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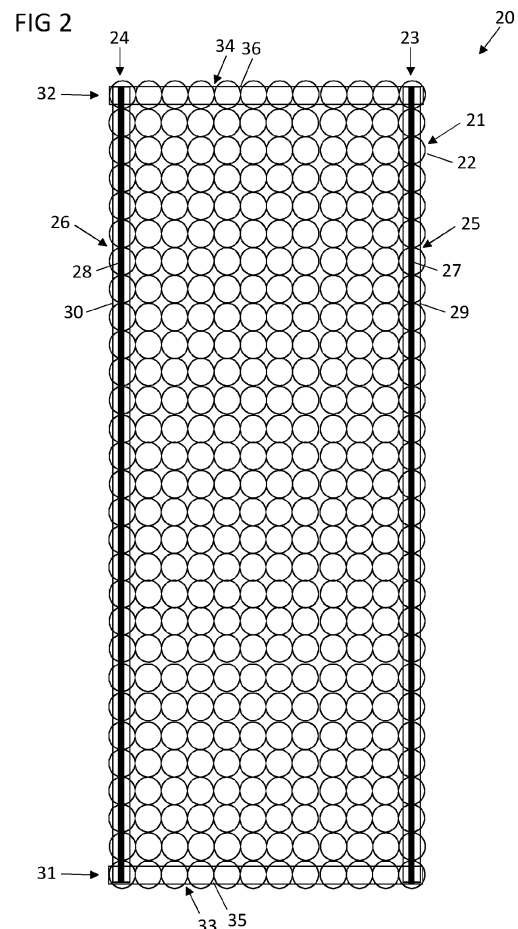
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(54) **POCKET SPRING CORE**

(57) The present invention relates to a pocket spring core (20) comprising an assembly of a plurality of pocketed spring elements (21) arranged in rows (23, 24) and columns (31, 32), each of the plurality of pocketed spring elements (21) being formed of a pocket (22) and at least one coil spring enclosed by the pocket (22). The pocket spring core (20) comprises at least two elongate reinforcing members comprising a first elongate reinforcing member (25) and a second elongate reinforcing member (26) separate from the first elongate reinforcing member (25). The first elongate reinforcing member (25) is arranged along a first edge of the assembly and the second elongate reinforcing member (26) is arranged along a second edge of the assembly. The first edge and the second edge are located on opposite sides of the assembly. The first elongate reinforcing member (25) is glued to a first plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the first edge of the assembly, and the second elongate reinforcing member (26) is glued to a second plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the second edge of the assembly.



Description

FIELD OF THE INVENTION

[0001] The invention relates to a pocket spring core, a bedding or seating product comprising a pocket spring core, and a method of manufacturing a pocket spring core.

BACKGROUND OF THE INVENTION

[0002] Pocket spring cores are widely used in seating and bedding products. Pocket spring cores may be made of a matrix of multiple pocketed springs joined together by a fabric within which each an individual spring is contained. Additionally, the matrix of multiple pocketed springs may be enclosed by a frame extending along a circumference of the matrix of the multiple pocketed springs. The frame may be positioned on a top and/or bottom side of the pocketed springs and may be fastened by clips to pocketed springs at the edges of the matrix.

[0003] Fig. 1 shows a prior art pocket spring core 10 comprising an arrangement of a plurality of pocketed spring elements 11. Each pocketed spring element 11 comprises a pocket 13 which contains a coil spring (not shown in Fig. 1). The arrangement of the plurality of pocketed spring elements 11 is enclosed by a frame 12. The frame 12 is coupled to at least some of the plurality of pocketed spring elements 11. In particular, the frame 12 is coupled via a clips 14 to the coil springs enclosed in the pockets 13. Thus, the frame 12 contributes to reinforce the pocket spring core 10 and may support stability and maintaining a shape of the pocket spring core 10.

[0004] For coupling the frame 12 with the clips 14 to the coil springs, each clip 14 penetrates the nonwoven material of a corresponding pocket 13. Coupling the frame 12 to the coil springs with clips 14 is a manual or semiautomatic task as the positioning of the frame 12 has to be aligned for each pocket spring element 11 to ensure correct clipping to an appropriate position at the corresponding coil spring.

[0005] For each size of a pocket spring core 10, for example for different sizes of mattresses, a correspondingly sized frame 12 is required and many variants of frames must be provided.

[0006] Therefore, there is a need for an improved pocket spring core with more efficient reinforcing for supporting stability and maintaining the shape of the pocket spring core.

BRIEF SUMMARY OF THE INVENTION

[0007] According to the present invention, a pocket spring core and a method of manufacturing a pocket spring core as defined in the independent claims are provided. The dependent claims define embodiments of the invention.

[0008] According to an embodiment, a pocket spring

core is provided, for example for incorporation into a bedding product, such as a mattress, or for incorporation into a seating product, such as a sofa cushion or chair cushion. The pocket spring core comprises an assembly of a plurality of pocketed spring elements arranged in rows and columns. Each pocketed spring element of the plurality of pocketed spring elements is formed of a pocket and at least one coil spring which is enclosed by the pocket. Some or each pocket may comprise more than one coil spring, for example for adjusting a firmness or rigidity of a mattress or some areas thereof. The coil springs may be formed of a metal wire, for example steel wire. The pocket spring core comprises at least two elongate reinforcing members. The at least two elongate reinforcing members comprise a first elongate reinforcing member and a second elongate reinforcing member separate from the first elongate reinforcing member. In other words, each of the elongate reinforcing members is an individual component which can be manufactured and positioned independent from any other elongate reinforcing member and which is not formed integrally with another elongate reinforcing member. The first elongate reinforcing member is arranged along a first edge of the assembly and the second elongate reinforcing member is arranged along a second edge of the assembly. The first edge and the second edge are located on opposite sides of the assembly. Thus, the first elongate reinforcing member is spaced apart from the second elongate reinforcing member. The first elongate reinforcing member is glued to a first plurality of pockets of the plurality of pocketed spring elements arranged along the first edge of the assembly, and the second elongate reinforcing member is glued to a second plurality of pockets of the plurality of pocketed spring elements arranged along the second edge of the assembly.

[0009] For example, the pocket spring core may have a rectangular shape of a predefined length and width. The pocketed spring elements of a row correspond to the length of the pocket spring core, and the pocketed spring elements of a column correspond to the width of the pocket spring core. The first elongate reinforcing member may be glued to each pocketed spring element of a row along the first edge of the assembly, and the second elongate reinforcing member may be glued to each pocketed spring element of a row along the second edge of the assembly.

[0010] The first and second elongate reinforcing members may be cut to the required length during production of the pocket spring core such that provisioning and stocking of elongate reinforcing members with specific lengths may be avoided. It is clear that provisioning and stocking of the above described prior art frames of different sizes may be avoided also.

[0011] By gluing the elongate reinforcing members to the pockets no fastening materials, for example clips, are required, such that gluing the elongate reinforcing members to the pockets may be automated and may be performed by a machine or robot. As a result, manufacturing

cost may be reduced. Furthermore, the elongate reinforcing members may be attached to the pocketed spring elements at an arbitrary position of the pocketed spring elements.

[0012] According to various examples, the at least two elongate reinforcing members are exactly two elongate reinforcing members. For example, only the above described first elongate reinforcing member and second elongate reinforcing member may be glued to the pocketed spring elements of the row along the first edge of the assembly and the row along the second edge of the assembly, respectively. Cost savings with respect to manufacturing and material may be achieved.

[0013] According to further examples, the at least two elongate reinforcing members comprise a third elongate reinforcing member and a fourth elongate reinforcing member separate from the third elongate reinforcing member. The third elongate reinforcing member is arranged along a third edge of the assembly and the fourth elongate reinforcing member is arranged along a fourth edge of the assembly. The third edge and the fourth edge are located on opposite sides of the assembly. For example, in case of an rectangular pocket spring core, the third edge and the fourth edge may be parallel to each other and perpendicular to the first and second edges of the assembly. The third elongate reinforcing member is glued to a third plurality of pockets of the plurality of pocketed spring elements arranged along the third edge of the assembly, and the fourth elongate reinforcing member is glued to a fourth plurality of pockets of the plurality of pocketed spring elements arranged along the fourth edge of the assembly.

[0014] For example, in case of the above described rectangular pocket spring core, the third elongate reinforcing member may be glued to each pocketed spring element of a column along the third edge of the assembly, and the fourth elongate reinforcing member may be glued to each pocketed spring element of a column along the fourth edge of the assembly.

[0015] The third and fourth elongate reinforcing members may be cut to the required length during production of the pocket spring core such that provisioning and stocking of elongate reinforcing members with specific lengths and prior art frames may be avoided.

[0016] According to various examples, each of the at least two elongate reinforcing members comprises a rod or band made of metal, e.g. steel, or plastics or a combination thereof. The elongate reinforcing members are separate from each other, i.e. there is no continuous connection between any of the rods or bands. For example, each of the at least two elongate reinforcing members comprises a corresponding rod, e.g. a corresponding steel rod. These rods do not contact each other directly, i.e. any two rods of the at least two rods are separated by a gap.

[0017] The rod or band may have a quadratic cross section, a rectangular cross section, a triangular cross section, a trapezium cross section, a polygonal cross

section, a circular cross section, an ellipse cross section, or an oval cross section. The type of cross-section in combination with a corresponding dimensioning of the cross section may support stability of the elongate reinforcing members and roll packaging of the mattress.

[0018] According to various examples, each of the at least two elongate reinforcing members comprises a strip of nonwoven material. For example, the strip may enclose the rod such that a first part of the strip is arranged between the rod and the corresponding plurality of pockets to which the corresponding reinforcing member is glued, and a second part of the strip covers the rod. Thus the rod is embedded in the strip, and the strip is glued to the corresponding plurality of pockets. The rod may be embedded in the strip in line with attaching the thus formed reinforcing member to the pocket spring core. Alternatively, the reinforcing member comprising the rod embedded in the strip may be provided as a prefabricated component, e.g., as a cut-off section of an "endless" reinforcing element or a reinforcing member with predetermined length, which is glued to the pocket spring core.

[0019] According to further examples, the rod is directly glued to the corresponding plurality of pockets. This means that, apart from the glue, there may be no further components between the rod and the plurality of pockets. Additionally, a strip of nonwoven material may be arranged on the rod and glued to the corresponding plurality of pockets so as to cover the rod. The strip of nonwoven material may have a width larger than a width of the elongate reinforcing member. The strip of nonwoven material may thus contribute to avoid that glue residues outside the rod attaches to other components when stacking several pocket spring core units or roll packaging the pocket spring core.

[0020] Each of the at least two elongate reinforcing members may be glued to the corresponding plurality of pockets using a hot melt adhesive, polyurethane (PU) adhesive or epoxy lime adhesive. However, other adhesives may additionally be used, for example non-reactive or reactive adhesives.

[0021] For example, the hot melt adhesive may be based on polymer components including polyolefins such as ethylene-vinyl acetate copolymer (EVA), linear low density polyethylene (LLDPE) and other ethylene based semi-crystalline polymers, such as amorphous poly-alpha-olefins (APAO), such as olefin block copolymer (OBC), such as amorphous polypropylene, isotactic polypropylene and other propylene based polymers, styrene block copolymers (SBC) such as styrene-isoprene-styrene (SIS) copolymer and styrene-butadiene-styrene (SBS) copolymer, ethylene ethyl acrylate copolymers (EEA), polyamides (PA), polyesters, and polyurethane reactive adhesives (PUR).

[0022] According to further examples, the polyurethane adhesive may comprise for example a PU adhesion based on isocyanate and polyol or polyol.

[0023] In further examples, the epoxy lime adhesive may comprise for example two-component epoxy glue.

[0024] Such glue or adhesive may have properties which meet requirements of durability tests according to EN1957 without breakage of the glue connections between the elongate reinforcing members and the plurality of pockets, for example between a steel rod and a pocket of nonwoven/woven material, or between a steel rod enclosed in nonwoven/woven material and a pocket of nonwoven/woven material. In particular, such glue or adhesive may enable to roll pack for example a mattress comprising the pocket spring core with elongate reinforcing members glued to the pockets in rolls with a maximum diameter of 60-70 cm, preferably 62-63 cm, including 7 to 30 pocketed spring elements in line along the rolling direction, without breakage of the glue connections between the elongate reinforcing members and the pockets either during or after opening the roll in a controlled opener. Furthermore, such glue or adhesive may allow the roll packed pocket spring core to be exposed during storage to low temperatures far below 0°C not causing the glue connections between the elongate reinforcing members and pockets to break when opening the roll packed pocket spring core later.

[0025] According to various examples, each pocket of the plurality of pockets has a substantially cylindrical shape having a top surface and a bottom surface. Each of the at least two elongate reinforcement members is glued to the top surfaces or bottom surfaces of the corresponding plurality of pockets. Furthermore, elongate reinforcement members may be glued to both, the top surfaces and the bottom surfaces of the corresponding plurality of pockets. Thus, depending on requirements concerning rigidity and stability, the number and position of elongate reinforcement members may be easily varied without significantly changing the automated manufacturing process.

[0026] According to further examples, each pocket of the plurality of pockets is made by spunbonding. Additionally or as an alternative, each pocket of the plurality of pockets may be made by needlepunching woven material or other nonwoven material. Such pockets may provide a reliable enclosing for the coil springs and may be reliably glued to the elongate reinforcing members.

[0027] According to a further embodiment, a bedding or seating product is provided. The bedding or seating product comprises a pocket spring core as defined above. The pocket spring core comprises an assembly of a plurality of pocketed spring elements arranged in rows and columns. Each pocketed spring element of the plurality of pocketed spring elements is formed of a pocket and at least one coil spring which is enclosed by the pocket. Some or each pockets may comprise more than one coil spring, for example for adjusting a firmness or rigidity of a mattress or some areas thereof. The coil springs may be formed of a metal wire, for example steel wire. The pocket spring core comprises at least two elongate reinforcing members. The at least two elongate reinforcing members comprise a first elongate reinforcing member and a second elongate reinforcing member sep-

arate from the first elongate reinforcing member. The first elongate reinforcing member is arranged along a first edge of the assembly and the second elongate reinforcing member is arranged along a second edge of the assembly. The first edge and the second edge are located on opposite sides of the assembly. The first elongate reinforcing member is glued to a first plurality of pockets of the plurality of pocketed spring elements arranged along the first edge of the assembly, and the second elongate reinforcing member is glued to a second plurality of pockets of the plurality of pocketed spring elements arranged along the second edge of the assembly.

[0028] According to another embodiment, a method of manufacturing a pocket spring core is provided. According to the method, an assembly of a plurality of pocketed spring elements arranged in rows and columns is provided. Each of the plurality of pocketed spring elements is formed of a pocket and at least one coil spring enclosed by the pocket. Furthermore, at least two elongate reinforcing members are positioned at plurality of pocketed spring elements. A first elongate reinforcing member and a second elongate reinforcing member of the at least two elongate reinforcing members are positioned separate from each other and such that the first elongate reinforcing member is arranged along a first edge of the assembly and the second elongate reinforcing member is arranged along a second edge of the assembly. The first edge and the second edge are located on opposite sides of the assembly. The first elongate reinforcing member is glued to a first plurality of pockets of the plurality of pocketed spring elements arranged along the first edge of the assembly, and the second elongate reinforcing member is glued to a second plurality of pockets of the plurality of pocketed spring elements arranged along the second edge of the assembly.

[0029] The pocket spring core may comprise the pocket spring core defined in the embodiments above.

[0030] According to various examples, at least the steps of positioning and gluing of the at least two elongate reinforcing members may be performed automatically by a manufacturing machine, for example by a robot. This may contribute to reduce production cost.

[0031] Although in the above summary various embodiments and examples are described separately, the various embodiments and examples may be combined with each other unless specifically noted otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] Embodiments of the invention will be described with reference to the accompanying drawings.

Fig. 1 shows a schematic perspective view of a prior art pocket spring core.

Fig. 2 shows a schematic top view of a pocket spring core according to an embodiment.

Fig. 3 shows a schematic top view and sectional view of a reinforcing member according to an embodiment.

Fig. 4 shows a schematic view of the pocket spring core of Fig. 2 in more detail.

Fig. 5 shows a schematic top view of a pocket spring core according to another embodiment.

Fig. 6 shows a schematic view of the pocket spring core of Fig. 5 in more detail.

Fig. 7 shows a schematic view of a pocket spring core according to a further embodiment.

Fig. 8 shows a schematic top view of a pocket spring core according to yet a further embodiment.

Fig. 9 shows a flowchart illustrating a pocket spring core manufacturing according to an embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0033] Exemplary embodiments of the invention will be described with reference to the drawings. While some embodiments will be described in the context of specific fields of application, such as in the context of mattresses, the embodiments are not limited to this field of application. The features of the various embodiments described in the following description may be combined with each other unless specifically noted otherwise. Throughout the following description, same reference numerals refer to same or like components or mechanisms.

[0034] Fig. 2 shows a top view of a pocket spring core 20 according to an embodiment. The pocket spring core 20 comprises a plurality of pocketed spring elements 21, which are arranged in a matrix, for example a rectangular matrix having a plurality of rows and columns of pocketed spring elements 21. The matrix of pocketed spring elements may be intended to be comprised in a product, for example a mattress. The mattress may comprise further components, for example a foam pad (not shown) on top of the pocket spring core 20 and an upholstered covering material (not shown) enclosing the pocket spring core 20.

[0035] Each pocketed spring element 21 comprises a pocket 22 and at least one coil spring (not shown) enclosed by the pocket 22. The pocket 22 may be made by spunbonding or needlepunching woven material or other nonwoven material. Each pocketed spring element 21 may be formed by providing a fabric layer, inserting the coil spring into the fabric layer, folding the fabric layer so as to cover the coil spring either before or after insertion of the coil spring, and applying longitudinal and transverse seams, for example by welding. Thus, each pocketed spring element 21 may have a cylindrical or barrel shape. A number of pocketed spring elements 21 may be arranged in a row which may extend along a length

of the product, for example the mattress. A symmetry axis of the cylindrical or barrel shape extends in an up/down direction such that the sides of the pocketed spring elements 21 are in contact. Several of such rows may be arranged in a side-by-side relationship to create an assembly or matrix of pocketed spring elements 21 in rows and columns. A first row 23 of pocketed spring elements 21 is arranged along a first edge of the pocket spring core 20, and a second row 24 of pocketed spring elements 21 is arranged along a second edge of the pocket spring core 20. The first edge and the second edge are located on opposite sides of the pocket spring core 20. Further rows may be arranged between the first row 23 and the second row 24. As a result, a first column 31 of pocketed spring elements 21 is formed along a third edge of the pocket spring core 20, and a second column 32 of pocketed spring elements 21 is formed along a fourth edge of the pocket spring core 20. The third edge and the fourth edge are located on opposite sides of the pocket spring core 20 and perpendicular to the first and second edges. Depending on the length of each row, further columns are formed between the first column 31 and the second column 32.

[0036] Two separate elongate reinforcing members are provided. A first elongate reinforcing member 25 is arranged along the first edge on a top side of the pocketed spring elements 21 of the first row 23, and a second elongate reinforcing member 26 is arranged along the second edge on a top side of that the pocketed spring elements 21 of the second row 24. Each elongate reinforcing member 25, 26 comprises a rod 27, 28, which may be made of steel or plastics or a combination thereof. Depending on the length of the pocket spring core 20, the rods 27, 28 may be cut to a correspondingly matching length.

[0037] Furthermore, each elongate reinforcing member 25, 26 comprises a corresponding strip 29, 30 of for example nonwoven material. A length of the strip 29, 30 is arranged along the length of the corresponding row 23, 24.

[0038] Fig. 3 shows the arrangement of the strip 29 and rod 27 of reinforcing member 25 in more detail. Although Fig. 3 shows this arrangement with respect to reinforcing member 25, this arrangement and the following description applies likewise to other reinforcing members, for example reinforcing member 26 and reinforcing members 41 and 42 described below in connection with Figs. 5 and 6. In the upper part of Fig. 3, a top view of a section of the reinforcing member 25 is shown, and in the lower part of Fig. 3, a sectional view along sectional plane A-A is shown. The strip 29 encloses the rod 27 such that a first part 37 of the strip 29 is arranged between the rod 27 and the plurality of pocketed spring elements 21 of the row 23, and a second part 38 of the strip 29 covers the rod 27. As shown, the strip 29 may be folded around the rod 27 for enclosing the rod 27.

[0039] The first part 37 of the strip 29 may be glued to the top sides of each of the plurality of pockets 22 of the row 23. The first part 37 of the strip 29 may be glued to

the pockets 22, which may be made of nonwoven material, by adding a defined glue quantity and extent of the glue to create adhesion between the material of the pockets 22 and the first part 37 of the strip 29. A large variety of glue patterns may be used. For example a predefined glue quantity and extent of the glue may be added to each single pocket 22 along the row 23. In another example, a predefined glue quantity and extent of the glue may be added to every second pocket 22 along the row 23. In general, a predefined glue quantity and extent of the glue may be added to the pockets 22 along the row 23 as needed to obtain a sufficient adhesion.

[0040] The second part 38 of the strip 29, which covers the rod 27, may be glued to the first part 37 of the strip 29 for providing a closed enclosure for the rod 27. Additionally, the rod 27 may be glued to the first part 37 and/or the second part 38 of the strip 29 to avoid moving of the rod 27 within the enclosing strip 29. As shown, the whole enclosure formed by the strip 29 may be filled with glue 39.

[0041] As an alternative, each strip 29, 30 may comprise two separate sub-strips, a first sub-strip of the two sub-strips may be arranged between the corresponding rod 27, 28 and the plurality of pocketed spring elements 21 of the corresponding row 23, 24, and a second sub-strip of the two sub-strips may be arranged on top of the corresponding rod 27, 28 so as to cover the rod 27, 28. The first sub-strip may be glued to the top surfaces of each of the plurality of pockets 22 of the corresponding row 23, 24. The second sub-strip, which covers the corresponding rod 27, 28, may be glued to the first sub-strip for providing a closed enclosure for the rod 27, 28. Additionally, the rod 27, 28 may be glued to the first sub-strip and/or the second sub-strip to avoid moving of the rod 27, 28 within the enclosing strip 29, 30.

[0042] A width of the folded strip or the sub-strips may be in a range of 5 to 15 cm, for example, the width of the folded strip or the sub-strips may be 10 cm. A length of each strip 29, 30 may correspond essentially to a length of the pocket spring core 20. For example, a length of each strip 29, 30 may be in a range of 160 cm to 220 cm.

[0043] The rod 27, 28 may have a round, square, triangular, trapezium, polygonal, circular, ellipse, oval or rectangular cross-section, or a combination of several of these cross sections. In particular, the rod 27, 28 may have a flat rectangular cross-section and may be made of steel, e.g. spring steel. The flat rectangular cross-section may distribute a load on the edge of the pocket spring core 20 to a plurality of the pocketed spring elements 21 and the spring steel may contribute to maintain the shape of the pocket spring core 20.

[0044] Two more separate elongate reinforcing members may be provided. A third elongate reinforcing member 33 may be arranged along the third edge on a top side of the pocketed spring elements 21 of the first column 31, and a fourth elongate reinforcing member 34 may be arranged along the fourth edge on a top side of the pocketed spring elements 21 of the second column 32.

Each elongate reinforcing member 33, 34 comprises a corresponding strip 35, 36 of for example nonwoven material. A length of the strip 35, 36 is arranged along a length of the corresponding column 31, 32, i.e. the width of the pocket spring core 20. Each strip 35, 36 may be glued to the top sides of each of the plurality of pockets 22 of the corresponding column 31, 32.

[0045] A width of the strips 35, 36 may be in a range of 5 to 15 cm, for example, the width of the strips 35, 36 may be 10 cm. A length of the strips 35, 36 may correspond essentially to a width of the pocket spring core 20. For example, a length of the strips 35, 36 may be in a range of 60 cm to 160 cm.

[0046] Fig. 4 shows the lower left corner of the pocket spring core 20 of Fig. 2 in more detail. The second elongate reinforcing member 26 extends along the second row 24. A lower side of the strip 30 of the second elongate reinforcing member 26 is glued to top sides of the pockets 22 of the pocketed spring elements 21 arranged in the second row 24. The strip 30 is folded on itself in the longitudinal direction, i.e. the strip 30 is substantially twice as wide as shown in the figure and therefore lies in two layers. Between the two layers of the strip 30 is the rod 28. The upper layer of the strip 30 may be glued to the lower layer of the strip 30 along the longitudinal edges of the upper and lower layers of the strip 30, thus enclosing the rod 28. Additionally, the rod 28 may be glued to the upper and/or lower layer of the strip 30 to keep the rod 28 at a fixed position with respect to the strip 30 and the pockets 22 of the second row 24.

[0047] The strip 35 extends along the first column 31. A lower side of the strip 35 is glued to the top sides of the pockets 22 of the pocketed spring elements 21 arranged in the first column 31. The strip 35 and the strip 30 may overlap in the lower left corner of the pocket spring core 20, i.e. the strip 35 and the strip 30 may be glued to the same pocket 22 of the pocketed spring element 21 in the lower left corner of the pocket spring core 20. For example, the strip 35 may be glued on top of the strip 30 or the strip 30 may be glued on top of the strip 35 in the lower left corner of the pocket spring core 20.

[0048] However, as an alternative, the strip 35 and the strip 30 may be non-overlapping and there may be a gap between the strip 35 and the strip 30.

[0049] It is to be noticed that the above described arrangement of the second elongate reinforcement member 26 and the third elongate reinforcing member 33 in the lower left corner of the pocket spring core 20 applies likewise to the arrangement of the elongate reinforcement members 25, 26, 33 and 34 in the other three corners of the pocket spring core 20.

[0050] Fig. 5 shows a further pocket spring core 40. The pocket spring core 40 shown in Fig. 5 comprises the same first and second elongate reinforcing members 25, 26 as the pocket spring core 20 shown in Fig. 2. However, along the first and second columns 31, 32, the pocket spring core 40 comprises a third elongate reinforcing member 41 and a fourth elongate reinforcing member

42. The third elongate reinforcing member 41 and the fourth elongate reinforcing member 42 have the same structure as the first and second elongate reinforcing members 25, 26, i.e. each of the third and fourth elongate reinforcing members 41, 42 comprises a corresponding strip 43, 44 and a corresponding rod 45, 46.

[0051] The rods 45, 46 may be made of steel or plastics or a combination thereof. Depending on the width of the pocket spring core 40, the rods 45, 46 may be cut to a correspondingly matching length. The strips 43, 44 may be made of for example nonwoven material. A length of the strips 43, 44 extends along the length of the corresponding column 31, 32. Each strip 43, 44 encloses the corresponding rod 45, 46 such that a first part of the strip 43, 44 is arranged between the rod 45, 46 and the plurality of pocketed spring elements 21 of the corresponding column 31, 32, and a second part of the strip 43, 44 covers the rod 45, 46. For example, each strip 43, 44 may be folded around the corresponding rod 45, 46 for enclosing the rod 45, 46. The first part of the strip 43, 44 may be glued to the top sides of each of the plurality of pockets 22 of the corresponding column 31, 32. The second part of the strip 43, 44, which covers the rod 45, 46, may be glued to the first part of the strip 43, 44 along longitudinal edges of the strip 43, 44 for providing a closed enclosure for the rod 45, 46. Additionally, the rod 45, 46 may be glued to the first part and/or the second part of the strip 43, 44 to avoid moving of the rod 45, 46 within the enclosing strip 43, 44.

[0052] As an alternative, each strip 43, 44 may comprise two separate sub-strips, a first sub-strip of the two sub-strips may be arranged between the corresponding rod 45, 46 and the plurality of pocketed spring elements 21 of the corresponding column 31, 32, and a second sub-strip of the two sub-strips may be arranged on top of the corresponding rod 45, 46 so as to cover the rod 45, 46. The first sub-strip may be glued to the top sides of each of the plurality of pockets 22 of the corresponding column 31, 32. The second sub-strip, which covers the corresponding rod 45, 46, may be glued to the first sub-strip for providing a closed enclosure for the rod 45, 46. Additionally, the rod 45, 46 may be glued to the first sub-strip and/or the second sub-strip to avoid moving of the rod 45, 46 within the enclosing strip 43, 44.

[0053] The rod 45, 46 may have a round, square, triangular, trapezium, polygonal, circular, ellipse, oval or rectangular cross-section, or a combination of several of these cross sections. In particular, the rod 45, 46 may have a flat rectangular cross-section and may be made of metal, e.g. spring steel. The flat rectangular cross-section may distribute a load on the edge of the pocket spring core 40 to a plurality of the pocketed spring elements 21 and the spring steel may contribute to maintain the shape of the pocket spring core 40.

[0054] Fig. 6 shows the lower left corner of the pocket spring core 40 of Fig. 5 in more detail. The second elongate reinforcing member 26 extends along the second row 24 and is configured and glued to the pockets 22 of

the second row 24 as described above in connection with Fig. 4.

[0055] The third elongate reinforcing member 41 extends along the first column 31. A lower side of the strip 43 of the third elongate reinforcing member 41 is glued to top sides of the pockets 22 of the pocketed spring elements 21 arranged in the first column 31. The strip 43 is folded on itself in the longitudinal direction, i.e. the strip 43 is substantially twice as wide as shown in the figure and therefore lies in two layers. Between the two layers of the strip 43 is the rod 45. The upper layer of the strip 43 may be glued to the lower layer of the strip 43 along the longitudinal edges of the strip 43, thus enclosing the rod 45. Additionally, the rod 45 may be glued to the upper and/or lower layer of the strip 43 to keep the rod 45 at a fixed position with respect to the strip 43 and the pockets 22 of the first column 31.

[0056] The strip 43 and the strip 30 may overlap in the lower left corner of the pocket spring core 40, i.e. the strip 43 and the strip 30 may be glued to the same pocket 22 of the pocketed spring element 21 in the lower left corner of the pocket spring core 40. For example, the strip 43 may be glued on top of the strip 30 or the strip 30 may be glued on top of the strip 43 in the lower left corner of the pocket spring core 40.

[0057] However, as an alternative, the strip 43 and the strip 30 may be non-overlapping. Likewise, in the lower left corner of the pocket spring core 40, the rod 45 may overlap the rod 28 or the rods 45 and 28 may be arranged non-overlapping with a gap between them.

[0058] The above described arrangement of the second elongate reinforcement member 26 and the third elongate reinforcing member 41 in the lower left corner of the pocket spring core 40 applies likewise to the arrangement of the elongate reinforcement members 25, 26, 41 and 42 in the other three corners of the pocket spring core 40.

[0059] Fig. 7 shows a further example of gluing an elongate reinforcing member 61 to a plurality of pockets 22 of a pocket spring core 60. The plurality of pockets 22 may comprise pockets of any of the first and second rows 23, 24 or any of the first and second columns 31, 32 as described above in connection with the pocket spring core 20 of Fig. 2, i.e. pockets which are arranged along an edge of the pocket spring core 60. The elongate reinforcing member 61 comprises a rod 62 which is directly glued to a top surface of the plurality of pockets 22.

[0060] The rod 62 may be glued to the pockets 22, which may be made of nonwoven material, by adding a defined glue quantity and extent of glue 50 to create adhesion between the material of the pockets 22 and the rod 62. A large variety of glue patterns may be used. For example, a predefined glue quantity and extent of the glue 50 may be added to each single pocket 22 or every second pocket 22 along the rod 62. Although not shown in Fig. 7, in further embodiments, the rod 62 may also be glued to the pockets 22 by creating an unbroken, uniform glue line on the top surfaces of the pockets 22 along the

rod 62. For example, the uniform glue line on the top surfaces of the pockets 22 is formed along a diameter of each of the top surfaces of each pocket 22 such that the continuous unbroken glue line can be formed. The rod 62 may be placed in this glue line. In general, a predefined glue quantity and extent of the glue 50 may be added to the pockets 22 along the rod 62 as needed to obtain a sufficient adhesion.

[0061] Furthermore, a covering strip (not shown), which may be made of nonwoven material, may be placed on the rod 62, for example after or while gluing the rod 62 to the pockets 22. The strip may extend along the rod 62 and may have a width which is larger than the width of the rod 62. The width of the strip may be sufficient to cover the rod 62 and an expected excess of glue at each side of the rod 62. The width of the strip may be in a range of 5 to 15 cm, for example, the width of the strip may be 10 cm. A length of the strip may correspond essentially to a length of the row or column on which it is placed. For example, a length of the strip may be in a range of 60 cm to 220 cm. By adding such a strip, unintended attachment to for example roll back paper in the following process of roll packaging the pocket spring core 60 may be avoided. Furthermore, unintended attachment to other pocket spring core units from glue residues outside the rod may be avoided when stacking the several pocket spring core units after gluing.

[0062] Further rods may be arranged and glued at the other edges of the pocket spring core. The rods may be arranged separately from each other, i.e. they do not contact each other at the corners of the pocket spring core, i.e. gaps are provided between the rods.

[0063] In general, the adhesive used for gluing the elongate reinforcing members to the pocket material of the pocketed spring elements 21 may comprise a hot melt adhesive, polyurethane (PU) adhesive or epoxy lime adhesive. However, other adhesives may additionally be used, for example non-reactive or reactive adhesives. The hot melt adhesive may be based on polymer components including polyolefins such as ethylene-vinyl acetate copolymer (EVA), linear low density polyethylene (LLDPE) and other ethylene based semi-crystalline polymers, such as amorphous poly-alpha-olefins (APAO), such as olefin block copolymer (OBC), such as amorphous polypropylene, isotactic polypropylene and other propylene based polymers, styrene block copolymers (SBC) such as styrene-isoprene-styrene (SIS) copolymer and styrene-butadiene-styrene (SBS) copolymer, ethylene ethyl acrylate copolymers (EEA), polyamides (PA), polyesters, and polyurethane reactive adhesives (PUR). The polyurethane adhesive may comprise for example a PU adhesion based on isocyanate and polyol, and the epoxy lime adhesive may comprise for example two-component epoxy glue.

[0064] It is to be noticed that the elongate reinforcing members may be positioned at an arbitrary position on the top surface or the bottom surface of the pockets 22, for example at the center or near the outer edges of pocket

spring core without taking into account the locations of spring turns of the coil springs inside the pocketed spring elements 21. For example, the location of the elongate reinforcing member may vary from along the outer edge of the outer row or column of pocketed spring elements stepless step is to for example a second or third row or column of pocketed spring elements of the pocket spring core. Each elongate reinforcing member can be positioned independent from any other elongate reinforcing member of the pocket spring core as required or appropriate. Therefore, this process can be automated and is suitable to be performed by a machine, for example a robot.

[0065] As described above, the elongate reinforcing members may be glued to the pocket spring core on two or four sides. Elongate reinforcing members may be arranged either on the bottom side, the top side or on both sides of the pocket spring core.

[0066] Fig. 8 depicts a further pocket spring core 20 which essentially corresponds to the pocket spring core 20 of Fig. 2 described above. However, as shown in Fig. 8, each of the elongate reinforcing members comprises several separate pieces or sections arranged along a side of the pocket spring core. For example, the elongate reinforcing member 25 may comprise three separate sections 25a, 25b, 25c each comprising a corresponding sub-rod, wherein at least the sub-rods of these sections are separated from each other. Likewise, for example, the elongate reinforcing member 26 may comprise three separate sections 26a, 26b, 26c, wherein at least the sub-rods of these sections are separated from each other. The strips of the elongate reinforcing members 25, 26 may be continuous or also separated by the sections. The separate sections may be spaced apart from each other in the longitudinal direction, for example, the sub-rods may be spaced apart from each other in the longitudinal direction by a few millimeters or centimeters. Providing an elongate reinforcing member with several separate sections may achieve horizontal rigidity and vertical flexibility of the pocket spring core. For example, the pocket spring core 20 may be part of a mattress. The elongate reinforcing members 25, 26 along the rows 23, 24 of the pocket spring core 20 of the mattress may each consist of three sections, one section 25a, 26a for the head part, one section 25b, 26b for the center part, and one section 25c, 26c for the foot part of the mattress. The vertical flexibility caused by the three sections of the elongate reinforcing members enables an individual inclination for each part of the mattress, for example in adjustable beds.

[0067] To improve adhesion to the elongated reinforcing members and to achieve a consistent adhesion force, the strip and in particular the rod may be preheated prior to the gluing.

[0068] Preheating the rod may be combined with a chemical/mechanical treatment of a surface of the rod prior to preheating. For example, surface treatments may comprise brushing the surface of the rod or punching

holes in the rod, or chemically cleaning or etching the surface of the rod. However, the chemical/mechanical treatment of the surface of the rod may be made independent from preheating the rod, for example without preheating the rod.

[0069] Fig. 9 shows method steps of a method for manufacturing a pocket spring core, for example the pocket spring core 20 shown in Fig. 2. According to this method, in step 71 an assembly of a plurality of pocketed spring elements 21 arranged in rows 23, 24 and columns 31, 32 is provided. Each of the plurality of pocketed spring elements 21 is formed of a pocket 22 and at least one coil spring enclosed by the pocket 22. In step 72, at least two elongate reinforcing members comprising a first elongate reinforcing member 25 and a second elongate reinforcing member 26 separate from the first elongate reinforcing member 25 are provided such that the first elongate reinforcing member 25 is arranged along a first edge of the assembly and the second elongate reinforcing member 26 is arranged along a second edge of the assembly. The first edge and the second edge are located on opposite sides of the assembly. A first row 23 of pocketed spring elements 21 is arranged along the first edge, and a second row 24 of pocketed spring elements 21 is arranged along the second edge. In step 73, the first elongate reinforcing member 25 is glued to a first plurality of pockets 22 of the plurality of pocketed spring elements 21 arranged along the first edge in the first row 23 of the assembly, and the second elongate reinforcing member 26 is glued to a second plurality of pockets 22 of the plurality of pocketed spring elements 21 arranged along the second edge in the second row 24 of the assembly.

[0070] At least the steps of positioning and gluing the first and second elongate reinforcing members 25, 26 to the pockets 22 of the plurality of pocketed spring elements 21 in the first and second rows 23, 24 may be performed automatically by a manufacturing machine, such as a robot.

Claims

1. A pocket spring core, comprising:

an assembly of a plurality of pocketed spring elements (21) arranged in rows (23, 24) and columns (31, 32), each of the plurality of pocketed spring elements (21) being formed of a pocket (22) and at least one coil spring enclosed by the pocket (22), and
at least two elongate reinforcing members comprising a first elongate reinforcing member (25) and a second elongate reinforcing member (26) separate from the first elongate reinforcing member (25), the first elongate reinforcing member (25) being arranged along a first edge of the assembly and the second elongate reinforcing member (26) being arranged along a second

edge of the assembly, the first edge and the second edge being located on opposite sides of the assembly,

wherein the first elongate reinforcing member (25) is glued to a first plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the first edge of the assembly, and the second elongate reinforcing member (26) is glued to a second plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the second edge of the assembly.

2. The pocket spring core of claim 1, wherein the at least two elongate reinforcing members are exactly two elongate reinforcing members.

3. The pocket spring core of claim 1, wherein the at least two elongate reinforcing members comprise a third elongate reinforcing member (33, 41) and a fourth elongate reinforcing member (34, 42) separate from the third elongate reinforcing member (33, 41), the third elongate reinforcing member (33, 41) being arranged along a third edge of the assembly and the fourth elongate reinforcing member (34, 42) being arranged along a fourth edge of the assembly, the third edge and the fourth edge being located on opposite sides of the assembly, wherein the third elongate reinforcing member (33, 41) is glued to a third plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the third edge of the assembly, and the fourth elongate reinforcing member (34, 42) is glued to a fourth plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the fourth edge of the assembly.

4. The pocket spring core of any one of the preceding claims, wherein each of the at least two elongate reinforcing members comprises a rod (27, 28, 45, 46, 62) made of steel or plastics or a combination thereof.

5. The pocket spring core of claim 4, wherein the rod (27, 28, 45, 46, 62) has a cross section which is one of a group comprising:

- a quadratic cross section,
- a rectangular cross section,
- a triangular cross section,
- a trapezium cross section,
- a polygonal cross section,
- a circular cross section,
- an ellipse cross section, and
- an oval cross section.

6. The pocket spring core of any one of the preceding claims, wherein each of the at least two elongate

reinforcing members comprises a strip (29, 30, 35, 36, 43, 44) of nonwoven material.

7. The pocket spring core of claim 4 and claim 6, wherein the strip (29, 30, 35, 36, 43, 44) encloses the rod (27, 28, 45, 46, 62) such that a first part of the strip (29, 30, 35, 36, 43, 44) is arranged between the rod (27, 28, 45, 46, 62) and the corresponding plurality of pockets (22) to which the corresponding reinforcing member is glued, and a second part of the strip (29, 30, 35, 36, 43, 44) covers the rod (27, 28, 45, 46, 62). 5
8. The pocket spring core of claim 4 or claim 5, wherein the rod (62) is directly glued to the corresponding plurality of pockets (22). 10
9. The pocket spring core of claim 8, wherein a strip of nonwoven material is arranged on the rod (62) and glued to the corresponding plurality of pockets (22) so as to cover the rod (62). 15
10. The pocket spring core of any one of the preceding claims, wherein each of the at least two elongate reinforcing members is glued to the corresponding plurality of pockets (22) by use of an adhesive selected from a group comprising: 20
 - a hot melt adhesive,
 - a polyurethane adhesive, and
 - an epoxy lime adhesive. 25
11. The pocket spring core of claim 10, wherein the hot melt adhesive is based on at least one of a group comprising: 30
 - polymer components including polyolefins,
 - linear low density polyethylene,
 - ethylene based semi-crystalline polymers,
 - isotactic polypropylene,
 - propylene based polymers,
 - styrene block copolymers,
 - ethylene ethyl acrylate copolymers,
 - polyamides,
 - polyesters, and
 - polyurethane reactive adhesives. 35
12. The pocket spring core of claim 10 and claim 11, wherein the polyurethane adhesive comprises a polyurethane adhesive based on isocyanate and polyol. 40
13. The pocket spring core of any one of claims 10-12, wherein the epoxy lime adhesive comprises a two-component epoxy glue. 45
14. The pocket spring core of any one of the preceding claims, wherein each pocket of the plurality of pock-

ets (22) has a substantially cylindrical shape having a top surface and a bottom surface, wherein each of the at least two elongate reinforcement members is glued to the top surfaces or bottom surfaces of the corresponding plurality of pockets (22).

15. A bedding or seating product, wherein the bedding or seating product comprises a pocket spring core (20, 40, 60) according to any one of the preceding claims.
16. A method of manufacturing a pocket spring core, the method comprising:

providing (71) an assembly of a plurality of pocketed spring elements (21) arranged in rows (23, 24) and columns (31, 32), each of the plurality of pocketed spring elements (21) being formed of a pocket (22) and at least one coil spring enclosed by the pocket (22), and positioning (72) at least two elongate reinforcing members comprising a first elongate reinforcing member (25) and a second elongate reinforcing member (26) separate from the first elongate reinforcing member (25) such that the first elongate reinforcing member (25) is arranged along a first edge of the assembly and the second elongate reinforcing member (26) is arranged along a second edge of the assembly, the first edge and the second edge being located on opposite sides of the assembly, gluing (73) the first elongate reinforcing member (25) to a first plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the first edge of the assembly, and the second elongate reinforcing member (26) to a second plurality of pockets (22) of the plurality of pocketed spring elements (21) arranged along the second edge of the assembly.

17. The method of claim 16, wherein the pocket spring core (20) comprises the pocket spring core of any one of claims 2-14.
18. The method of claim 16 or claim 17, wherein at least the steps of positioning (72) and gluing (73) are performed automatically by a manufacturing machine.

FIG 1

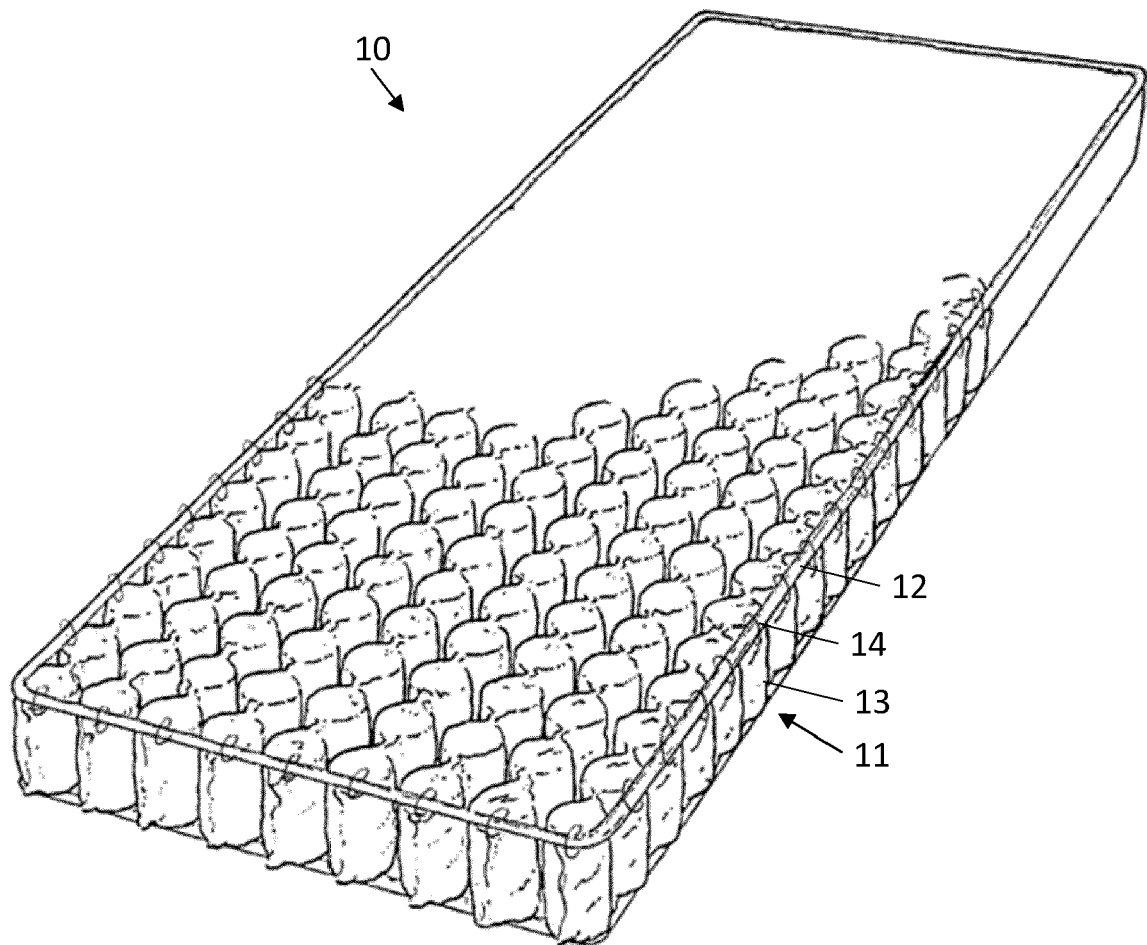


FIG 2

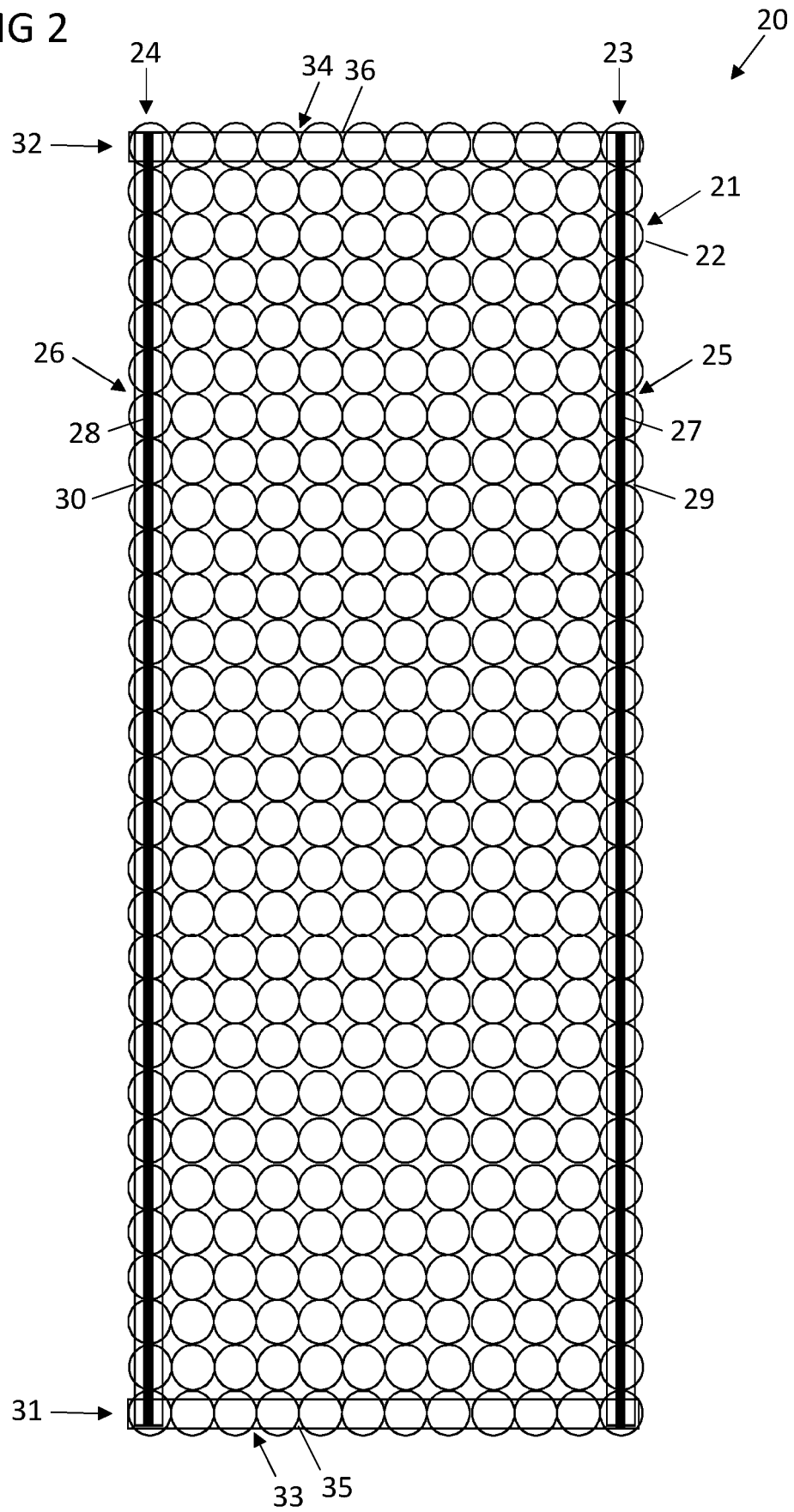


FIG 3

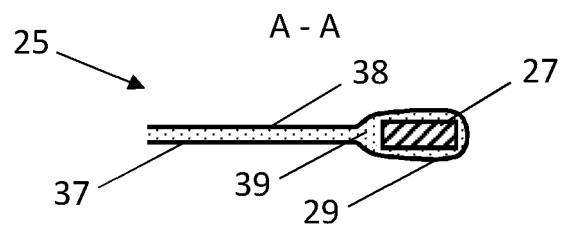
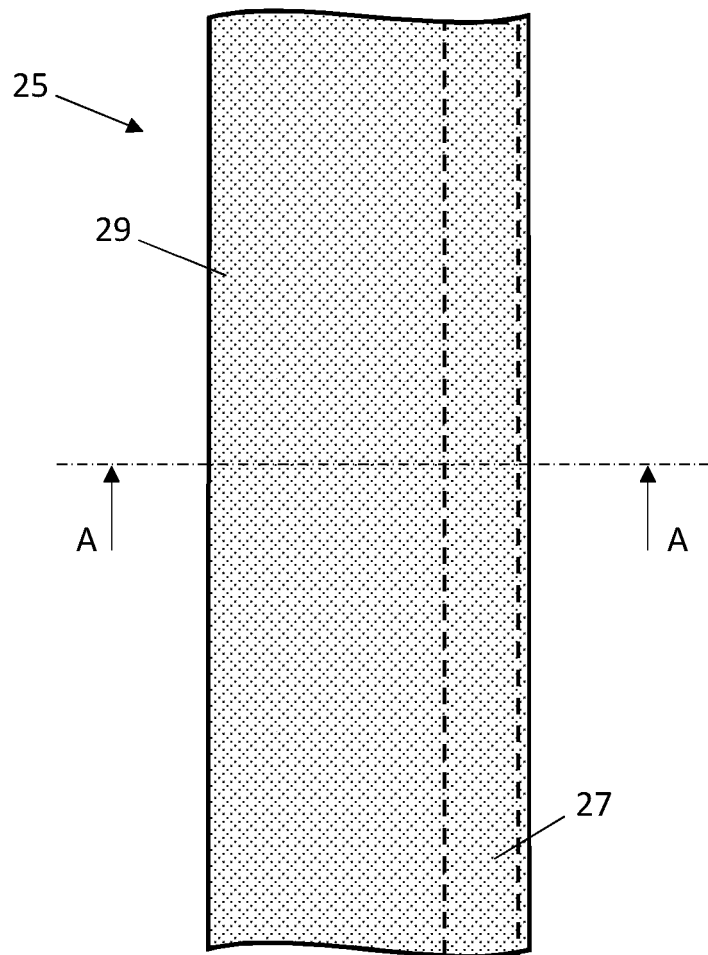


FIG 4

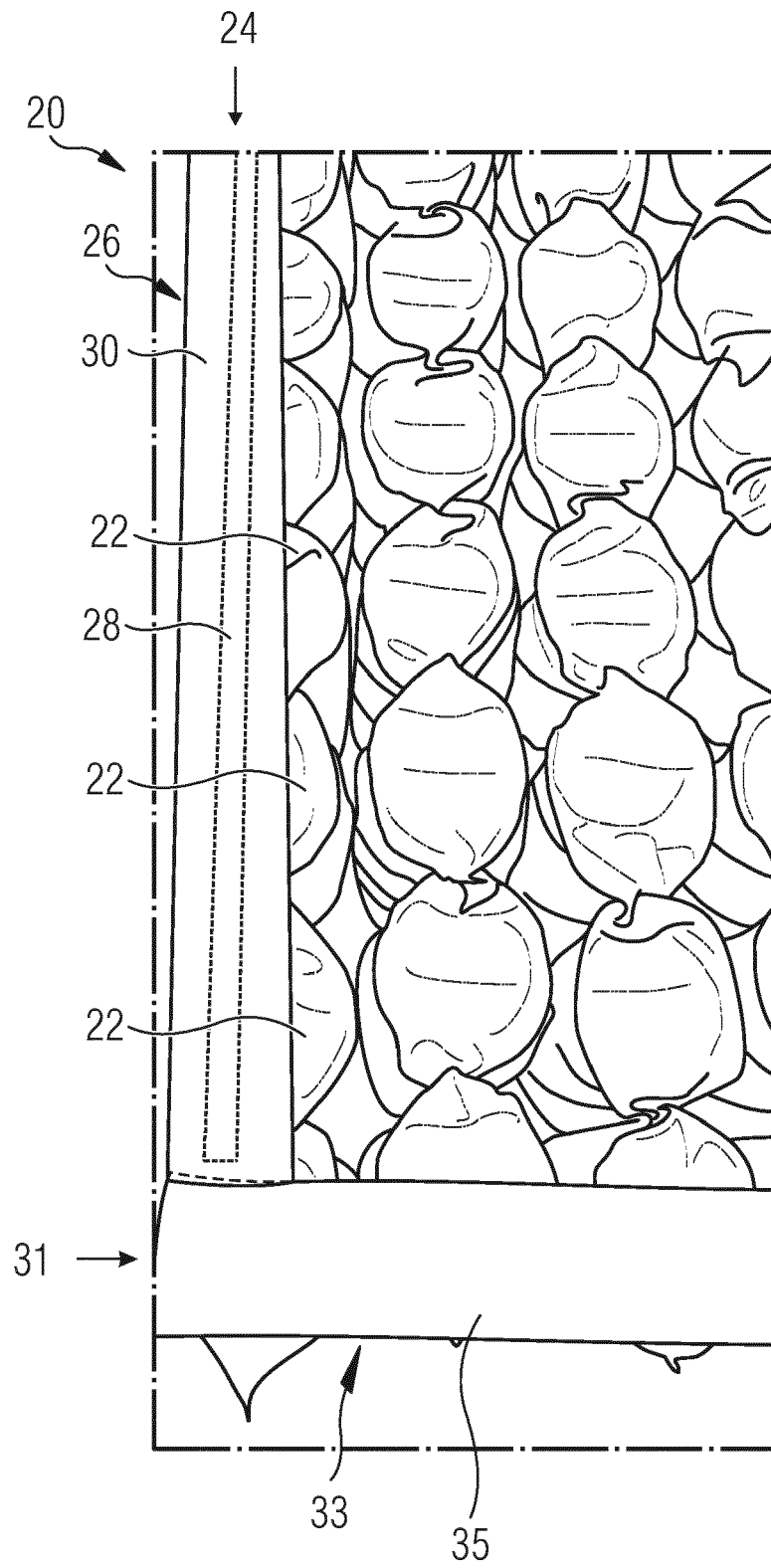


FIG 5

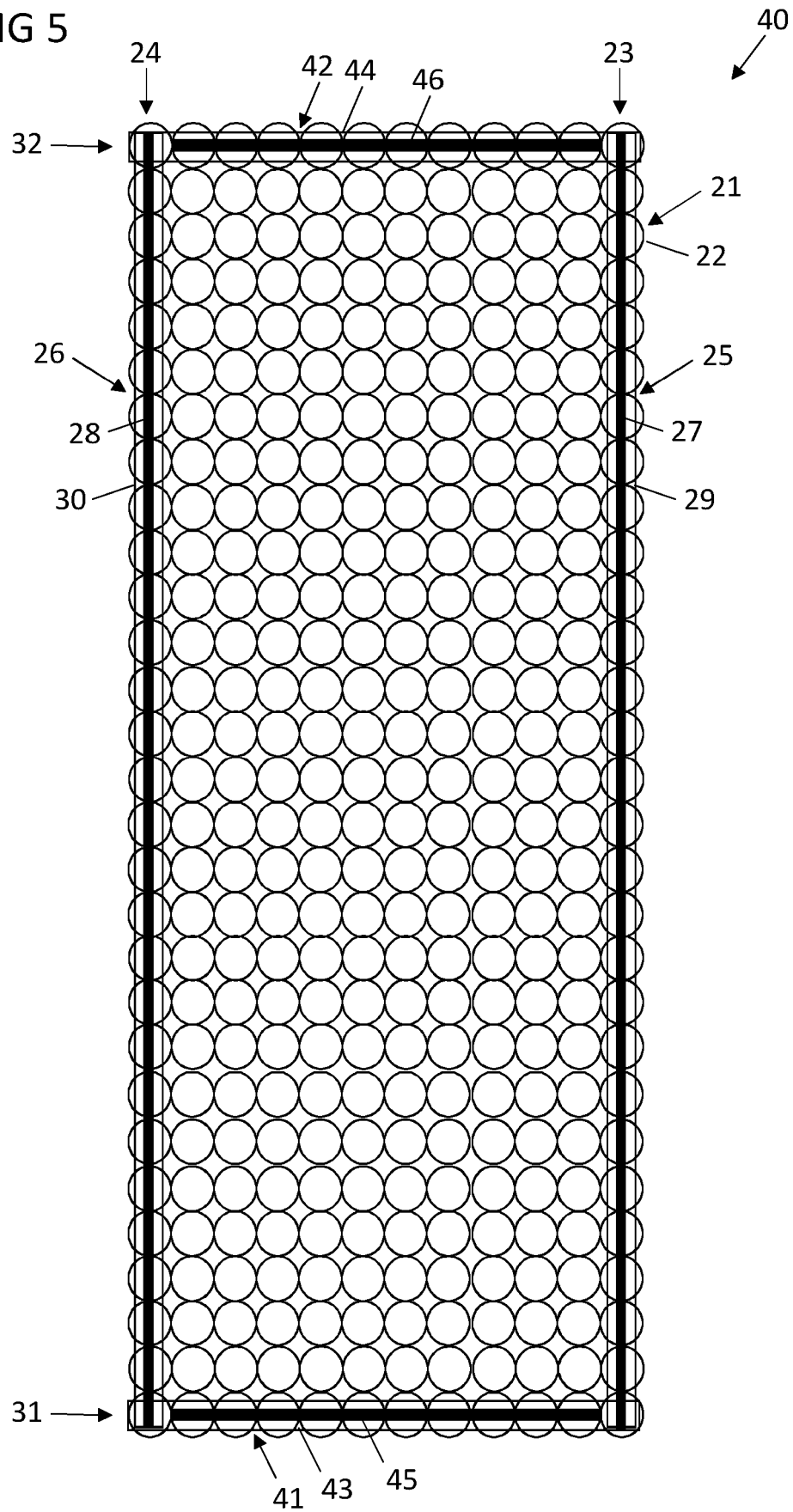


FIG 6

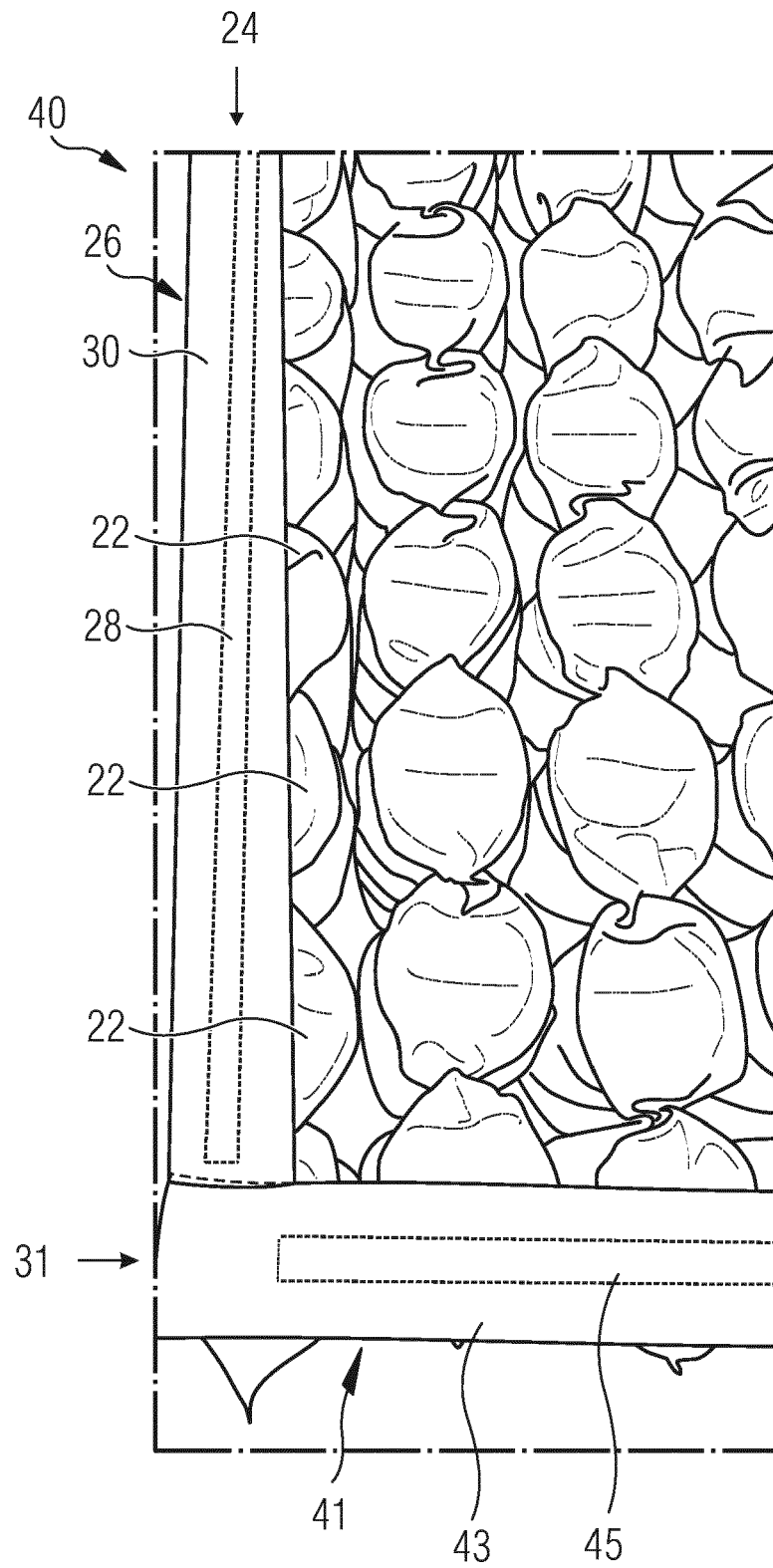


FIG 7

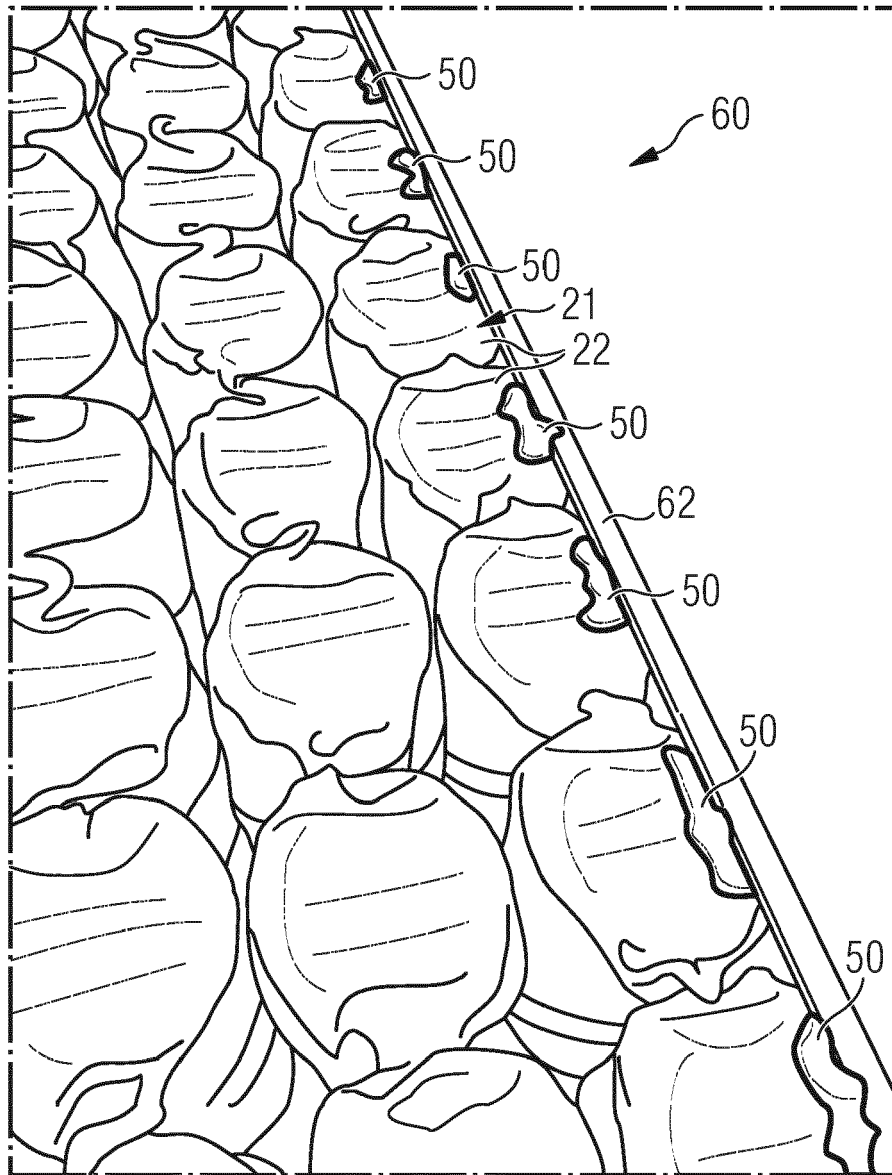


FIG 8

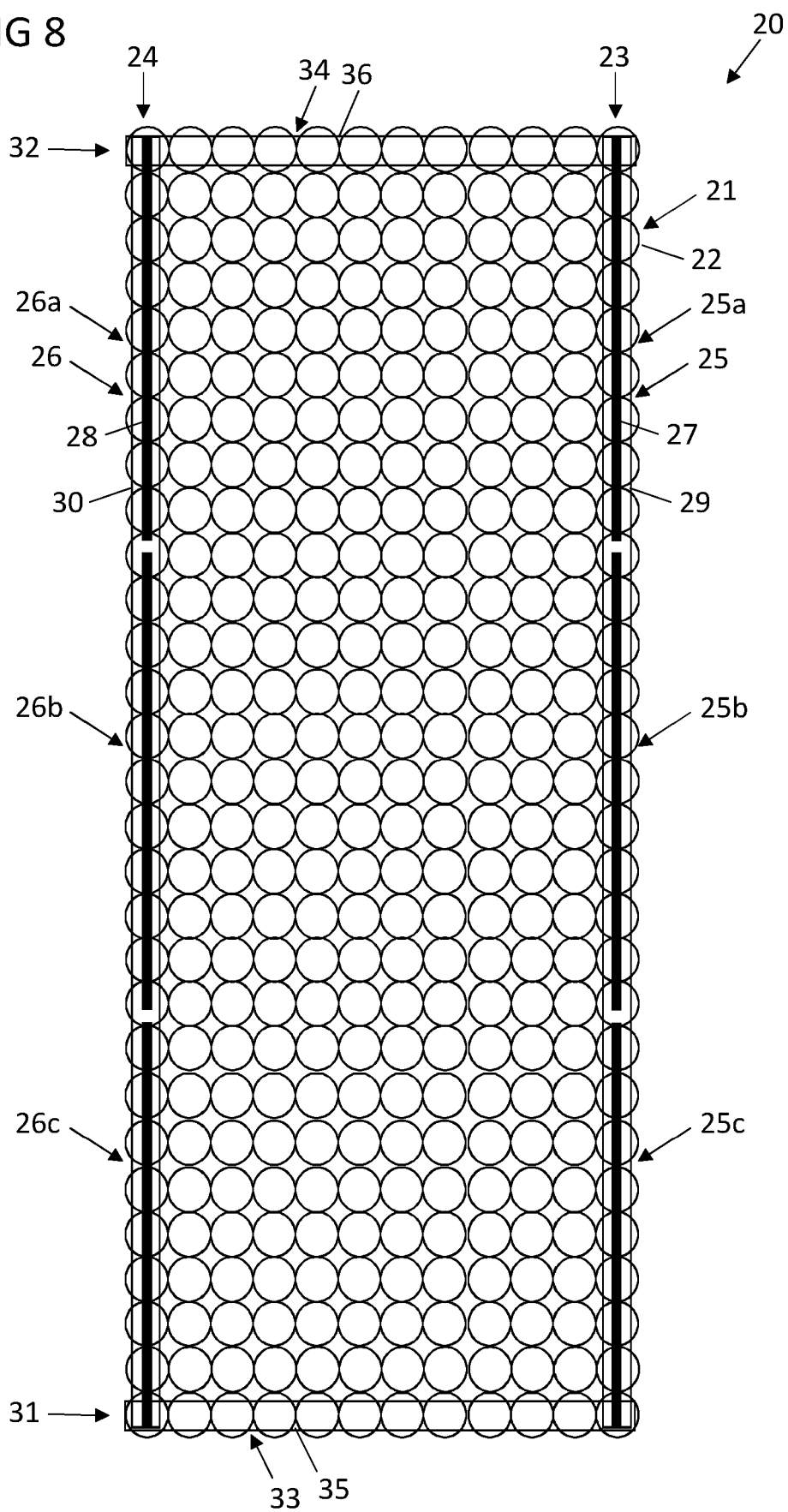
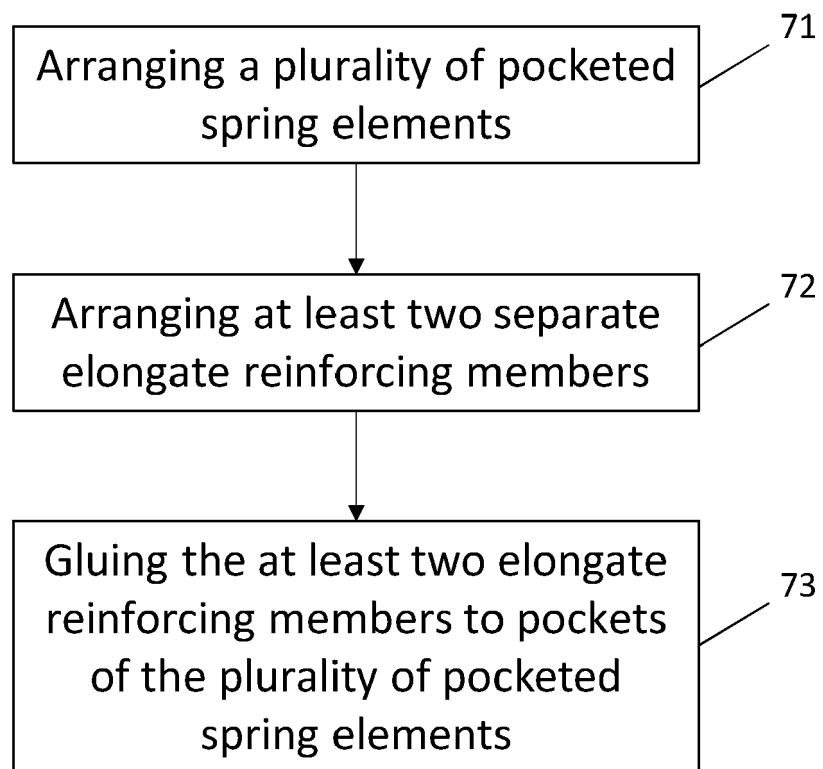


FIG 9





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Place of search The Hague		Date of completion of the search 7 October 2021	Examiner Kis, Pál
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