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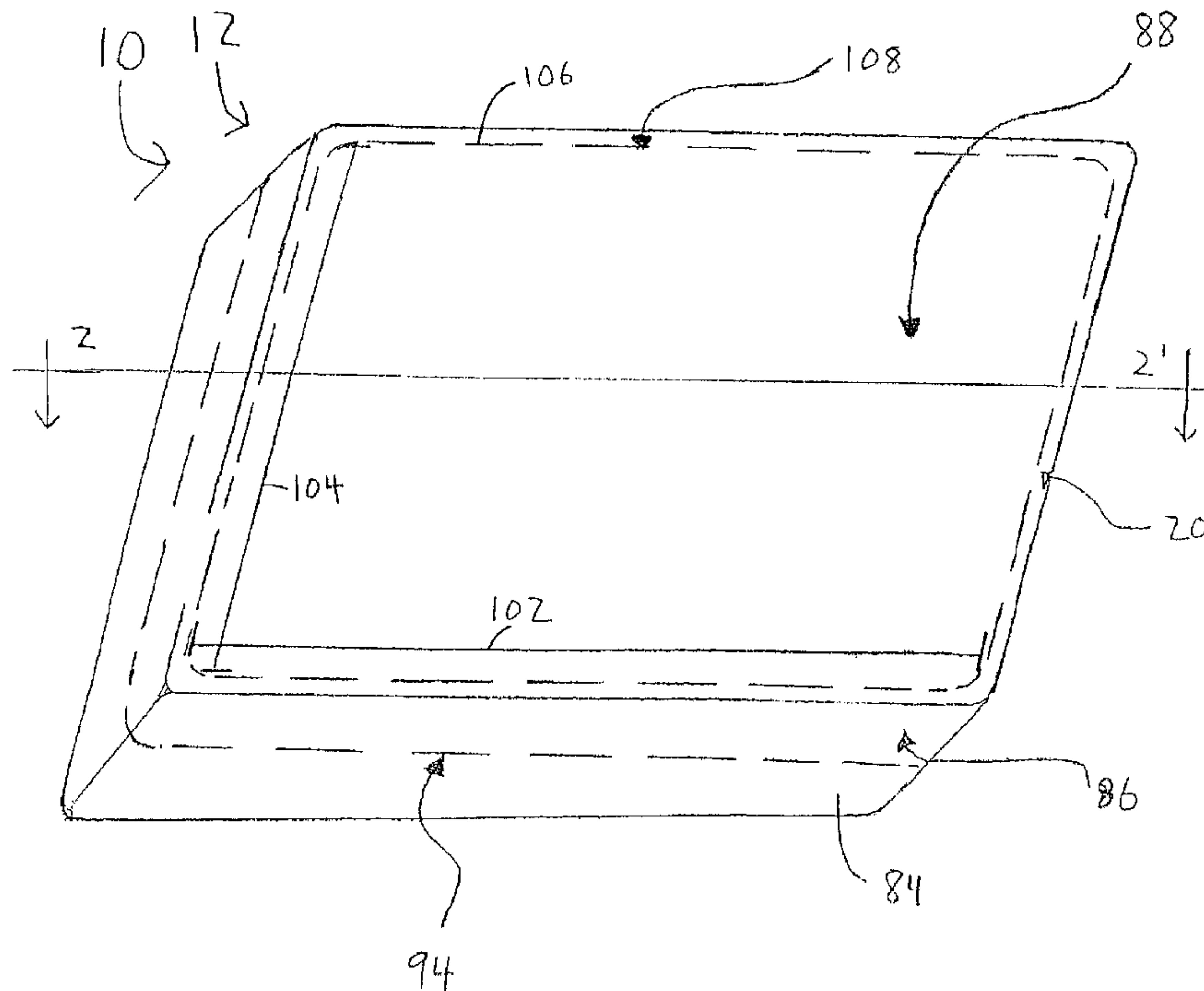
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(54) **Titre : DISPOSITIF DE COUCHAGE COMPORTANT DES PANNEAUX INTERCHANGEABLES**

(54) **Title: SLEEPING SYSTEM WITH INTERCHANGEABLE PANELS**



(57) **Abrégé/Abstract:**

A bed assembly is provided that comprises a frame and a mattress member array. The mattress member array includes a plurality of discrete, resiliently compressible mattress segment members. The frame defines a plurality of upwardly opening support sockets sized and shaped to mateably receive an associated one of the mattress segment members therein. A support surface for at least one person is formed when each of the support sockets holds one associated mattress segment member therein.



ABSTRACT

A bed assembly is provided that comprises a frame and a mattress member array. The mattress member array includes a plurality of discrete, resiliently compressible mattress segment members. The frame defines a plurality of upwardly opening support sockets sized and shaped to mateably receive an associated one of the mattress segment members therein. A support surface for at least one person is formed when each of the support sockets holds one associated mattress segment member therein.

SLEEPING SYSTEM WITH INTERCHANGEABLE PANELS

SCOPE OF THE INVENTION

The present invention relates to a sleeping system for providing a support surface for at least one person. In particular, the invention provides a bed assembly that includes a number of discrete mattress segment members that are insertable into a support frame and which allows a user or manufacturer to customize individual areas of the support surface to vary one or more of softness, materials, compressibility, and thickness. Such mattress segment members can be easily reorganized and replaced as desired.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a support surface comprising a number of discrete mattress segment members that can be replaced as desired. In one preferred embodiment, the mattress segment members are substantially modular in design so as to be interchangeable. Optionally, the mattress segment members can be of variable firmness, such that the firmness of each area of the support surface can be selected independently of the firmness of the other areas. This allows a user to select a support surface that provides their preferred firmness and comfort. In embodiments of the invention where the support surface can accommodate two persons, each person is able to select a desired firmness independently of the other person.

In another preferred application, the bed assembly of the invention can be used to treat patients for whom a more or less rigid support surface is desired. A good sleeping

surface should provide support for the natural curves and alignment of the spine. Experts say that the specific type and firmness level of a sleeping surface that will provide the greatest comfort varies from person to person. In general, experts agree that a sleeping surface should allow the spine to assume the same natural curve when a person is lying down as when that person is standing. A sleeping surface that is too hard will force the spine into an unnatural position, while one that is too soft will sag and fail to provide adequate support.

Accordingly, further preferred embodiments of the bed assembly of the present invention may be beneficial to health, and may be useful in home and/or clinical cases where one desires to correct defects in the vertebral column acquired through prolonged use of too soft or too hard sleeping surfaces. In non-limiting preferred constructions, the bed assembly of the present invention is designed to allow a person to select a desired sleeping surface support profile which may help to prevent ailments of the spine that are caused by undesirable sleeping surfaces from originating or becoming aggravated.

In one non-limiting preferred construction, a firmness profile of the support surface is selected in consultation with a doctor, chiropractor, physiotherapist, or other qualified health professional. The firmness profile is preferably selected in view of the unique shape and sleep requirements of the user. For example, the optimal firmness profile may depend on the sleeping style of the user, such as whether the user tends to sleep on his or her front, back, or side. Furthermore, the height, weight, and physical conditioning of the user may be relevant factors in selecting the optimal firmness profile. A firmness profile that is selected according to an individual's specific needs may help to provide a more restful and comfortable sleep.

In another non-limiting preferred construction, the firmness profile of the sleeping surface is selected to provide optimal spinal alignment to a user while sleeping or resting. In particular, the firmness profile is preferably selected to provide the optimal support to each region of the user's spinal column, including the cervical curve, the thoracic curve, the lumbar curve, and the sacral curve. Achieving such an optimal firmness profile may, in some cases, be useful in ameliorating and/or preventing back pain.

In one possible hospital or institutional use, individual mattress segment members that become contaminated with blood or other fluids, for example, can be easily replaced without requiring the entire support surface to be replaced. These individual mattress segment members can then be washed and/or sterilized and reused, or disposed of as required.

In an optional embodiment, the bed assembly is equipped with a cover that can be removed and washed or replaced, and a filter that is dust mite resistant and will not support mildew or bacteria.

Another object of the present invention is to provide a bed assembly with structural flexibility which, in preferred embodiments, is capable of allowing a person to adjust a sleeping surface to the desired comfort without interfering with the comfort selected by a bed mate.

To achieve at least some of the foregoing objects, the present invention provides a bed assembly comprising a frame and a mattress member array, the mattress member array including a plurality of mattress segment members, panels, or blocks, and the frame having a plurality of upwardly opening support sockets, recesses, cavities, or the like. Each of the support sockets is shaped and sized to mateably receive the lower portion of

an associated one of said mattress segment members therein, such that a support surface for at least one person is formed when each of the support sockets holds one associated mattress member therein. The number, size and shape of the support sockets can vary from one bed assembly to another. These can be varied, for example, depending on the size of the support surface, or the desired comfort of a person using the support surface. The mattress segment members can be made of variable materials and densities as desired. Although not essential, each of the mattress segment members is provided with a modular design of similar shape and size so as to be interchangeable. In addition, each of the mattress segment members optionally has a related pre-selected degree of firmness. Preferably, not all of the mattress segment members in the mattress member array have the same degree of firmness. By mix and matching mattress segment members with support sockets, many different support surfaces can be provided, with different firmness profiles. This allows the user or users of the bed assembly to select the desired support profile. For example, in a hospital setting the support surface could be selected to accommodate the particular needs and comfort preferences of a first patient. When this first patient leaves the hospital, the support surface can be easily modified to select a firmness profile as required or preferred by a second patient. Furthermore, should one of the mattress segment members become contaminated with body fluids, such as blood, the contaminated mattress segment member can be easily replaced, without having to replace the entire support surface.

In optional constructions, the support surface can accommodate more than one person, preferably two persons. The support surface may include two support regions for supporting the two persons, each support region having a firmness profile. Preferably,

the firmness profile of each support region can be selected independently of the firmness profile selected for the other support region. This allows a first user of the support surface to select their desired firmness profile without interfering with the preferred firmness profile of the second user of the support surface.

In one construction, the support surface formed by the mattress segment members held in the support sockets produces an irregular top surface, with gaps between the mattress segment members where the sidewalls of the support sockets are located. Although not essential, the bed assembly further includes a comfort panel that is sized and shaped to substantially cover the support surface, and which provides a substantially uniform top surface when placed thereon. The comfort panel may be of variable thickness.

In one embodiment the mattress segment members are held in the support sockets by gravity. Alternatively, the mattress segment members may be held in the support sockets solely or additionally by friction, or by a physical connection such as a fastener, clip, hook and loop connector or otherwise.

Each of the mattress segment members preferably have unique color coding, with the color of the mattress segment member indicating its related degree of firmness. This feature allows for the bed assembly to be very quickly adapted to the desired firmness profile, as the related degree of firmness of each mattress segment member can be very quickly identified.

In one construction, the bed assembly of the invention may be completely disassembled into its component parts, and rebuilt as desired.

The bed assembly of the present invention is, in one non-limiting construction, for

use in a hospital. In a hospital setting, the filter can protect the sleeping surface from contamination with body fluids, mildew, bacteria, parasites or other contaminants. Furthermore, the interchangeable mattress segment members allow individual mattress segment members to be replaced when contaminated with, for example, body fluids, without requiring an entire mattress to be replaced. Furthermore, the support surface can be readily adapted to different preferred firmness profiles dependant upon the patient who is using the support surface at any given time.

Although not essential, the bed assembly may include more mattress segment members than there are support sockets. The extra mattress segment members allow for greater flexibility in selecting the desired sleeping surface, such that the firmness selected for each section of the sleeping surface can be selected independently of the firmness selected for each other section of the sleeping surface.

Accordingly, in one aspect the present invention resides in a bed assembly, comprising a frame and a mattress member array; said mattress member array comprising a plurality of discrete mattress segment members, each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising: an upper portion with an upper surface, and a lower portion with a lower surface; said frame comprising a mattress member receptacle, said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls; said generally vertical sidewalls having an uppermost edge; said support sockets being shaped and sized to mateably receive the lower portion of an associated one of said mattress segment members therein, such that the upper surface of said associated mattress segment member is above the uppermost edge of the

vertical sidewalls when said associated mattress segment member is in the at least partially compressed state; and wherein when the lower portion of said mattress segment members are positioned in the associated support sockets, the upper surface of the mattress segment members forms a support surface for supporting at least one person thereon.

In one embodiment, each of said mattress segment members is of a similar size and shape, so as to be interchangeable.

In another embodiment, each of said mattress segment members has a preselected degree of firmness, and at least two of the mattress segment members have different degrees of firmness; said support surface including one or more support regions.

In a further embodiment, the support regions include: a first said support region for supporting a first person in a resting position reclined thereon, and a second said support region for supporting a second person in a resting position reclined thereon.

In a still further embodiment, spacing between adjacent ones of said mattress segment members forms the support surface as a non-continuous surface; said bed assembly further comprising a resiliently compressible comfort panel shaped and sized to substantially cover said non-continuous surface.

In a preferred embodiment, the bed assembly further comprises a removable cover, said cover being formed from a washable fabric and having releasably connectable top and bottom sections; said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein.

In a further preferred embodiment, the cover further includes a top sheet releasably connectable to the top section and forming a filter compartment therebetween;

said bed assembly further comprising a flexible filter panel sized for placement in said filter compartment; wherein the placement of the filter panel in the filter compartment protects the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

In an especially preferred embodiment, each of said support regions includes a cervical support area; a thoracic support area; a lumbar support area; and a sacral support area; and wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.

In a further non-limiting construction, said frame further comprises a base, said base positioned below and supporting said mattress member receptacle.

In one embodiment said bed assembly is a hospital bed assembly.

In another aspect, the present invention resides in a bed assembly, comprising a frame and a mattress member array; said mattress member array comprising a plurality of discrete mattress segment members; each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising an upper portion with an upper surface and a lower portion with a lower surface; each of the mattress segment members having a preselected degree of firmness, and at least two of the mattress segment members having different degrees of firmness; said frame comprising a mattress member receptacle, said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls, said generally vertical sidewalls having an uppermost edge, said support sockets being shaped and sized to mateably receive therein in friction-fit the

lower portion of one said mattress segment member therein, such that the upper surface of said one mattress segment member is above the uppermost edge of the vertical sidewalls when said one mattress segment member is in the at least partially compressed state; and wherein when the lower portion of said mattress segment members are positioned in the support sockets, the upper surface of the mattress segment members forms a support surface for supporting at least one person in a resting position reclined thereon.

In one embodiment, said support surface includes: a first support region for supporting a first person in a resting position reclined thereon; and a second support region for supporting a second person in a resting position reclined thereon.

In a preferred embodiment, the support surface includes a cervical support area; a thoracic support area; a lumbar support area; and a sacral support area; and wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.

In a further preferred embodiment, the bed assembly further comprises a removable cover, said cover being formed from a washable fabric and having releasably connectable top and bottom sections; said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein.

In another embodiment, the cover further includes a top sheet releasably connectable to the top section and forming a filter compartment therebetween; said bed assembly further comprising a flexible, washable, and reusable filter panel sized for placement in said filter compartment; wherein the placement of the filter panel in the

filter compartment protects the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

In a still further preferred embodiment, each of said mattress segment members is of a similar size and shape, so as to be interchangeable.

In a further aspect, the present invention resides in a bed assembly, comprising a frame, a mattress member array, a resiliently compressible comfort panel, a removable cover formed from a washable fabric, and a flexible filter panel; said mattress member array comprising a plurality of discrete mattress segment members; each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising an upper portion with an upper surface and a lower portion with a lower surface; each of the mattress segment members being of a similar size and shape; and each of said mattress segment members having a preselected degree of firmness, at least two of the mattress segment members having different degrees of firmness; said frame comprising a base and a mattress member receptacle, said base positioned below and supporting said mattress member receptacle, said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls, said generally vertical sidewalls having an uppermost edge, said support sockets being shaped and sized to mateably receive the lower portion of any one of said mattress segment members therein, such that the upper surface of said one mattress segment member is above the uppermost edge of the vertical sidewalls when said one mattress segment member is in the at least partially compressed state; wherein when the lower portion of said mattress segment members are positioned in the support sockets, the upper surface of the mattress segment members forms a support surface for

supporting at least one person thereon; said support surface including one or more support regions; said comfort panel shaped and sized to substantially cover said support surface when positioned thereon; said cover comprising a top section, a bottom section, and a top sheet, said top and bottom sections being releasably connectable to each other, said top sheet being releasably connectable to said top section and forming a filter compartment therebetween; said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein and said comfort panel positioned thereon; said filter panel sized for placement in said filter compartment; wherein the placement of the filter panel in the filter compartment protects the comfort panel and the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

In a preferred embodiment, the support regions include: a first said support region for supporting a first person in a resting position reclined thereon, and a second said support region for supporting a second person in a resting position reclined thereon.

In one non-limiting construction, each of the mattress segment members has an associated color indicating the degree of firmness of the mattress segment member.

In an especially preferred embodiment, each of said support regions includes a cervical support area, a thoracic support area, a lumbar support area, and a sacral support area; and wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purposes of providing a better understanding of the principles of the invention, reference is now made to preferred embodiments illustrated in the accompanying drawings in which:

- Figure 1 shows a perspective view of a bed assembly;
- Figure 2 shows a cross-sectional view of the bed assembly shown in Figure 1 taken along line 2-2';
- Figure 3 shows a partially exploded view of a mattress support subassembly;
- Figure 4 shows a side view of mattress segment members in compressed and uncompressed states;
- Figure 5 shows a partially exploded view of a mattress support subassembly and a comfort panel;
- Figure 6 shows a perspective view of a mattress support subassembly with a comfort panel placed thereon;
- Figure 7A shows a cross-sectional view of the mattress support subassembly shown in Figure 5 taken along line 4-4';
- Figure 7B shows a cross-sectional view of the mattress support subassembly and comfort panel shown in Figure 6 taken along line 6-6';
- Figure 8 shows a partially assembled bed assembly with a filter panel being placed therein;
- Figure 9 shows a top view of a filter panel;
- Figure 10 shows a cross-sectional view of a mattress segment member with a spring core;

Figure 11 shows a human vertebral column; and

Figure 12 shows a partial view of a support region of a bed assembly with mattress segment members arranged to provide support to a human vertebral column.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference may first be had to Figure 1, which illustrates a bed assembly 10 in accordance with a preferred embodiment of the invention. The bed assembly 10 is shown as assembled to form a covered bed 12. Figure 2 shows a cross-section of the bed assembly 10 depicted in Figure 1, taken along line 2-2'. As is best shown in Figure 2, the bed assembly 10 comprises a mattress support subassembly 14, a foam comfort pad or panel 16, a filter panel 18, and an outer cover 20.

Figure 3 shows best a partially exploded view of the mattress support subassembly 14. The mattress support subassembly 14 comprises a frame 22 and a mattress member array 24. The mattress member array 24 comprises a plurality of discrete mattress segment members 26.

As best shown in Figures 3 and 4, the mattress segment members 26 are generally rectangular six sided foam blocks, each with an upper portion 28 having an upper surface 30, and a lower portion 32 having a lower surface 34. Each mattress segment member 26 has a height 36, a width 38, and a length 40. The mattress segment members 26 are resiliently compressible, with each having an uncompressed height 36u when in an uncompressed state I, and a compressed height 36c when in a substantially compressed state II. Each of the mattress segment members 26 are of substantially the same size and

shape so as to be interchangeable. Preferably, the height 36 of the mattress segment members 26 is in the range of 10 cm to 50 cm; the width 38 of the mattress segment members 26 is in the range of 30 cm to 110 cm; and the length 40 of the mattress segment members 26 is in the range of 30 cm to 55 cm. More preferably, the height 36 of the mattress segment members 26 is in the range of 15 cm to 40 cm; the width 38 of the mattress segment members 26 is in the range of 45 cm to 100 cm; and the length 40 of the mattress segment members 26 is in the range of 45 cm to 55 cm.

The mattress segment members 26 in the mattress member array 24 do not all have the same degree of firmness. Although the mattress member array 24 may include mattress segment members 26 with any desired number of degrees of firmness to choose from, preferably there are at least five different degrees of firmness (for example, gentle support, medium support, medium firm support, firm support, and extra firm support). As will be described, this feature allows a user or manufacturer to customize the bed assembly 10 to provide the desired comfort and support. As shown in Figure 4, the mattress segment member 26.1 has a first color 42, and the mattress segment member 26.2 has a second color 44. The first color 42 indicates that mattress segment member 26.1 has a first degree of firmness, and the second color 44 indicates that the mattress segment member 26.2 has a second degree of firmness. This color coding allows the firmness of a mattress segment member 26 to be ascertained quickly and easily.

As shown in Figure 3, the frame 22 is provided as a wooden support structure comprising a mattress member receptacle 46 and a base 48. The base 48 is positioned below and supporting the mattress member receptacle 46. The base 48 and the mattress member receptacle 46 meet at contact point 50 and are tightly joined to each other to

form one stable unit. The mattress member receptacle 46 defines a number of upwardly opening support sockets 52 having generally vertical sidewalls 54 and a closed bottom 56. The support sockets 52 each have a width 58 and a length 60. Each sidewall 54 has a height 62 and an uppermost edge 64 (best shown in Figure 7A).

The support sockets 52 are sized and shaped to each mateably receive the lower portion 32 of a mattress segment member 26 therein. The width 58 and length 60 of the support sockets 52 are selected to substantially correspond to the width 38 and length 40 of the mattress segment members 26. This allows the support sockets 52 to each securely accommodate a mattress segment member 26 therein. Preferably, the width 58 of the support sockets 52 is in the range of 30 cm to 110 cm; and the length 60 of the support sockets 52 is in the range of 30 cm to 55 cm. More preferably, the width 58 of the support sockets 52 is in the range of 45 cm to 100 cm; and the length 60 of the support sockets 52 is in the range of 45 cm to 55 cm.

The sidewalls 54 are designed to hold the mattress segment members 26 in place, and prevent them from shifting while the bed assembly 10 is in use. The height 62 of the sidewalls 54 is selected to be lower than the compressed height 36c of the mattress segment members 26. As will be described, this allows for a more comfortable sleep by ensuring that the weight of a person lying on the bed assembly 10 is supported by the resiliently compressible mattress segment members 26, rather than the hard, wooden sidewalls 54. The height 62 of the sidewalls 54 is preferably in the range of 8 cm to 48 cm. More preferably, the height 62 of the sidewalls 54 is in the range of 13 cm to 38 cm.

As shown by the arrows in Figure 3, the mattress segment members 26a-h are to be received by the support sockets 52a-h, respectively. However, as each of the mattress

segment members 26 are of substantially the same size and shape, it is possible for any mattress segment member 26 to be received by any support socket 52.

When the lower portion 32 of a mattress segment member 26 is received by a support socket 52, the upper surface 30 of the mattress segment member 26 sits above the uppermost edge 64 of the sidewalls 54 (best shown in Figure 7A). A support surface 66 for supporting two people is formed when a mattress segment member 26 is held in each of the support sockets 52 of the mattress member receptacle 46 (best shown in Figure 5). Having the upper surface 30 of the mattress segment members 26 above the uppermost edge 64 of the sidewalls 54 ensures that the weight of a person laying on the support surface 66 is supported by the resiliently compressible mattress segment members 26, and not the hard, wooden sidewalls 54. This allows for a more comfortable sleep.

The support surface 66 has a length 68 and a width 70. Preferably, the support surface 66 has a length 68 in the range of 135 cm to 215 cm; and a width 70 in the range of 65 cm to 210 cm. More preferably, the support surface 66 has a length 68 in the range of 190 cm to 205 cm; and a width 70 in the range of 95 cm to 190 cm.

As is best shown in Figure 5, the support surface 66 includes two support regions 72, each sized to accommodate one person laying thereon. Each of the support regions 72 comprises four mattress segment members 26 placed within four support sockets 52. Each support region 72 has a firmness profile that is dependent on the degree of firmness of each of the mattress segment members 26 in the support region 72. For example, the firmness profile of the support region 72a shown in Figure 5 is determined by the degree of firmness of each of the mattress segment members 26a-d held in support sockets 52a-d. As will be described, the features of the bed assembly 10 allow the firmness profile of

each support region 72 to be selected independently.

The mattress support subassembly 14 is designed to allow the users of the bed assembly 10 to select a support surface 66 with their desired level of support and comfort. By selecting mattress segment members 26 with the desired degree of firmness, the users of the bed assembly 10 can design and create an individualized support surface 66. For example, a user may wish to have a sleeping surface 66 that supports the head with a mattress segment member 26 of one degree of firmness, and supports the rest of the body with mattress segment members 26 of another degree of firmness.

Furthermore, if the user of the bed assembly 10 wants to try a different configuration of mattress segment members 26, the mattress segment members 26 can be easily reorganized as desired. Because the mattress segment members 26 are interchangeable, the mattress segment members 26 in one support socket 52 can be easily swapped with a mattress segment member 26 in another support socket 52. Furthermore, as the mattress segment members 26 are color coded, the degree of firmness of each can be ascertained quickly and easily, facilitating the process of designing, creating, and reorganizing the desired support surface 66.

Preferably, the mattress member array 24 includes more mattress segment members 26 than there are support sockets 52 in the mattress member receptacle 46. More preferably, the mattress member array 24 includes at least as many mattress segment members 26 of each degree of firmness as there are support sockets 52 in the mattress member receptacle 46. This allows for greater customizability, as the degree of firmness of the mattress segment member 26 in each support socket 52 can be selected independently of the degree of firmness of the mattress segment members 26 in the other

support sockets 52. This would allow the two people using the mattress support subassembly 14 shown in Figure 5 to each select their desired firmness profile for their respective support regions 72 independently of each other. In this way, the present invention allows two people with different needs and/or preferences with respect to bed comfort and support to share the bed assembly 10, while still getting their desired comfort and support.

In an optional application, the bed assembly 10 is for use in a hospital. The mattress support subassembly 14 is particularly advantageous in the hospital setting, in that the individual mattress segment members 26 can be easily removed, washed, replaced, or disposed of as required. In a hospital setting, body fluids such as blood can frequently come in contact with hospital beds. When a standard mattress becomes contaminated with blood, the entire mattress may need to be removed and replaced, even if only a small area of the mattress is affected. It may also be difficult to clean a standard mattress, as they are generally large in size and cannot be accommodated by smaller cleaning machines. In contrast, in the bed assembly 10 of the present invention, only the individual mattress segment members 26 that become contaminated with blood need to be removed. These can then be easily replaced with individual mattress segment members 26, without requiring all of the mattress segment members 26 to be replaced. Furthermore, as the mattress segment members 26 are of smaller size than a standard mattress, they are much more easily accommodated by smaller cleaning machines, such as standard washing machines for bedding and clothing.

In the course of a year, a hospital bed is typically used by many different patients, each having their own requirements and preferences with respect to support and comfort.

A standard mattress cannot be customized to accommodate these differing needs. The bed assembly 10 of the present invention, however, can be easily customized to provide the support surface 66 required by each patient. Furthermore, using the color coding, hospital staff can easily and quickly re-organize the mattress support subassembly 14 to the preferences of new patients.

Figure 5 best shows a partially exploded view of the mattress support subassembly 14 and the comfort panel 16. The comfort panel 16 is a generally rectangular, resiliently compressible foam pad. The comfort panel 16 has a length 74, a width 76, and a thickness 78. The length 74 and width 76 of the comfort panel 16 are selected to generally correspond to the length 68 and width 70 of the support surface 66, such that the comfort panel 16 substantially covers the support surface 66 when placed thereon. Preferably, the comfort panel 16 has a length 74 in the range of 135 cm to 215 cm; and a width 76 in the range of 65 cm to 210 cm. More preferably, the comfort panel 16 has a length 74 in the range of 190 cm to 205 cm; and a width 76 in the range of 95 cm to 190 cm.

Figure 6 best shows the mattress support subassembly 14 with the comfort panel 16 in place above the support surface 66. The comfort panel 16 allows for a more comfortable sleep by providing an extra layer of cushion on top of the mattress segment members 26. The thickness 78 of the comfort panel 16 is selected to achieve the desired comfort. Preferably, the thickness 78 of the comfort panel 16 is in the range of 1 cm to 10 cm. More preferably, the thickness 78 of the comfort panel 16 is in the range of 2 cm to 6 cm.

Figure 7A shows a cross-sectional view of the mattress support subassembly 14

shown in Figure 5, taken along the line 4-4'. As shown, the upper surfaces 30 of the mattress segment members 26 are above the uppermost edge 64 of the sidewalls 54. This produces gaps in the support surface 66 above the sidewalls 54, and results in the formation of an irregular top surface 80.

Figure 7B shows a cross-sectional view of the mattress support subassembly 14 and comfort panel 16 shown in Figure 6, taken along the line 6-6'. As shown, the comfort panel 16 covers the gaps in the support surface 66, and produces a substantially uniform top surface 82. The substantially uniform top surface 82 allows for a more comfortable sleep, by providing a more even sleeping surface.

The cover 20 is best shown in Figure 1. The cover 20 is made from a washable fabric and forms an outer layer of the bed assembly 10. The cover 20 bears the brunt of the wear and tear of the use of the bed assembly 10, and can be removed, washed, and replaced as required. As shown in Figure 1, the cover 20 includes a bottom section 84; a top section 86; and a top sheet 88. The bottom section 84 defines a cavity that is sized and shaped to mateably receive a lower portion 90 of the frame 22 therein. The top section 86 defines a cavity that is sized and shaped to mateably receive the comfort panel 16, the support surface 66 and an upper portion 92 of the frame 22. A first zipper system 94 releasably connects the bottom 84 and top 86 sections of the cover 20. When the bottom 84 and top 86 sections are mounted over the comfort panel 16 and the mattress support subassembly 14 and are connected together with the first zipper 94, the comfort panel 16 and the mattress support subassembly 14 are completely encompassed by the cover 20 (best shown in Figure 2). When assembled in this way, the bottom 84 and top 86 sections hold the comfort panel 16 and the mattress support subassembly 14 together

in a secure fashion. This allows the bed assembly 10 to be moved, for example, without various parts such as the comfort panel 16 and the mattress segment members 26 falling out of place. The top section 86 can be easily disconnected from the bottom section 84 in order to access the comfort panel 16 and the mattress support subassembly 14 and, for example, replace or reorganize the mattress segment members 26.

Figure 8 best shows the bed assembly 10 in a partially assembled state, showing the placement of the filter panel 18 and the top sheet 88. The top sheet 88 of the cover 20 is a rectangular sheet that is sized and shaped so as to substantially cover an uppermost surface 96 of the top section 86. The uppermost surface 96 is a relatively flat, rectangular surface that sits on top of the comfort panel 16. The uppermost surface 96 has a length 98 and a width 100 that are substantially equal to the length 74 and width 76 of the comfort panel 16, respectively. The top sheet 88 has a length 102 and a width 104 that are slightly less than the length 98 and width 100 of the uppermost surface 98, respectively. The top sheet 88 has a circumference 106, the entire circumference 106 being releasably connectable to the top section 88 with a second zipper system 108. When the top sheet 88 is connected to the top section 86, a filter compartment 110, sized and shaped to hold the filter panel 18, is formed therebetween (best shown in Figure 2).

Figure 9 best shows the filter panel 18. The filter panel 18 has a length 112 and a width 114. The length 112 and width 114 of the filter panel 18 are equal to, or slightly less than, the length 102 and width 104 of the top sheet 88, respectively. This allows the filter panel 18 to sit securely below the top sheet 88 in the filter compartment 110. The filter panel 18 is a thin, pliable sheet that is dust mite resistant, and substantially impermeable to body fluids, bacteria, and parasites. The filter panel 18 is washable and

reusable.

When the filter panel 18 is placed in the filter compartment 110, it helps to protect the comfort panel 16 and the mattress support subassembly 14 from contamination with body fluids, such as blood, as well as dust mites, parasites and bacteria. The top sheet 88 holds the filter panel 18 in place between a person lying on the bed assembly 10 and the mattress support subassembly 14. If the top sheet 88 and filter panel 18 become contaminated with blood, the top sheet 88 can be easily disconnected from the top section 86, and the top sheet 88 and filter panel 18 can be easily removed and washed or replaced, without having to wash or replace all of the cover 20. Furthermore, by protecting the comfort panel 16 and the mattress support subassembly 14 from contamination, the filter panel 18 reduces the frequency with which the comfort panel 16 and the mattress segment members 26 need to be replaced and washed or disposed of. This is particularly advantageous in the hospital setting, as hospital beds may be frequently contaminated by body fluids such as blood.

Figure 10 best shows a cross-sectional view of a mattress segment member 26 according to an alternate embodiment of the invention. In this embodiment, the mattress segment member 26 has a hollow spring core 116 comprising a plurality of resiliently compressible springs or coils 118. The springs 118 are formed from coiled metal strands. The type of metal and the shape and size of the springs 118 are selected to provide the desired firmness and support.

A first upholstery layer 120 sits immediately above the spring core 116, and a second upholstery layer 122 sits immediately below the spring core 116. The first 120 and second 122 upholstery layers are made from a soft, resiliently compressible foam,

and provide a cushioning layer to give the mattress segment member 26 the desired comfort. The mattress segment member 26 can be placed in a support socket 52 with either the first 120 or second 122 upholstery layer facing upwards. If the first upholstery layer 120 is placed facing upwards in the support socket 52, after prolonged use it may lose some resiliency and comfort may decrease. The user of the bed assembly 10 can then flip the mattress segment member 26 around so that the second upholstery layer 122 is facing upwards. In this way, the useful life of the mattress segment member 26 can be increased.

The first upholster layer 120 has a thickness 124, and the second upholster layer 122 has a thickness 126. The thicknesses 124 and 126 are selected to provide the desired softness and comfort. Optionally, the thicknesses 124 and 126 are different, such that the comfort provided by the first 120 and second 122 upholstery layers differs. This allows for greater customizability, as the user of the bed assembly 10 can choose to use either the first 120 or second 122 upholstery layer in the support surface 66, according to the user's preferences.

A pliable fabric casing 128 completely encompasses the spring core 116 and the first 120 and second 122 upholstery layers. The casing 128 helps to protect the spring core 116 and the first 120 and second 122 upholstery layers from damage by keeping them unexposed. The casing 128 also provides a smooth outer surface to the mattress segment member 26, easing the insertion and removal of the mattress segment member 26 from the support sockets 52. Optionally, the casing 128 is made from a material that is impermeable to fluid. This is particularly advantageous in the hospital setting, as it helps protect the spring core 116 and the first 120 and second 122 upholstery layers from

contamination with body fluids, such as blood, and allows for easier cleaning of the mattress segment member 26.

In a preferred embodiment, the arrangement of mattress segment members 26 in the mattress support subassembly 14 is selected in consultation with a doctor, chiropractor, physiotherapist, or other qualified health professional. The firmness profile of each support region 72 is preferably selected in view of the unique shape and sleep requirements of the user of that support region 72. Furthermore, the firmness profile of the support region 72 is preferably selected to provide optimal spinal alignment to the user while sleeping or resting.

Figure 11 shows a human vertebral column 130. The vertebral column 130 includes a number of distinct regions, including the cervical curve 132, wherein the cervical vertebrae 134 are located; the thoracic curve 136, wherein the thoracic vertebrae 138 are located; the lumbar curve 140, wherein the lumbar vertebrae 142 are located; and the sacral curve 144, wherein the sacrum 146 and coccygeal vertebrae 148 are located. In a preferred embodiment, the firmness profile of each support region 72 is selected to provide the optimal support to each region of the vertebral column 130, including the cervical curve 132, the thoracic curve 136, the lumbar curve 140, and the sacral curve 144.

Figure 12 shows a partial view of a preferred embodiment of the bed assembly 10. In this embodiment, the support region 72 includes a mattress segment member 26cc that is sized and arranged specifically to provide support for the cervical curve 132, a mattress segment member 26tc that is sized and arranged specifically to provide support for the thoracic curve 136, a mattress segment member 26lc that is sized and arranged

specifically to provide support for the lumbar curve 140, and a mattress segment member 26sc that is sized and arranged specifically to provide support for the sacral curve 144. Preferably, the related degree of firmness of each of the mattress segment members 26cc, 26tc, 26lc, and 26sc is selected in consultation with a doctor or chiropractor to provide the optimal firmness and support for the corresponding regions of the vertebral column 130. For example, the user may, in consultation with a doctor or chiropractor, decide that the mattress segment member 26lc should be selected so as to provide firm support to the lumbar curve 140, while the cervical curve 132, thoracic curve 136, and sacral curve 144 should each have medium firm support.

Achieving such optimal support for the vertebral column 130 through consultation with a qualified health professional may, in some cases, be useful in ameliorating and/or preventing back pain. The effect of the customized support region 72 on back pain and/or alignment of the vertebral column 130 can be tracked over time, and easily adjusted as necessary. Furthermore, in embodiments of the bed assembly 10 wherein there is a separate support region 72 for each of two different users, each support region 72 can be independently customized so as to accommodate the needs of each user.

Although the first 120 and second 122 upholstery layers have been described as made from a foam material, the invention is not so limited. The first 120 and second 122 upholstery layers could be made from any suitable soft material, such as natural latex, wool, hay, animal hair, cotton, and other synthetic and natural fibres. Furthermore, the first 120 and second 122 upholstery layers can each be made from a different material, or combination of materials. This provides for even greater customizability, allowing the user of the bed assembly 10 to create a support surface 66 that uses whichever of the first

120 and second 122 upholstery layers the user prefers.

Although the bed assembly 10 has been described as for use in a hospital setting, it could be used in other environments as well, such as a residential setting, a nursing home, a university dormitory, or a military barracks. Various features of the bed assembly 10 can be adapted or omitted, and other features can be added, in order to best suit the environment in which the bed assembly 10 is to be used. For example, in a residential setting in which contamination with body fluids such as blood is less of a concern, the filter panel 18 can be omitted.

While the mattress segment members 26 have been described as made from either a foam material, or a spring core 116 with a fabric casing 128 and first 120 and second 122 upholstery layers, the invention is not so limited. The mattress segment members 26 could be made from any suitable materials for providing the desired comfort and support. For example, the mattress segment members 26 could be made from natural latex and/or wool. Furthermore, the mattress member array 24 could include mattress segment members 26 made with different materials and combinations of materials. The upper surface 30 of the mattress segment members 26 could also have contours or curves that provide added comfort or support to selected parts of the body.

Though the mattress segment members 26 are of substantially the same size and shape in the preferred embodiments described above, this is not required. For example, the mattress member array 24 could include mattress segment members 26 of different sizes and shapes, with particularly shaped mattress segment members 26 compatible with only some of the support sockets 52 in the mattress member receptacle 46.

Although the frame 22 has been described as made from wood, the frame 22

could be made from any suitable material that is sufficiently solid to hold the mattress segment members 26 therein and support the weight of the person or persons using the bed assembly 10. For example, the frame 22 could be made from metal, plastic, semi-soft foam materials, or combinations thereof.

While the mattress segment members 26 have been described in the preferred embodiments as generally rectangular in shape, in an alternate embodiment the mattress segment members 26 each have an upper lip that is of greater width than the support sockets 52. The upper lip sits on top of the sidewalls 54 of the support sockets 52 when a mattress segment member 26 is placed therein. In this embodiment, the upper lips substantially fill the gaps which would otherwise exist above the sidewalls 54 of the support sockets 52 so as to provide a more uniform surface.

In a further alternate embodiment, the sidewalls 54 of the support sockets 52 are formed of a semi-soft material. In this embodiment, having some contact between the sleeping person and the uppermost edge 64 of the sidewalls 54 does not substantially interfere with the desired comfort of the support surface 66, as the sidewalls 54 have some give. In this embodiment, the mattress segment members 26 are able to sit lower in the support sockets 52 to create for a more uniform surface.

Although the support sockets 52 have been described in the preferred embodiments as having a closed bottom 56, this feature is not necessary. For example, the support sockets 52 could instead have a bottom flange that leaves an opening at the bottom of the support sockets 52. The size of this opening would be selected so that the mattress segment members 26 could not pass through the opening and would be held in place in the support sockets 52. Alternatively, the support sockets 52 could have no

bottom at all, with the mattress segment members 26 resting directly on the base 48 below.

Though the frame 22 has been described in the preferred embodiments as including a base 48, this feature is not strictly necessary. Instead, the mattress member receptacle 46 could sit directly on the floor. Alternatively, the bed assembly 10 of the invention could be used in conjunction with a standard bed frame with legs. In this embodiment, the bed assembly 10 would sit on top of the standard bed frame, but the standard bed frame would not be encompassed by the cover 20.

While the comfort panel 16 has been described in the preferred embodiments as having a uniform thickness 78, this is not necessary. A comfort panel 16 of variable thickness 78 could also be used to achieve the desired comfort. The comfort panel 16 could further be made from any suitable, resiliently compressible material.

The bed assembly 10 has been depicted in the preferred embodiments as shaped to provide a generally rectangular support surface 66. Alternatively, the bed assembly 10 could be shaped to provide a support surface 66 that is circular, square, oval, half moon, or any other desired shaped. The support sockets 52 and mattress segment members 26 could likewise be provided with different shapes and sizes from those depicted in the preferred embodiments.

Although the cover 20 has been described in the preferred embodiments as using zipper connectors 94 and 108, this is not required. Other connectors, such as hook and loop connectors, clips, and ties could also be used.

The preferred embodiments illustrated and described are in no way intended to limit the invention. Various modifications and variations may be made thereto without

departing from the scope of the invention.

WE CLAIM:

1. A bed assembly, comprising a frame and a mattress member array;
said mattress member array comprising a plurality of discrete mattress segment members, each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising:
 - an upper portion with an upper surface, and
 - a lower portion with a lower surface;said frame comprising a mattress member receptacle, said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls;
 - said generally vertical sidewalls having an uppermost edge;
 - said support sockets being shaped and sized to mateably receive the lower portion of an associated one of said mattress segment members therein, such that the upper surface of said associated mattress segment member is above the uppermost edge of the vertical sidewalls when said associated mattress segment member is in the at least partially compressed state; andwherein when the lower portion of said mattress segment members are positioned in the associated support sockets, the upper surface of the mattress segment members forms a support surface for supporting at least one person thereon.

2. The bed assembly according to claim 1, wherein each of said mattress segment members is of a similar size and shape, so as to be interchangeable.
3. The bed assembly according to claim 1, wherein each of said mattress segment members has a preselected degree of firmness, and at least two of the mattress segment members have different degrees of firmness;
said support surface including one or more support regions.
4. The bed assembly according to claim 3, wherein the support regions include:
a first said support region for supporting a first person in a resting position reclined thereon, and
a second said support region for supporting a second person in a resting position reclined thereon.
5. The bed assembly according to claim 1, wherein spacing between adjacent ones of said mattress segment members forms the support surface as a non-continuous surface;
said bed assembly further comprising a resiliently compressible comfort panel shaped and sized to substantially cover said non-continuous surface.
6. The bed assembly according to claim 1, further comprising a removable cover, said cover being formed from a washable fabric and having releasably connectable top and bottom sections;

said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein.

7. The bed assembly according to claim 6, wherein the cover further includes a top sheet releasably connectable to the top section and forming a filter compartment therebetween;

said bed assembly further comprising a flexible filter panel sized for placement in said filter compartment;

wherein the placement of the filter panel in the filter compartment protects the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

8. The bed assembly according to claim 3, wherein each of said support regions includes a cervical support area; a thoracic support area; a lumbar support area; and a sacral support area; and

wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.

9. The bed assembly according to claim 1, wherein said frame further comprises a base, said base positioned below and supporting said mattress member receptacle.

10. The bed assembly according to claim 1, wherein said bed assembly is a hospital bed assembly.
11. A bed assembly, comprising a frame and a mattress member array;
said mattress member array comprising a plurality of discrete mattress segment members;
each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising an upper portion with an upper surface and a lower portion with a lower surface;
each of the mattress segment members having a preselected degree of firmness, and at least two of the mattress segment members having different degrees of firmness;
said frame comprising a mattress member receptacle, said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls, said generally vertical sidewalls having an uppermost edge,
said support sockets being shaped and sized to mateably receive therein in friction-fit the lower portion of one said mattress segment member therein, such that the upper surface of said one mattress segment member is above the uppermost edge of the vertical sidewalls when said one mattress segment member is in the at least partially compressed state; and

wherein when the lower portion of said mattress segment members are positioned in the support sockets, the upper surface of the mattress segment members forms a support surface for supporting at least one person in a resting position reclined thereon.

12. The bed assembly according to claim 11, wherein said support surface includes:

a first support region for supporting a first person in a resting position reclined thereon; and

a second support region for supporting a second person in a resting position reclined thereon.

13. The bed assembly according to claim 11, wherein the support surface includes a cervical support area; a thoracic support area; a lumbar support area; and a sacral support area; and

wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.

14. The bed assembly according to claim 11, further comprising a removable cover, said cover being formed from a washable fabric and having releasably connectable top and bottom sections;

said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein.

15. The bed assembly according to claim 14, wherein the cover further includes a top sheet releasably connectable to the top section and forming a filter compartment therebetween;

said bed assembly further comprising a flexible, washable, and reusable filter panel sized for placement in said filter compartment;

wherein the placement of the filter panel in the filter compartment protects the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

16. The bed assembly according to claim 11, wherein each of said mattress segment members is of a similar size and shape, so as to be interchangeable.

17. A bed assembly, comprising a frame, a mattress member array, a resiliently compressible comfort panel, a removable cover formed from a washable fabric, and a flexible filter panel;

said mattress member array comprising a plurality of discrete mattress segment members;

each of the mattress segment members being resiliently compressible between an uncompressed state and an at least partially compressed state, and comprising an upper portion with an upper surface and a lower portion with a lower surface;

each of the mattress segment members being of a similar size and shape; and

each of said mattress segment members having a preselected degree of firmness, at least two of the mattress segment members having different degrees of firmness;

said frame comprising a base and a mattress member receptacle,

said base positioned below and supporting said mattress member receptacle,

said mattress member receptacle defining a plurality of upwardly opening support sockets having generally vertical sidewalls, said generally vertical sidewalls having an uppermost edge,

said support sockets being shaped and sized to mateably receive the lower portion of any one of said mattress segment members therein, such that the upper surface of said one mattress segment member is above the uppermost edge of the vertical sidewalls when said one mattress segment member is in the at least partially compressed state;

wherein when the lower portion of said mattress segment members are positioned in the support sockets, the upper surface of the mattress segment members forms a support surface for supporting at least one person thereon;

said support surface including one or more support regions;

said comfort panel shaped and sized to substantially cover said support surface when positioned thereon;

said cover comprising a top section, a bottom section, and a top sheet,

said top and bottom sections being releasably connectable to each other,

said top sheet being releasably connectable to said top section and forming a filter compartment therebetween;

said cover being shaped and sized to substantially contain said frame with said mattress segment members mounted therein and said comfort panel positioned thereon;
said filter panel sized for placement in said filter compartment;

wherein the placement of the filter panel in the filter compartment protects the comfort panel and the support surface from contamination by at least one of body fluids, dust mites, bacteria, and parasites.

18. The bed assembly according to claim 17, wherein the support regions include:

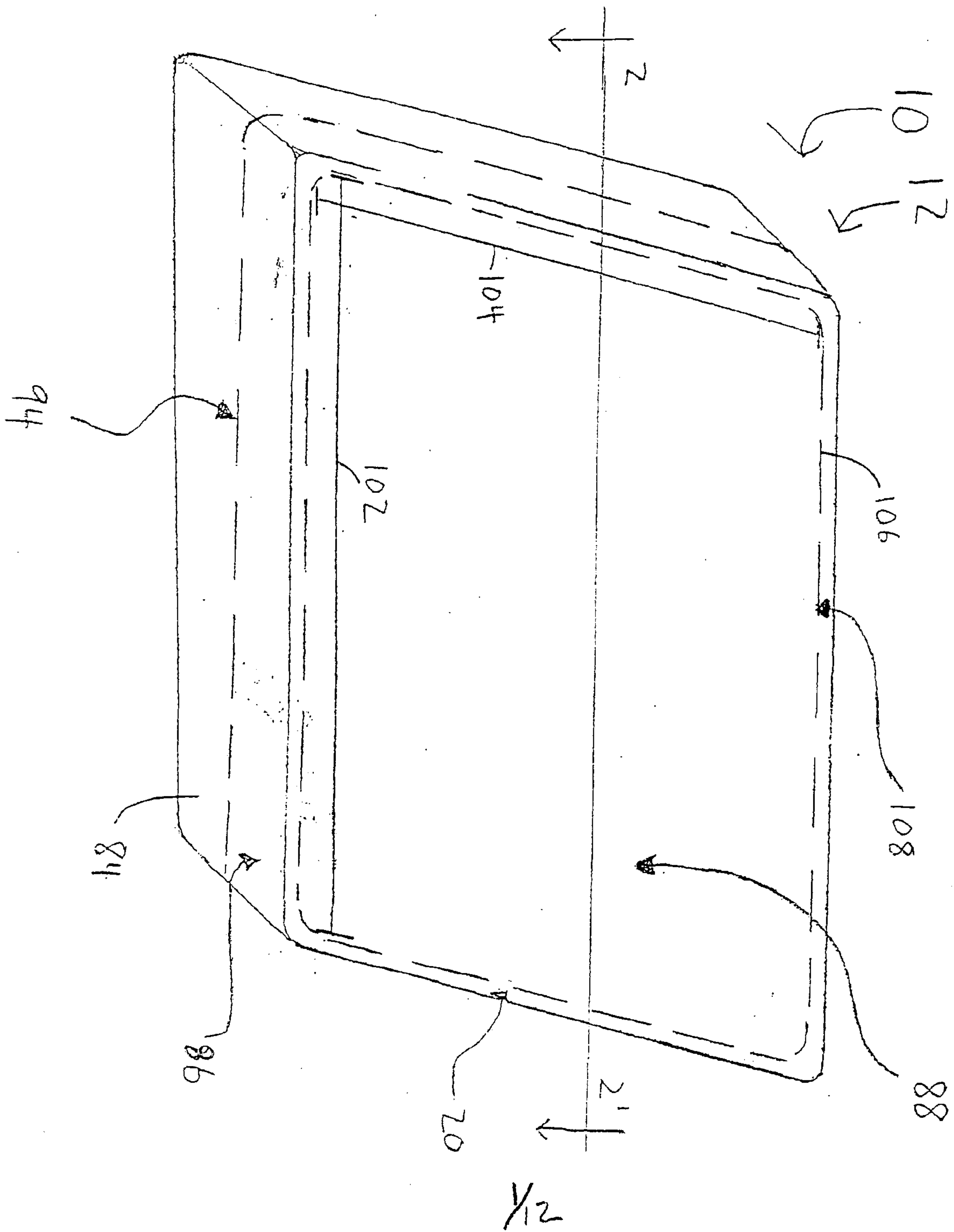
a first said support region for supporting a first person in a resting position reclined thereon, and

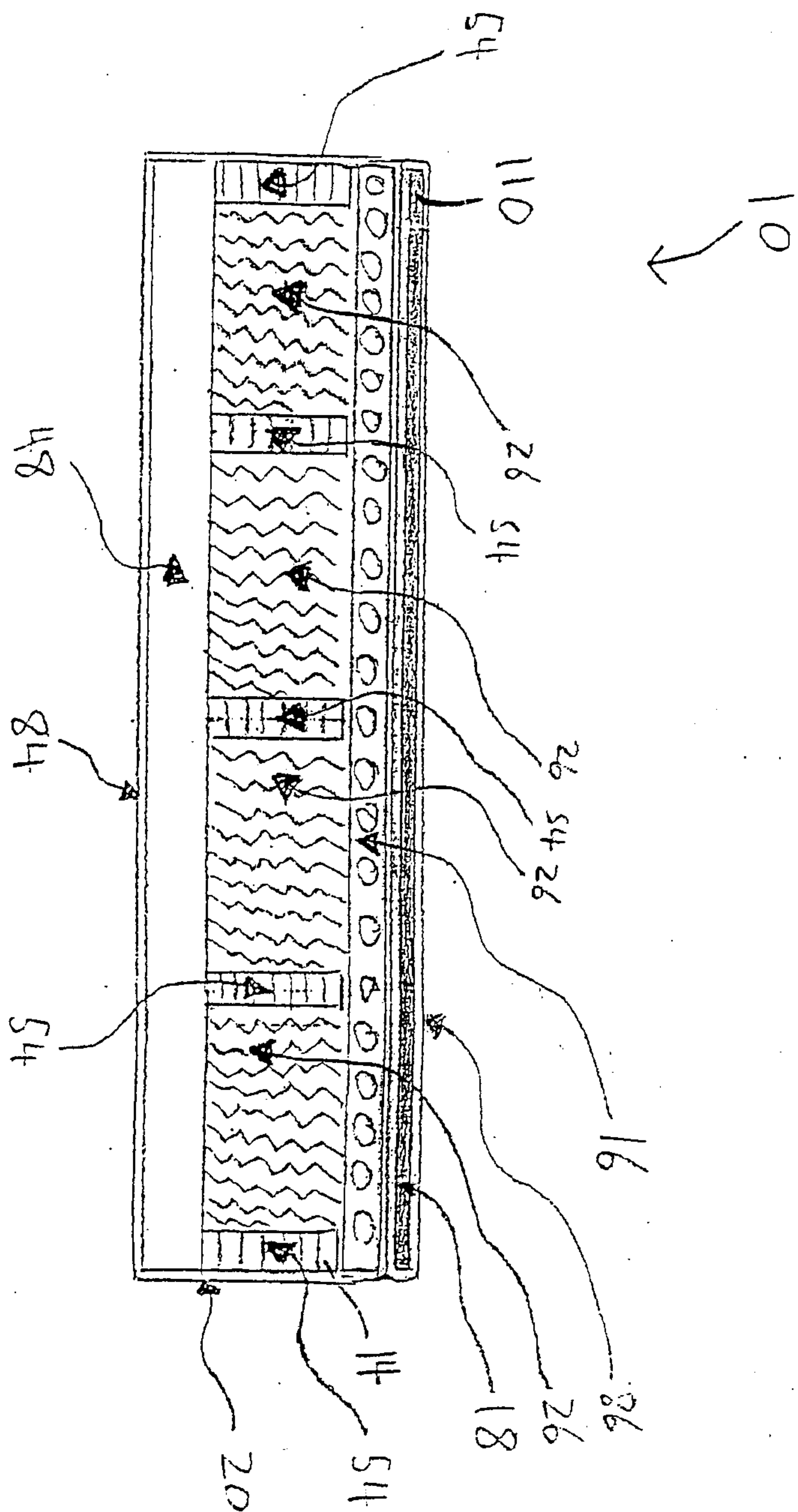
a second said support region for supporting a second person in a resting position reclined thereon.

19. The bed assembly according to claim 17, wherein each of the mattress segment members has an associated color indicating the degree of firmness of the mattress segment member.

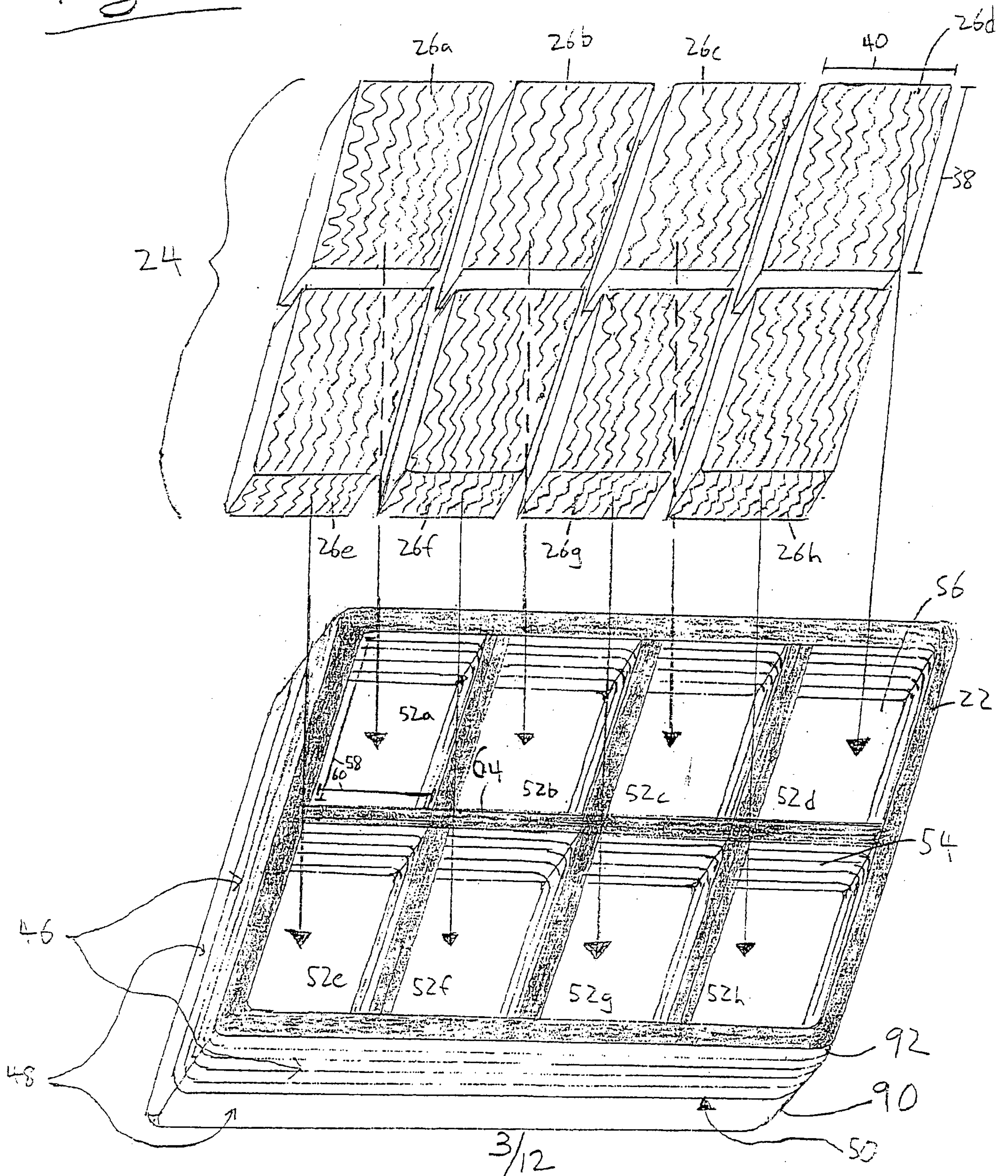
20. The bed assembly according to claim 17, wherein each of said support regions includes a cervical support area, a thoracic support area, a lumbar support area, and a sacral support area; and

wherein the mattress segment members in each of the cervical support area, the thoracic support area, the lumbar support area, and the sacral support area are independently selectable.





7.2

Fig. 3

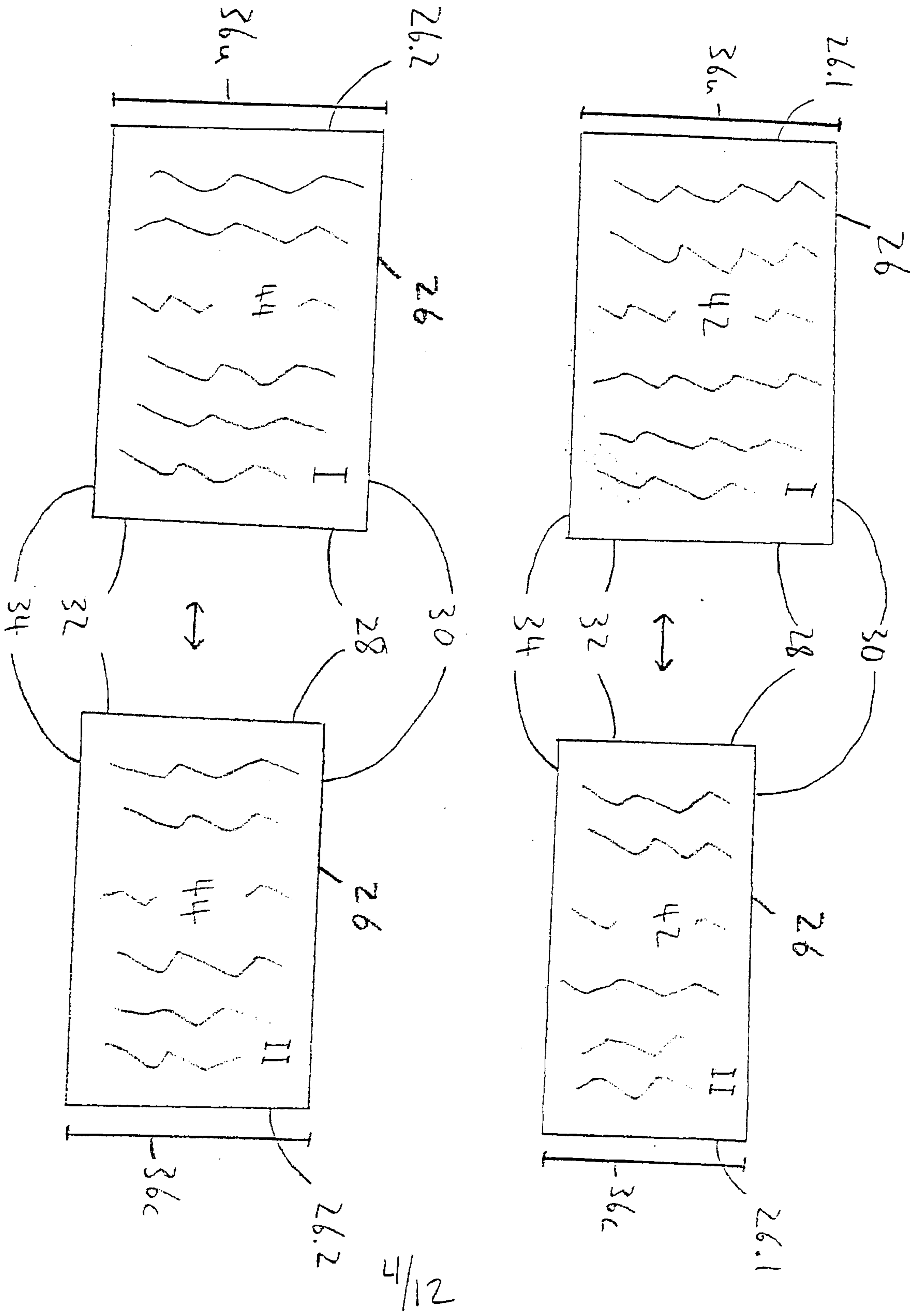
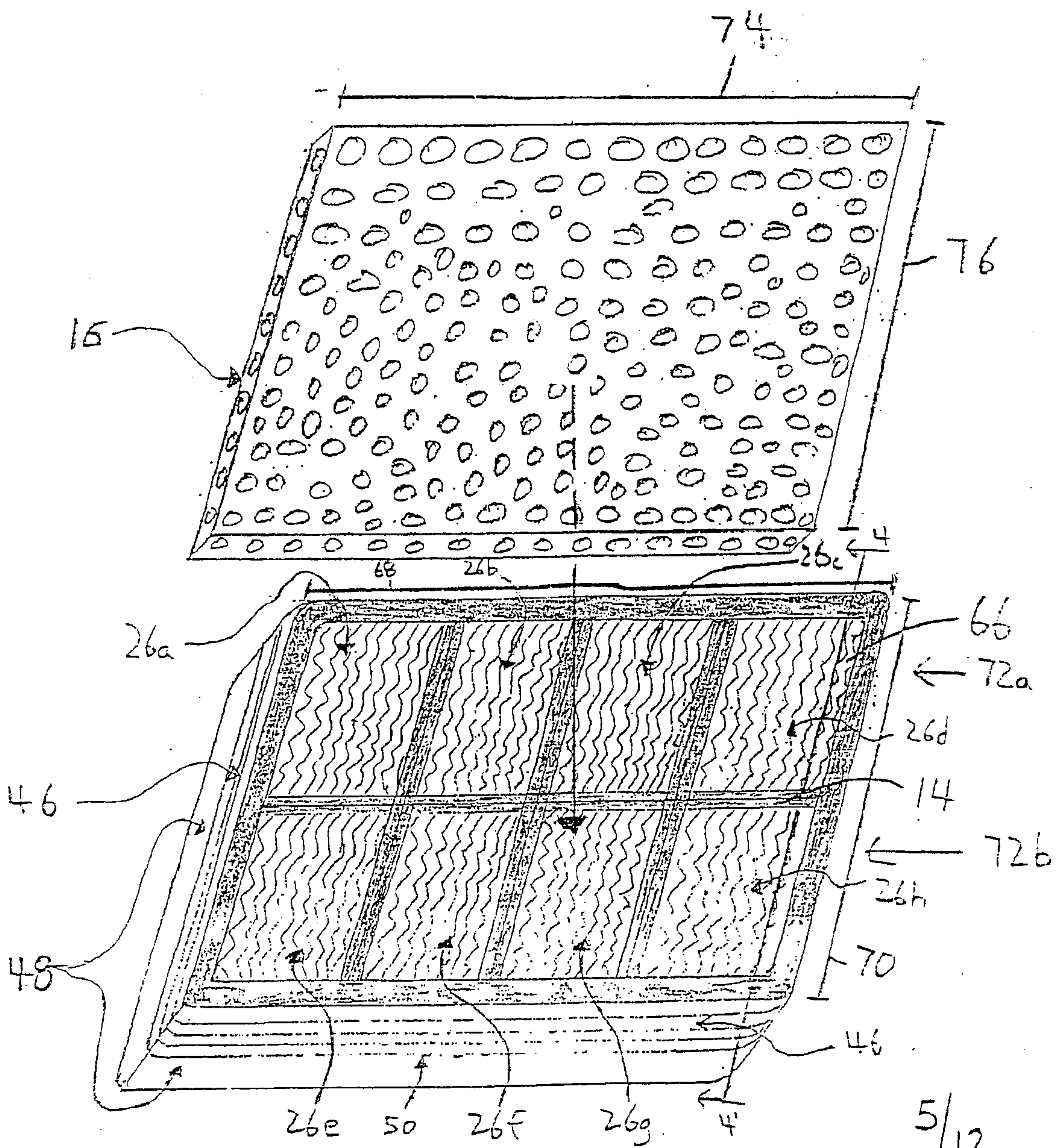


Figure 4

Fig 5



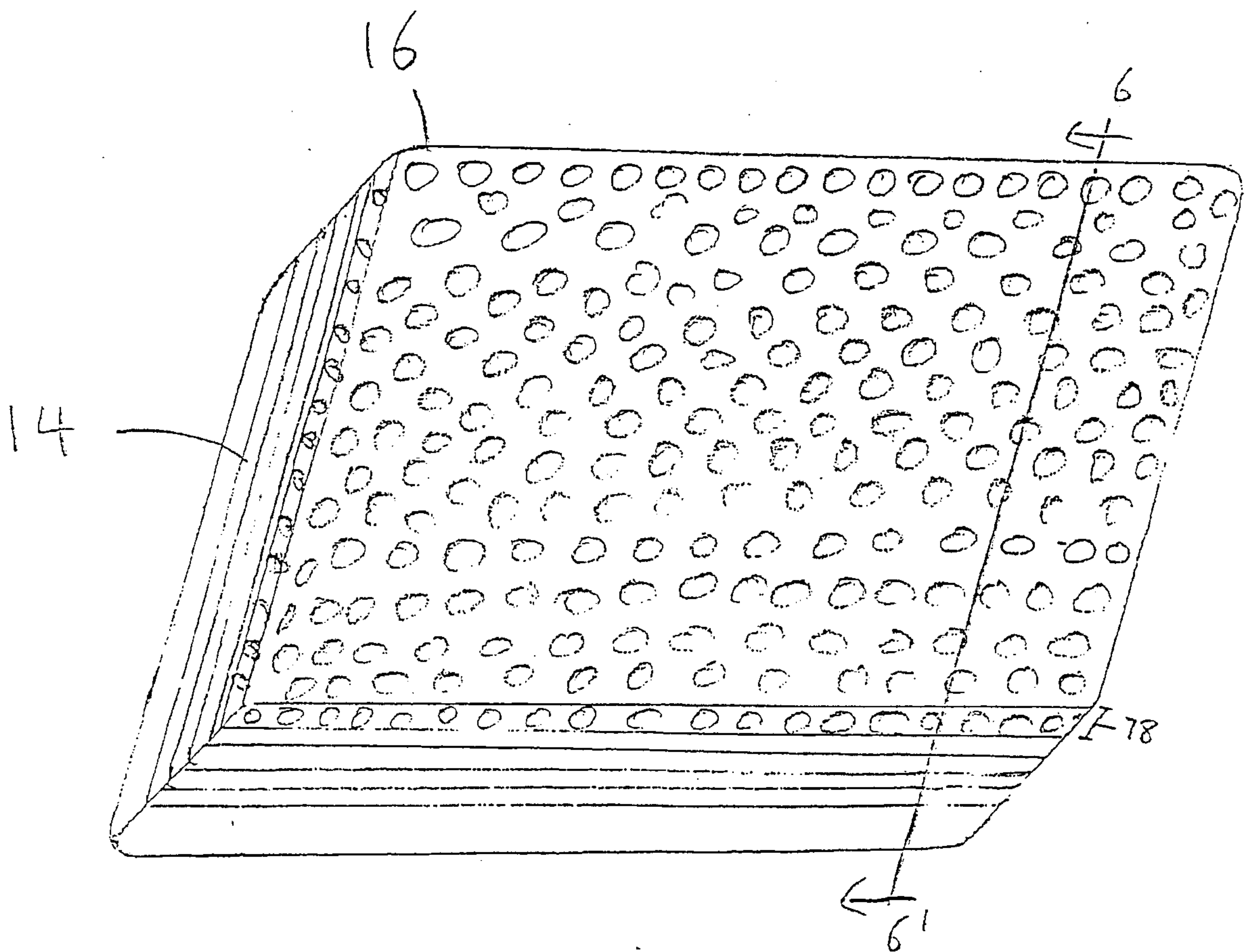


FIG 6
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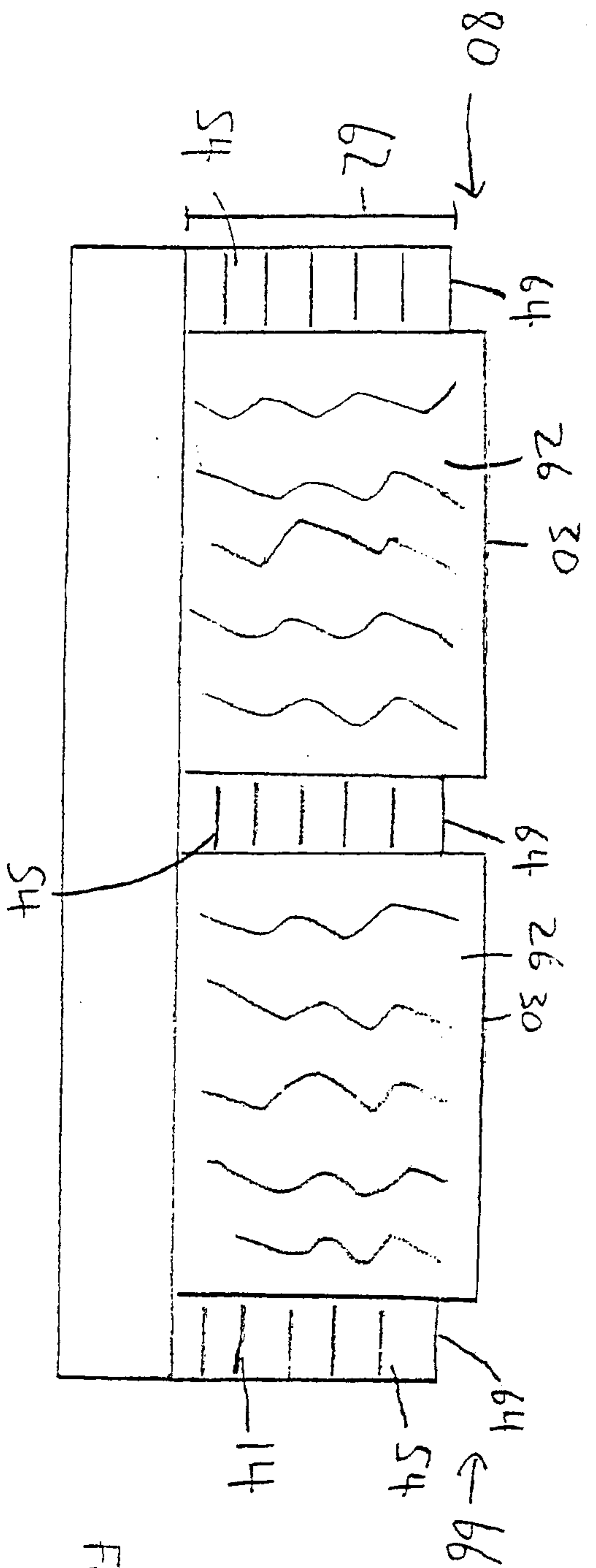


Figure 7A

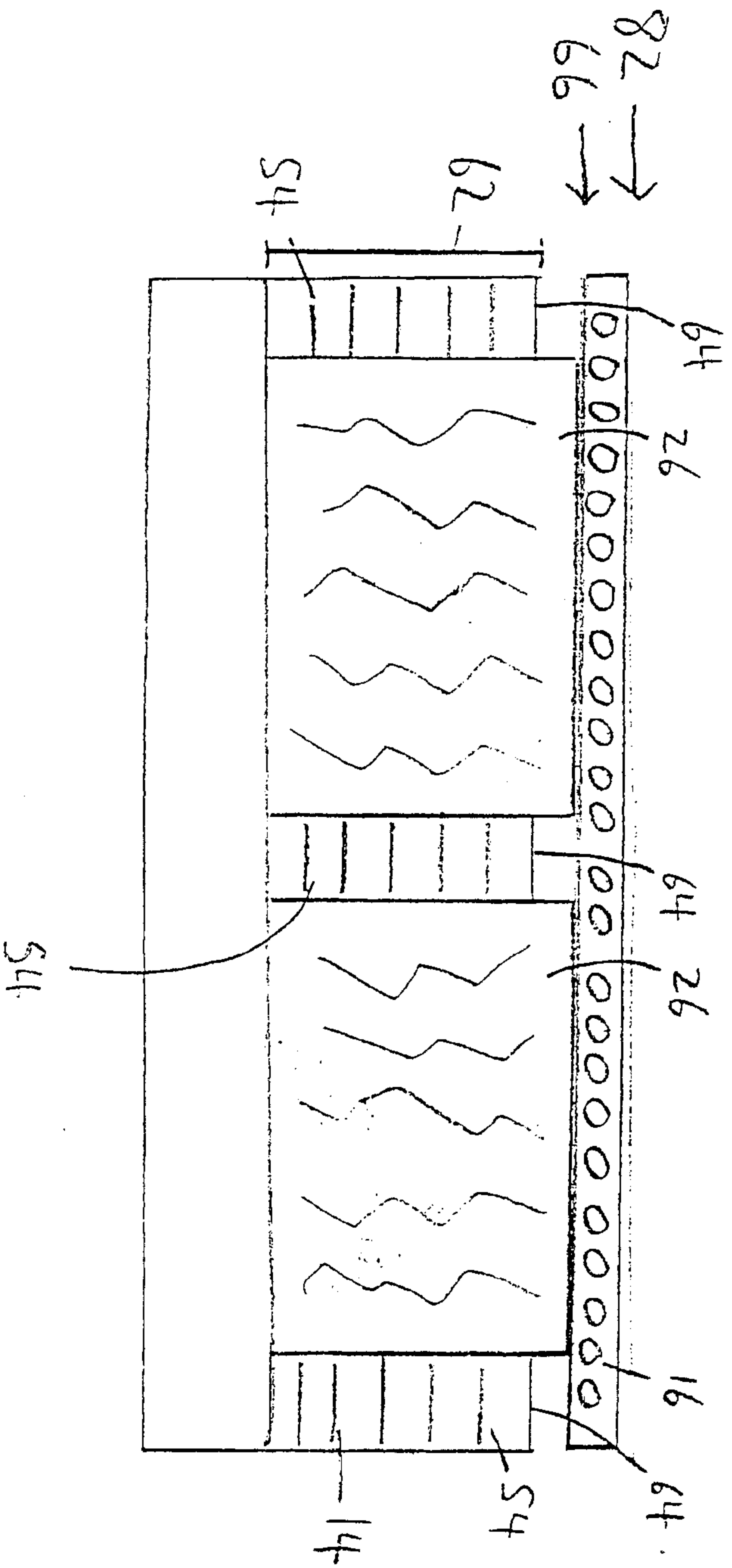


Figure 7B

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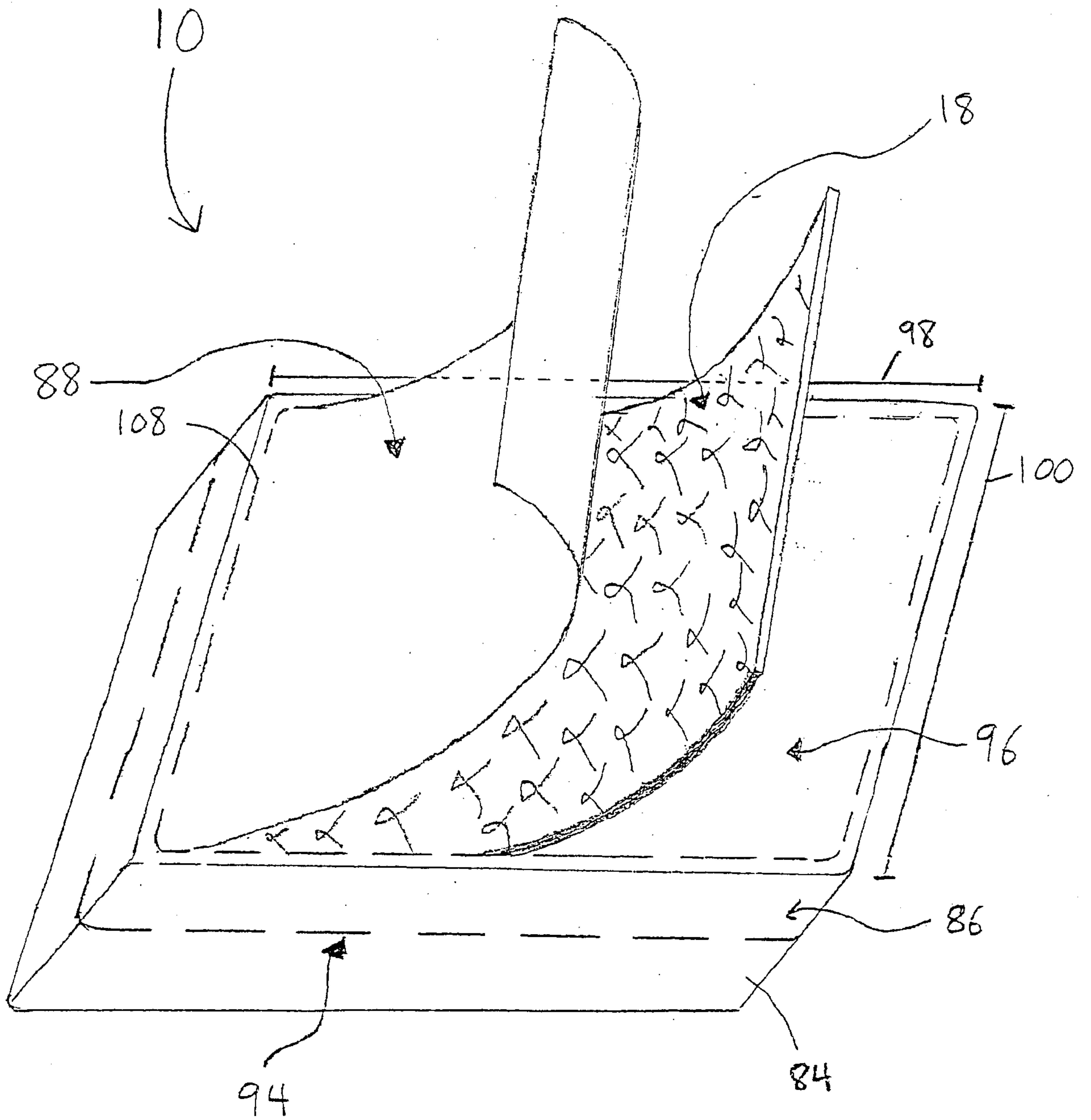


Fig 8

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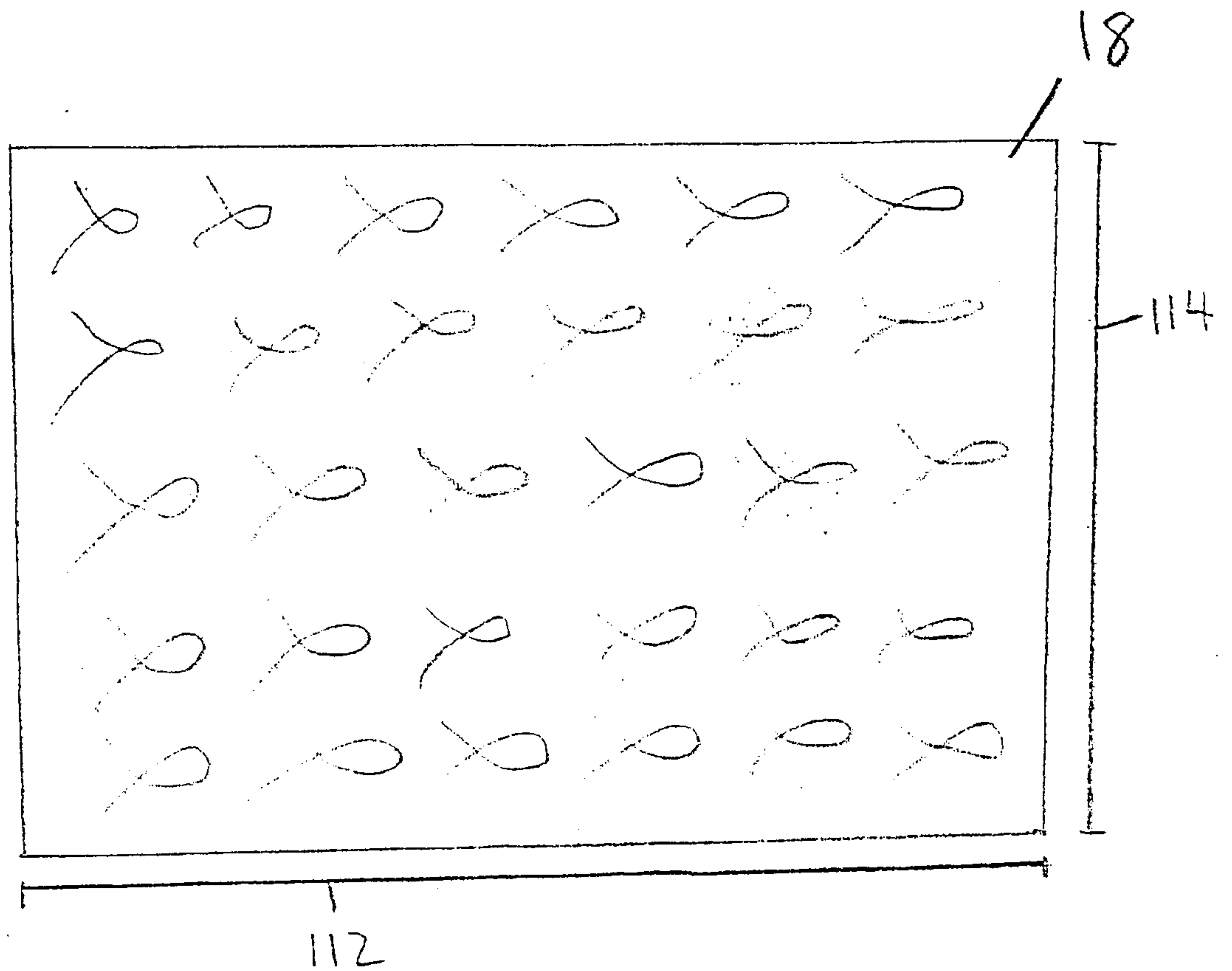


Figure 9

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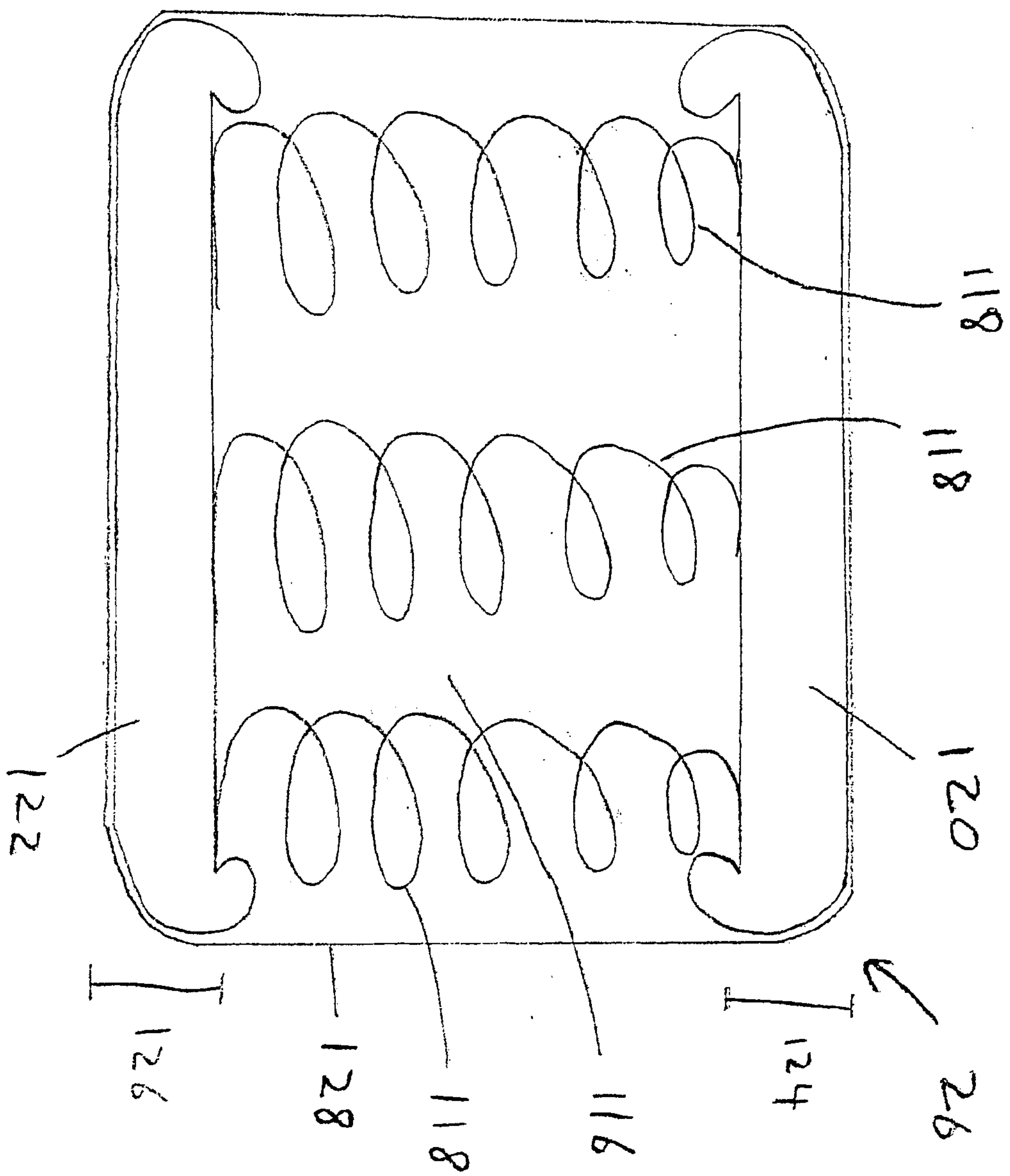
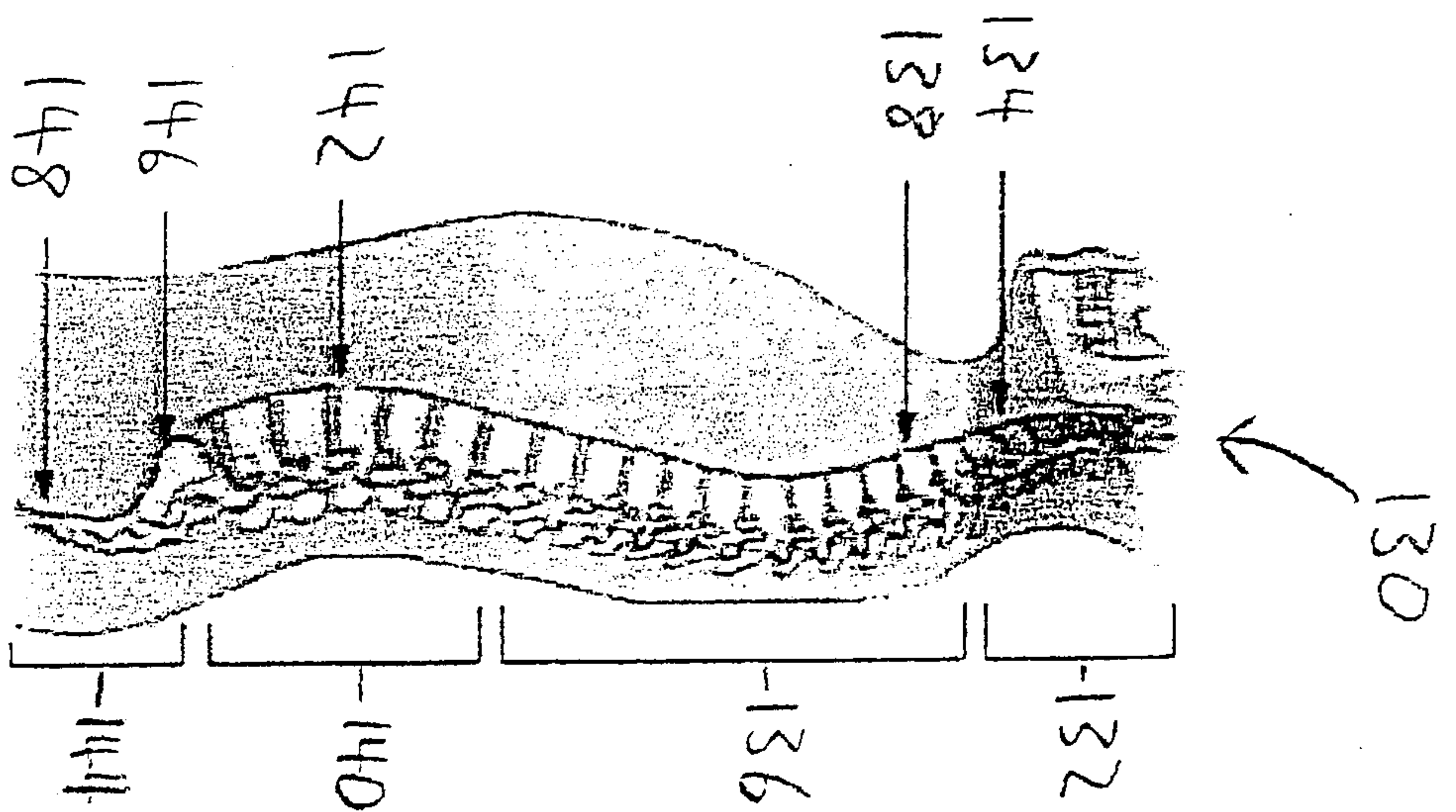


Figure 10

Figure 11



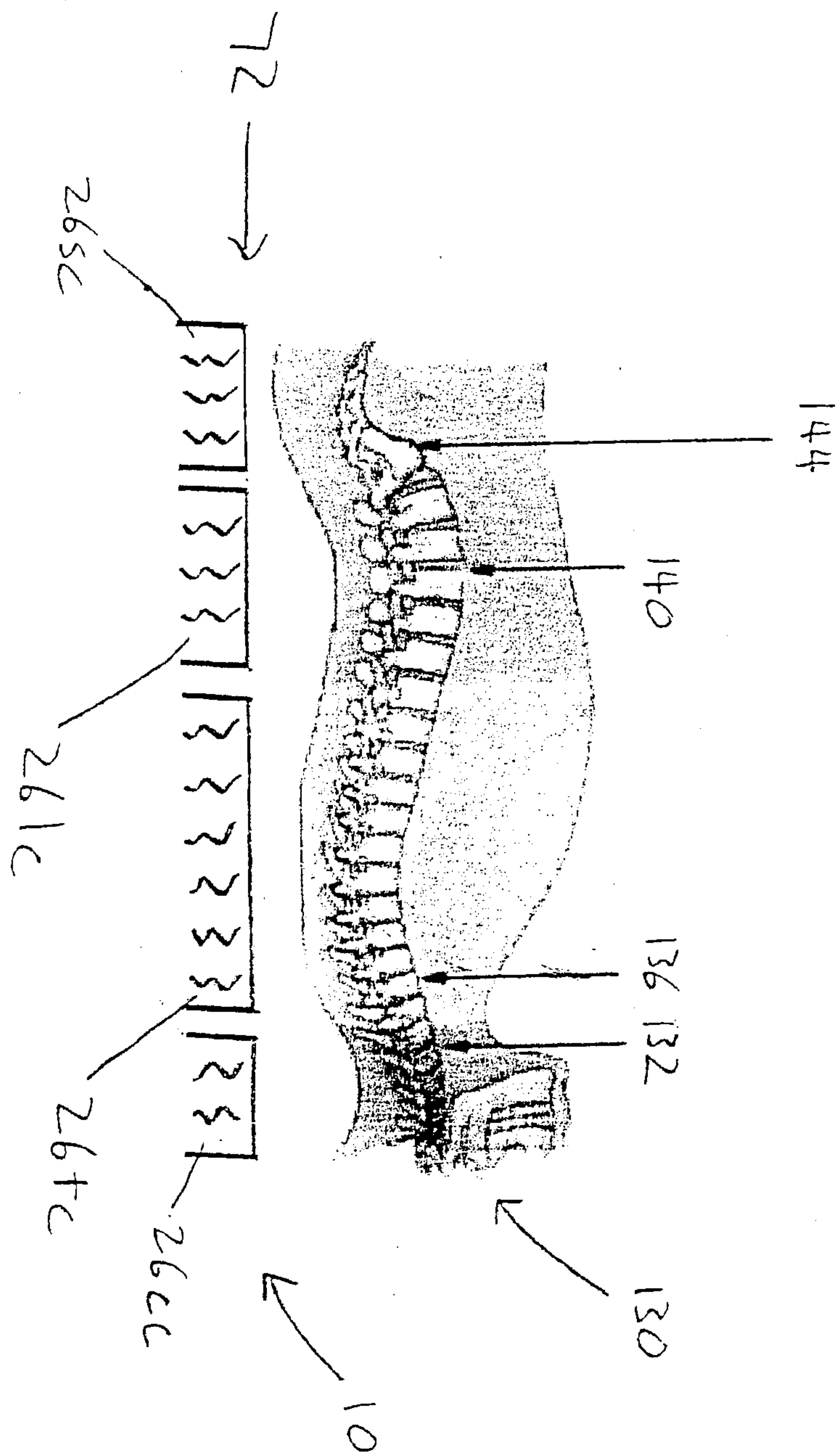


Figure 12

