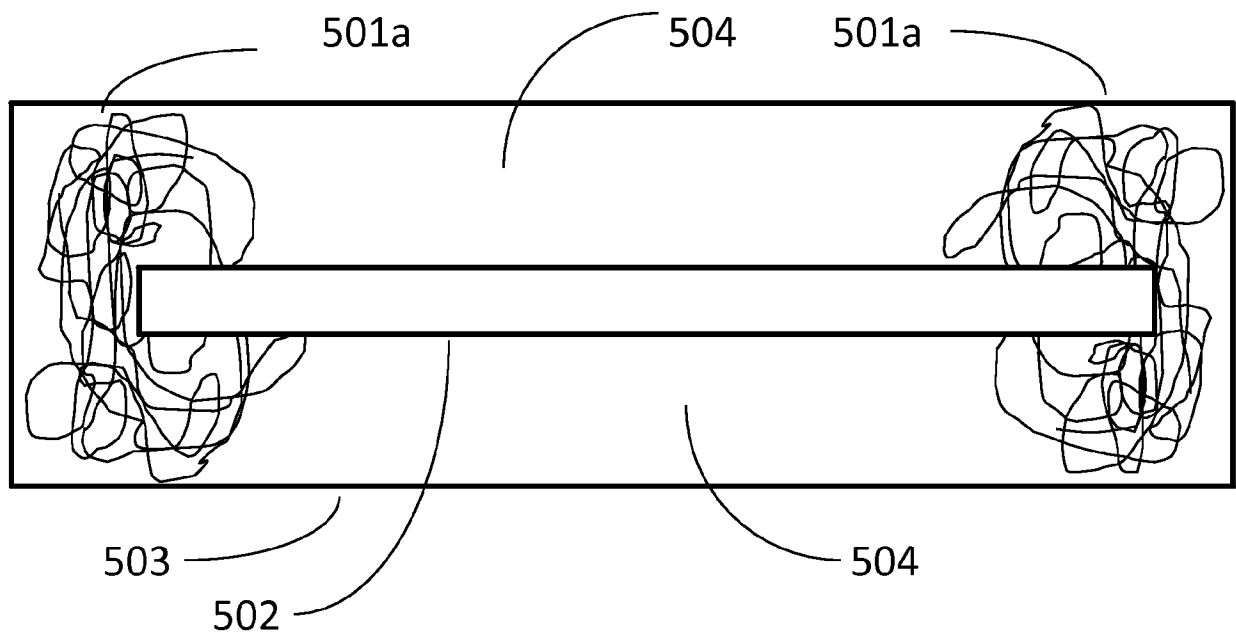


FIG. 4B

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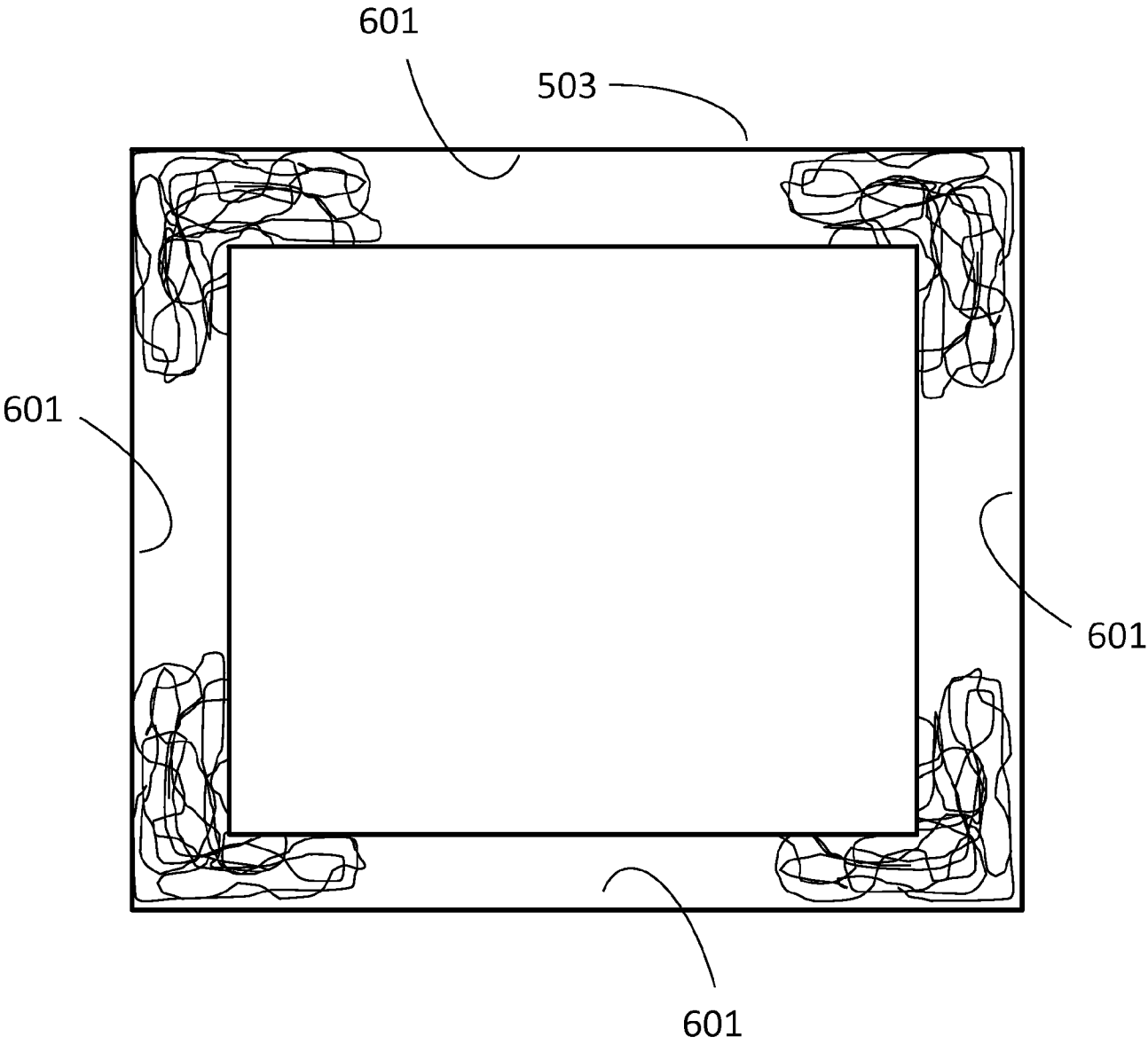


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/072732

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65B55/20 B31D5/00 B65D81/05
ADD.

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)

B65B B31D B65D

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

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

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CA 2 521 161 A1 (BURKE LARRY [CA]; YU NICHOLAS [CA]; BURKE WESLEY [CA]) 26 March 2007 (2007-03-26) cited in the application page 7, lines 157-164; claims; figures 2-8 page 8, lines 196-200 page 9, lines 211-219 claims; figures 2-8 -----	1-3,5-7
Y	EP 0 602 580 A1 (WATANABE TOKUJI [JP]) 22 June 1994 (1994-06-22) the whole document -----	1-3,5-7
X	US 5 255 784 A (WEDER DONALD E [US] ET AL) 26 October 1993 (1993-10-26) column 8, lines 20-30; figure 8 ----- -/--	4



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

24 February 2015

Date of mailing of the international search report

04/03/2015

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/072732

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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