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(54) **HEALTH CARE MESH BED**

(57) A health care mesh bed comprises a mesh fabric (2) and a weight-bearing frame (1); the mesh fabric is made by interwoven warps and wefts (21), and the junction points of the warp and the weft are fastened by relatively fixed connection; the diameter of a mesh hole or the diameter of the incircle of a mesh hole is 2 to 6 times the diameter of the warp and the weft constituting the mesh; a mesh unit has a mesh opening area accounting for 35-78% of the total area of the mesh unit; the diameter of a mesh hole or the diameter of the incircle of the mesh

hole is less than 1.5 mm; and the diameter of the warp and the weft constituting the mesh is less than 0.55 mm; the thickness of the mesh fabric is less than 1.1 mm; at least two edges of the mesh fabric are suspended between two corresponding opposing sides of the weight-bearing frame, thus forming a structure with fixed relative position, which can not only ensure the warp and weft of the fabric will not cause skin damage, but also maintain good air permeability to the skin and make bedsores less likely, as well as create a good environment for skin recovery for a burn patient.

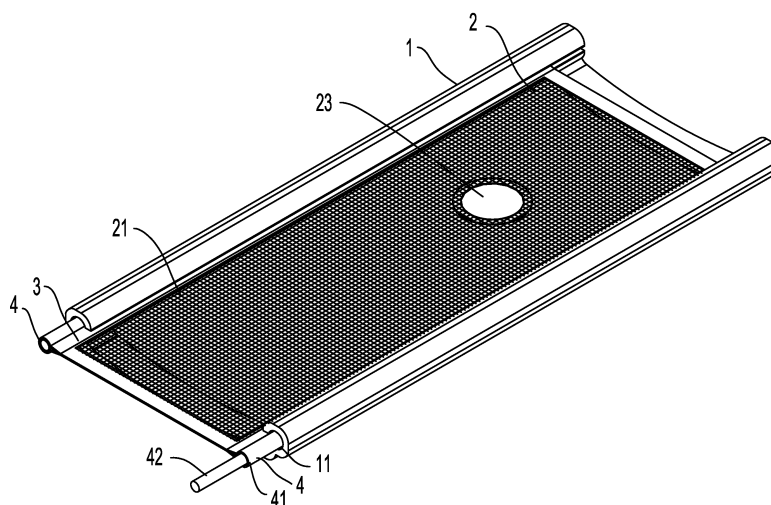


FIG. 1

Description

[0001] The invention relates to the field of medical instruments, and more particularly to a health care mesh bed for bedridden patients.

[0002] Health care mesh beds are widely used in hospitals for patients to rest and sleep, particularly for bedridden patients. The health care mesh beds can prevent the patients from getting bed sore and from burning. CN Patent No. 03271456.4 discloses a health care mesh bed, a bed body thereof is a single layer of sheet fabric with a mesh opening by interweaving a warp and a weft in a vertical direction and, an interweaving point of the warp and the weft is fastened by a fixed connection, and a diameter or diagonal length of the mesh opening is more than or equal to a diameter of the warp and the weft and less than 30 times the diameter of the warp and the weft. The invention provides a health care mesh bed with special sizes of warp and weft and mesh opening. In the prior art, no health care mesh beds with thin warp and weft and small mesh opening are disclosed. Thus, the conventional health care mesh beds are not suitable for use by bedridden patients.

[0003] The invention is a continuation of CN Patent No. 03271456.4 and European Patent No. 1661542.

[0004] In view of the above-described problem, it is one objective of the invention to provide a health care mesh bed comprising specific warps and wefts.

[0005] The objective is achieved by the following technical scheme. A health care mesh bed comprises a net-shaped fabric with a mesh opening, and a bearing frame. The net-shaped fabric comprises a warp and a weft interwoven in a vertical direction, an interweaving point of the warp and the weft is fastened by a fixed connection, the diameter or inscribed circle diameter of the mesh opening is 2 - 6 times the diameter of the warp and the weft, the ratio of the area of an opening of the mesh opening to the area of the mesh opening is 35% to 78%, the diameter or inscribed circle diameter of the mesh opening is less than 1.5 mm, the diameter of the warp and the weft is less than 0.55 mm, the thickness of the net-shaped fabric is less than 1.1 mm, at least two edges of the net-shaped fabric are hang between two opposite edges of the bearing frame whereby forming a mutual positioning structure.

[0006] A tensile layer is disposed at the edge of the net-shaped fabric or along a cutting line thereof.

[0007] The width of the net-shaped fabric disposed between two edges of the bearing frame is 1 mm to 20 mm longer than that between the two edges, the diameter or inscribed circle diameter of the mesh opening is less than 0.8 mm, the diameter of the warp and the weft is less than 0.27 mm, and the thickness of the net-shaped fabric is less than 0.55 mm.

[0008] The diameter or inscribed circle diameter of the mesh opening is less than 0.3 mm, the diameter of the warp and the weft is less than 0.08 mm, and the thickness of the net-shaped fabric is less than 0.16 mm.

[0009] The net-shaped fabric is a single-layered plain-weave structure interwoven by the warp and the weft, an error in length of the warp and the weft is within a range of $\pm 20\%$ of a rating value, an angle between the warp and the weft is greater than 60° .

[0010] One of two adjacent interweaving points of the warp and the weft is fastened by a fixed connection, and the other one thereof is fastened by an unfixed connection.

[0011] The warp and the weft at the edge of the net-shaped fabric, especially the edge hanging the bearing frame are densely interwoven.

[0012] Multiple warp interwoven strips or weft interwoven strips are disposed on the net-shaped fabric in a direction of one of the strip or the weft, or in directions of the strip and the weft, the width of the interwoven strip is less than 3 mm, and the interwoven strips are uniformly distributed on the net-shaped fabric and in the shape of a pectination or a grid.

[0013] The interwoven strips are fastened by a fixed connection.

[0014] The tensile layer is made of materials coated on the net-shaped fabric, and parts or all of the materials block mesh openings that are coated.

[0015] The tensile layer comprises one of a soft fabric, a film, or a non-woven fabric that is coated and fixed on the net-shaped fabric, or on materials coated on the net-shaped fabric.

[0016] Multiple fixing edges are disposed on edges or strengthening edges of the net-shaped fabric and the bearing frame mutually positioning each other, the fixing edges are edges or strengthening edges fixed on a columnar pin, and the bearing frame comprises a cavity operating to receive the fixing edges, and a groove allowing the net-shaped fabric to pass thereby.

[0017] A rigid strip is disposed on the tensile layer, the width of the rigid strip is less than that of the tensile layer, the rigid strip and the tensile layer form a fixing edge, a hanging hole is disposed on the fixing edge, a hanging column is disposed on the bearing frame, the hanging hole and the hanging column form a removable positioning structure, and a normal displacement of a fixing edge between adjacent hanging holes due to elastic bending is less than 5 mm.

[0018] The edges or the tensile layer of the net-shaped fabric is fixed on the bearing frame via adhesive.

[0019] Multiple fixing edges are disposed on edges or strengthening edges of the net-shaped fabric and the bearing frame mutually positioning each other, the fixing edge comprises a sleeve surrounded by the edges and the tensile layer, and a columnar pin disposed in the sleeve, and the bearing frame comprises a cavity operating to receive the sleeve and the columnar pin, and a groove allowing the net-shaped fabric to pass thereby.

[0020] The bearing frame is a rectangular frame formed by a pair of long edges and a pair of short edges, the distance between the long edges and that between the short edges are adjustable, an adjusting range of the

long edges is no greater than 6 cm, an adjusting range of the short edges is no greater than 9 cm, the long edges simultaneously move in a reverse direction and the short edges separately move during adjustment, and movement of the long edges and the short edges can be fixed at any position.

[0021] The bearing frame is a rectangular frame formed by a pair of long edges and a pair of short edges, the fixing edge comprising the columnar pin are capable of rotating a circumference less than 6 cm in a reverse direction in a cavity formed by the long edges, and rotation of the fixing edge can be fixed at any position.

[0022] Edges of the net-shaped fabric and the bearing frame mutually positioning each other correspond to hip curves and each has wave ruffling, and the wave ruffling is fixed in the tensile layer.

[0023] The net-shaped fabric comprises the mesh opening, and dense warp and weft interwoven with each other, and is fixed to the bearing frame along the edge thereof via the tensile layer, which ensures the warp and the weft do not hurt skin of patients, guarantees good air permeability of the skin, prevents bedsores, and creates a good environment for recovery of fire victims.

[0024] The invention is described hereinbelow with reference to accompanying drawings, in which:

[0025] FIG. 1 is a stereogram of a health care mesh bed of an exemplary embodiment of the invention;

[0026] FIG. 2 is a schematic view of a net-shaped fabric of the invention;

[0027] FIG. 3 is a partial view of a net-shaped fabric;

[0028] FIG. 4 is another partial view of a net-shaped fabric;

[0029] FIG. 5 is a further partial view of a net-shaped fabric; and

[0030] FIG. 6 is a partially cross-sectional view of a tensile layer;

[0031] Legends: 1 - bearing frame; 2 - net-shaped fabric; 3 - tensile layer; 4 - fixing edge; 11 - cavity; 12 - groove; 21 - warp and weft; 22 - mesh opening; 23 - outlet; 24 - interwoven strip; 25 - wave ruffling; 31 - coverage area; 32 - half coverage area; 33 - soft fabric; 41 - sleeve; 42 - columnar pin; 43 - rigid strip; 44 - hanging hole.

[0032] As shown in FIG. 1, a health care mesh bed of the invention comprises a bearing frame 1, and a net-shaped fabric 2 hang on the bearing frame 1. The bearing frame 1 is disposed on a normal bedstead, or on a bedstead of a heat-insulating health care mesh bed with a temperature and humidity regulating function, or legs are disposed at four corners of the bearing frame 1 whereby forming a simple health care mesh bed. The width of the net-shaped fabric 2 disposed between two edges of the bearing frame 1 is 1 mm to 20 mm longer than that between the two edges. For better resolution of force applied by a patient, the net-shaped fabric 2 is slightly concave and loose, and is not in a tension state, so that elastic elongation or fracture does not occur. The diameter or inscribed circle diameter of the mesh opening is less than 0.8 mm, the diameter of the warp and the

weft is less than 0.27 mm, and the thickness of the net-shaped fabric is less than 0.55 mm. The diameter or inscribed circle diameter of the mesh opening 22 on other part of the net-shaped fabric 2 is less than 0.3 mm, the diameter of the warp and the weft 21 is less than 0.08 mm, and the thickness of the net-shaped fabric 2 is less than 0.16 mm. The part of the net-shaped fabric 2 is more fine and close, which is beneficial for wound of skin of the patient. In details, the part is corresponding to wound that is pressed by the patient himself in bed, and an area thereof is larger than a wound area. Nurses can spray cleaning fluid or liquor on the wound via the mesh opening.

[0033] An outlet 23 is disposed at a hip of the patient, and a tensile layer 3 is disposed at the edge of the outlet 23, whereby reinforcing the net-shaped fabric 2, and preventing drawnwork or partial fracture.

[0034] To facilitate the discharge of shapeless excrement discharged from premature children or nursing infants or something like that, no outlet 23 is arranged corresponding to the human buttocks, but a discharge region formed by a plurality of discharge holes is arranged corresponding to between two thighs and close to anus. The discharge region has an area of 1-30 cm², comprising holes of 1-5 mm in diameter. The distance between two discharge holes equals to the sum of the diameter of 2-20 warp and weft. The warp and weft in the discharge region are continuous, without break. To fasten the position and shape of the warp and weft and the discharge holes, the warp and weft are stuck by flexible materials. To facilitate the removal of the excrement, anti-sticky materials are coated on the non-discharge part of the face side and back side of the discharge region.

[0035] As shown in FIG. 2, edges of the net-shaped fabric 2 and the bearing frame 1 mutually positioning each other correspond to hip curve of the patient, and each has a heave and set wave ruffling 25, and the wave ruffling 25 is fixed in the tensile layer 3.

[0036] As shown in FIG. 3, the net-shaped fabric 2 comprises a mesh opening 22, and a warp and a weft 21 interwoven in a vertical direction, an interweaving point of the warp and the weft 21 is fastened by a fixed connection, adhesive, or heating. As the adhesive is used, one of two adjacent interweaving points of the warp and the weft 21 is fastened by a fixed connection, and the other one thereof is fastened by an unfixed connection (as shown in a dashed line in FIG. 3). This ensure smooth surface of the net-shaped fabric, and prevents the surface thereof from being contaminated by the adhesive.

[0037] In the invention, plain weave using square holes is used. Plain weave facilitates optimum effect in terms of stretch proofing of the net-shaped fabric, easy cleaning, the mesh opening, the thickness of the fabric, and so on. Preferably, the net-shaped fabric 2 is a single-layered plain-weave structure interwoven by the warp and the weft 21, an error in length of the warp and the weft 21 is within a range of $\pm 20\%$ of a rating value, an angle between the warp and the weft 21 is greater than

60°. The mesh opening 22 comprises an opening, and a warp and a weft 21 surrounding the opening.

[0038] As shown in FIG. 4, a tensile layer 3 is disposed at the edge of the net-shaped fabric 2 or along a cutting line thereof, and the tensile layer 3 and the bearing frame 1 form a mutual positioning structure. The edge described hereinafter comprises surrounding edges, cutting edges, edges at the opening, and so on. The warp and the weft 21 at the edge of the net-shaped fabric, especially the edge hanging the bearing frame 1 are densely interwoven whereby improving tensile force at the edge.

[0039] As shown in FIG. 5, multiple warp interwoven strips 24 or weft interwoven strips 24 are disposed on the net-shaped fabric 2 in a direction of one of the strip or the weft, or in directions of the strip and the weft, the width of the interwoven strip 24 is less than 3 mm, and the interwoven strips 24 are uniformly distributed on the net-shaped fabric 2 and in the shape of a pectination or a grid, whereby improving bearing capability and tensile capability of the fabric, and positioning performance of the warp and the weft. The warp and the weft 21 on the interwoven strips 24 are fastened via a fixed connection. In an embodiment, adhesive is disposed on strip at the back of the net-shaped fabric 2 for connection.

[0040] As shown in FIG. 4, the tensile layer 3 is made of materials coated on the net-shaped fabric 2, and parts or all of the materials block mesh openings 22 that are coated. The edge of net-shaped fabric 2 is heavily coated, and the mesh opening is complexly blocked, as indicated as a coverage area 31 in FIG. 2. The thickness of the net-shaped fabric 2 becomes more thinner from the edge to the center thereof whereby forming a half coverage area 32 in which the mesh opening is partially blocked. Strengthening materials are coated on an intersection point between the warp and the weft, and thickness thereof gradually decreases, or stepwisely decreases, whereby preventing intensity catastrophe occurring at a junction between the tensile layer and the non-tensile layer. The materials are soft flexible structure adhesive, which is better than normal adhesive in terms of shear strength, tensile strength, peel strength, non-uniform tear strength, and so on. The tensile layer 3 comprises one of a soft fabric 33, a film, or a non-woven fabric that is coated and fixed on the net-shaped fabric 2, or on the materials coated on the net-shaped fabric 2. The soft fabric 33 can be coated on one side or both sides of the net-shaped fabric 2 whereby improving strength thereof and implementing mutual positioning between the net-shaped fabric 2 and the bearing frame 1.

[0041] As shown in FIGS. 1 and 6, mutual positioning between the net-shaped fabric 2 and the bearing frame 1 is implemented by adhesion and is removable so that replacement, disassembly or cleaning is convenient. The specific method is as follows:

[0042] 1. Multiple fixing edges 4 are disposed on the tensile layer 3 of edges of the net-shaped fabric 2 and the bearing frame 1 mutually positioning each other, the

fixing edge 4 comprises a sleeve 41 surrounded by the tensile layer 3, and a columnar pin 42 disposed in the sleeve 41, and the bearing frame 1 comprises a cavity 11 operating to receive the sleeve 41 and the columnar pin 42, and a groove 12 allowing the net-shaped fabric 2 to pass thereby. After the columnar pin 42 is pulled out, the net-shaped fabric 2 is separated from the bearing frame 1, which is suitable for a bed partially using the net-shaped fabric 2. In details, the net-shaped fabric 2 in FIG. 1 is a whole piece of net-shaped fabric 2, or a partially used net-shaped fabric 2, and is used for a hip of a patient during cleaning of defecation, other parts thereof can use normal fabrics that are assembled altogether.

[0043] 2. Multiple fixing edges 4 are disposed on the tensile layer 3 of edges of the net-shaped fabric 2 and the bearing frame 1 mutually positioning each other, the fixing edge 4 is a tensile layer 3 fixed on a columnar pin 42, and the bearing frame 1 comprises a cavity 11 operating to receive the fixing edges 4, and a groove 12 allowing the net-shaped fabric 2 to pass thereby. The columnar pin 42 is fixed to the tensile layer 3, which features good integrity.

[0044] 3. A fixing edge 4 is a rigid strip 43 disposed on the tensile layer 3. As shown in FIG. 5, the width of the rigid strip 43 is less than that of the tensile layer 3, the rigid strip 43 and the tensile layer 3 form a fixing edge 4, a hanging hole 44 is disposed on the fixing edge 4, a hanging column is disposed on the bearing frame 1, the hanging hole 44 and the hanging column form a removable positioning structure, and a normal displacement of a fixing edge between adjacent hanging holes due to elastic bending is less than 5 mm.

[0045] For example, the hanging holes 44 are uniformly disposed on the rigid strip 43, the hanging column received in the hanging hole 44 is disposed on the bearing frame 1. Mutual positioning between the hanging hole 44 and the hanging column makes disassembly convenient and replacement simple.

[0046] 4. The simplest method is to fix the net-shaped fabric 2 on the bearing frame 1 along the tensile layer 3 via adhesion whereby forming a mutual positioning structure. The method features high requirement for operation of changing the net-shaped fabric, and a simple structure.

[0047] To implement adjustment of tightness of the net-shaped fabric 2 on the bearing frame 1, the bearing frame 1 is a rectangular frame formed by a pair of long edges and a pair of short edges, the distance between the long edges and that between the short edges are adjustable, an adjusting range of the long edges is no greater than 6 cm, an adjusting range of the short edges is no greater than 9 cm, the long edges simultaneously move in a reverse direction and the short edges separately move during adjustment, and movement of the long edges and the short edges can be fixed at any position.

[0048] Alternatively, the bearing frame 1 is a rectangular frame formed by a pair of long edges and a pair of short edges, the fixing edge comprising the columnar pin 42 are capable of rotating a circumference less than 6

cm in a reverse direction in a cavity 11 formed by the long edges, and rotation of the fixing edge can be fixed at any position.

[0049] To summarize, the net-shaped fabric 2 is disposed on two long edges, and the long edge of the health care mesh bed can be divided into multiple sections according to posture of the patient in bed, and the sections can be connected to each other via hinges whereby forming a sitting and sleeping bed.

Claims

1. A health care mesh bed, comprising a net-shaped fabric with a mesh opening, and a bearing frame; said net-shaped fabric comprising a warp and a weft interwoven in a vertical direction, an interweaving point of said warp and said weft being fastened by a fixed connection;
characterized in that
the diameter or inscribed circle diameter of said mesh opening is 2 - 6 times the diameter of said warp and said weft;
the ratio of the area of an opening of said mesh opening to the area of said mesh opening is 35% to 78%;
the diameter or inscribed circle diameter of said mesh opening is less than 1.5 mm;
the diameter of said warp and said weft is less than 0.55 mm; the thickness of said net-shaped fabric is less than 1.1 mm; and
at least two edges of said net-shaped fabric are hang between two opposite edges of the bearing frame whereby forming a mutual positioning structure.
2. The health care mesh bed of claim 1, **characterized in that** a tensile layer is disposed at the edge of said net-shaped fabric or along a cutting line thereof.
3. The health care mesh bed of claim 1 or 2, **characterized in that** the width of said net-shaped fabric disposed between two edges of said bearing frame is 1 mm to 20 mm longer than that between the two edges; the diameter or inscribed circle diameter of said mesh opening is less than 0.8 mm; the diameter of said warp and said weft is less than 0.27 mm; and the thickness of said net-shaped fabric is less than 0.55 mm.
4. The health care mesh bed of any of claims 1-3, **characterized in that** the diameter or inscribed circle diameter of said mesh opening is less than 0.3 mm; the diameter of said warp and said weft is less than 0.08 mm; and the thickness of said net-shaped fabric is less than 0.16 mm.
5. The health care mesh bed of any of claims 1-4, **characterized in that** said net-shaped fabric is a single-layered plain-weave structure interwoven by said

warp and said weft; an error in length of said warp and said weft is within a range of $\pm 20\%$ of a rating value; and an angle between said warp and said weft is greater than 60° .

6. The health care mesh bed of any of claims 1-5, **characterized in that** one of two adjacent interweaving points of said warp and said weft is fastened by a fixed connection; and the other one thereof is fastened by an unfixed connection.
7. The health care mesh bed of any of claims 1-6, **characterized in that** said warp and said weft at the edge of said net-shaped fabric, especially the edge hanging said bearing frame are densely interwoven.
8. The health care mesh bed of any of claims 1-7, **characterized in that** multiple warp interwoven strips or weft interwoven strips are disposed on said net-shaped fabric in a direction of one of the strip or the weft, or in directions of the strip and the weft; the width of said interwoven strip is less than 3 mm; and said interwoven strips are uniformly distributed on said net-shaped fabric and in the shape of a pectination or a grid.
9. The health care mesh bed of claim 8, **characterized in that** said interwoven strips are fastened by a fixed connection.
10. The health care mesh bed of claim 2, **characterized in that** said tensile layer is made of materials coated on said net-shaped fabric, and parts or all of the materials block mesh openings that are coated.
11. The health care mesh bed of claim 2 or 10, **characterized in that** said tensile layer comprises one of a soft fabric, a film, or a non-woven fabric that is coated and fixed on said net-shaped fabric, or on materials coated on said net-shaped fabric.
12. The health care mesh bed of claim 1 or 2, **characterized in that** multiple fixing edges are disposed on edges or strengthening edges of said net-shaped fabric and said bearing frame mutually positioning each other; said fixing edges are edges or strengthening edges fixed on a columnar pin; and said bearing frame comprises a cavity operating to receive said fixing edges, and a groove allowing the said net-shaped fabric to pass thereby.
13. The health care mesh bed of claim 2, **characterized in that** a rigid strip is disposed on said tensile layer, the width of said rigid strip is less than that of said tensile layer; said rigid strip and said tensile layer form a fixing edge; a hanging hole is disposed on said fixing edge; a hanging column is disposed on said bearing frame; said hanging hole and said hang-

ing column form a removable positioning structure;
and a normal displacement of a fixing edge between
adjacent hanging holes due to elastic bending is less
than 5 mm.

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14. The health care mesh bed of claim 1 or 3, **characterized in that** said edges or said tensile layer of said net-shaped fabric is fixed on said bearing frame via adhesive.

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15. The health care mesh bed of claim 1 or 2, **characterized in that** multiple fixing edges are disposed on edges or strengthening edges of said net-shaped fabric and said bearing frame mutually positioning each other; said fixing edge comprises a sleeve surrounded by said edges and said tensile layer, and a columnar pin disposed in said sleeve; and said bearing frame comprises a cavity operating to receive said sleeve and said columnar pin, and a groove allowing said net-shaped fabric to pass thereby.

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16. The health care mesh bed of claim 12, **characterized in that** said bearing frame is a rectangular frame formed by a pair of long edges and a pair of short edges; the distance between said long edges and that between said short edges are adjustable; an adjusting range of said long edges is no greater than 6 cm; an adjusting range of said short edges is no greater than 9 cm; said long edges simultaneously move in a reverse direction and said short edges separately move during adjustment; and movement of said long edges and said short edges can be fixed at any position.

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17. The health care mesh bed of claim 15, **characterized in that** said bearing frame is a rectangular frame formed by a pair of long edges and a pair of short edges; said fixing edge comprising said columnar pin are capable of rotating a circumference less than 6 cm in a reverse direction in a cavity formed by said long edges; and rotation of said fixing edge can be fixed at any position.

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18. The health care mesh bed of claim 2, **characterized in that** edges of said net-shaped fabric and said bearing frame mutually positioning each other correspond to hip curves and each has heave and set wave ruffling; and said wave ruffling is fixed in said tensile layer.

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19. The health care mesh bed of any of claims 1-18, further comprising a discharge region formed by a plurality of discharge holes, the discharge region being arranged corresponding to between two thighs and close to anus.

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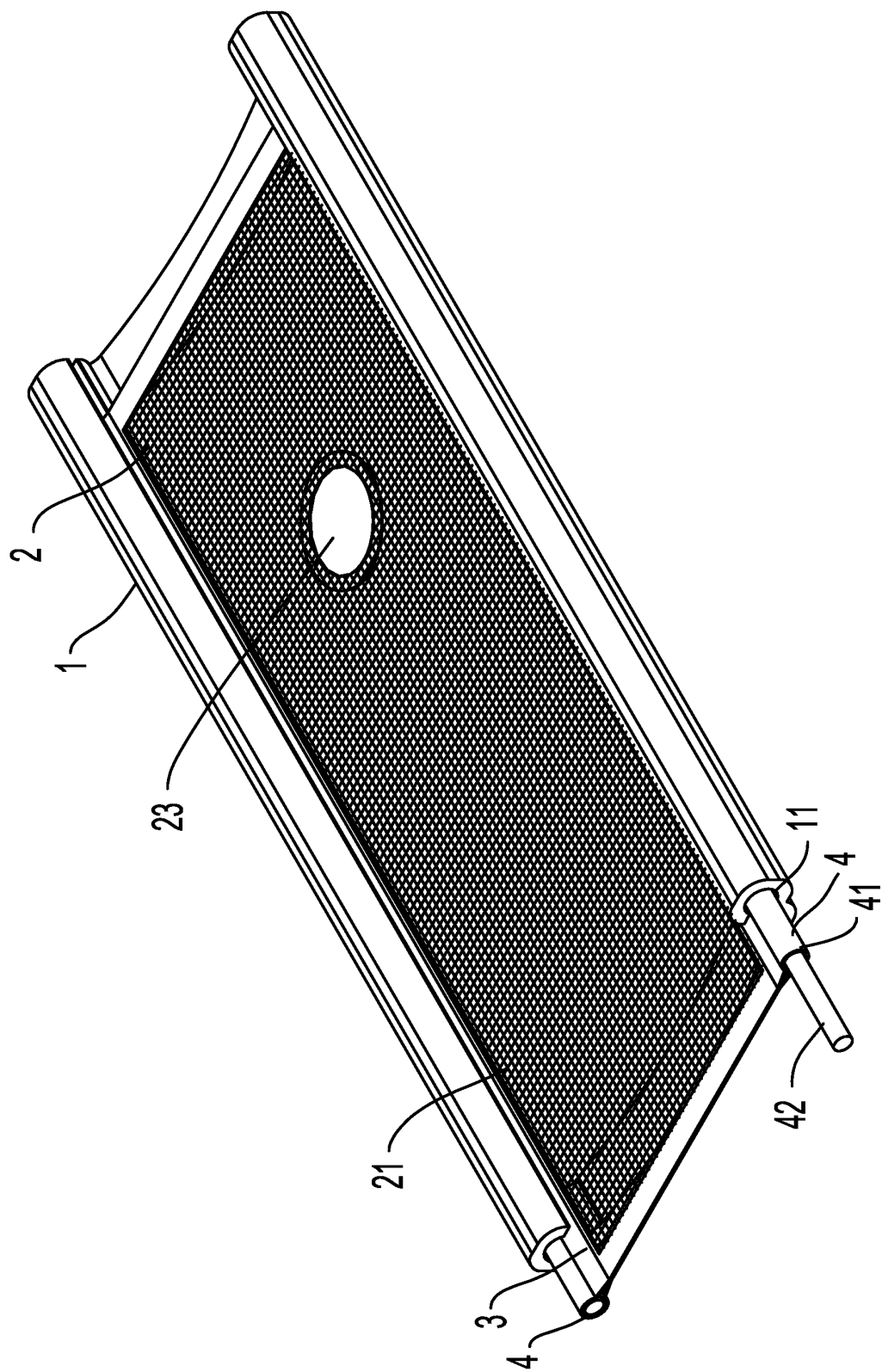


FIG. 1

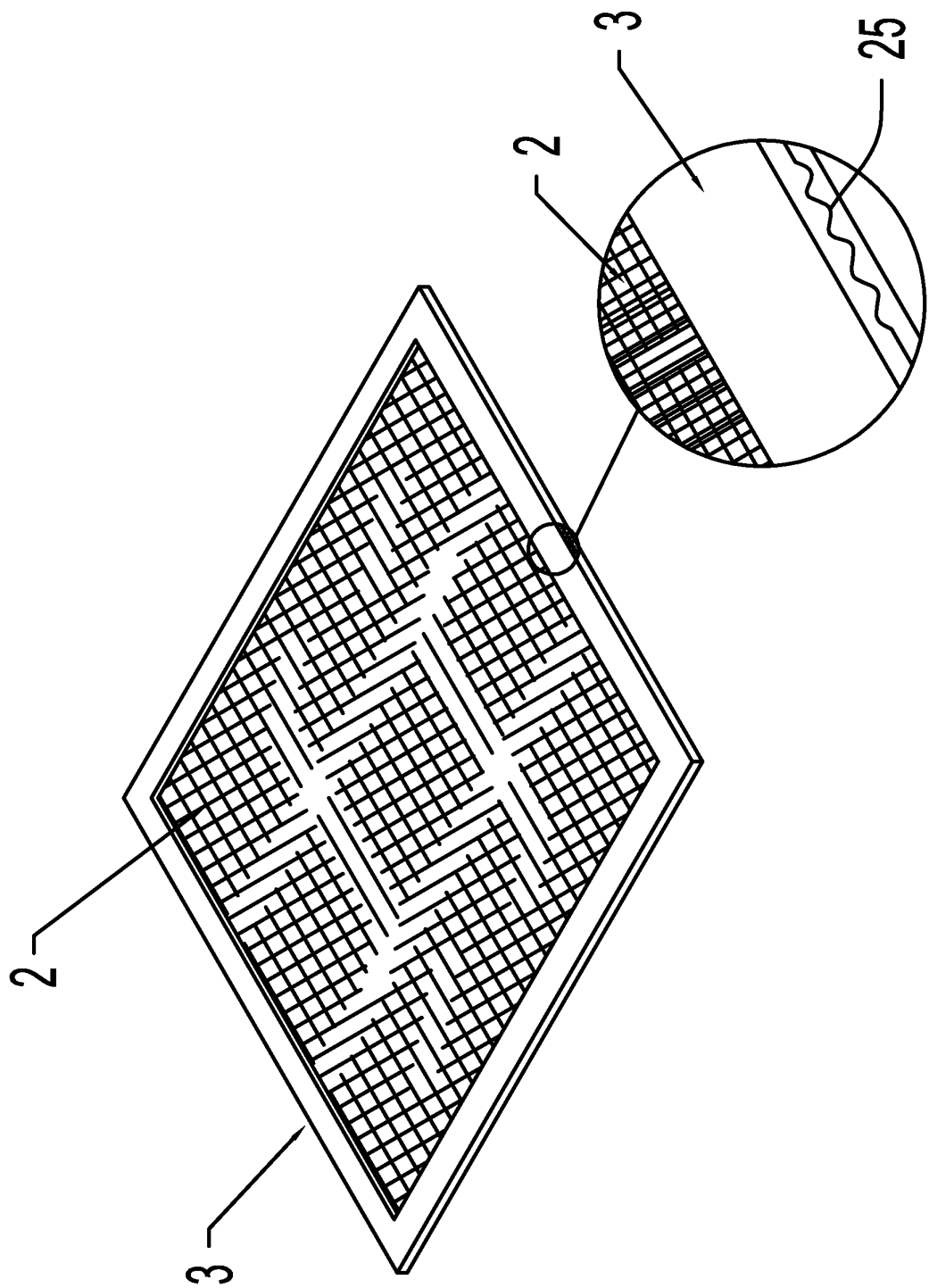


FIG. 2

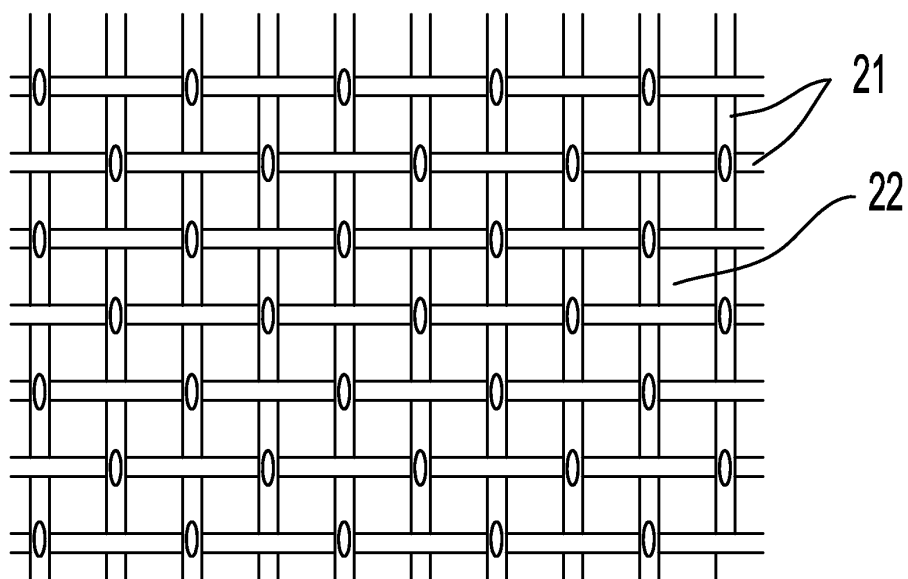


FIG. 3

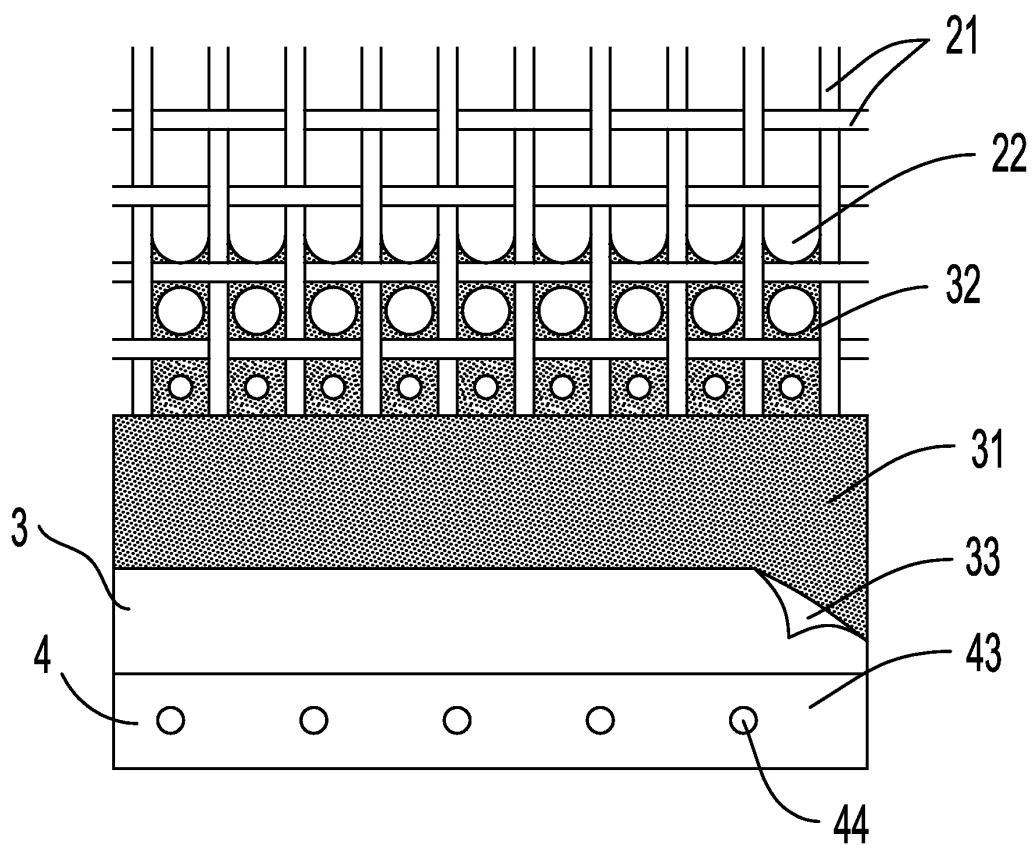


FIG. 4

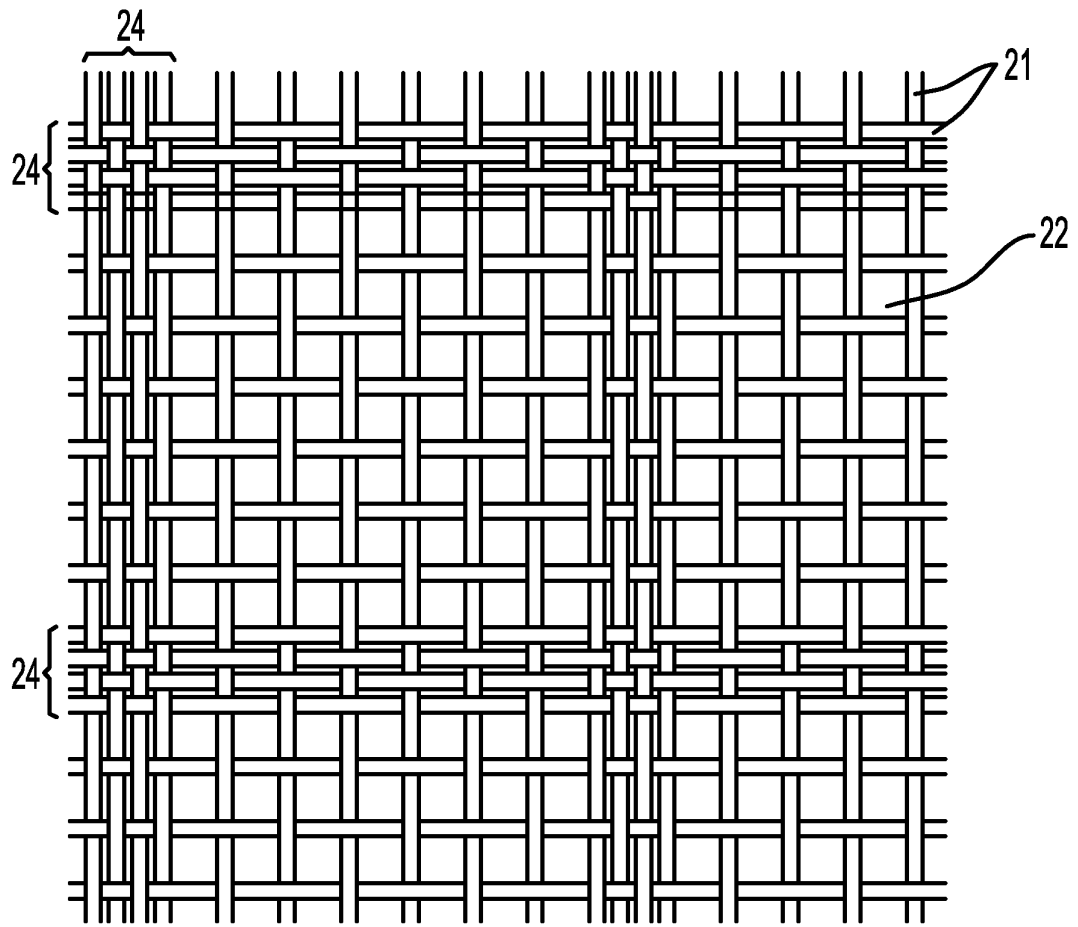


FIG. 5

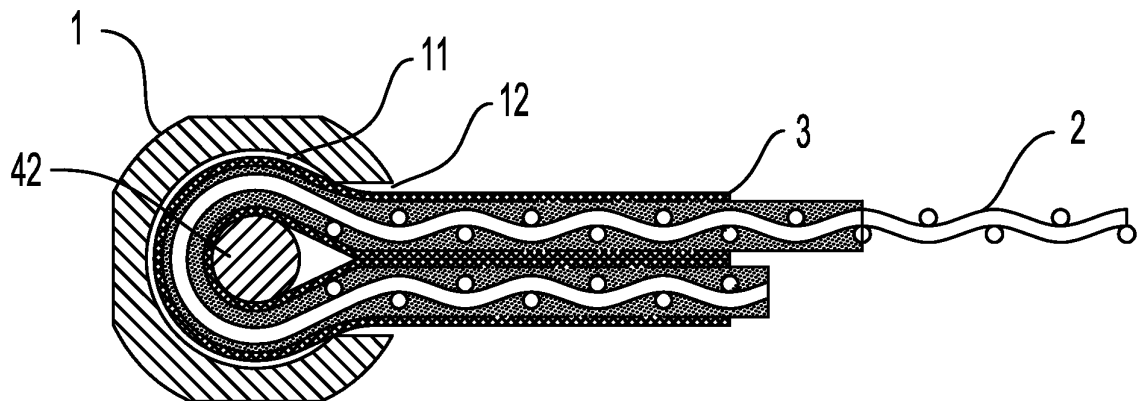


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2011/078010**A. CLASSIFICATION OF SUBJECT MATTER**

See the extra sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A61G, A47C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CNPAT, CNKI, EPODOC, WPI: nurse, net, bed, burn, scald, ventilate, ventilating, diameter, area; nurs???, health?, bed?, mesh??, net???, web?, burn???, ventilat???, dia, diameter?, area?, acreage, proportion?**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claims
PX	CN201894711U (WANG, Xiading) 13 July 2011 (13.07.2011), see concrete embodiments, and figures 1-6.	1-19
PX	CN101940517A (WANG, Xiading) 12 January 2011 (12.01.2011), see concrete embodiments, and figures 1-6.	1-19
X	JP200265764A (MITSUBISHI RAYON CO LTD) 5 March 2002 (05.03.2002), see embodiments.	1, 2, 6, 7, 10, 11, 14, 18, 19
A	US20060207030A1 (WANG X) 21 September 2006 (21.09.2006), the whole document.	1-19
A	US4222133A (CSATARY L K) 16 September 1980 (16.09.1980), the whole document.	1-19
A	CN101147714A (WANG, Xiading) 26 March 2008 (26.03.2008), the whole document	1-19
A	CN201353252Y (CHEN, Zhaowei) 2 December 2009 (02.12.2009), the whole document.	1-19

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the prior art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
26 October 2011 (26.10.2011)Date of mailing of the international search report
10 November 2011 (10.11.2011)Name and mailing address of the ISA/CN:
State Intellectual Property Office of the People's Republic of China
No.6 Xituchenglu, Jimenqiao, Haidian District, Beijing, China
100088
Facsimile No.: (86-10)62019451Authorized officer

ZHU, Zhengqiang
Telephone No.: (86-10)62085485

EP 2 601 924 A1

INTERNATIONAL SEARCH REPORT Information on patent family members

International application No.
PCT/CN2011/078010

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN201894711U	13.07.2011	CN101940517A	12.01.2011
		US2011131732A1	09.06.2011
CN101940517A	12.01.2011	CN201894711U	13.07.2011
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A. CLASSIFICATION OF SUBJECT MATTER

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