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(54) **METHODS FOR MANUFACTURING ENCASED MATTRESSES**

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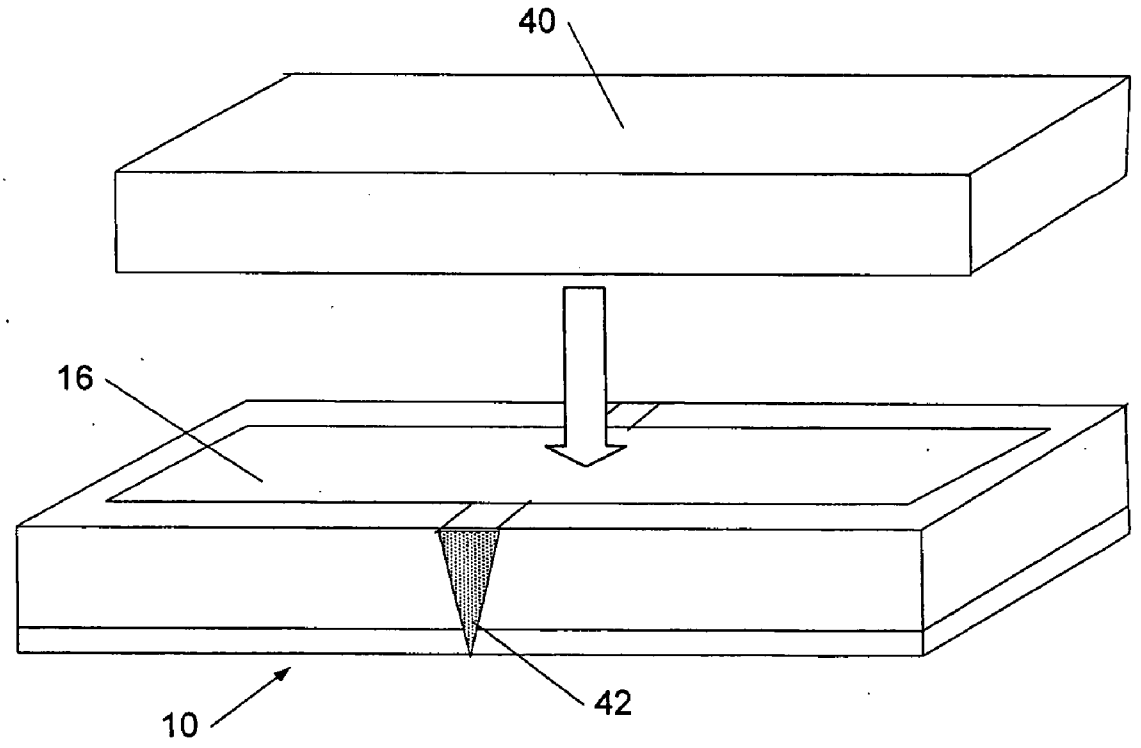
(57) **ABSTRACT**

A mattress innercore support system in the form of a padded tray with a substantially rigid bottom panel. The tray has of a perimeter sidewall that is preferably made of foam and attached to the bottom panel. The system is compatible with (and sized for) all standard mattress cores, e.g., coil spring, pocketed spring, foam, foam/coil composite, and all known sizes. The mattress innercore is attached to the bottom panel by an adhesive, which simplifies assembly and reduces manufacturing cost of the mattress.



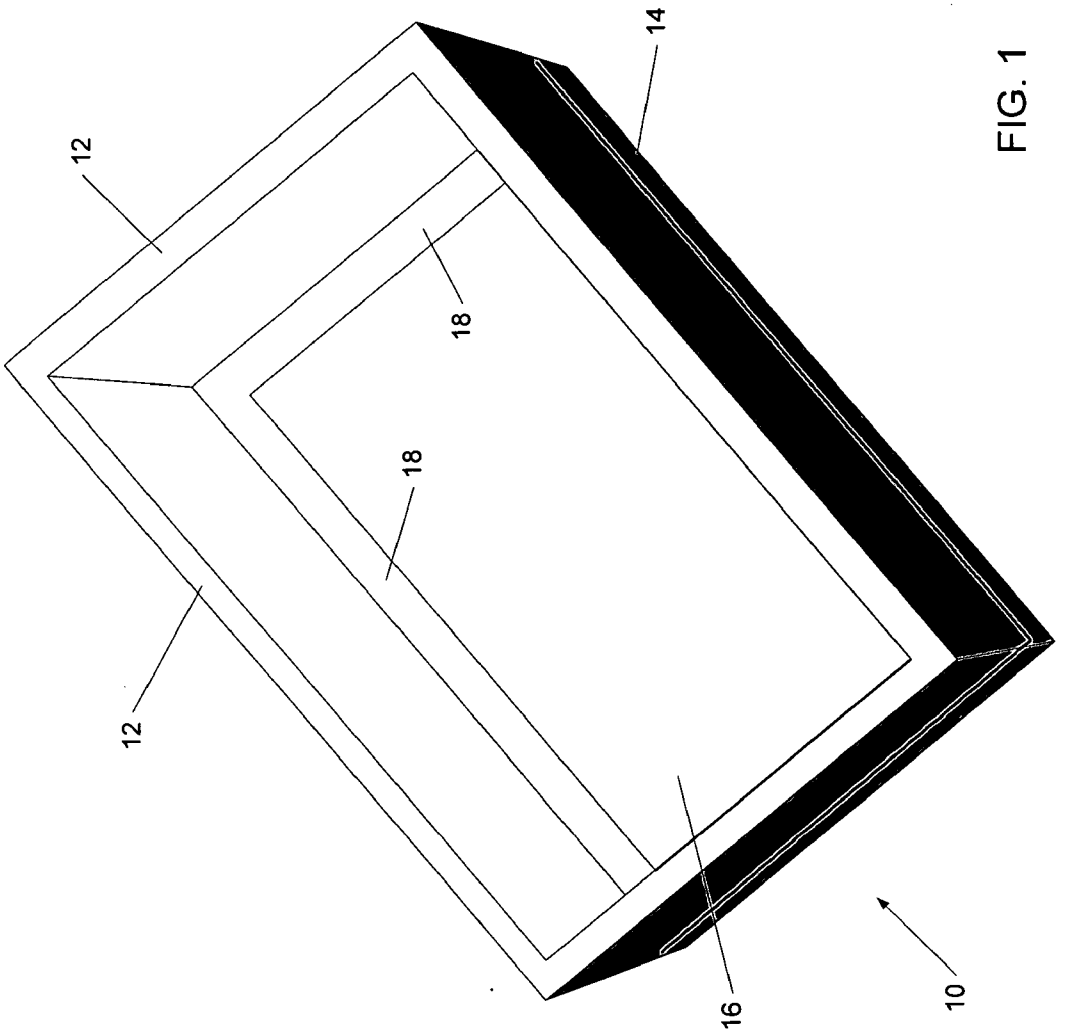


FIG. 1

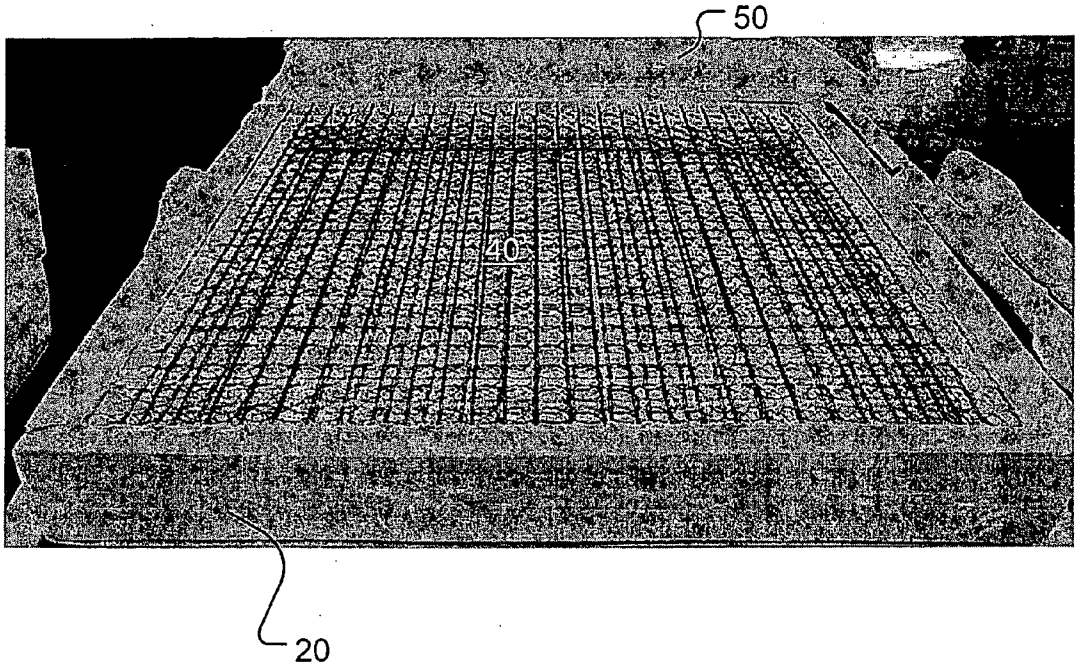


FIG. 2

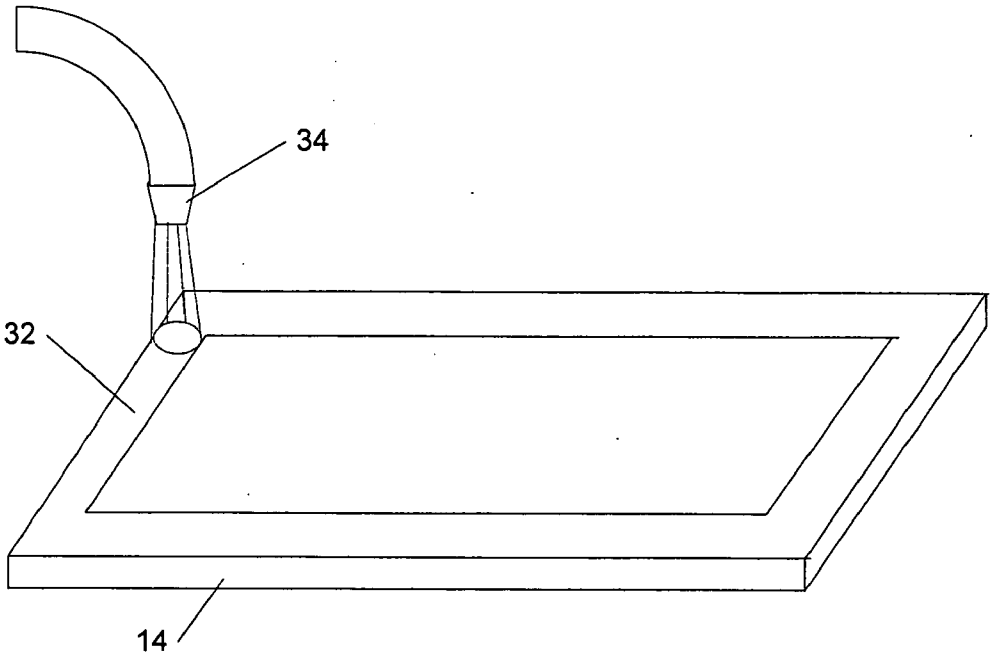


FIG. 3

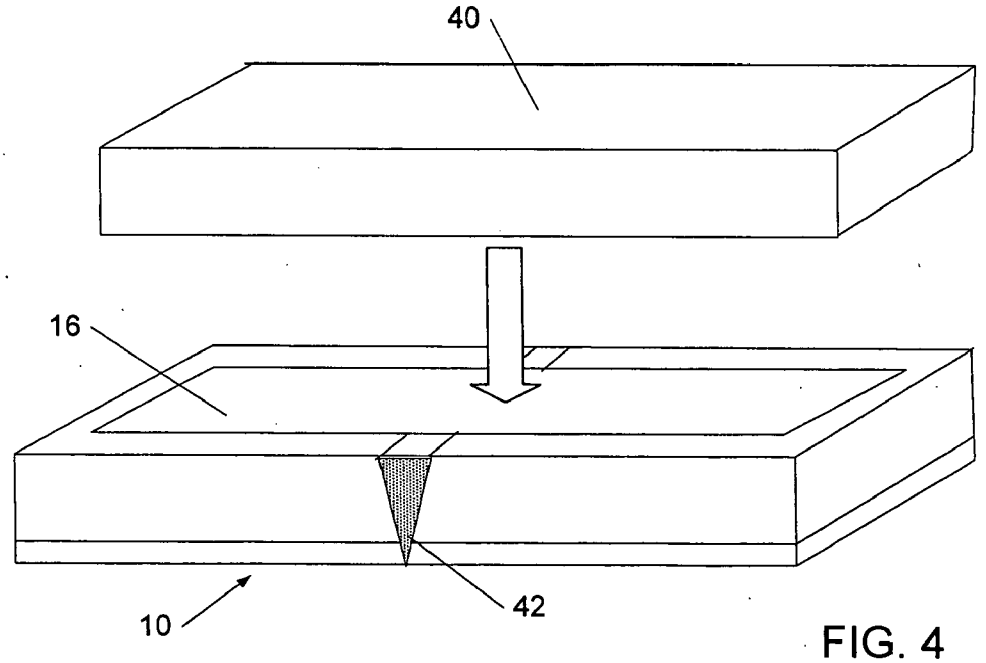


FIG. 4

METHODS FOR MANUFACTURING ENCASED MATTRESSES

RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. application Ser. No. 10/686,019, filed 15 Oct. 2003, which claims the benefit of U.S. Provisional Patent Application Ser. No. 60/419026, filed 15 Oct. 2002. This application also claims the benefit of U.S. Provisional Patent Application Ser. No. 60/437,524, filed 31 Dec. 2002. The contents of these applications are hereby incorporated herein by reference in their entirety.

BACKGROUND

[0002] The systems and methods described herein relate to the manufacture of bedding products, specifically mattresses and mattress foundations, and related manufacturing systems, mattresses and bedding products.

DESCRIPTION OF THE RELATED ART

[0003] Conventional mattress systems typically consist of a foundation or box spring and a mattress. The mattress assembly typically consists of a core, various layers of padding above and below the core, and a cover enveloping the assembly. Additional features or embellishments, such as support bolsters around the perimeter of the core or toppers are also well-known.

[0004] The mattress core may comprise a plurality of coil springs, either individually pocketed or un-pocketed, or one or more layers (or regions) of different foam materials.

[0005] Present mattress systems have a number of drawbacks. Firstly, the need for a separate foundation is costly and presents logistical issues in terms of stocking foundations that match mattresses. Secondly, the complexity of assembling and covering a complete mattress core and padding assembly results in higher than desirable manufacturing costs and demand for skilled labor. To reduce cost while still providing adequate edge support, mattress manufacturers have introduced mattresses with a foam encased innercore that gives greater edge support.

[0006] Foam encased innercores expand the mattress' edge-to-edge sleeping surface with a foam encasement that encircles the perimeter of the innerspring. It provides a firmer seating edge and expands the sleeping surface to the full perimeter of the mattress. The edge surrounds the coil unit, and sits on a support layer that supports the foam edge and the coil unit. The foam edge is typically glued to the support layer and the coil unit is joined to the support layer by a border wire and hog rings.

[0007] When manufacturing the mattress, the innerspring unit is typically attached to a lower border wire and that border wire is joined to the support layer. The foam edge is glued in place around the innerspring unit.

[0008] Although such mattresses and manufacturing processes work well, there is a need in the art for improved techniques for manufacturing mattresses to provide stronger, more robust designs that are easier to manufacture.

SUMMARY OF THE INVENTION

[0009] The systems and methods described herein include improved mattresses and techniques for manufacturing such mattresses.

[0010] Presently disclosed is a mattress core support system, wherein the mattress core is encased in a tray, in particular a foam tray, and a method of manufacturing an encased mattress. The system and method are compatible with (and can be sized for) all standard mattress cores, e.g., coil spring, foam, foam/coil composite, and all known sizes.

[0011] According to one aspect of the invention, a method of manufacturing a mattress includes the acts of providing a tray having a bottom panel and a perimeter sidewall, wherein the bottom panel and perimeter sidewall form a cavity; applying an adhesive to the bottom panel inside the cavity at least proximate to the perimeter sidewall; and placing an innercore inside the cavity. The innercore is thereby secured to the bottom panel by the adhesive.

[0012] According to another aspect of the invention, a mattress includes a substantially rigid base platform; a perimeter sidewall joined to the base platform, wherein the platform and perimeter sidewall define an interior cavity; and an innercore disposed within the cavity. The innercore is secured to the bottom panel by an adhesive at least proximate to the perimeter sidewall.

[0013] Exemplary embodiments may include one or more of the following features. Both the bottom panel and the perimeter sidewalls may be made of foam, whereby the bottom panel is preferably made of high density foam. Alternatively, the bottom panel can be made of wood, cardboard, or plastic as long as the material is capable of providing support to the innercore. The entire assembly can be topped with a conventional layer of padding and closed by a cover.

[0014] The innercore can be in the form of an open coil construction, fabric-encased spring coils, and/or foam-encased springs. Alternatively or in addition, the innercore can also be made at least in part of a block of resilient foam.

[0015] The foam tray can be manufactured of several pieces, for example, by gluing the perimeter sidewall to a peripheral region of a major surface of the bottom panel. The perimeter sidewall can include a plurality of sidewall sections, preferably four sections. For additional support, the innercore can be secured against the substantially rigid base platform by a wire, such as a border wire. In addition, the sidewall can include a joint for allowing the mattress to pivot between a reclined and an inclined position.

[0016] The mattresses described herein may be two-sided mattresses and may come in any suitable shape and size, including California King, king, Olympic Queen, queen, and twin. It will further be understood that the assemblies described herein may be employed in other applications, including futons, couches, or any other type of seating furniture.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The following figures depict certain illustrative embodiments of the invention in which like reference numerals refer to like elements. These depicted embodiments are to be understood as illustrative of the invention and not as limiting in any way.

[0018] **FIG. 1** illustrates one embodiment of a mattress foam tray for a foam encased mattress according to the invention;

[0019] **FIG. 2** shows a foam tray assembly with a spring coil core in place, according to one embodiment of the present invention;

[0020] **FIG. 3** depicts a first step in a process for making a mattress; and

[0021] **FIG. 4** depicts a second step in a process for making a mattress.

DETAILED DESCRIPTION

[0022] To provide an overall understanding of the invention, certain illustrative practices and embodiments will now be described, including a method for manufacturing a mattress that glues at least a peripheral edge of a coil unit to a support layer of the mattress. However, it will be understood by one of ordinary skill in the art that the systems and methods described herein can be adapted and modified and applied in other applications and that such other additions, modifications and uses will not depart from the scope hereof.

[0023] **FIG. 1** depicts one portion of a foam-encased mattress **10** being manufactured according to the systems and methods described herein. As shown in **FIG. 1**, the foam edge **12**, in this embodiment, sits on top of a platform or support layer **14** that acts as the support layer of, in the depicted exemplary embodiment, a one sided mattress. The foam edge **12** in conjunction with the support layer **14** define an interior cavity **16** into which a support unit **40** (see **FIG. 2**), such as an inner spring, pocketed coil unit, latex foam core, or combination of these, may be placed. In this way, a conventionally used separate foundation or box spring piece may be entirely eliminated as the support layer **14** provides sufficient mechanical support for the mattress assembly. As also shown in **FIG. 1** and to be described in more detail below, the interior periphery **18** of the foam edge **12** can be coated with, for example, a strip of a glue, adhesive, or other bonding agent, that can hold the support unit on the support layer and/or the foam edge **12**, thereby providing for the ready manufacture of foam encased mattresses.

[0024] Sidewalls **12** can be constructed from a dense natural and/or synthetic foam material of the type commonly used in the bedding arts, such as (but not limited to) latex, polyurethane, or other foam products commonly known and used in the bedding and seating arts having a density of 1.5 to 1.9 and 20 to 35 ILD. Although a specific foam composition is described, those skilled in the art will realize that foam compositions other than one having this specific density and ILD can be used. For example, foams of various types, densities, and ILDs may be desirable in order to provide a range of comfort parameters to the buyer.

[0025] Platform **14** may consist of another panel of rigid foam, or it may be made of a wooden, cardboard, or plastic structure selected to provide support to the mattress core. Depending on the mattress core selected and its inherent stiffness, stiffer or more compliant base platforms **14** may be chosen.

[0026] **FIG. 2** shows an exemplary embodiment of a tray support **20** with a coil spring mattress core **40** in place. Note that, for clarity, top padding layers **50** and the cover have been peeled back. One of ordinary skill in the art will recognize that various combinations of top padding, covers, and toppers are compatible with the system disclosed herein. Accordingly, the invention is not limited to any means of finishing the mattress and includes all such means and materials within its scope.

[0027] Conventional coil spring core **40** may be comprised of conventional helical or semi-helical springs. The springs may also be encased in a fabric pocket, either individually, in groups, or in strings joined by fabric, all of which are well-known in the bedding art.

[0028] A foam core module (not shown) may also be substituted for coil spring mattress core **40**. The foam core module is, in some embodiments, a monolithic block of a single type of resilient foam selected from foams having a range of densities (themselves well-known in the art) for supporting one or more occupants during sleep. In one embodiment, foam core is made of any industry-standard natural and/or synthetic foams, such as (but not limited to) latex, polyurethane, or other foam products commonly known and used in the bedding and seating arts having a density of 1.5 to 1.9 and 20 to 35 ILD. Although a specific foam composition is described, those skilled in the art will realize that foam compositions other than one having this specific density and ILD can be used. For example, foams of various types, densities, and ILDs may be desirable in order to provide a range of comfort parameters to the buyer.

[0029] In an alternative embodiment, the foam core may comprise one or more horizontal layers of multiple types of foams arranged in a sandwich arrangement. This sandwich of different foams, laminated together, may be substituted for a homogeneous foam block of a single density and/or ILD.

[0030] In a further embodiment, the foam core may comprise one or more vertical regions of different foam compositions (including vertical regions having multiple horizontal layers), where the different foams are arranged to provide different amounts of support (also referred to as "firmness" in the art) in different regions of the sleeping surface.

[0031] Accordingly, the invention is not limited to any particular type of foam density or ILD or even to a homogenous density/ILD throughout the foam core. Furthermore, the invention is not limited to any particular type of core.

[0032] In an exemplary embodiment, a conventional mattress cover envelopes the entire assembly. In an alternate embodiment, the sides of the vertical walls and the bottom surface of the platform may be pre-finished according to conventional means and the cover attached to the side panels only. This latter attachment may be made by conventional means, as by a zipper, Velcro, or stitching, and with or without additional decoration (such as rope welting) or embellishment (such as a mattress topper).

[0033] In summary, **FIG. 2** illustrates a mattress support comprising a perimeter sidewall and a platform, wherein the perimeter sidewall is attached to the top surface of the platform to define a cavity disposed to receive a mattress core. The perimeter sidewall may comprise one or more segments, each attached to the platform. The perimeter sidewall segments may also be attached to each other. The mattress support may also include top padding attached to the perimeter sidewall and a cover enveloping the top padding, the perimeter sidewall, and the platform and secured thereto.

[0034] Turning to **FIG. 3**, one practice for manufacturing mattresses according to the invention is depicted. Specifically, **FIG. 3** depicts the platform or support layer **14** of a one sided mattress **10**. As shown in **FIG. 3**, an adhesive material **32** is applied by a spay gun **34** about the peripheral edge of the support layer **14**. In one embodiment, the adhesive is a spray glue, such as the spray glue Super 77, manufactured and sold by the 3M company of St. Paul, Minn. In one practice, a moderate coating of spray glue is placed around the edge of the support layer. Once the adhesive material **32** is in place along the portion of the perimeter of the support layer **14**, the foam material that makes up the perimeter sidewall **12** (see **FIG. 1**) of the mattress is placed on the adhesive material **32** and clamped in place for about one to fifteen minutes. In this practice, a permanent bond is formed between the adhesive material **32** and the foam as the spray glue dissolves the foam and joins it to the support layer. Accordingly, in one preferred embodiment the support layer **14** is also made of a foam material that will similarly dissolve on contact with the spray glue. As such, an advantage of this method is that it creates a tight permanent joint between the support layer and the foam edge.

[0035] Returning now to **FIG. 1**, once the perimeter sidewall **12** is attached to the support layer **14**, the spray nozzle depicted in **FIG. 3** may also be employed for spraying glue about the interior peripheral edge **18** of the support layer **14**. Accordingly, as shown in **FIG. 1**, a strip **18** of spray glue having a width of for example, four inches (10 cm) may be laid down on the support layer **14** and against the interior edge of the perimeter sidewall **12**. As shown in **FIG. 4**, a mattress core **40**, such as a coil spring unit, may be lowered into the cavity **16** formed by the perimeter sidewall **12** and the support layer **14** such that the peripheral edge of the coil spring unit sits against the strip **18** laid onto the support layer **14**. In one embodiment, the coil spring unit can include a plurality of pocketed coils with the pocket formed of Duon material. The Duon material will bond tightly to the support layer by the action of the spray glue. Other materials may be used, and in an alternate embodiment, the coil can be an open coil unit. In this way, the coil unit can be joined to the support layer **14** without the use of a border wire or hog rings. However, in alternate embodiments depending on the particular application, a border wire and hog rings may still be employed in conjunction with the spray glue to add strength.

[0036] Once the support unit **40** is placed inside the interior cavity **16**, ticking and/or upholstery layers **50** (see **FIG. 2**) may be attached to the mattress and a finished mattress will be produced. The upholstery layer can be stitched to upholstery material stapled or otherwise joined to the exterior surface of the parameter sidewall. In this way, the upholstery layer, as well as any intermediate padding, aids in holding the innercore within the cavity defined by the parameter sidewall. In one optional embodiment, the mattress core **40** may be dimensioned to be slightly larger than the interior cavity **16**. To this end, in an embodiment where the mattress core **40** comprises a spring core, the spring core may be made slightly larger by adding one or more additional rows of springs along the length of the core. In this way, the mattress core **40** will fit snuggly against the perimeter sidewall **12**, allowing frictional engagement to hold the core, at least in part, within the cavity **16**. Additionally, the mattress core **40** may include one or more optional rows of springs running along the width of the core **40**, to cause a snug fit against the head and foot of the perimeter wall **12**. In embodiments where the mattress core **40** comprises foam, latex, an air mattress or some other support structure, the core **40** may be dimensioned to be slightly larger than the cavity **16**.

[0037] In the embodiment depicted by **FIG. 2**, the mattress is a one sided mattress that has a support layer **14** that is relatively rigid. However, in other embodiments the systems and methods described herein maybe used with two sided mattresses as well as mattresses that are capable of being used with adjustable beds. For example, a mattress for an adjustable bed may have a foam edge that has a break or a flexible component **42** that is disposed somewhat midway along both long edges of the mattress. In this way, the adjustable bed will be more capable of pivoting around a central axis as the flexible portion built in the foam edge readily allows the mattress to pivot and bend.

[0038] The support layer **14** may be foam, wood, plastic or a composite of such materials and typically will be covered by a thin layer of a non-woven sheeting. It may be a high density polyurethane foam having a density of approximately 1.85 lbs./cu. ft. and a firmness above 30 ILD. The firmness may be achieved by using one substantially rigid layer, or by using a plurality of layers that in aggregate provide the desired firmness. Other rigid materials may be used and may include plastic, wood, or other non-yielding rigid materials. To the extent such materials for the layer yield to pressure, such materials are to have at least a high degree of recoverability once the pressure has been removed so that the materials are not compacted.

[0039] The order in which the steps of the present method are performed is purely illustrative in nature. In fact, the steps can be performed in any order or in parallel, unless otherwise indicated by the present disclosure.

[0040] While particular embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspect. Therefore, the appended claims are to encompass within their scope all such changes and modifications as fall within the true spirit of this invention.

What is claimed is:

1. A method of manufacturing a mattress, comprising:

providing a tray having a bottom panel and a perimeter sidewall, said bottom panel and perimeter sidewall forming a cavity,

applying an adhesive to the bottom panel inside the cavity at least proximate to the perimeter sidewall, and

placing an innercore inside the cavity,

wherein the innercore is secured to the bottom panel by the adhesive.

2. The method of claim 1, further comprising

disposing an upholstery layer over a top surface of the innercore.

3. The method of claim 1, wherein the perimeter sidewall is made of foam.

4. The method of claim 1, wherein the bottom panel comprises a layer of high density foam.

5. The method of claim 1, wherein the bottom panel forms a substantially rigid base platform that comprises a layer made of a material selected from the group consisting of wood, cardboard, plastic or foam, said material capable of providing support to the innercore.

6. The method of claim 1, wherein the innercore comprises a plurality of spring coils.

7. The method of claim 1, wherein the innercore is selected from the group of open coil innercores, fabric-encased spring coil innercores, and springs in foam innercore.

8. The method of claim 1, wherein the innercore comprises a block of resilient foam.

9. The method of claim 1, wherein providing the foam tray includes gluing the perimeter sidewall to a peripheral region of a major surface of the bottom panel.

10. The method of claim 9, wherein the perimeter sidewall comprises a plurality of sidewall sections.

11. The method of claim 10, wherein the perimeter sidewall comprises at least four foam sidewall sections.

12. The method of claim 10, and further providing a wire for securing the innercore against the substantially rigid base platform.

13. The method of claim 1, wherein the perimeter sidewall includes a joint for allowing the mattress to pivot between a reclined and an inclined position.

14. A mattress comprising

a substantially rigid base platform;

a perimeter sidewall joined to the base platform, said platform and perimeter sidewall defining an interior cavity; and

an innercore disposed within the cavity,

wherein said innercore is secured to the bottom panel by an adhesive at least proximate to the perimeter sidewall.

15. The mattress of claim 14, wherein the innercore comprises pocketed springs and the adhesive bonds fabric surrounding the pocketed springs to the bottom panel.

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