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(54) Title: ADVANCED CONFORMANCE ENCASED COIL SPRING UNITS

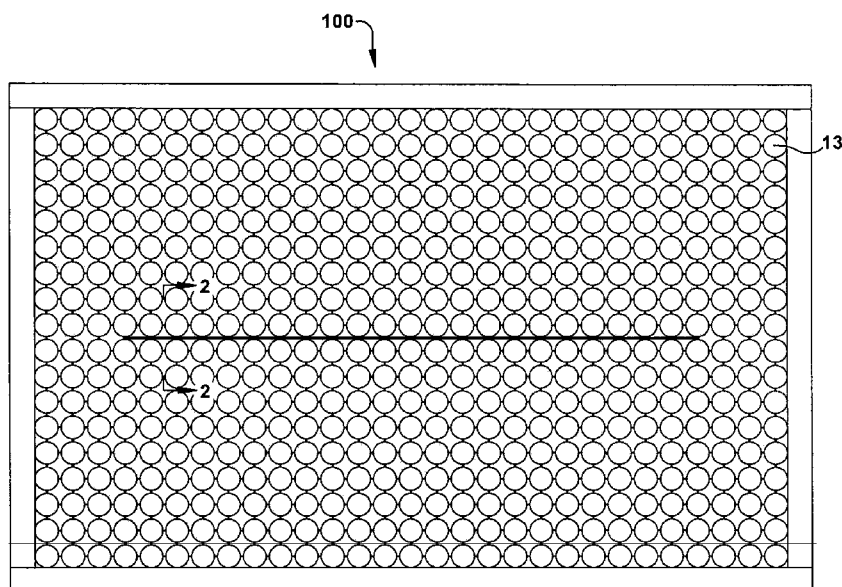


Fig. 1

(57) Abstract: Encased coil units with advance conforming properties have various interconnections and structures between individually encased or wrapped coils. In the various embodiments, encasement structures between coils such as closure or attachment of sheet material or fabric, which encase the coils, are configured to allow and enhance independent movement of coils with respect to adjacent coils and remote coils of the unit.



TITLE OF THE INVENTION

ADVANCED CONFORMANCE ENCASED COIL SPRING UNITS

UNITED STATES PATENT APPLICATION

SEALY TECHNOLOGY, LLC

RELATED APPLICATIONS

This application claims priority to U.S. Provisional Patent Application No. 61/485,284, filed on May 12, 2011, which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The present invention is in the field of reflexive support systems including support systems for humans such as bedding or seating.

BACKGROUND OF THE INVENTION

Encased coil spring units for mattresses and other reflexive support applications have long been manufactured by the use of long strips of sheet or fabric material which is folded or cut in halves and secured about a line of coil springs from the tops of the coil springs to the bottoms, and then sewn or fused between each coil spring to form a spring unit. Various methods of attachment of the sheet material between each coil spring and between adjacent rows or columns of encased coil springs have been used, such as stitches through the sheet material, ultrasonic welding or gluing. Because each coil spring is uniformly encapsulated in the material and also attached to the material surrounding adjacent coils, the encased coil spring unit is stabilized by the encapsulating material and provides a support structure and surface which distributes a load over a broad area relative to the primary force vector as a result of the common interconnection of the coil springs.

SUMMARY OF THE INVENTION

Encased coil units with advance conforming properties have various interconnections and structures between individually encased or wrapped coils. In the various embodiments, structures between coils such as closure or attachment of sheet material or fabric, which encase the coils, are configured to allow independent movement of coils with respect to adjacent coils. Modifications in the sheet material or fabric which encases the coils include variations in the points of connection or disconnection between adjacent coils, such as slits in the material proximate to top ends of the coils in a continuous string, or the absence of welds or glue points between adjacent encasements or strings of encasements, proximate to top ends of the coils to allow more freedom of movement of the top or upper ends of the coils and with

respect to adjacent coils, and to reduce load transfer or cratering of the coil springs 12 about the locus of the force vector.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of an Advanced Conformance Encased Coil Spring Unit of the present invention.

FIG. 2 is a side view of the Advanced Conformance Encased Coil Spring Unit of Figure 1 from the direction of arrows 2-2.

FIG. 3 is a front view of two center coils of the Advanced Conformance Encased Coil Spring Unit of FIG. 1

FIG. 4 is a front view of the two center coils of FIG. 3 with one of the coils having a force exerted thereon.

FIG. 5 is a front view of the coils of FIG. 2 from the direction of arrows 5-5.

GENERAL DESCRIPTION OF PREFERRED AND ALTERNATE EMBODIMENTS

Encased coil units 100 with advance conforming properties have various interconnections and structures between individually encased or wrapped coils 13. In the various embodiments, structures between coils such as closure or attachment of sheet material or fabric, which encase the coils, is configured to allow independent movement of coils with respect to adjacent coils. Modifications in the sheet material or fabric which encases the coils, referred to generally in the figures at reference numeral 14 and particularly the sheet material between the coils, include variations in the points of connection 16 or disconnection between adjacent coils, such as slits 15 in the material proximate to top ends of the coils 12 in a continuous string, or the absence of welds or glue points 16 between adjacent encasements or strings of encasements, proximate to top ends of the coils 12 to allow more freedom of movement of the top or upper ends of the coils 12 and with respect to adjacent coils, and to reduce load transfer or cratering of the coil springs 12 about the locus of the force vector. In these embodiments, each coil 12 remains individually encased in the sheet material 14, which completely encircles and encloses the coil 12 circumferentially and from top to bottom, but each coil 12 so encased is not necessarily attached to adjacent encased coils 13 along an entire length of the coil encasements, i.e. from top to bottom, and preferably has fewer structural attachments 16 between the encasements 14 about upper regions of the coils 12 than about lower regions of the coils 12. This is particularly advantageous with respect to the upper ends

of the coils 12 which would otherwise compress and move by region or area of compression about the point or loading, rather than to individual extents, and applicable to one-sided mattresses for upper support side of the coil spring unit to have the ability for the described independent coil movement, while the lower half of the coil spring unit remains relatively more structurally interconnected.

In one particular embodiment, an advanced conformance encased coil spring unit 100 of the present disclosure has separations 18 between adjacent coil encasements 13 of a continuous strand of coils, and has one or more points or areas of connection 16 of the encasement material 14 between a first strand of coils and an adjacent strand of coils, wherein the one or more points or areas of connection 16 are not located adjacent to the separations 18, as shown in FIGS. 2, 3 and 4. Referring to FIG. 1, the horizontal rows of adjacent coils are attached together at one or more attachment points via glue, welding or other such attachment mechanism, while the vertical columns of adjacent coils are sewn or fused together. The separations 18 in the encasement material 14 between coils 12 is preferably proximate to an upper region of the coils 12, shown in FIGS. 2 and 3, and the one or more points or areas of connection 18 the encasement material 14 between adjacent strands of coils 12 are preferably proximate to a lower region of the coils 12, shown in FIG. 5. For example, as shown in FIG. 3, two horizontally adjacent center coils 12 contain a separation 18 therebetween, which extends approximately halfway down the height of the coils, to allow independent movement between the two coils 12, as shown in FIG. 4, wherein the coil 12 on the left may be compressed (at least half way) by having a forced applied thereto, while the adjacent coil 12 on the right remains unaffected. These same coils 12 also contain attachment points 16 along the bottom half of the encasement 14 for partial attachment to the encasement 14 of the coils 12 vertically adjacent thereto. This ensures that the independent movement of the center coils 12 enabled by the separation 18 is not impeded by or does not substantially effect movement of the coils 12 otherwise adjacent to the center coils 12. The separations 18 may be in the form of a cut, slit, perforation, opening or cut-out of the encasement material 14 between adjacent coils 12 of a strand and more particularly between the closures of the encasement material 14 about each coil 12, such as by stitching or glue or welds so that each coil 12 remains entirely encased. The points or areas of attachment 16 of the encasement material 14 of one strand of coils to an adjacent strand, which are most commonly glue but may also be direct fusing of the encasement material 14, are located in a region of the coils 12

spaced from the region proximate the separations 18, such as a lower region of the coils 12, so that the points or areas of connection 16 are not laterally proximate to the separations 18. This provides a stable interconnection between the coil encasements 14 in a base or lower region of the encased coil unit 13 without interfering with or diminishing the independent coil 12 movement enabled by the separations 18. Any number, combination or pattern of connections 16 between the adjacent coil encasements 14 can be utilized. For example, as shown in FIG. 1, the advanced conformance encased spring unit is shown having a horizontal separation 18 between the two adjacent rows of coils located at the center of the unit 100. This separation 18 does not extend along the entire row of adjacent coils but stops approximately 3 coils before reaching the opposing short edge or ends of the row. This allows for independent movement between the right and left sides of the unit 100 while still providing a cohesive spring unit 100, whereby someone sleeping on the right side of a mattress may move freely without disturbing or causing motion for someone sleeping on the left side of the mattress.

The separations 18 can be made uniformly throughout the encased coil unit 100, such as across an entire upper region of a unit 100, or in one or more areas of the unit 100, or in any pattern or patterns. Also, the size or extent of the separations 18 may be uniform or not, such as the length of a linear cut in the encasement material 14, or the number or size of openings, cut-outs or perforations in the material.

The attachment points 16 or areas may similarly be either substantially uniform throughout the unit 100, or varied as desired to similarly alter the structure of the unit 100 in particular areas or regions. There may be multiple points of attachment 16 in the material 14 between each coil 12, or a single point or area of attachment the size of which is designed to cooperate with the corresponding separations 18 in the adjacent coil encasements 14.

In another aspect of the disclosure and related inventions, the encasement material 14 is configured to have a relatively low coefficient of friction in contact with itself for enhanced sliding properties. Enhanced polyester or acrylic content are examples of optimizing the encasement material 14 for this purpose. Alternatively, the encasement material 14 may be coated with a coating which serves as a low friction-slipping agent, such as for example a silicone containing coating material. This serves to greatly reduce compression of a group of coils of the unit 100 which otherwise occurs as a result of friction of the encasement material 14 between adjacent material upon compression.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive. Other features and aspects of this invention will be appreciated by those skilled in the art upon reading and comprehending this disclosure. Such features, aspects, and expected variations and modifications of the reported results and examples are clearly within the scope of the invention where the invention is limited solely by the scope of the following claims.

CLAIMS

What is claimed is:

1. An advanced conformance encased coil spring unit comprising:
a plurality of coils interconnected in a substantially rectangular array of columns and rows, each coil being encased in an encasement material, the coils in each column connected to each adjacent coil to form a continuous strand of coils extending between two opposing long edges of the unit, the coils in each row extending transverse of the unit;
a partial separation in the encasement material in a generally vertical orientation between adjacent coils, the partial separation proximate to an upper region of the coil encasement proximate to a support surface of the unit, one or more attachment points between the encasement material of each horizontally adjacent coil, the one or more connection points located proximate to a lower portion of the coils and not aligned with the partial separation.
2. The advanced conformance coil spring unit of claim 1, wherein the one or more connection points are formed by glue which bonds the encasement material.
3. The advanced conformance coil spring unit of claim 1, wherein the portion of the vertically adjacent center coils contains two or more attachment points.
4. The advanced conformance coil spring unit of claim 1, wherein adjacent coils, which are not in contact with the partial separation, have three connection points of the encasement material.
5. The advanced conformance coil spring unit of claim 4, wherein coils, which are in contact with the partial separation, have three connection points.
6. The advanced conformance coil spring unit of claim 1, wherein the encasement material is enhanced polyester or acrylic.

7. An advanced conformance encased coil spring unit comprising:
 - a plurality of coils arranged in any array of rows and columns, each coil being individually covered in an encasement material and attached to each adjacent coil in each column creating a continuous strand of coils, each row of coils being attached by one or more connection points between the encasement material to each adjacent continuous strand of coils;
 - a subset of the continuous coil strands having a partial slit between two center vertically adjacent coils, the partial slit proximate to an upper portion of the two center vertically adjacent coils, the subset also having fewer connection points between each pair of horizontally adjacent coils than the remaining horizontally adjacent coils;
 - wherein the subset of the continuous coil strands does not include coils proximate to an outer perimeter of the encased coil spring unit.
8. The advanced conformance encased coil spring unit of claim 7, wherein the subset of the continuous coil strands have three connection points between each pair of horizontally adjacent coils.
9. The advanced conformance encased coil spring unit of claim 8, wherein the remaining coils have four connection points between each pair of horizontally adjacent coils.
10. The advanced conformance encased coil spring unit of claim 7, wherein the one or more connection points are glue.
11. The advanced conformance encased coil spring unit of claim 7, wherein the one or more connection points are welded.
12. The advanced conformance encased coil spring unit of claim 7, wherein the subset of the continuous coil strands does not include the first three coils on opposing ends of two adjacent center horizontal rows of the unit.
13. The advanced conformance encased coil spring unit of claim 7, wherein the encasement material is polyester.

14. The advanced conformance encased coil spring unit of claim 7, wherein the encasement material contains acrylic.
15. The advanced conformance encased coil spring unit of claim 7m wherein the encasement material is coated with silicone.
16. An advanced conformance encased coil spring unit comprising:
 - a plurality of encased coils arranged rows and columns, the coils in each column encased in a continuous coil strand and the coils in each row being attached by two or more connection points;
 - a portion of the plurality of encased coils located in the same horizontal row, having a partial separation between at least one vertically adjacent coil and having fewer connection points between at least one horizontally adjacent coil than the other coils;
 - wherein the partial separations are not co-located with the connection points between the encased coils.
17. The advanced conformance encased coil spring unit of claim 16, wherein the portion of the plurality of encased coils include coils located in two adjacent center rows of the unit.
18. The advanced conformance encased coil spring unit of claim 16, wherein the portion of the plurality of encased coils does not include coils located at the perimeter edge of the unit.
19. The advanced conformance encased coil spring unit of claim 16, wherein the plurality of encased coils are coil-in-coil coils.
20. The advanced conformance encased coil spring unit of claim 16, wherein the partial separation is proximate to an upper region of the coils and the connection points are proximate to a lower region of the coils.

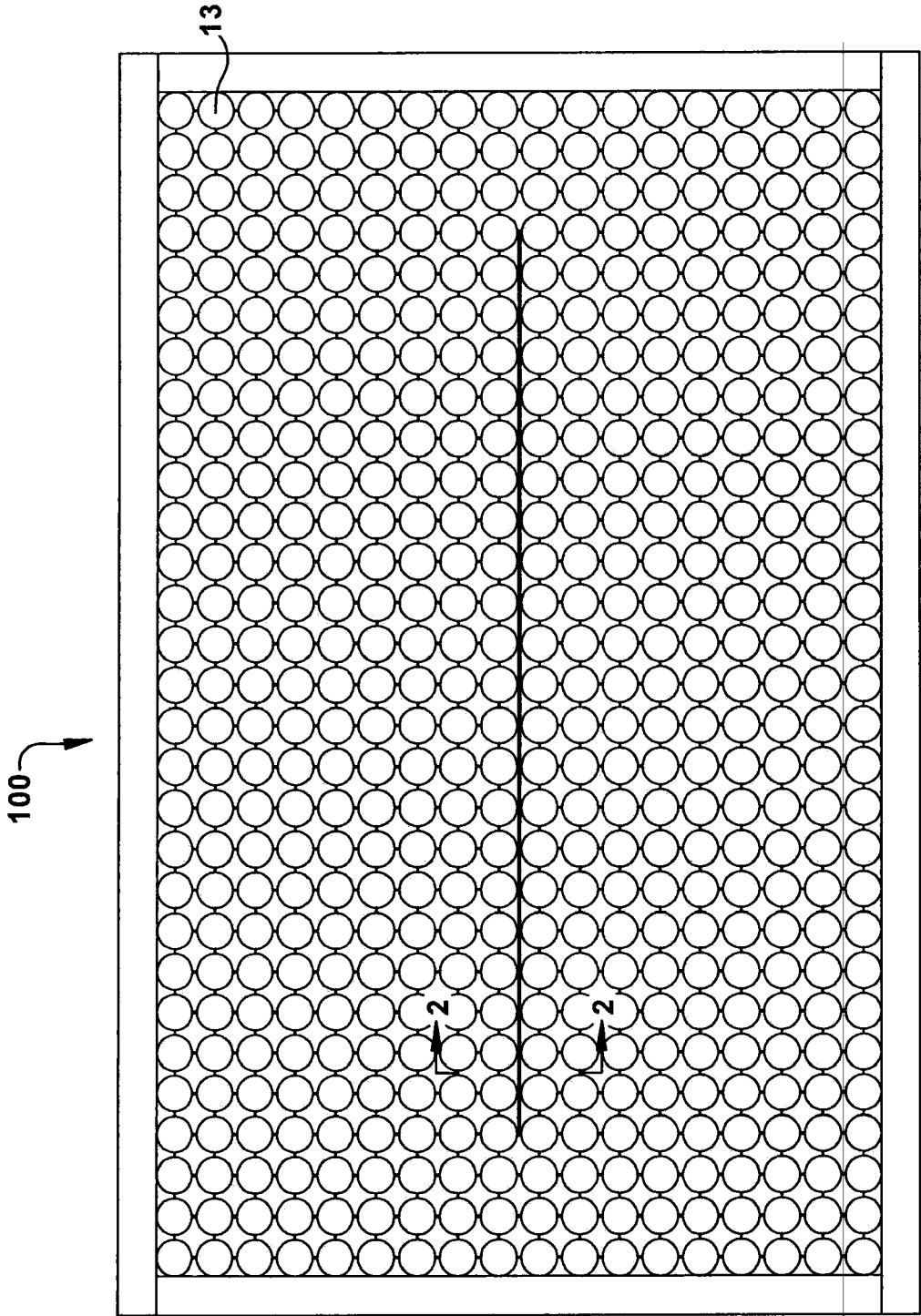


Fig. 1

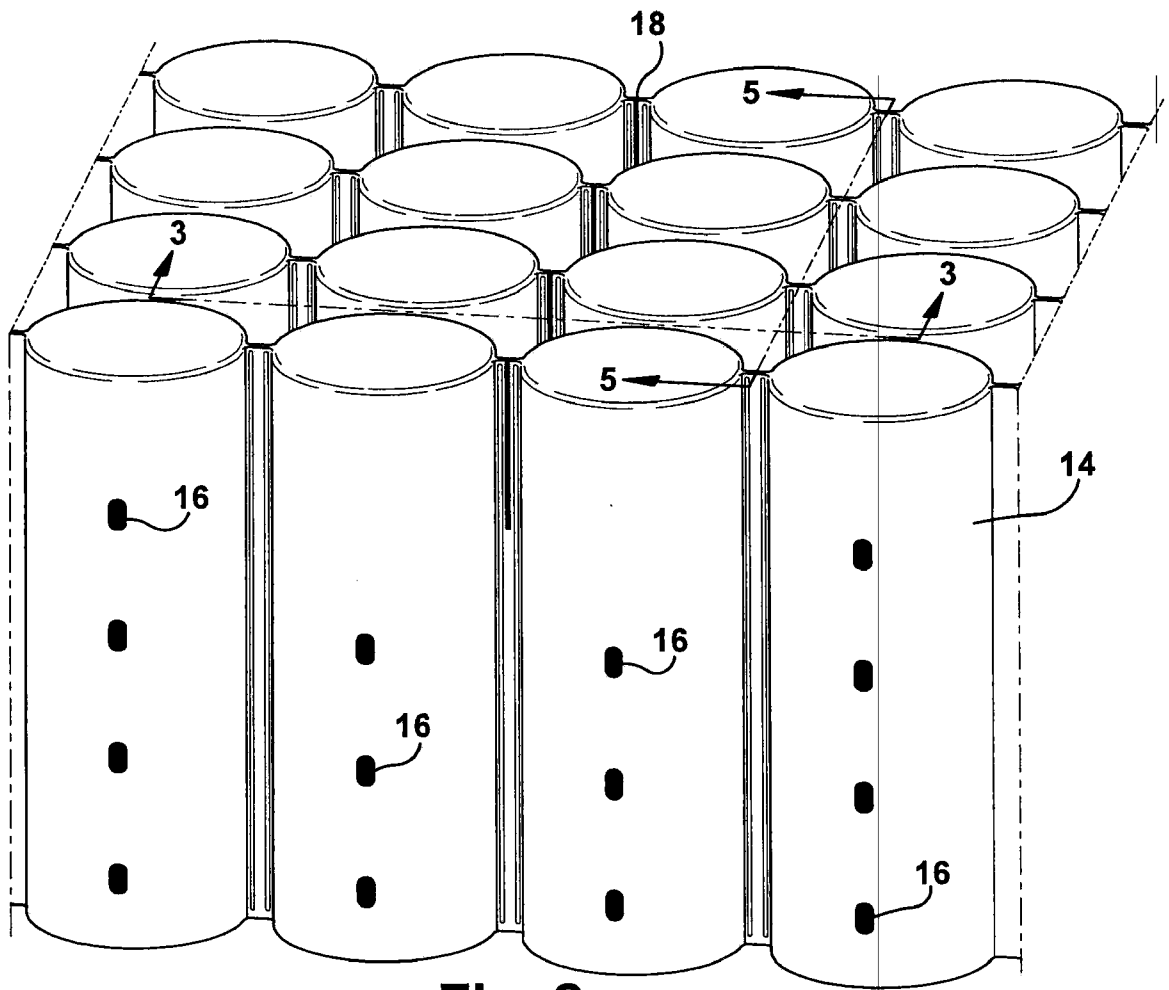


Fig. 2

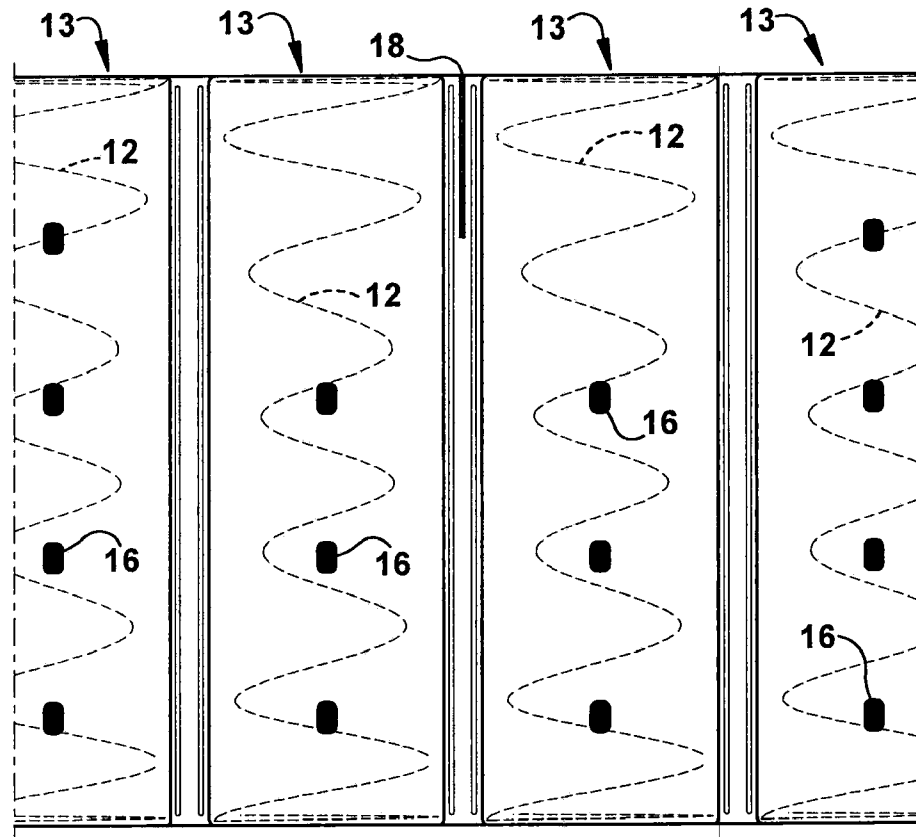


Fig. 3

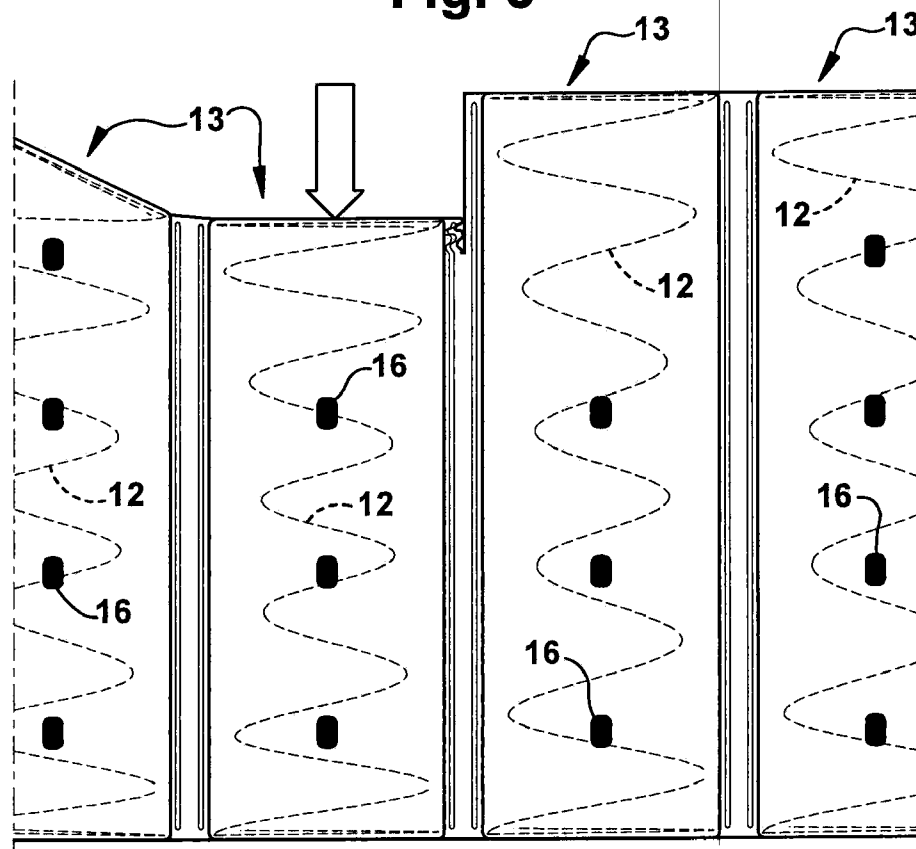
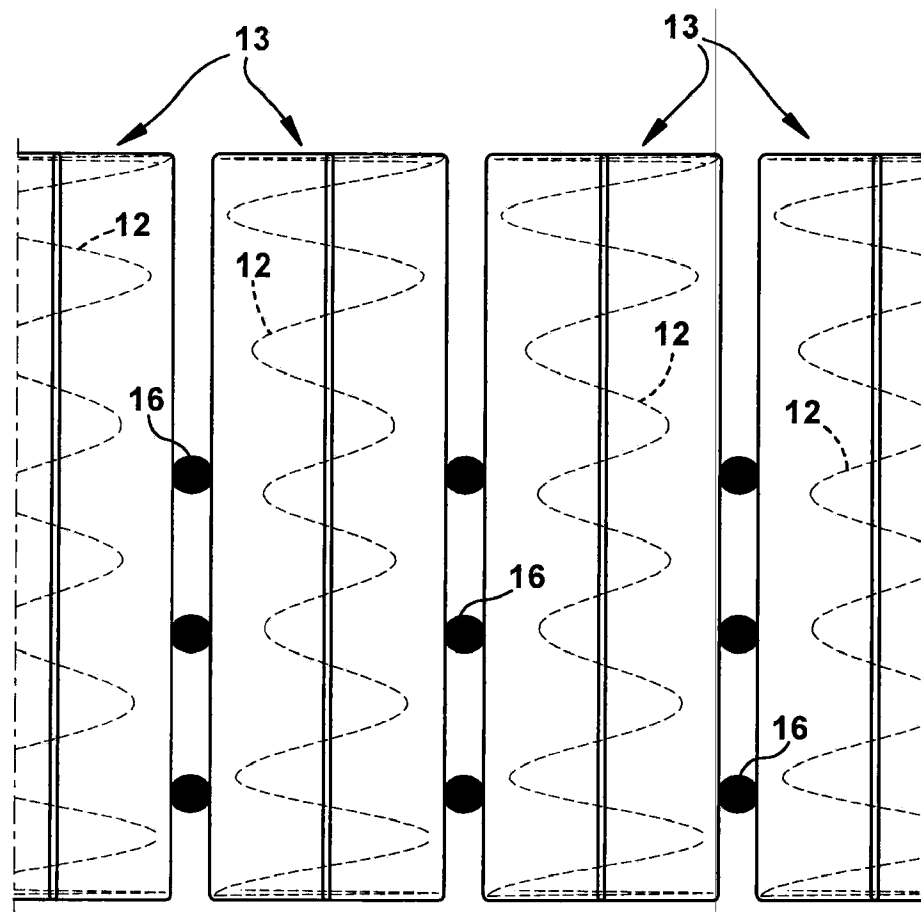


Fig. 4

**Fig. 5**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/037749

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B68G 9/00 (2012.01)

USPC - 5/720

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)

IPC(8) - A47C 23/04, 23/043, 23/30, 27/00, 27/04, 27/06, B68G 9/00 (2012.01)

USPC - 5/655.7, 655.8, 716, 720, 29/91, 91.1, 267/80, 81, 83, 84, 142, 143

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)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2007/0289068 A1 (EDLING) 20 December 2007 (20.12.2007) entire document	1-6
Y	US 2003/0093864 A1 (VISSER et al) 22 May 2003 (22.05.2003) entire document	1-6
Y	US 2004/0133988 A1 (BARBER) 15 July 2004 (15.07.2004) entire document	6
A	US 5,319,815 A (STUMPF et al) 14 June 1994 (14.06.1994) entire document	1-20
A	US 3,083,381 A (BAILEY) 02 April 1963 (02.04.1963) entire document	1-20
A	US 1,284,384 A (LEWIS) 12 November 1918 (12.11.1928) entire document	1-20

☐ Further documents are listed in the continuation of Box C.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

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09 July 2012

Date of mailing of the international search report

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