ABSTRACT

It is proposed a new construction system for mattress made of latex including sacked springs, that allows an assembly without glueings or fastenings of mechanical type and allows to supply different bearing surfaces for the human body with different support densities, suitable for the different zones of human body in the rest position and related manufacturing method.
FIG. 3

FIG. 4
MATTRESS MADE OF LATEX FOAM INTEGRATING A STRUCTURE OF SPRINGS SACKE D OR HELD IN OTHER SUPPORTING MATERIAL

FUNDAMENT OF THE INVENTION

[0001] This invention refers to the manufacturing field of elastic mattresses made of foamed materials and holding springs for getting a better support of human body during the rest period. The types of mattress present on the market are substantially the following ones:

[0002] 1. Mattresses made with springs and fabric materials,
[0003] 2. Mattresses made of sole wool,
[0004] 3. Mattresses made of sole polyurethane foam or other artificial foam materials derived from petroleum,
[0005] 4. Mattresses made of natural or artificial latex, without other supports of different materials.

[0006] Each of above mentioned components, such as springs, wool, natural and artificial fibres, polyurethane, latex foam and other materials are mainly used in combination with other materials in various percentages and construction forms.

[0007] The main characteristic, that an efficient and ergonomic mattress must have, is the body support for guaranteeing a correct support to the spinal column during the rest period and the user’s comfort necessary for a compete muscle relaxation, and it further avoids the formation of pressure points in which the blood does not circulate owing to excessive tissue compression.

[0008] Excepting the traditional mattress made of wool and those ones made of latex foam or polyurethane or other foamed materials, the actually known spring mattresses supply the elastic support sometimes by steel springs or springs made of other materials, e.g. plastic material and natural or artificial fibres.

[0009] In the field of spring mattress types it exists a particular structure that is commonly termed as “sacked” springs, as each spring is Inserted singularly in a fabric sack that insulates it from the other ones. This structure is characterised by its particular adaptability to the body form as, owing to the sack, each spring is relatively independent from the adjacent ones and then it supplies a differentiation of the body support thanks to the presence of a series of springs near and working in an independent manner with one another.

[0010] The springs can be completely independent (if they are not joined with one another) or relatively joined with one another in any manner and position.

[0011] For making comfortable the body support structure there are added different strata of materials among which some foam strata such as of latex, polyurethane, other foamed materials, and the whole structure is covered by stuffings made of wool, cotton or other materials and then closed in a fabric envelope or sack.

[0012] The connection of foam strata to the springs occurs by a mechanical process, e.g. clinching by metallic stitches or by glueing; these two operations are both costly as they require a rather long and tedious manual work and that must be made in the greater part manually by skilled workers.

[0013] The glueing operation can also compromise the mattress duration as using it for various years the glue can lose its adhesive capacity; further the manual glueings operation cannot be made in the correct manner or the glue cannot be applied in uniform manner on two pieces belonging to the same production lot or simply on the same piece.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Owing to the disadvantages of preceedently used systems we have thought to integrate a structure of many sacked springs in a sole latex foam block, avoiding each manual glueing or single clinching operation, that is not always precise and requires a lot of labor. Further the new system allows, if it is wished, to make different all of surfaces in areas having different densities or support capacities and forms for receiving in the more suitable manner the different human body zones in the rest position. In fact back, legs, shoulder zone, for getting a complete rest require a differentiated support and different absorption depth of the human body into the mattress.

Invention Process

[0015] The spring structure is inserted in a mold preferably made of aluminium alloy having dimensions slightly higher than the ones of the spring structure so that it remains an empty interspace between the mold and the structure in conjunction with each face, but not necessarily in conjunction with all faces.

[0016] One or many strata of any material can be put over the spring structure with the aim, for example, to insulate better the springs from the latex foam or to increase the mattress comfort or simply to increase its thickness.

[0017] The mold is closed hermetically by a cover on which there are applied “nozzles” suitably positioned so that they can inject the latex foam. The latex foam injection establishes the filling of all of interspaces over, under and on the flanks of the spring structure but not in the inside thereof, as the springs are sacked and the covering material causes them to become “impermeable” (completely or partially) against the latex foam, that is rather dense.

[0018] After the injection there will be made the process for the fabrication of a latex foam block, independently from the applied method

Product Characteristics

Internal Part

[0019] Springs sacked singularly, or in groups, or on the whole
[0020] Springs of any form, type and material and in any number.

[0021] The spring structure can be homogeneous or not homogeneous as regards the spring forms, the density per square meter, each spring characteristic.
Strata of any material can be put on the springs with a different aim owing to the used material (to insulate, to increase the comfort or other properties).

External Part

The surface, or the rest plane, can be smooth or machined for dividing the structure in zones: alveolar or filled; differentiated of equal on both sides.

The flanks can be filled or supplied with holes or machined.

Foam Composition

The composition and/or density of used latex foam can be changed in relation to characteristics of the finished product that it is wished.

Possible Variants

The mold can be of "opened" type instead of "closed" type as above described; in this case the latex foam shall not be injected after the cover closing, but it shall be simply poured into the inside of the mold that will be kept opened until its also partial filling and it will be closed only in the following phases.

In this manner the spring structure can be inserted after the filling, also partial, of the mold (but before its closing) or during the filling operation.

In the case of "naked" spring structure, very great empty spaces exist among the springs that in some way must be made "impermeable" (completely or partially) to the latex foam. The more simple solution is that of using a sacked spring structure among the ones found usually on the market, but all of spring types existing on the market can be used, provided that the springs are wound or closed into a suitable material.

The winding can concern the whole complete structure or blocks or rows of springs, or each single spring and can also regard only some parts of spring structure.

The material that makes impermeable the springs against the latex foam (completely or partially), can be fabric, unweaved fabric, galize, polyether, polyurethane, polyethylene, paper or any other material suitable for this aim, including jute, hemp, raffia and cotton.

Instead of integrating (plunging) into the latex foam a spring structure, we can insert a block of any other material, for example, a block of polyurethane foam eventually and suitably shaped or a block of coco fibres or a block of polyester fibres for obtaining mattresses "in strata" (sandwich) and/or in zone form.

In the case of closed mold the foam can be injected, through the cover and also (or solely) through the walls and/or also (or solely) through the mold bottom.

For a better comprehension of this invention and for showing as the same one can applied, it shall be made reference, as sole example aim, to the annexed drawings, in which.

FIG. 1 shows the normal position that a person assumes on an elastic mattress supplied with springs and having a traditional structure;

FIG. 2 shows a solution of sacked springs as they are foreseen for the assembly in the mattress of the present invention;

FIG. 3 shows a final structure of strata that is possible in a mattress structure of the previous technics, that can be broken easily,

FIG. 4 shows a possible structure of holes for getting different densities on the rest plane/s;

FIG. 5 shows a possible structure of mold for the injection and the fulfillment of a mattress with springs embodied into the rubber latex, according to the present invention;

FIG. 6 shows a detail of the position of sacked springs laid on suitable cylindrical or conical pins or having another form present in the mold;

FIG. 7 shows a mold structure in perspective view in opened condition including the cover and pins for generating in the mattress, after the extraction, some holes for the lateral perforation.

FIG. 8 shows a possible final external structure of the new mattress with differentiated surface and density and with transpiration holes on the lateral surfaces;

FIG. 9 shows a further mattress layout in the mold with an internal structure made of various natural or artificial material in fibre foam or made of expansible material;

Making now reference to the FIG. 1, it is shown the normal position that a person assumes on an elastic mattress supplied with springs and having a traditional structure, in which M indicates the finished mattress, PE indicates a person lying on his/her back side and the arrows A1, B1 show the deformation actions of the mattress when it is submitted to the weight of the various body parts. Evidently the central part corresponding to the body barycenter or to the pelvis and to the shoulders are more "hard" as they must support a greater weight, while the zones of arms and head can be made more soft as they are submitted to a lower weight.

The FIG. 2 shows a typical structure of sacked springs as they are foreseen for the assembly of mattress of the present invention. It must be noticed that, in previous technics, these springs might be wound in wool or cotton wadding mass, or made of any other material foreseen for increasing the comfort.

In the case of the present invention the springs are wound by a proper material on each side, therefore they remain internally empty and then they can apply more efficiently the flexibility action on the user's body. M shows the spring and EL shows the external material, of various compositions, but in any case impermeable (completely or partially) against the latex foam.

The FIG. 3 shows a possible structure of a mattress made by the previous technics, that can be easily broken, as the various parts are glued, sawn or clinched and the same springs are glued or sewn or clinched in various manners to
a sole latex stratum obtained precedingly, then subject to breakages or to drawback of breakaway of glued, sewn or clinched parts.

[0047] The FIG. 4 shows a possible hole structure suitable for getting the density variation.

[0048] These holes are obtained, in the present invention, using the cover and mold bottom structures, that are supplied with pins having dimensions suitable for the various types of holes, that will be described in relation to FIGS. 5, 6, 7, 8.

[0049] The FIG. 5 shows a possible mold structure for the injection 1 and the fulfillment of a mattress structure with springs embodied in the rubber latex, according to the present invention.

[0050] The mold is made up of the walls 2, 3, the wall 6 in the sheet plane and the wall 7 in the plane behind the sheet, a bottom 4, a cover 5 and the elements 8 for the aerating holes. The bottom 4 or the cover 5, in its internal sides, are supplied with pins 11 having sections suitable for creating the differentiated holes of the mattress that were described with reference to FIG. 4 and are laid on the faces 12 of the springs. There are foreseen nozzles 9, 10 for introducing the latex foam, in a various number, for distributing in a regular manner the latex foam within the mold. The springs 13 are sacked in any suitable material 14 (FIG. 6) for getting that the latex foam remains out (completely or partially) of the internal spring space. This allows a better flexibility and comfort.

[0051] The four lateral walls 2, 3, 6, 7 (FIG. 7) can be tilted in the moment of mattress extraction from the mold.

[0052] The springs 13 (FIG. 6) at the moment of preparation for the injection are laid onto internal pins 11.

[0053] It is foreseen also another possible spring structure covered by protection material against the latex foam (completely or partially), this material being a fabric, unweaved fabric, gauze, polyethylene, polyurethane, polyethylene, paper or any other material suitable for this aim, including lute, hemp, raffia and cotton, suitable to insulate the spring's (completely or partially) with respect to the latex foam for avoiding that the spring's are buried in latex foam and that in this manner the flexibility of the spring structure is reduced.

[0054] The FIG. 6 shows the rest situation of springs 13, covered by impermeable material (completely or partially) onto latex foam 14 on all of sides. The zones 20 adjacent to horizontal faces of springs are naturally filled with latex foam, therefore the springs are suspended on the pins 11 during the injection. The pins 11 form also the support of springs for making them stable during the injection.

[0055] The FIG. 7 shows a structure mold in perspective view in opened condition including the cover 5 and the pins for lateral aerating holes. The shown mold includes a division wall 22 extractable/replaceable (preferably made of aluminium alloy) that allows to make the bed mattress for a sole person obtaining two mattresses contemporaneously, while extracting this wall it is possible to make a mattress for two persons with the same production modalities.

[0056] The cover 5 can be lifted for the insertion of springs into the mold and is closed and locked again when said load of springs is made. The springs due to its weight and due to a light pressure applied by pins 11 remain stable during the injection.

[0057] The FIG. 8 shows a possible final external structure of the mattress in a sole block with zones having different densities F1, F2, F3 substantially as the ones indicated in FIG. 4, and indicates the holes 8 generated by pins 8, after having extracted the mattress from the mold. These holes make easier the air transpiration across the finished mattress.

[0058] The FIG. 9 shows a further layout of the mattress in the mold with an internal structure UR made of various natural or artificial materials made of fibres or other expandable material, of polyurethane foam, or coco fibres or wool or polyester fibres for manufacturing a mattress in strata (sandwich) and/or with different zones.

[0059] Although this invention was described with reference to some of its particular embodiments, many other variants and modifications and other uses shall be evident to the skilled technicians.

1. Mattress made of latex foam including a structure of springs or other bearing material, that is obtained by a construction system of mattress including sacked springs, that allows an assembly without glueings or fastenings of mechanical type or seams, and allows to create different bearing surfaces for the human body with different support densities suitable for the different zones of human body in the rest position, characterised in that a structure of many sacked springs is included in a block of latex foam, and that allows to differentiate the surfaces in areas having different densities or support capacities and forms for including in the more suitable manner the different human body zones in the rest position as back, legs, shoulder zone, for getting a complete rest, require a differentiated support and with different absorption depths and transpiration of the human body laid on the mattress.

2. Process for the fabrication of the mattress of claim 1, characterised in that the spring structure is inserted in a closed mold or mold with hinged cover having dimensions slightly higher than the ones of the spring structure so that an empty jacket remains between the mold and the structure in conjunction with each mattress face, and that over the spring structure there are foreseen one or more strata of any material having the aim to insulate better the springs from the latex foam or to increase the comfort of the mattress or simply to increase its thickness, and afterwards the mold is closed hermetically by a cover and in that the mold is supplied with nozzles suitably located so that it is possible to inject the latex foam through them and in the following it occurs the injection of the latex foam that causes the filling of one, some and/or all interspaces over, under and on the sides of the spring structure, also partially, but not in the inside of springs, being the springs sacked and made impermeable (completely or partially) to the latex foam material covering them, and in that after the injection it is made the normal process for forming a latex foam block, whatever is the process applied.
3. A mattress according to claim 1 and manufactured by the process of claim 2, having the following general characteristics:

**INTERNAL PART**

Springs sacked singularly, or in groups, or on the whole.

Springs of any form, type and material and in any number.

The spring structure can be homogeneous or not homogeneous as regards the spring forms, the density per square meter, and each spring characteristic.

Strata of any material can be put over the springs and/or on the various faces with a different aim owing to its position and the used material (to insulate, to increase the comfort, or to increase the thickness, etc.).

**EXTERNAL PART**

The surface can be smooth or machined for dividing the structure in zones; alveolar or filled: differentiated or equal on both sides.

The flanks can be filled or supplied with holes or machined.

One or more faces/flanks can be provided also without latex foam.

**FOAM COMPOSITION**

The composition and/or density of used latex foam can be changed in relation to characteristics of the finished product that it is wished to obtain, then it can be changed density, injection temperature, mixture composition, additive adding, etc.

4. Mattress and fabrication method according to preceding claims, characterised in that the mold can be of "opened" type instead of "closed" type as above described in claim 2; in this case the latex foam shall be not injected into the mold, but it will be simply poured into the mold, that is kept opened until its also partial filling and it is closed only in the following phases, so that the spring structure is inserted into the latex foam mass after the filling, also partial of the mold (but before its closing) or during the filling operation.

5. Mattress and fabrication method according to preceding claims, characterised in that the spring structure is made "impermeable" (completely or partially) to the latex foam using a sacked spring structure, but being also used all of types of springs, provided that the springs are wound or closed in a suitable material, the winding concerning the whole complete structure or spring blocks or rows, or each single spring, including also the mixed "naked" and covered spring solutions.

6. Mattress and fabrication method according to preceding claims, characterised in that the springs are made impermeable against the latex foam (completely or partially), by various materials such as fabric, unweaved fabric, gauze, polyether, polyurethane, polyethylene, paper or any other material, including jute, hemp, raffia and cotton suitable for the insulation and/or impermeabilization aims (completely or partially) of the latex foam, including plastic materials and films, thin sheets, bands.

7. Mattress and fabrication method according to preceding claims, characterised in that instead of integrating a spring structure into the latex foam it is inserted a block or many blocks of any other material, such as a block or some blocks of polyurethane foam eventually and suitably shaped or a block/s of coco fibres, or a block/s of polyester fibres for obtaining mattresses "in strata" (sandwich) and/or divided in zones, including also mixed solutions.

8. Mattress and fabrication method according to preceding claims, characterised in that, in the case of use of closed mold, the foam is injected, from the cover, or in alternative also (or solely) from the walls and/or also (or solely) from the mold bottom.

9. Mattress and fabrication method according to preceding claims, characterised in that the mold includes a bulkhead (preferably made of aluminium alloy) detachable/extractable, that allows to get a mattress of the type for two persons or, contemporaneously, two mattresses for a sole person.

In the name of Applicant

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The Mandatary

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