AIRBED UTILIZING EXTRUDED COILS

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ABSTRACT

An extruded, seamless and weld-free, loop of flexible material for use as a coil in an airbed. The extruded coil provides more strength and no weak points for coils, and thus a more stable, durable, airbed. In addition, the process of using an extruded coil allows for less manufacturing deviation, and thus a more consistently durable airbed. The extruded coils may be textured inside and out to allow for ease of assembly, and to keep the coils from sticking during inflation and deflation of the product.
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TECHNICAL FIELD OF THE INVENTION

[0001] The present invention is directed to airbeds, and more specifically to reinforcing structures for airbeds.

BACKGROUND OF THE INVENTION

[0002] An airbed is a large rectangular rubber or plastic bag that is filled with air so that it may be used as a bed. Airbeds are well known in the art and have proven themselves to be very useful. On the one hand, when there is no need to sleep on an inflatable airbed, an owner may simply deflate the airbed (i.e., let all the air out), fold it up, and then store it away in a closet or basement. On the other hand, when guests arrive or when the owner of the airbed takes a trip to a place where there is no bed, the owner may simply inflate the airbed and sleep on it.

[0003] Most current inflatable airbeds have a single chamber, meaning that air can travel anywhere inside the airbed since there is no barrier sealing off one portion of the airbed from another. Therefore, when multiple people sleep or sit on the airbed, air is constantly being moved from one portion of the airbed to another as the weight of the person is shifted.

[0004] For example, suppose person A is sleeping on the left side of an inflated queen size airbed. Because there is currently no weight on the right side of the airbed, air would naturally flow toward the unweighted right side of the airbed until an equilibrium pressure condition is established (i.e., the right side cannot hold anymore air). This shifting of air to the right side consequently would cause the right side of the airbed to rise.

[0005] Next, suppose person B wants to sleep on the now elevated right side of the airbed. As person B descends onto the right side of the airbed, this new weight causes a redistribution of the air back toward the left side of the airbed where person A is sleeping. Air flows back to the left side of the air bed, causing the left side to rise due to the newly added air pressure underneath. This unexpected elevation in the left side of the airbed may even awake person A. Furthermore, each time person A or B moves around during their sleep and causes a shift in weight on the airbed, air may also be shifted around inside the entire airbed. This constant movement of air inside the airbed in response to weight shifts causes different portions of the airbed to rise and fall until the weight movement stops. This constant rocking, elevation or depression of various portions of the airbed every time one person moves can disrupt a good night’s sleep.

[0006] To address the unequal distribution of air in an airbed, a variety of different constructions have been used to control the structure and shape of airbeds. A first type is an internal I-beam structure, having a material that extends from an interior of a top wall of an airbed to an interior of a bottom wall of the airbed. This structure is designed in such a way to consist of well defined start and stop points, the start and stop points attached to the inner surfaces of the airbed. The I-beam prevents portions of the airbed adjacent to the I-beam from rising beyond a certain height. However, I-beams are inherently weak because of the start and stop points.

[0007] An improvement to the I-beam construction is the concept of coil designs. Coils allow for an effectively closed loop to be attached at upper and lower portions of the loop to the interior portions of the upper and lower walls of the airbed. Because a loop is used, there are effectively no start and stop points in this design. Thus, this structure greatly improves the performance and durability of an airbed.

[0008] The most commonly used coils in contemporary airbeds are formed by taking two flat sheets of material and butt welding the edges of these materials together, forming a tube. The butt welded tube is then heat welded to the top and bottom walls of the airbed with ellipse-like welds. It has been found that the ellipse-like welds and other discretely shaped welds, such as circular, triangular, or rectangular-shaped welds, provide users with more comfort than a rigid, narrow weld, such as a standard I-beam-type weld. Moreover, the ellipse-like welds also allow for optimal strength characteristics in bonding of the coils.

[0009] Such a structure is shown in FIG. 1, where an airbed includes coils having butt welds at top and bottom edges. Oval welds are utilized to connect the coils to upper and lower walls of the airbed. The butt welds are contained within and extend perpendicular to the oval welds. The butt welds are not strong enough to maintain a permanent connection of the coil, and thus serve as a temporary, end-process weld that holds the coil to the airbed. The coil is attached to the upper and lower walls of the airbed by the oval welds. The oval welds then hold the two ends in place.

[0010] One problem with the design shown in FIG. 1 is that the butt weld can become a weak spot for the attachment of the coil to the oval weld. Thus, the butt weld can reduce the durability of the airbed.

SUMMARY OF THE INVENTION

[0011] The following presents a simplified summary of some embodiments of the invention in order to provide a basic understanding of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some embodiments of the invention in a simplified form as a prelude to the more detailed description that is presented later.

[0012] In accordance with an embodiment, an extruded, seamless and weld-free, loop of flexible material is provided for use as a coil in an airbed. The extruded coil provides more strength and no weak points for coils, and thus a more stable, durable, airbed. In addition, the process of using an extruded coil allows for less manufacturing deviation, and thus a more consistently durable airbed.

[0013] In accordance with an embodiment, the extruded coils may be textured inside and out to allow for ease of assembly, and to keep the coils from sticking during inflation and deflation of the product.

[0014] Other features of the invention will become apparent from the following detailed description when taken in conjunction with the drawings, in which:
BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 shows a side perspective view of a prior art airbed;

[0016] FIG. 2 shows a side perspective view of an airbed incorporating coils in accordance with an embodiment of the present invention;

[0017] FIG. 3 is a cross-sectional view taken along the section lines 3-3 of FIG. 2; and

[0018] FIG. 4 is a diagrammatic view representing a method by which an extruded coil may be produced in accordance with an embodiment.

DETAILED DESCRIPTION

[0019] In the following description, various embodiments of the present invention will be described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

[0020] Referring now to the drawings, in which like reference numerals represent like parts throughout the several views, FIG. 2 shows a side perspective view of an airbed 20 incorporating coils 22 in accordance with an embodiment. Briefly described, the coils 22 are formed of a single-piece, seamless, weld-free, extruded flexible tube of material.

[0021] The coils 22 are attached to upper and lower walls 24, 26, of the airbed 20 by oval welds 28. Although oval welds 28 are shown in the drawings, other welds may be used, including any type of ellipse-like weld, such as circular, triangular, or rectangular shaped welds, or more narrow welds. In addition, although a single weld is shown for attaching a coil 22 to the upper wall 24 and another, single oval weld 28 is shown as attaching the lower wall 26 to the coil 22, two or more welds may be used at the attachment of the coils 22 to the upper and/or lower walls 24, 26.

[0022] In the embodiment shown, the coils 22 are provided as short segments, and a series of coils 22 are provided along the length of the airbed 20. However, in an alternate embodiment, longer coils 22 may be provided, having multiple oval welds 28 or similar welds for attaching the elongated coils 22 to the upper and lower walls 24, 26. In an alternate embodiment, the coils 22 may extend almost the length of the airbed 20, and may be attached by multiple oval welds 28 or similar welds along the length of the coils 22.

[0023] The coils 22 may be cut to proper length, or may be provided by a supplier at a desired length. The coils 22 are then welded in a manner known in the art to the upper and lower walls 24, 26. When in place, the coils 22 provide structure for the airbed 20, as can be seen in FIG. 3. The coils 22 prevent movement of the upper and lower walls 24, 26 in the area adjacent to the coils 22.

[0024] In accordance with an embodiment, the coils 22 are made of polyvinylchloride (PVC). However, any suitable material may be used. PVC, however, is typically the material used for airbeds, such as the airbed 20, and thus provides quick and easy welding to the upper and lower walls 24, 26.

[0025] The method for making extruded polyvinylchloride flexible tubes is known, but a process is shown in FIG. 4 for the benefit of the reader. An extrusion mold 30 is utilized for forming an elongate, flexible extrusion 32. The extrusion mold 30 includes an outer dye 34 and an inner dye 36. The elongate extrusion 32 is extruded from between the outer dye 34 and the inner dye 36.

[0026] During the extrusion process, it is important to keep the sides of the elongate extrusion 32 from touching one another so that they will not weld together before cooling. To this end, an internal cooling airstream, indicated by the arrows 38 may be provided for the cooling and separation of the elongate extrusion 32. In addition to or in replacement of the internal cooling airstream 38, a vacuum, such as via vacuum boxes 40 may be supplied on the outside of the elongate extrusion 32, for pulling the walls of the elongate extrusion 32 apart. The internal cooling airstream 38 and/or the vacuum boxes 40 may extend an appropriate length beyond the extrusion molds 30 so that the elongate extrusion 32 is cooled when it is no longer supported by the internal cooling airstream 38 and/or the vacuum boxes 40.

[0027] The coils 22 of the present invention provide a stable structure for an airbed, such as the airbed 20. The coils 22, because they are formed of an extruded material, do not include butt welds or any other potentially weak locations.

[0028] If desired, the coils 22 may be textured on the inside and outside to allow for ease of assembly. Texturing would also prevent the coils 22 from sticking during the inflation and deflation of the airbed 20.

[0029] The use of the extruded coils 22 permits coils to be produced with less manufacturing deviation. As such, the size of the coils 22 is more consistent, providing a more consistently durable airbed 20.

[0030] Other variations are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, a certain illustrated embodiment thereof is shown in the drawings and has been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims.

[0031] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

[0032] The use of the terms “a” and “an” and “the” and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms “comprising,” “having,” “including,” and “containing” are to be construed as open-ended terms (i.e., meaning “including, but not limited to,”) unless otherwise noted. The term “connected” is to be construed as partly or
wholly contained within, attached to, or joined together, even if there is something intervening. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

1. An airbed, comprising:
   an upper wall;
   a lower wall; and
   at least one coil connected between the upper wall and the lower wall, said at least one coil comprising an extruded, weld-free, loop of flexible material.

2. The airbed of claim 1, wherein the coil is seamless.
3. The airbed of claim 1, wherein the coil is connected to the upper and lower walls by ellipse-like welds.
4. The airbed of claim 1, said at least one coil comprises polyvinylchloride.
5. The airbed of claim 4, wherein said at least one coil comprises polyvinylchloride.
6. The airbed of claim 1, wherein at least one coil comprises polyvinylchloride.
7. A method of forming an airbed, comprising:
   extruding at least one coil, said at least one coil comprising a weld-free, loop of flexible material; and
   connecting said at least one coil to an upper wall and a lower wall of the airbed.
8. The method of claim 7, wherein connecting comprises welding said at least one coil to the upper and lower walls.
9. The method of claim 7, wherein connecting comprises welding said at least one coil to the upper and lower walls using ellipse-like welds.
10. The method of claim 7, wherein said at least one coil is seamless.
11. A method of forming an airbed, comprising:
   obtaining at least one coil, said at least one coil comprising an extruded, weld-free, loop of flexible material; and
   connecting said at least one coil to an upper wall and a lower wall of the airbed.
12. The method of claim 11, wherein connecting comprises welding said at least one coil to the upper and lower walls.
13. The method of claim 11, wherein connecting comprises welding said at least one coil to the upper and lower walls using ellipse-like welds.
14. The method of claim 11, wherein said at least one coil is seamless.