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(71) Applicant: **Peters, Ludovic Marcel**
8730 Oedelem (BE)

(72) Inventor: **Peters, Ludovic Marcel**
8730 Oedelem (BE)

(74) Representative: **Donné, Eddy et al**
Bureau M.F.J. Bockstael nv
Arenbergstraat 13
2000 Antwerpen (BE)

(54) **SLATTED BASE FOR A BED**

(57) Slatted base (8) provided with slats (24) held in slat holders (13) for supporting a mattress (3) in a bed, that comprises five zones, i.e. a head zone (15), a shoulder and upper back zone (16), a lower back or lumbar zone (17), a pelvis zone (18), and a leg and foot zone (19), characterised in that for the slatted base (8) in the horizontal situation the level difference of the slats (24) between the level determined by the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the shoulder and upper back zone (16) and/or the pelvis zone (18) is at least 4 cm at all times.

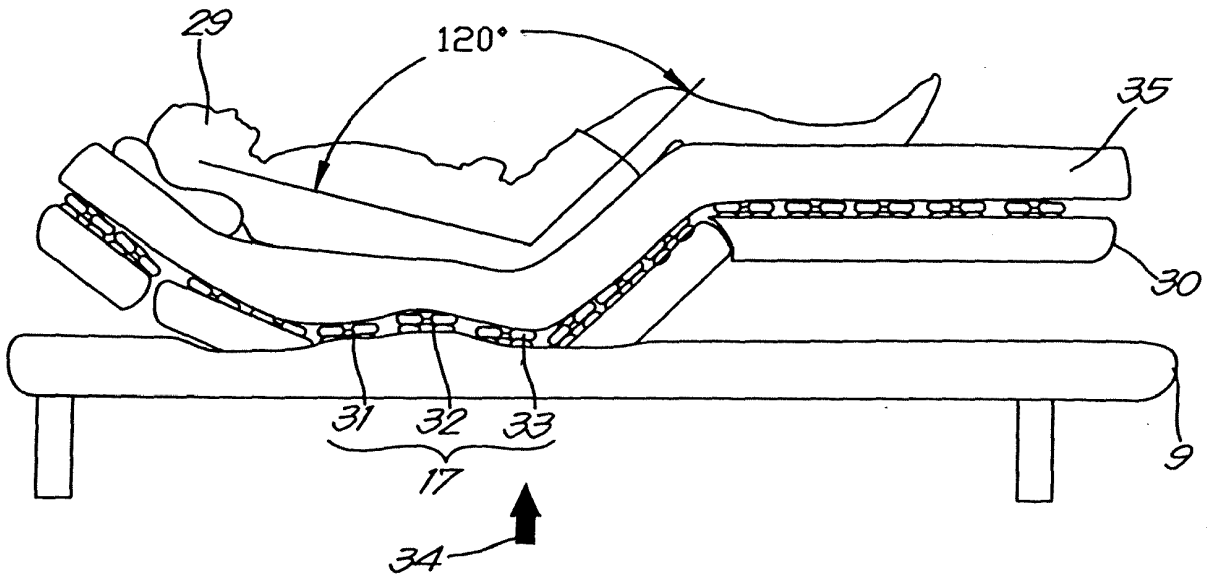

Fig.10

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Description

[0001] The present invention relates to a slatted base for a bed.

[0002] More specifically, the invention is intended to be used for supporting a mattress in a bed on which a person can sleep.

[0003] It is known that slatted bases are used to support a mattress, whereby the slatted base is provided with elastic slats that span the width of the slatted base.

[0004] Traditionally these slatted bases consist of a horizontal frame, whose lengths are connected together by means of slats that are held in slat holders that are often made of an elastic material such as rubber or plastic.

[0005] Sometimes these traditional slatted bases consist of a number of segments that can hinge with respect to one another. Hereby the head end or the foot end of the horizontal frame can frequently be turned out of the horizontal plane and secured at a certain angle to the horizontal plane in order to better support the head or the legs of the sleeper.

[0006] Frequently one slat holder supports two (double slat) or even three (triple slat) slats whereby the slats cannot only tilt individually, but also the elasticity of a double slat or triple slat can be set by moving two or more sliders that provide more or less support through an extra (third or fourth) underlying slat with stiffer elasticity that lies between the overlying slats of the double slat but at a lower level.

[0007] Slatted bases are also known with individually adjustable slat holders with which the elasticity of the slats concerned can be influenced. The purpose of this adjustable elasticity of the slatted bases is to better adapt them to the human anatomy of the sleeper.

[0008] It is also known that a good sleeping position for the person lying on his side is distinguished by the fact that the spinal column remains in a straight line when sleeping on the side, whereby the two upper legs are best raised at an angle of approximately 120° with respect to the upper body, which fosters the relaxation of the spinal column and prevents the build-up of undesired stresses between the vertebrae and the intervertebral discs. It is also known that a good sleeping position on the back ensures that the natural neck lordosis, the shoulder and upper back kyphosis, the lumbar lordosis and the sacral kyphosis are preserved.

[0009] This straight position of the spinal column when lying sideways or the preservation of the natural succession of lordoses and kyphoses when lying on the back are more difficult to achieve if the sleeper lies on a bed where there are no different zones that provide different support in the right place, in other words a bed that presents no level differences. These zones can be divided into five zones: the head segment, the shoulder and upper back segment, the lower back segment or lumbar segment, the pelvis segment and the leg and foot segment.

[0010] In order to obtain a straight position of the spinal column when lying sideways or a correct succession of lordoses and kyphoses, the slats of the slatted base in the shoulder and upper back segment, as well as in the pelvis segment, must be brought to a lower level than in the lumbar section, so that the natural anatomical shape of the human body when lying sideways or lying on the back is better supported.

[0011] The known systems for improving the support are insufficiently corrected for this. In a sideways lying position the connecting line between the shoulders is not vertical but tilted, so that the spinal column is no longer straight and the legs are not in the desired parallel position. When lying on the back the natural lordoses and kyphoses are not preserved.

[0012] The purpose of the present invention is to provide a solution to the aforementioned and other disadvantages by providing a slatted base provided with slats held in slat holders for supporting a mattress in a bed that comprises at least five zones, i.e. a head zone, a shoulder and upper back zone, a lower back or lumbar zone, a pelvis zone and a leg and foot zone, characterised in that for the slatted base in the horizontal situation the level difference of the slats between the level determined by the highest slat holder of the lumbar zone and the level determined by the highest slat holder of the shoulder and upper back zone and/or the pelvis zone is at least 4 cm at all times, and whereby the slats are held in slat holders that are affixed in a fixed position in an outer frame or in an inner frame flanked or otherwise by an outer frame, and whereby either the inner frame or the outer frame consists of two flanks in which drill holes are made in which slat holders are introduced in a fixed position and which are connected by slats to the corresponding slat holders of the other flank and whereby the inner frame is divided into five segments, the head segment, the shoulder and upper back segment, the lower back segment or lumbar segment, the pelvis segment, and the leg and foot segment, whereby each segment of the inner frame can be tilted separately at an adjustable angle to the horizontal plane, except for the lumbar segment that forms an integral part of or is flanked by the outer frame of the slatted base.

[0013] Preferably, when loaded by a resting person, the level difference between the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the shoulder and upper back zone (16) can be up to 8 cm, and the level difference between the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the pelvis zone (18) can be up to 6 cm.

[0014] Preferably the slats are held in slat holders that are affixed in a fixed position in an outer frame or in an inner frame that is flanked or otherwise by an outer frame.

[0015] An advantage of such slat holders that are affixed in a fixed position is that they ensure that the desired level difference of at least 4 cm between the highest points of the slats that support the lumbar zone and the

slats that at least support one of the adjoining zones is sufficiently large to give the desired support.

[0016] Preferably the outer frame consists of two flanks in which drill holes are made in which slat holders are introduced at a fixed position, and which are connected by slats to the corresponding slat holders of the opposite flank.

[0017] An advantage of such fixed mounted slat holders is that they hold the relative position of the slats at all times and guarantee the desired support.

[0018] Preferably the slat holders are made of an elastic material such as rubber or plastic, so that they can be adjusted locally to the anatomical and anthropometric properties of the sleeper.

[0019] Preferably the inner frame consists of two flanks in which drill holes are made in which slat holders are introduced in a fixed position and which are connected by slats to the corresponding slat holders of the other flank and whereby the inner frame is divided into five segments, the head segment, the shoulder and upper back segment, the lower back segment or lumbar segment, the pelvis segment and the leg and foot segment, whereby each segment of the inner frame can be tilted separately at an adjustable angle to the horizontal plane, except for the lumbar segment that forms an integral fixed part of or is flanked by the outer frame of the slatted base, and hence cannot be tilted from the horizontal plane.

[0020] An advantage of the tiltable segments is that they also enable the support of the user to be assured in different positions to the horizontal sleeping position, whereby the lumbar segment is not tiltable and the lower back is always adequately supported.

[0021] This arises from the ideal position for sleeping whereby both thighbones are raised with respect to the upper body at an angle between 90° and 120°. This position can be adopted both lying on one side and lying on the back. This position ensures a lordosis reduction of the low lumbar vertebrae by relieving the iliopsoas muscle group that runs from the inside of the back via the pelvis to the inside of the upper legs. When lying on the back this position also ensures a reduction of the pressure in the facet joints of the lumbar vertebrae.

[0022] This position when lying on the back can be achieved by placing a thick pillow under the knees for example, but even better by making use of the electrically adjustable segments of the slatted base whereby the legs are raised with respect to the upper body and whereby the various kyphoses and lordoses are preserved by the specific shape of the slatted base according to the invention.

Preferably the four movable segments of the inner frame can be electrically or mechanically positioned so that a user can easily bring the slatted base to a number of positions.

[0023] Not all segments of the inner frame are tiltable but form an integral fixed part of the outer frame, such that their mutual position always remains the same and the inner frame is only suitable for a horizontal lying position.

[0024] Preferably the highest slat holders in the lumbar segment are in a fixed position in a highest or less high position with respect to the horizontal plane.

[0025] A preference of these two possible positions for the slats that support the lumbar zone is that the highest slats for the lumbar zone can be fixed in a highest or less high position, depending on the age, gender and anthropometric and anatomical characteristics of the user.

[0026] Another advantage of such a positioning of the highest slats is that in a horizontal situation the lumbar zone always lies high enough with respect to the adjoining zones to follow the natural form of the body, so that in a sideways sleeping position the spinal column can always form a straight line. When lying on the back the natural lordoses and kyphoses are preserved.

[0027] Preferably one or more double slats or triple slats between the slat holders are provided with two or more sliders, that provide more or less support with an extra (third or fourth) underlying slat with stiffer elasticity that lies between the overlying slats of the double slat or triple slat but on a lower level.

[0028] An advantage of these sliders is that the local elasticity of the slats concerned can be adjusted for less or more elasticity depending on the weight and anatomical and anthropometric characteristics of the user.

[0029] Preferably the length of the inner frame or the outer frame can be chosen through the use of a longer or shorter leg and foot segment so that the length of the entire slatted base can be adjusted to the length of the user.

[0030] With the intention of better showing the characteristics of the invention, a few preferred embodiments of a slatted base according to the invention are described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

figure 1 schematically shows a side view of a sleeping position on a slatted base according to the known state of the art;
figure 2 schematically shows a side view of a sleeping position on a slatted base according to the invention;
figure 3 schematically shows a side view of an outer frame of the slatted base according to the invention;
figure 4 schematically shows a side view of an inner frame of the slatted base according to the invention;
figure 5 shows a side view of a slatted base according to the invention in a horizontal situation;
figure 6 shows figure 5 but now in a folded situation;
figure 7 shows a perspective view of a slat holder of the slatted base according to the invention in more detail;
figure 8 shows a perspective view of a double slatted base according to the invention;
figure 9 shows a top view of a sleeping person lying sideways on a slatted base in the horizontal situation;

figure 10 shows a side view of a sleeping person lying on the back on a slatted base in the folded situation.

[0031] Figure 1 schematically shows the sleeping position of a person sleeping on a slatted base 1 from the known state of the art. The sleeping person 2 lies sideways on the mattress 3 that is supported by the slatted base 1, whereby the connecting line 4 between the two shoulders 5, 6 is not perpendicular but tilted with respect to the straight line through the spinal column. This position gives rise to a deformed spinal column 7. The same can be seen with the connecting line 4' through the hips.

[0032] Figure 2 schematically shows the sleeping position of a person sleeping on a slatted base 8 of the slatted base according to the invention. The sleeping person 2 lies sideways on the mattress 3 that is supported by the slatted base 8, whereby the connecting line 4 between the two shoulders 5, 6 and the hips 4' is now perpendicular with respect to the straight line through the spinal column 7.

[0033] Figure 3 shows a side view of an outer frame 9 of the slatted base 8 according to the invention, whereby the outer frame is cut out of a monolithic material such as wood or metal, or is made of plastic and is provided on the top 10 with cambers 11, and is provided on the inside with drill holes 12 in which slat holders 13 can be fastened.

[0034] Figure 4 shows an inner frame 14 according to the invention whereby the inner frame 14 is divided into five segments, the head segment 15, the shoulder and upper back segment 16, the lower back segment or lumbar segment 17, the pelvis segment 18, and the leg and foot segment 19. The head segment 15 can be tilted about its rotation axis 20, the shoulder and upper back segment 16 can be tilted around its rotation axis 21, the pelvis segment 18 can be tilted around its rotation action axis 22, and the leg and foot segment 19 can be tilted around its rotation axis 23. The lumbar segment 17 is not tiltable and forms part of the outer frame 9. Not all segments are rotatable and form a fixed part of the outer frame 9, whereby only a horizontal position of the slatted base 8 is possible.

[0035] Figure 5 shows a perspective view of a slatted base 8 according to the invention in a horizontal situation, whereby the slatted base 8 is composed of two outer frames 9, 9' that are provided with slat holders 13, and which are connected by slats 24 that are held on the one hand by a slat holder 13 of the first flank and on the other hand by the corresponding slat holder 13' of the second flank. One slat holder 13 can hold two slats 24, and in the case of double slats with adjustable elasticity, also a third but stronger third slat 25.

[0036] Figure 6 shows an inner frame 14 that can be folded open according to the invention in the folded open situation whereby the inner frame 14 is divided into four rotatable segments, the head segment 15, the shoulder and upper back segment 16, the pelvis segment 18, and the leg and foot segment 19, and whereby the lower back segment or lumbar segment 17 is not rotatable and forms part of or is flanked by the outer frame 9, 9' of the slatted base.

[0037] Figure 7 shows a perspective view in more detail of a slat holder 13 of an elastic material such as rubber or plastic, consisting of two head holders 26, 27 in which two slats 24 fit by one end that are each supported by a double elastic chamber 28, 28', whereby the bottom chambers are fastened in two pegs that are fastened in two drill holes 12 provided to this end in the flank 9, 9' of the slatted base 8 according to the invention.

[0038] Figure 8 shows a double slatted base according to the invention, whereby two slatted bases 8, 8' are placed against one another and each is provided with slat holders 13 that are connected by slats 24 that are held on the one hand by a slat holder 13 of the first flank 9 and on the other hand by the corresponding slat holder 13' of the second flank 9' of each slatted base 8, 8'.

[0039] Figure 9 shows the ideal sideways lying position of a sleeping person 29 on a slatted base 8 according to the invention in a horizontal situation, whereby the sleeping person 29 forms an angle between 90° and 120° between the upper body and thighbones.

[0040] Figure 10 shows the ideal lying position of a sleeping person 29 when lying on his back on a slatted base 8 according to the invention in the folded situation, whereby the sleeping person 29 forms an angle between 90° and 120° between the upper body and thighbones, and whereby the slatted base 30 is a variant whereby the lumbar segment 17, which is not rotatable and forms part of or is flanked by the outer frame 9, 9' of the slatted base, comprises three pairs of slat holders 31, 32, 33, of which the middle pair of slat holders 32 has the highest level and the two surrounding pairs of slat holders 31, 33 occupy a fixed lower position. This variant provides permanent optimum lumbar support 34 under the mattress 35 on which the sleeping person 29 is lying.

The operation of the slatted base 8 according to the invention is very simple and as follows.

[0041] In the completely horizontal situation the slatted base provides support for a mattress 3 on which a person 2 can sleep lying sideways, whereby the lumbar segment 17 of the slatted base supports the lower back in particular due to its higher level, and the adjacent segments, i.e. the shoulder and upper back segment 16 and the pelvis segment 18 present a lower level such that the natural forms of the human body of the user when lying sideways can be better accommodated and the spinal column 7 of the user is held in a straight horizontal position without it being deformed.

[0042] For a person 2 lying on his back, the slatted base 8 also provides the right support for a mattress 3 such that the succession of natural lordoses and kyphoses are preserved by a raised lumbar segment and lowered shoulder and upper back segment and pelvis segment.

[0043] The slatted base 8 can be adjusted in two ways

to the individual dimensions or bodily structure of the user. Firstly by placing the slat holders of the lumbar segment 17 at a lower level for which drill holes are provided, so that smaller and younger people experience adapted support. Secondly by increasing the length of the slatted base 8 by replacing the leg and foot segment 19 by a leg and foot segment with a longer dimension.

[0044] As a result of these adjustment facilities the slatted base can be used by practically any person, except for children younger than 2 years.

[0045] Optionally the slatted base can be equipped with foldable segments 15, 16, 18, 19 such that the slatted base 8 can be folded for use as a chaise longue in a non-horizontal position. Also in the folded situation of the slatted base, the lumbar segment 17, which does not change position, will continue to provide sufficient support for the lower back in order to ensure the comfort of the user.

[0046] It goes without saying that the fold-up mechanism of the tiltable segments can be mechanically or electrically driven as an option, and can be fixed in a number of intermediate positions.

[0047] The slatted base enables two slatted bases to be placed against one another whereby one single mattress can cover the surface of both slatted bases.

[0048] An advantage of this arrangement is that in this way a bed is obtained for two people who each have a supporting slatted base but both are supported by the same mattress, so that a double bed is obtained with the same therapeutic support.

[0049] Preferably the slatted bases are each equipped with an inner frame (14) that can be electrically positioned, whereby the electric positioning is synchronised between both inner frames so that the position of the mattress remains the same on both slatted bases.

[0050] The present invention is by no means limited to the embodiments described as an example and shown in the drawings, but a slatted base according to the invention can be realised in all kinds of forms and dimensions without departing from the scope of the invention, as described in the following claims.

Claims

1. Slatted base (8) provided with slats (24) held in slat holders (13) for supporting a mattress (3) in a bed that comprises five zones, i.e. a head zone (15), a shoulder and upper back zone (16), a lower back or lumbar zone (17), a pelvis zone (18), and a leg and foot zone (19), **characterised in that** for the slatted base (8) in the horizontal situation the level difference of the slats (24) between the level determined by the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the shoulder and upper back zone (16) and/or the pelvis zone (18) is at least 4 cm at all times, and whereby the slats (24) are held in slat holders (13) that are affixed in a fixed position in an outer frame (9,9') or in an inner frame (14) flanked or otherwise by an outer frame (9,9'), and whereby either the inner frame (14) or the outer frame (9,9') consists of two flanks (9, 9') in which drill holes (12) are made in which slat holders (13) are introduced in a fixed position and which are connected by slats (24) to the corresponding slat holders (13) of the other flank and whereby the inner frame (14) is divided into five segments, the head segment (15), the shoulder and upper back segment (16), the lower back segment or lumbar segment (17), the pelvis segment (18), and the leg and foot segment (19), whereby each segment of the inner frame (14) can be tilted separately at an adjustable angle to the horizontal plane, except for the lumbar segment (17) that forms an integral part of or is flanked by the outer frame (9, 9') of the slatted base (8).

2. Slatted base (8) according to claim 1, **characterised in that** when loaded by a resting person the level difference between the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the shoulder and upper back zone (16) when loaded, can be up to 8 cm, and the level difference between the highest slat holder of the lumbar zone (17) and the level determined by the highest slat holder of the pelvis zone (18) can be up to 6 cm.

3. Slatted base (8) according to claim 1, **characterised in that** the slat holders (13) are made of an elastic material such as rubber or plastic.

4. Slatted base (8) according to claim 1, **characterised in that** the four movable segments (15, 16, 18, 19) of the inner frame (14) can be electrically or mechanically positioned.

5. Slatted base (8) according to claim 1, **characterised in that** not all segments (15, 16, 17, 18, 19) of the inner frame (14) can be tilted but form an integral fixed part of the outer frame (9, 9'), such that their mutual position always remains the same.

6. Slatted base (8) according to claim 1, **characterised in that** the highest slat holders (13) in the lumbar segment (17) can be positioned immovably in a highest or a less high position with respect to the horizontal plane.

7. Slatted base (8) according to claim 1, **characterised in that** one or more double slats or triple slats (24) are provided with sliders between the slat holders (13), that enable more or less support by a third or fourth thicker slat (25) with stiffer elasticity that lies between the two or three slats (24) of the double slat or triple slat, but at a lower level.

8. Slatted base (8) according to claim 1, **characterised**

in that the length of the inner frame (14) or the outer frame (9, 9') can be chosen by using a longer or shorter leg and foot segment (19).

9. Slatted base (8) according to claim 1, **characterised in that** it is arranged as two slatted bases (8,8') placed against one another whereby both slatted bases can be spanned by one mattress at the same time.

10. Slatted base (8) according to claim 9, **characterised in that** the slatted bases are each equipped with an inner frame (14) that can be electrically positioned, whereby the electric positioning is synchronised between both inner frames so that the position of the mattress remains the same on both slatted bases.

11. Slatted base (8) according to claim 1, **characterised in that** the slatted base (30) is a variant whereby the lumbar segment (17), that is not rotatable and forms part of or is flanked by the outer frame (9, 9') of the slatted base, comprises three pairs of slat holders (31, 32, 33) of which the middle pair of slat holders (32) has the highest level and the two surrounding pairs of slat holders (31, 33) occupy a fixed lower position.

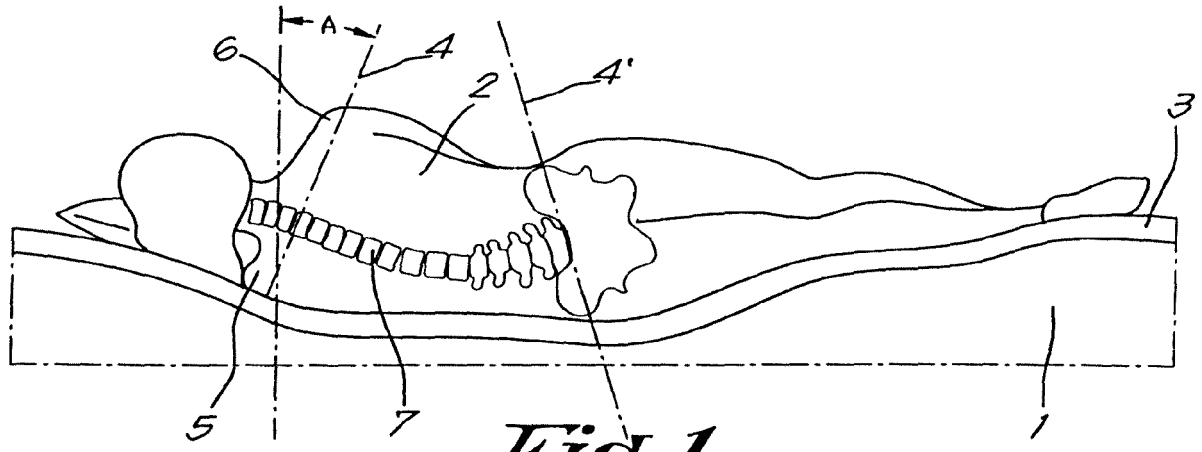

Fig. 1

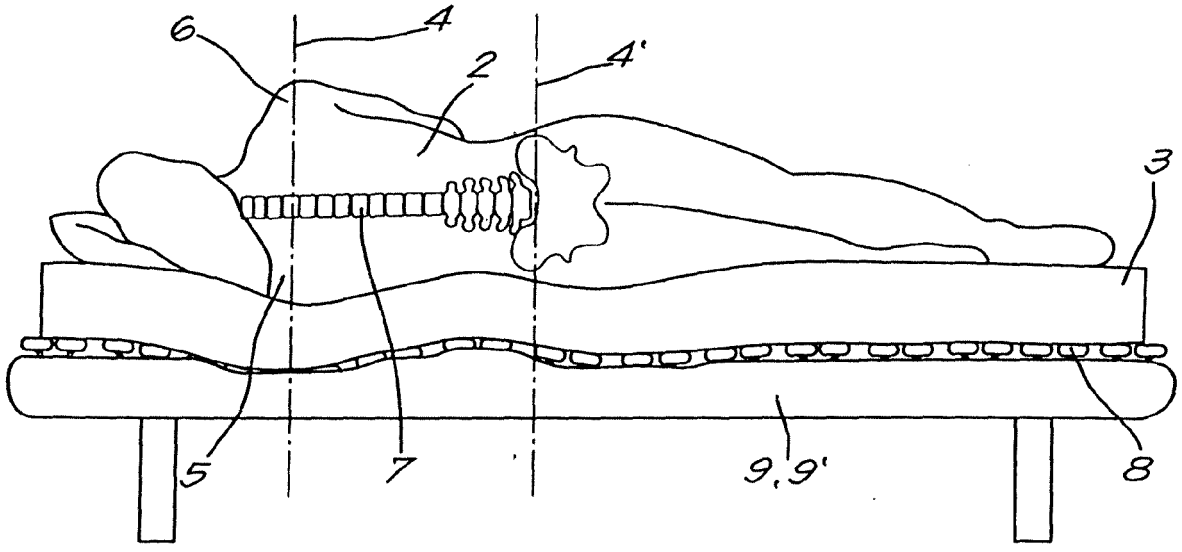

Fig. 2

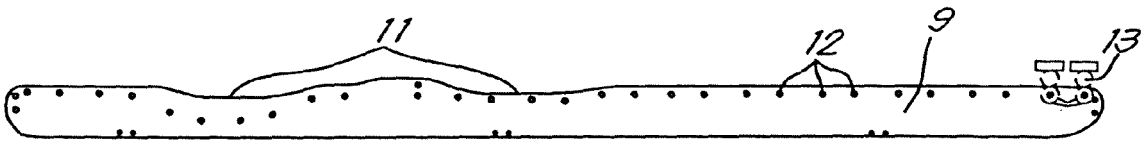

Fig.3

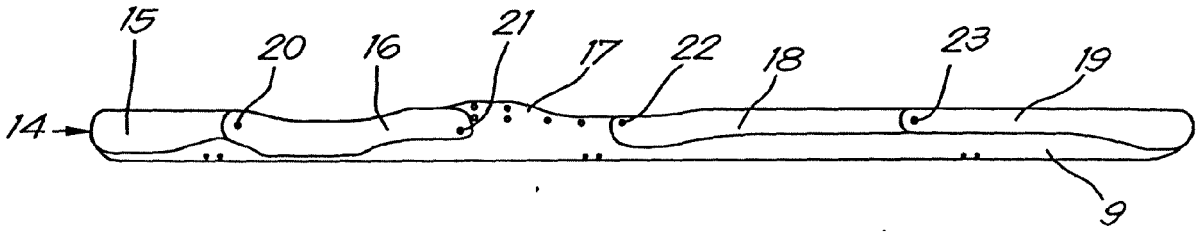

Fig.4

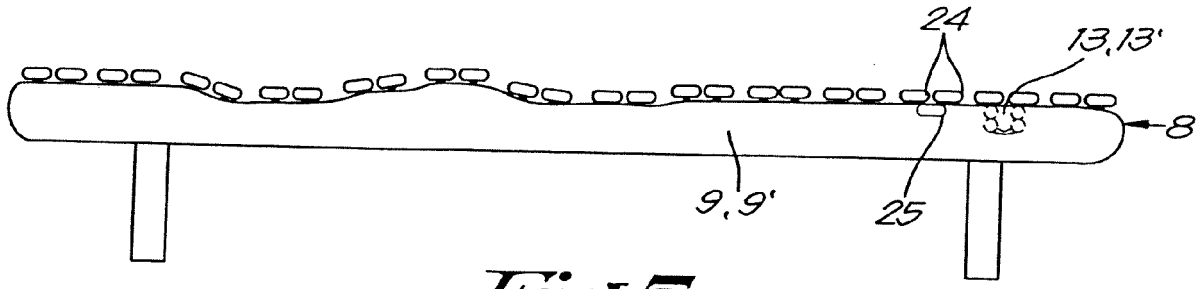

Fig.5

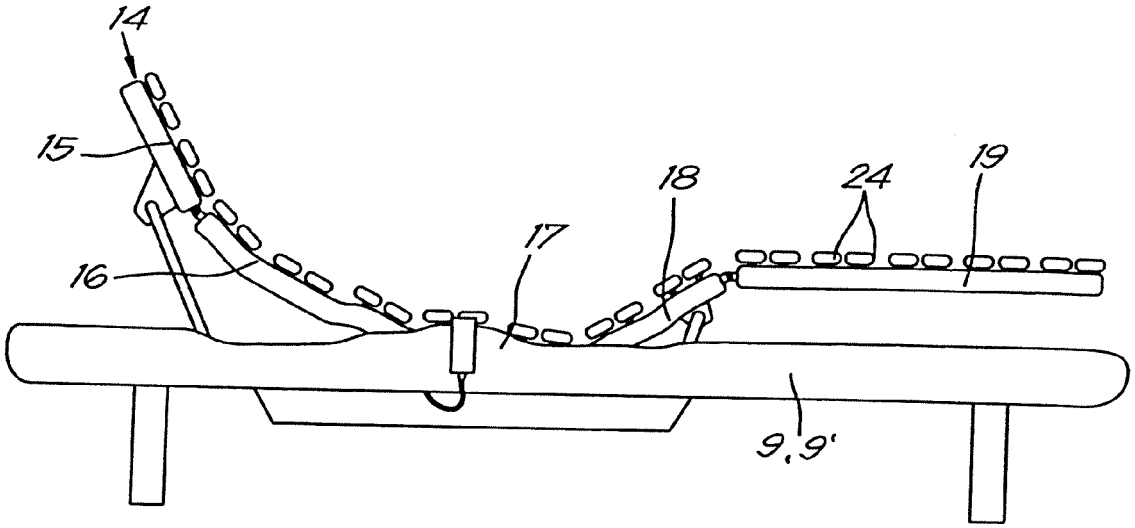

Fig.6

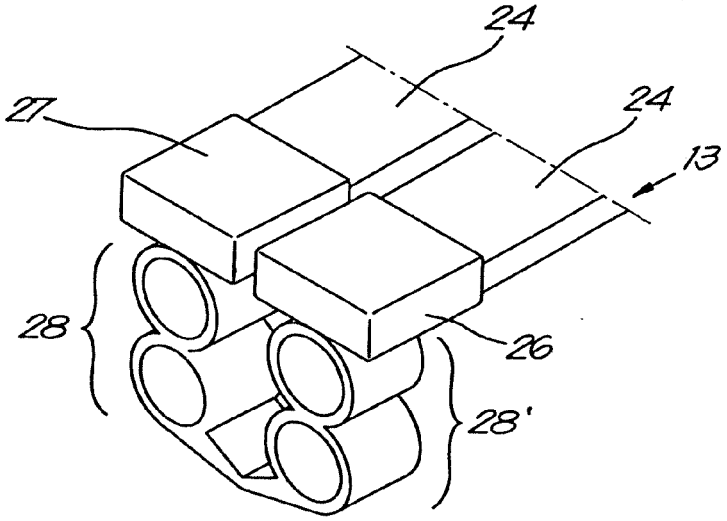

Fig.7

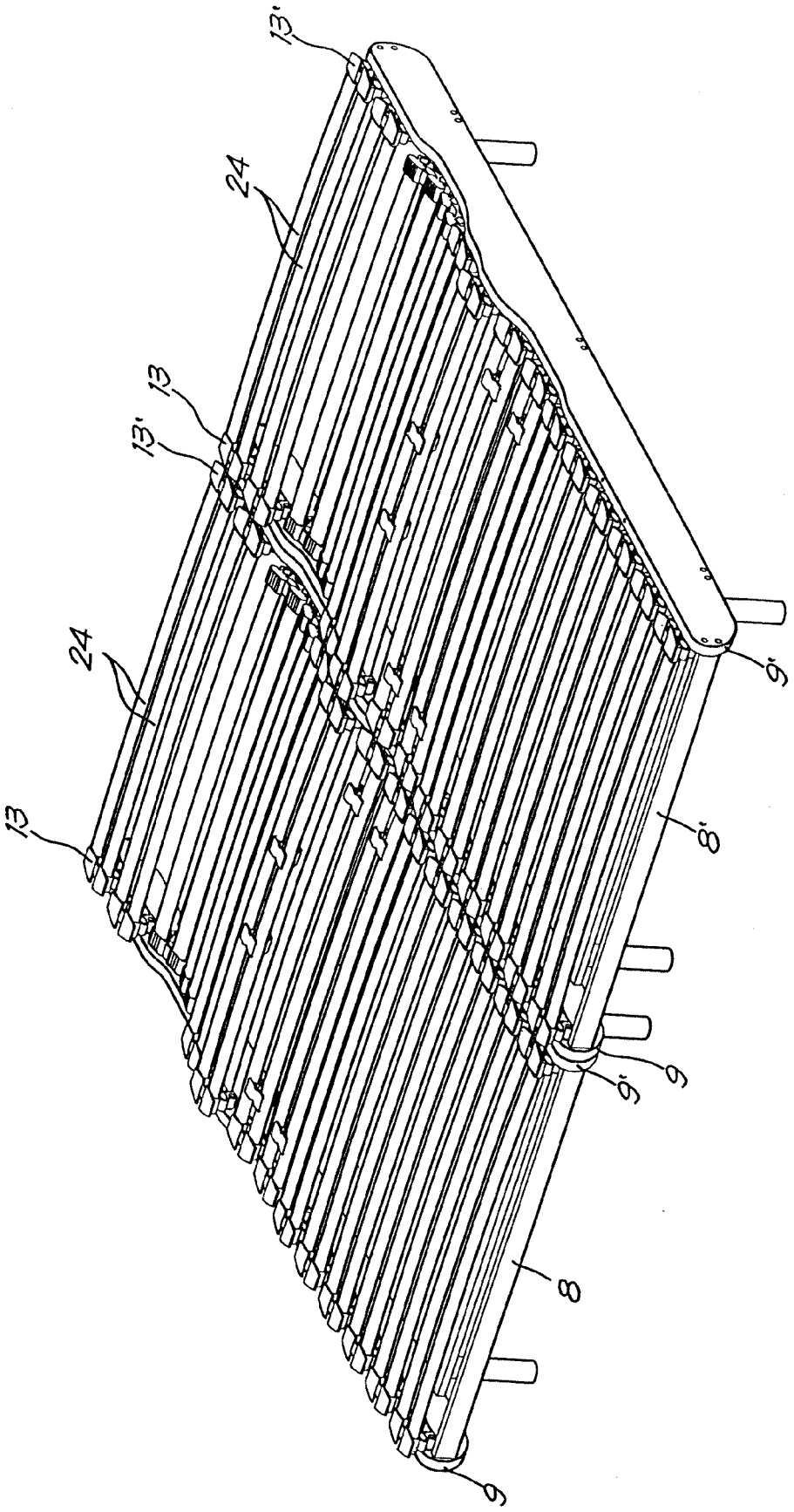

Fig.8

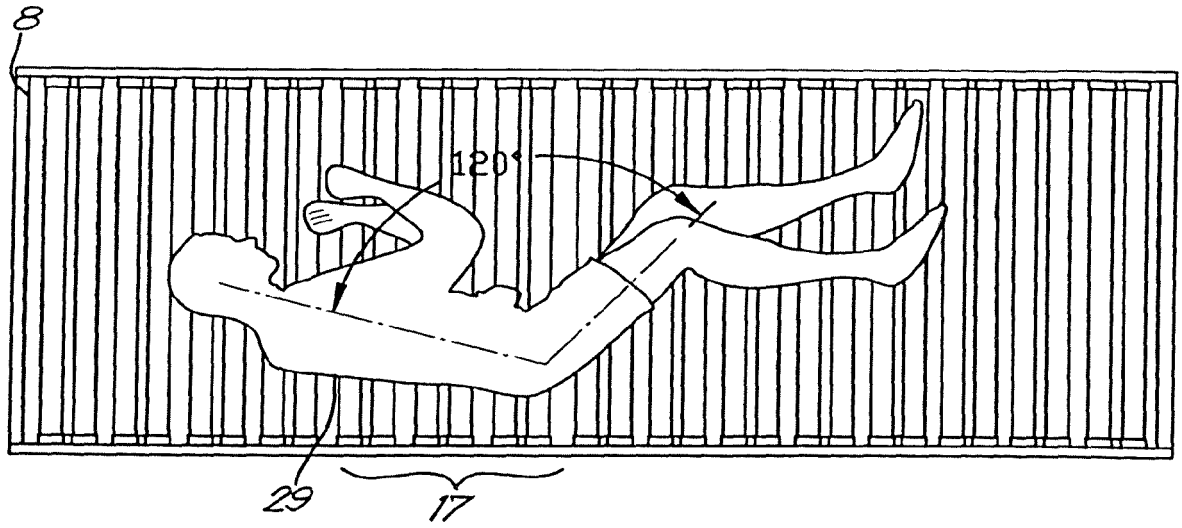

Fig.9

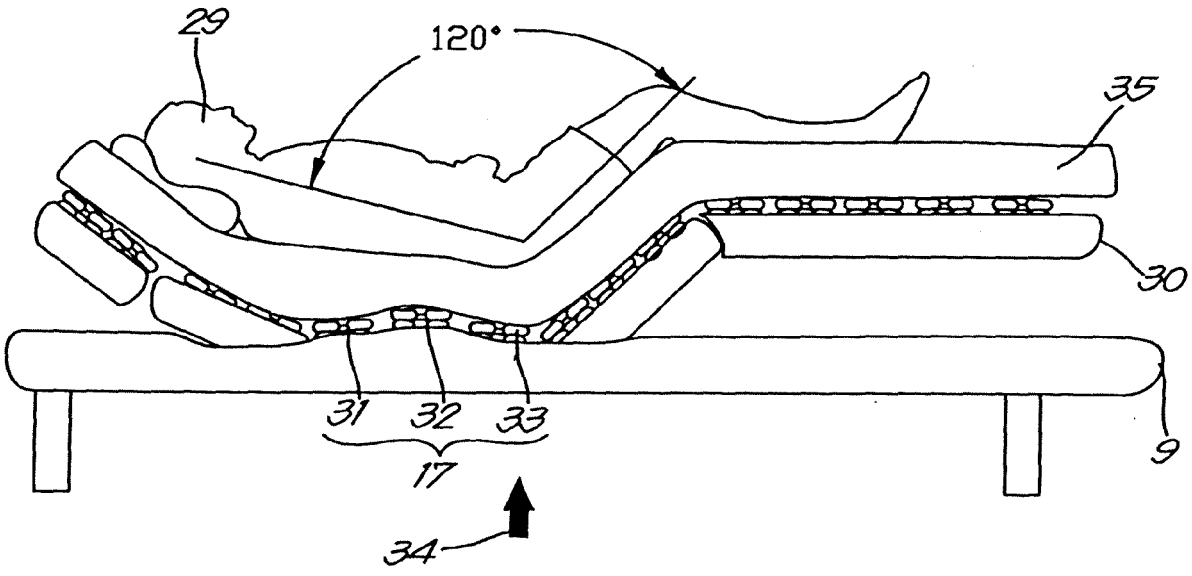

Fig.10

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EUROPEAN SEARCH REPORT

Application Number
EP 16 00 0179

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 94 20 452 U1 (HEILANDER JOSEF) 9 March 1995 (1995-03-09) * page 1, paragraph 1 - paragraph 4; figure 1 * -----	1	INV. A47C23/06
A	US 2013/298332 A1 (VANSTRAELEN KAREL) 14 November 2013 (2013-11-14) * abstract; figures 1c,2a,3a * * page 1, paragraph 5-7 * -----	1	
A	WO 80/01980 A1 (VALHAUS TRUST REG) 2 October 1980 (1980-10-02) * abstract; figures 2-4 * -----	1	
A	DE 100 49 946 A1 (SCHWENK HANS ULRICH) 11 April 2002 (2002-04-11) * abstract; figures 1,6-8 * * column 1, paragraph 5 * -----	1	
A	DE 20 2010 016136 U1 (BOCK HERMANN GMBH) 17 February 2011 (2011-02-17) * abstract; figures 6,7 * -----	1	TECHNICAL FIELDS SEARCHED (IPC) A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 February 2016	Tempels, Marco

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 00 0179

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16-02-2016

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