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(54) **Mattress or a like body-supporting element.**

(57) A mattress or a like body-supporting element comprising a foam core assembly (1) having at least two foam core halves (2, 3) disposed on top of each other, each of the main surfaces of the foam core halves (2, 3), which main surfaces face each other, being provided with a contour surface (4) to form cavities (11, 15), the contour surfaces (4) of the two foam core halves being complementary.

In accordance with a further elaboration of the invention, the complementary contour surfaces (4) substantially completely adjoin each other in a manufacturing state, the two foam core halves (2, 3) in the manufacturing state forming a rectangular block, the two foam core halves (2, 3) in a service state being displaced relative to each other such that at least a plurality of the tops (12) formed by the contour surfaces (4) abut against each other and the two foam core halves (2, 3) in the service state forming a rectangular block having a greater thickness than the rectangular block of the manufacturing state.

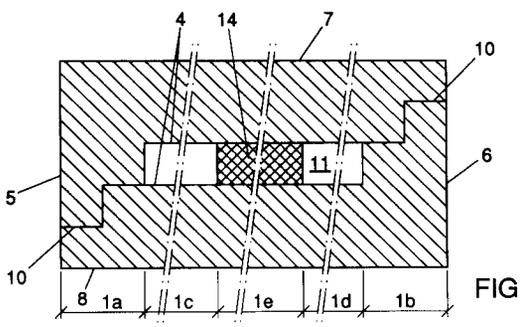

FIG. 3

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The invention relates to a mattress or a like body-supporting element comprising a foam core assembly having at least one cavity.

For the sake of readability, the application will hereinafter only refer to a mattress. However, it is understood that the invention also relates to, for instance, seat cushions for couches and other body-supporting elements.

The known mattresses provided with cavities are rather expensive in manufacturing. Generally, the known mattresses with cavities functioning as ventilating ducts are manufactured from two layers of full-foam material, with parts being cut away from the full-foam layers to form the cavities, after which, subsequently, the full-foam layers are placed on top of each other and interconnected by means of, for instance, glueing. The parts cut away from the full-foam layers form waste, causing a considerable loss item in manufacturing.

The object of the invention is to provide a mattress of a like body-supporting element having a foam core assembly provided with at least one cavity, the intended mattress being producible at a price equal to that of a mattress having a full-foam core which is approximately 2-4 cm thinner and for which an equal quantity of foam material has been used.

To this end, in accordance with the invention, the mattress or the body-supporting element is characterized in that the foam core assembly comprises at least two foam core halves disposed on top of each other, each of the main surfaces of the foam core halves, which main surfaces face each other, being provided with a contour surface to form the cavities, the contour surfaces of the two foam core halves being complementary, with the complementary contour surfaces substantially completely adjoining each other in a manufacturing state and the two foam core halves forming a rectangular block, the two foam core halves in a service state being displaced relative to each other such that at least a plurality of the tops formed by the contour surfaces abut against each other and the two foam core halves also form a rectangular block having a greater thickness than the rectangular block of the manufacturing state.

A thus composed foam core assembly can be manufactured from a layer of full-foam material which is divided into two foam core halves by means of a separating operation, such as, for instance, cutting or sawing. The contour surfaces are formed through the separating operation. The contour surfaces being complementary, both foam core halves can be manufactured without any waste of foam material.

A thus composed foam core assembly can be manufactured from a relatively thin layer of full-foam material, the displacement of the foam core halves, which are obtained through the separating operation, resulting in a foam core assembly of a greater thickness than the original layer of full-foam material and having ventilating ducts or like cavities. As the foam core halves form a rectangular block both in the service state and in the manufacturing state, no waste of material occurs whatsoever when the foam core assembly is being manufactured. Further, the foam core halves need only be displaced relative to each other and hence need not be rotated or turned. As a result, the handling of the foam core halves is limited considerably, which yields a considerable saving of time and cost.

For the simple manufacture, according to a further elaboration of the invention, the mattress is characterized in that the contours of the contour surfaces extend only in the width direction of the foam core assembly, the foam core halves in the service state being displaced relative to each other in the longitudinal direction relative to the manufacturing state.

In a thus composed foam core, the separating operation for manufacturing the foam core halves of the foam core assembly may consist of a simple sawing operation by means of, for instance, a cutting wire, extending through the entire width of the mattress, which is moved according to the desired contour in the longitudinal direction through the full-foam layer serving as the starting product.

Preferably, the contour surfaces are designed such that in the service state, a central cavity is formed at the middle part of the foam core assembly functioning as a hip-supporting part, into which central cavity a material layer or material parts of a different composition can be included, the contour surfaces at the location of the parts of the foam core assembly which function as shoulder and leg-supporting parts on either side of the middle part being designed such that the tops of the contours of the foam core halves abut against each other, with cavities, functioning as ventilating ducts, being formed between the tops abutting against each other, the contour surfaces of the ends of the foam core assembly which function as head and foot ends adjoining each other in the service state.

The hardness and/or stiffness of such a mattress can be varied by means of the material layer or material parts included into the central cavity at the location of the hip-supporting part. At the points where the mattress may be slightly softer, i.e. at the location of the leg and shoulder-supporting parts, the mattress is more supple through the presence of ventilating ducts. At the location of the head end, the mattress is slightly stiffer or harder again, which is particularly important in an adjustable bed. In the sitting position, the back may sink into the softer shoulder-supporting part such that a

separate head support is not necessary, because at the head end, the mattress is harder. Moreover, the addition material layer or the material parts in the hip-supporting part provide sufficient support and strength in the sitting position.

According to a further elaboration of the invention, it is particularly favorable if the ventilating ducts at the location of the shoulder and leg-supporting parts have a hexagonal section. In comparison with square or rectangular ducts, this leads to a better stability of the top parts, abutting against each other, of the contour surfaces of the foam core halves. After all, in the case of rectangular ducts, the walls of the contours supporting the top parts have a rectangular shape as well, due to the complementary form of the two contour surfaces. When there is an uneven load distribution on the mattress, the chance occurs that rectangular walls bend or tilt and then no longer provide any support. In the case of ventilating ducts of a hexagonal shape, the walls have a section having the shape of an isisceles trapezium, the base being wide and the top being narrow. Such a wall is much more stable than a wall having a rectangular section and will not tilt, even when there is an uneven load distribution. Another advantage of such a contour is that the length of the contour is shorter than that of a contour with which ventilating ducts of a rectangular section are formed. Due to the shorter length of the contour, the separating operation for forming the two foam core halves will take up less time, which results in lower manufacturing costs.

To provide that both in the manufacturing state and in the service state the foam core assembly has the shape of a rectangular block, according to the invention, the contour surfaces at the location of the head and foot ends have a stepped configuration, the first riser in the contour in the manufacturing state of the foam core assembly starting in an outward facing main surface of the foam core assembly, at the foot end as well as the head end. The distance through which the foam core halves should be displaced relative to each other to change from the manufacturing state into the service state corresponds to the length of tread of the stepped contour surface at the head and foot ends. The increase in thickness of the foam core assembly when changing from the manufacturing state into the service state corresponds to the height of the riser of the stepped contour surface at the head and foot ends. In this manner, in both states, at the head end as well as the foot end, a solid full-foam core is obtained of the desired strength. This strength is important in particular during the manufacturing process, such as glueing, covering and, if necessary, stuffing the mattress, and moreover provides the required stability in the service phase, so that deformations are prevented.

To allow the mattress to be rotated and turned, according to a further elaboration of the invention, it is particularly favorable if the contour surfaces at the location of at least the hip-supporting part and the leg and shoulder-supporting parts are symmetrical relative to the three orthogonal center planes of the foam core assembly in the service state.

To explain the invention, a number of exemplary embodiments of foam core assemblies of mattresses according to the invention will be described hereinafter with reference to the accompanying drawings. In these drawings:

Fig. 1 is a longitudinal section of a first embodiment of a foam core assembly in the manufacturing state;

Fig. 2 is a similar section of the foam core assembly shown in Fig. 1 in the service state;

Fig. 3 is a similar section as shown in Fig. 2, with the central cavity including an additional material layer;

Fig. 4 is a longitudinal section of a second embodiment of a foam core assembly in the manufacturing state;

Fig. 5 is a similar section of the foam core assembly shown in Fig. 4 in the service state;

Fig. 6 is a longitudinal section of a third embodiment of a foam core assembly in the manufacturing state; and

Fig. 7 is a similar section of the foam core assembly shown in Fig. 6 in the service state.

All foam core assemblies 1 shown in the Figures comprise two foam core halves 2, 3. Through a separating operation, such as, for instance, cutting or sawing along a specific contour 4, the foam core halves 2, 3 are manufactured from a layer of full-foam material or a like resilient material. After the separating operation, the thus obtained foam core halves 2, 3 are displaced relative to each other and, if necessary with a local interposition of a layer of glue, placed on top of each other again, the contour surfaces 4 facing each other.

In the exemplary embodiments shown, the contour 4 made by the separating operation extends through the entire width of the foam core assembly 1 to be manufactured. However, it is understood that the contour 4 may also extend lengthwise. In the first case, in the service state, openings are provided at the longitudinal sides of the foam core assembly, while if the contours 4 extend lengthwise of the foam core assembly 1, openings are formed in the end sides 5, 6 of the foam core assembly 1. A third possibility is that the contour surfaces 4, at least a part thereof, are curved in two directions. It can thus be provided that in the service state both the end sides and the longitudinal sides of the foam core assembly 1 do not contain any openings or, conversely, do contain openings. Obviously, the

manufacture of such a foam core assembly is considerably more complicated and expensive than the manufacture of a foam core assembly 1 whose contour surfaces 4 extend lengthwise or crosswise only.

The contour surfaces 4 of the exemplary embodiments shown in the Figures, all of which extend uniformly crosswise and vary lengthwise, as mentioned above, have a stepped configuration at the head and foot ends 1a and 1b respectively. In the manufacturing state, the contour surface 4 begins and ends in the main surfaces 7, 8 of the foam core assembly 1 with a riser 9, while in the service state, the contour surface 4 begins and ends in the end faces 5 and 6 of the foam core assembly 1 with a tread 10. When changing from the manufacturing state into the service state, the two foam core halves 2, 3 are displaced lengthwise relative to each other through a distance corresponding to the tread 10 of the stepped contour parts. The thickness of the foam core assembly 1 in the service state increases relative to the manufacturing state by a height corresponding to the riser 9 of the stepped contour parts 4a, 4b. In a foam core assembly 1 having a contour surface 4 which has a stepped configuration at the head and foot ends 1a and 1b respectively, the foam core assembly 1 has a rectangular block shape in the manufacturing state as well as in the service state. Hence, the foam core assembly 1 can be manufactured without any loss of material.

For the stability of the parts of the foam core assembly 1, which parts are provided with ventilating ducts 11 or like cavities, it is particularly favorable if at least a number of tops 12 of the contour surfaces 4 abut against each other. These tops 12 may then be provided, before the foam core halves 2, 3 are joined together into the service state, with a layer of glue. This offers the advantage that due to the interconnection created by the layer of glue, the walls 13, which are part of the contour surfaces 4 and carry the tops 12, are less liable to tilt.

Figs 1-4 show variants of different contour surfaces 4 for the shoulder and leg-supporting parts 1c, 1d and the hip-supporting part 1e. In the service state, the embodiment shown in Figs 1 and 2 has one large central cavity 11 extending through the shoulder and leg-supporting parts 1c, 1d as well as the hip-supporting part 1e. If necessary, it is possible to include in this cavity 11 a material layer or additional material parts 14 of the same or of a different composition and stiffness than the two foam core halves 2, 3, as is shown in Fig. 3. In the exemplary embodiment shown in Fig. 3, the material layer 14 only extends under the hip-supporting part 1e of the foam core assembly 1. An additional material layer 14 at the hip-supporting part 1e offers the advantage that the mattress, if it is used on an adjustable bed bottom, provides adequate support in a sitting position as well. The material layer or material parts 14 may have any composition, such as for instance peat, straw, foam material, natural or synthetic rubbers, etc. It is understood that such additional material parts 14, to be included into the cavities 11, may also be included at other locations in the foam core assembly 1.

Figs 6 and 7 show an embodiment which is most preferred. The contour surfaces 4e are crenellated at the hip-supporting part 1e, the crenellations having such dimensions relative to the contour surfaces 4 at the location of the shoulder and leg-supporting parts 1c, 1d, that an additional material layer 14 can be included herein for additional support, while due to the crenellated profile 4e in the service state of the foam core assembly 1, ventilating ducts 11 can still be formed at the location of the hip-supporting part 1e.

At the shoulder and leg-supporting parts 1c, 1d, the contour parts are of such design that in the service state, hexagonal ventilating ducts 15 are formed. The walls 13, forming the hexagonal ventilating ducts 15, have a section having the shape of an isisceles trapezium, the long side of each trapezium forming the base of each wall 13 and the short side of each trapezium forming the top of each wall. The tops 12 of the walls 13 of the two foam core halves 2, 3 are disposed opposite each other and are preferably interconnected by means of a layer of glue. As the walls 13 have a wide base, they are not liable to tilt even in the case of uneven load of the foam core assembly 1, as a result of which the foam core assembly 1 also provides a stable support at the shoulder and hip-supporting parts 1c, 1d. Moreover, the contour surface 4 with the trapezoidal walls 13 has the advantage that a shorter contour 4 is obtained than in the case of a crenellated contour configuration, which has a favorable effect on the processing time of the separating operation during manufacturing.

At the head and foot ends 1a, 1b, this embodiment, which is preferred, compises a stepped contour configuration as well.

It is understood that the invention is not limited to the exemplary embodiment described, but that various modifications are possible within the scope of the invention. For instance, one or several outer surfaces of the foam core assembly may have been provided with additional layers, for instance to obtain rounded corners or to close off the ventilating openings in the longitudinal and/or end sides of the foam core assembly. Obviously, the foam core assembly will generally be covered with a mattress cover.

Claims

1. A mattress or a like body-supporting element comprising a foam core assembly having at least one cavity, characterized in that the foam core assembly (1) comprises at least two foam core halves (2, 3) disposed on top of each other, each of the main surfaces of the foam core halves (2, 3), which main surfaces face each other, being provided with a contour surface (4) to form the cavities (11, 15), the contour surfaces (4) of the two foam core halves (2, 3) being complementary, with the complementary contour surfaces (4) substantially completely adjoining each other in a manufacturing state, the two foam core halves (2, 3) in the manufacturing state forming a rectangular block, the two foam core halves (2, 3) in a service state being displaced relative to each other such that at least a plurality of the tops (12) formed by the contour surfaces (4) abut against each other and the two foam core halves (2, 3) in the service state form a rectangular block having a greater thickness than the rectangular block of the manufacturing state.

2. A mattress or a like body-supporting element according to claim 1, characterized in that the contours of the contour surfaces (4) extend only in the width direction of the foam core assembly (1), the foam core halves (2, 3) in the service state being displaced relative to each other in the longitudinal direction relative to the manufacturing state.

3. A mattress or a like body-supporting element according to claim 1 or 2, characterized in that the contour surfaces (4) are designed such that in the service state a central cavity (11) is formed at the middle part of the foam core assembly (1) functioning as a hip-supporting part (1e), into which central cavity a material layer or material parts (14) of a different composition can be included, the contour surfaces (4) at the location of the parts (1c, 1d) of the foam core assembly (1) which function as shoulder and leg-supporting parts on either side of the middle part (1e) being designed such that the tops (12) of the contours (4) of the foam core halves (2, 3) abut against each other, with cavities (15), functioning as ventilating ducts, being formed between the tops (12) abutting against each other, the contour surfaces (4) of the ends (1a, 1b) of the foam core assembly (1) which function as head and foot ends adjoining each other in the service state.

4. A mattress according to claim 3, characterized in that cavities (15) at the location of the shoulder and leg-supporting parts (1c, 1d) have a hexagonal section.

5. A mattress according to claim 3 or 4, characterized in that the contour surfaces (4) at the location of the head and foot ends (1a, 1b) have a stepped configuration, the first riser (9) in the contour (4) in the manufacturing state of the foam core assembly (1) starting in an outward facing main surface of the foam core assembly (1), at the foot end (1a) as well as the head end (1b).

6. A mattress according to any one of the preceding claims, characterized in that the contour surfaces (4) at the location of at least the hip-supporting part (1e) and the leg and shoulder-supporting parts (1c, 1d) are symmetrical relative to the three orthogonal center planes of the foam core assembly (1) in the service state.

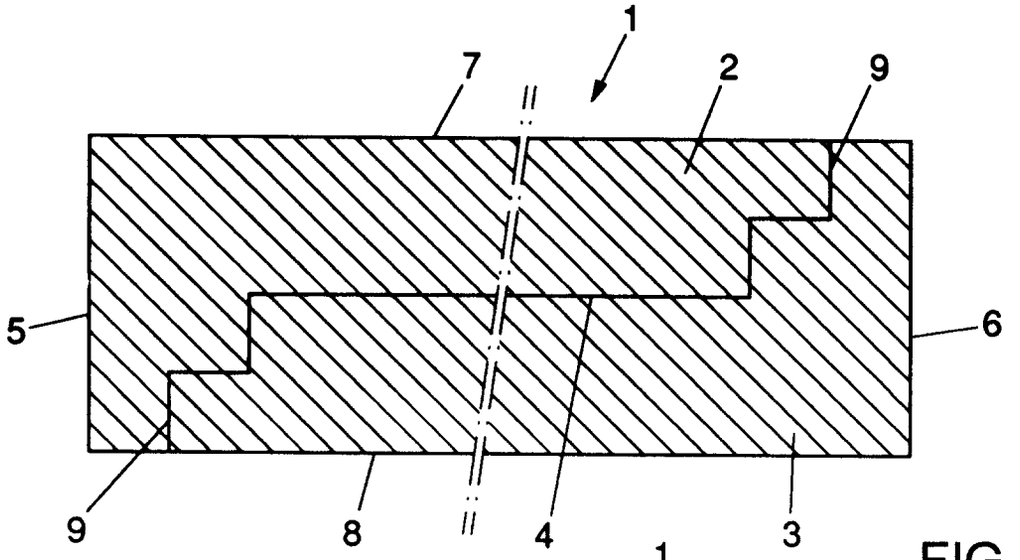

FIG. 1

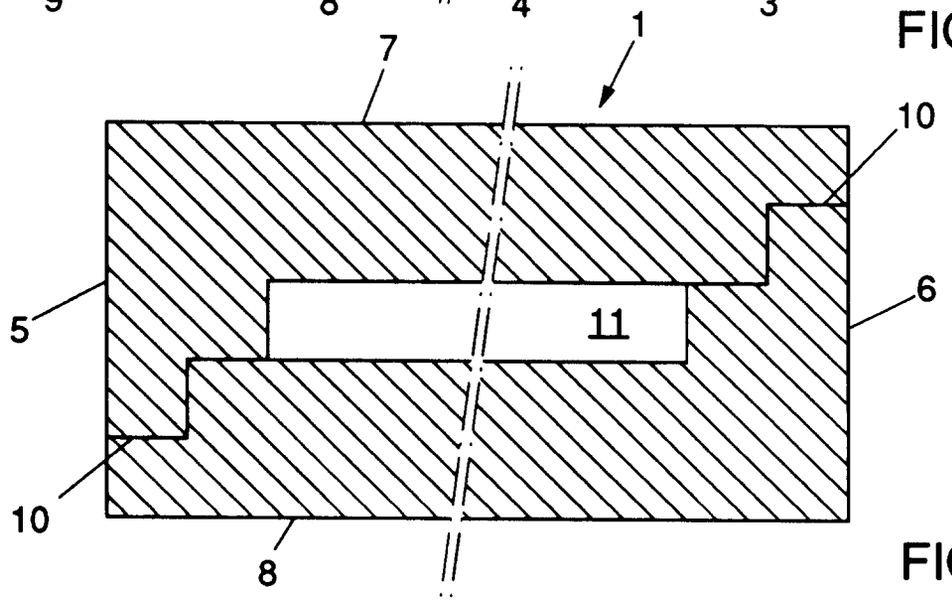

FIG. 2

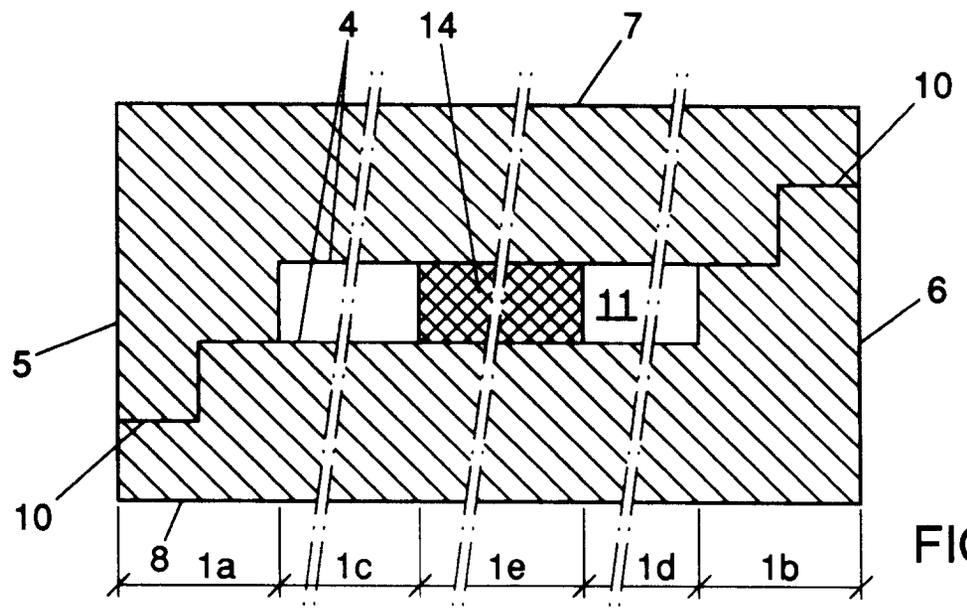

FIG. 3

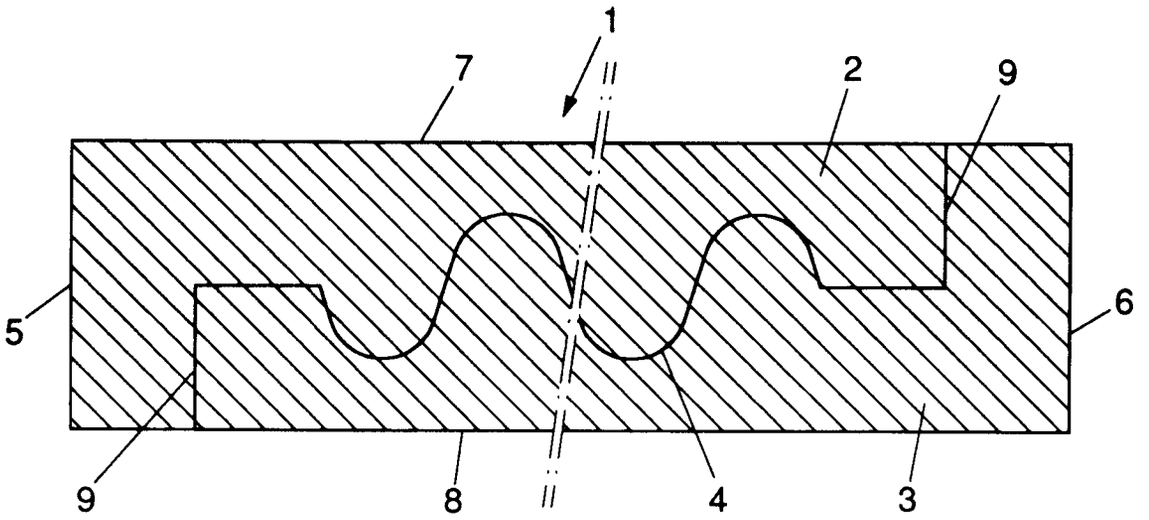

FIG. 4

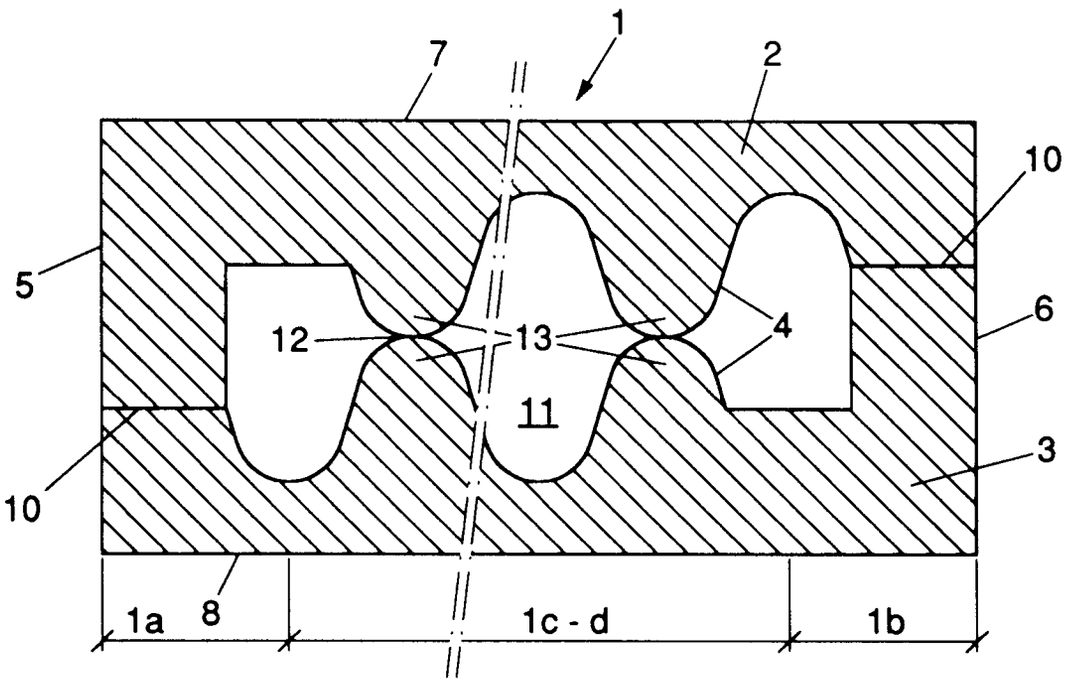

FIG. 5

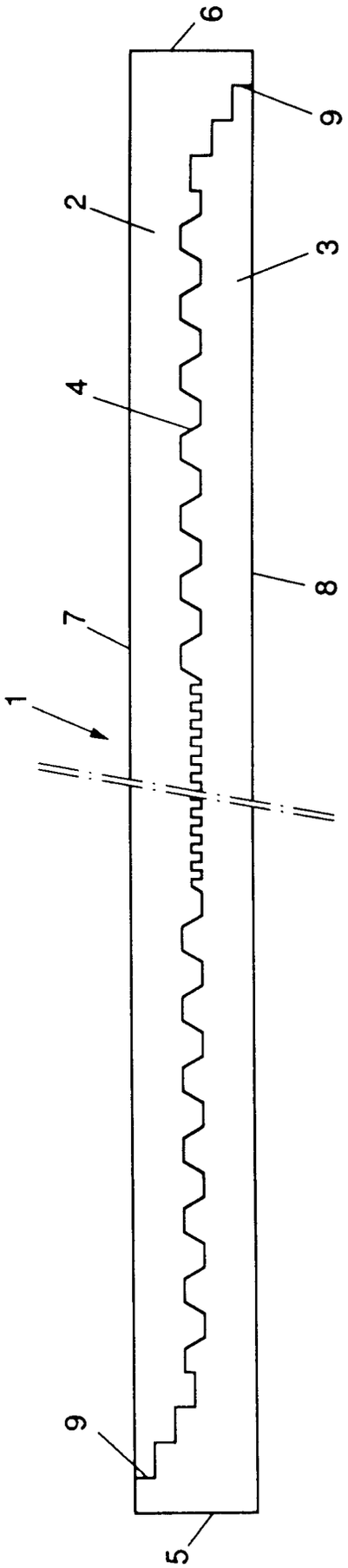

FIG. 6

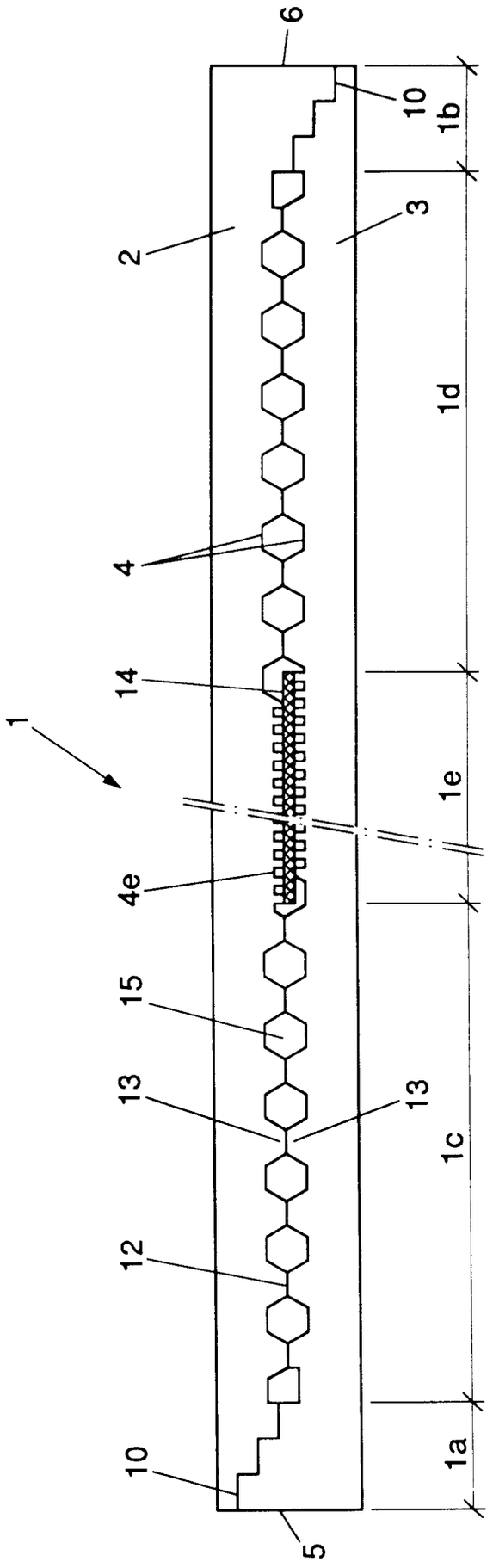

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1984

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE-A-28 20 282 (RECTICEL DEUTSCHLAND KUNSTSTOFFE GMBH)	1,2,6	A47C27/14
A	* page 11, line 19 - page 12, line 20; claims 1,2,4,5; figures 1,2,4,5 *	3,4	
Y	FR-A-2 435 232 (POLY-SAKS APS) * claim 3; figures 2,3 *	1,2,6	
A	US-A-3 323 152 (LERMAN) * column 2, line 44 - line 70; figures 2,3 *	3	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 September 1994	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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