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(54) **Means for demarcation of space**

(57) Means for demarcation of space (1) comprising flexible components interconnecting bi-dimensionally and comprising periodic cuttings (2) in one pre-defined extension direction through the entire thickness of said means, said periodic cuttings (2) made along a line in the given extension direction and along the entire length of said means for demarcation of space (1) comprise a

cross-cutting line (3). In the means for demarcation of space (1) several cross-cutting lines (3) are made that are parallel with one another, wherein adjacent cross-cutting lines (3) are offset relative to one another, so that cuttings (2) in one cross-cutting line (3) are opposite the connecting section between two adjacent cuttings (2) of the adjacent cross-cutting line (3).

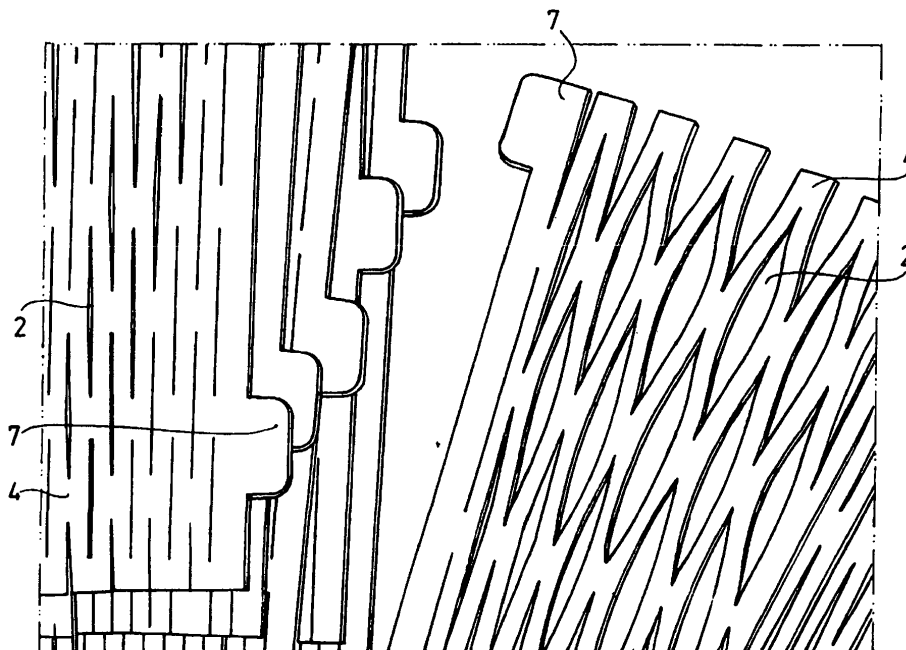


Fig. 4

Description

[0001] The invention relates to a means for demarcation of space comprising mutually bi-dimensionally inter-linked components, flexible ones, as the case may be. The unrestricted design and size features of the proposed space divider profile make it a preferred alternative to replace the previously used more costly or less aesthetical profiles, and make it possible to realise also unique appearances and design concepts.

[0002] Means for demarcation of space, also known as space divider profiles or room divider, are used in numerous fields in everyday life. In the following description all mentioned designations are used analogously. Part of them are solid, non-transparent and non-permeable; part are lattice- or grid-like and they are essentially meant to prevent passing through. Space divider profiles are made of the most diverse materials; in the field of lattice space divider profiles, metal, wood, and plastic are extensively used to create the entire space divider profile or - in case of space divider profiles of a modular structure and design - part of it. One characteristic feature of these space divider profiles called collectively, in a simplifying form, lattice space divider profiles is that they are to be created in function of the place and nature of their utilisation, adjusted to those, either in a prefabricated way or on site, and a ready-made space divider profile fitted into its place cannot be modified later on, and in most cases its production is highly labour- and cost-extensive. It is typical especially of the plastic lattice room divider profiles that, due to the material of the space divider profile, the profile is somewhat deformable, flexible, but this characteristic may be an advantage as well as a drawback. Although prefabricated plastic space divider profiles are, as a matter of course, easier to fit, their aesthetic appearance and durability often leave something to be desired, and that narrows also their field of utilisation.

[0003] US 6,308,487 B1 discloses a plastic lattice space divider profile made entirely of plastic, the lattice components of the profile included. In this solution, the required rigidity is created by the material and the working, but profiles of a larger size suffer unacceptable flexible deformation due to the plastic material, i.e. they get deformed temporarily.

[0004] WO/1996/024731 A1 discloses a space divider profile composed of wooden components bended in a wavelike way, the individual components of which must be fastened to each other mechanically, one by one, at the overlaps, which raises the manufacturing expenditures.

[0005] To my best knowledge, two methods are known for making the profiles of wooden space divider profiles: according to one, the lattice slats of the space divider profile are usually put on one another so as to be intersecting, as in the picture of the lattice designed in advance, and they are fixed to one another by binding components that may be nails, screws, staples, gluing, etc. One advantage of this method is that it provides, essen-

tially, for on-site construction. The other, rather theoretical, option is to make the lattice space divider profile out of wooden planes of appropriate size by cutting, so that the openings between the lattice components are removed by the known cutting method and, essentially, only the lattice slats of the lattice structure are left out of the original board of wood. This solution implies, on the one hand, a waste of material and, on the other, it is lengthy and costly, and it can only have a *raison d'être* in some special cases.

[0006] It is true of both known solutions that the space divider profile being created is essentially a flat (two-dimensional) configuration extending in a plane, except if the timber materials had been bended to the desired shape by some technique. In the latter case, however, making and assembling the space divider profile becomes even more difficult.

[0007] My experience is that the need has arisen for such a novel, aesthetic space divider profile that is relatively easy and cheap to manufacture, and has a structural design that makes it possible to adjust it to some extent to the actual dimensions on site in a way that does not require huge work on site, but nevertheless makes it possible to satisfy the various aesthetic demands and appearance-related desires.

[0008] A technology for densifying, cold wood-bending which allows the creation of so-called densified wood has been developed in the 1980s. The essence of the densifying technology is that timber is cut to the appropriate size, lignin is softened - without chemicals - by heating, and then the timber is put in a densifying equipment. In the densifying equipment, the fibre walls are creased like bellows by fibre-wise shrinking, the wood becomes denser and hence bendable, and it keeps its shape in the desired form after drying. However, not every tree species is suitable for this method of bending. Common ash, beech, elm, maple, oak and black walnut proved to be well-densifiable tree species. During densification, the humidity content of the timber is around 20-25% before it is put in the densifying equipment, then following softening by steaming, the longitudinal shape change, i.e. length reduction, is around 15 to 25%, and deformation after drying is 3 to 10%. This technique has been developed primarily for the furniture industry, to make it possible to produce arched furniture parts without cutting them out and hence without producing any waste.

[0009] The purpose of this invention is, therefore, to produce a space divider profile that is simple and easy to prepare as a space divider profile component that can then be adjusted to size either in advance or even on site, if necessary, at least in one extension direction. The purpose of the invention is, moreover, to have a space divider profile that can be prepared in advance in the required size and shape if no on site or a posteriori adjustment is necessary, so as to constitute a profile that is easy and cheap to manufacture and transport, and fulfils both the division function and the aesthetic requirements.

[0010] The idea underlying the invention is that this technology combined with the right raw material could be adapted to creating a space divider profile that is flexibly extendable and adjustable to the desired shape to some extent. The invention could, furthermore, be produced thanks to the revelation that, provided that the technology of cold wood bending with densification is applied adequately, wood can be bended along a much smaller radius than in the normal known procedures.

[0011] The task being set has been solved by a means for demarcation of space comprising flexible components interconnecting bi-dimensionally and characterised in that in one pre-defined extension direction of said means, said means for demarcation of space comprising periodic cuttings through its entire thickness; said periodic cuttings made along a line in the given extension direction and along the entire length of said means for demarcation of space comprise a cross-cutting line; in the means for demarcation of space, several cross-cutting lines are made that are parallel with one another; adjacent cross-cutting lines are offset relative to one another, so that cuttings in one cross-cutting line are opposite the connecting section between two adjacent cuttings of the adjacent cross-cutting line; the distance between the adjacent cross-cutting lines is selected commensurably with the thickness of means for demarcation of space; the flexible components interlinked bi-dimensionally are constituted of the material of means for demarcation of space between the cross-cutting lines; the components are made of densified timber; and the effective dimension of means for demarcation of space is determined by the internal openings formed via the opening of cuttings due to the traction power being applied perpendicularly to the cross-cutting lines and due to the flexibility of the components.

[0012] A preferred embodiment of the means for demarcation of space according to the invention is made at least one of oak, walnut, maple, elm, cherry, ash and birch wood.

[0013] In a further preferred embodiment of the means for demarcation of space according to the invention the distance between the cross-cutting lines is chosen so as to be identical with the thickness of said means for demarcation of space.

[0014] In a further preferred embodiment of the means for demarcation of space according to the invention the length of connecting section between the adjacent cuttings of a cross-cutting line is at most one fifth, preferably one tenth and even more preferably one fifteenth, of the length of a cutting.

[0015] In a yet further preferred embodiment of the means for demarcation of space according to the invention at its edges parallel with cross-cutting lines at least one fixing element is formed, said at least one fixing element providing for the transmission of traction power applied perpendicularly to cross-cutting lines to said means for demarcation of space and for the effective dimension of said means for demarcation of space.

[0016] In a yet further preferred embodiment of the means for demarcation of space according to the invention, for an extended means for demarcation of space, it is equipped with a fixing frame keeping the ends of the means for demarcation of space that are freestanding due to the cuttings running to the perpendicular edge of said means for demarcation of space at edges perpendicular to cross-cutting lines of said means for demarcation of space, in the plane of said means for demarcation of space.

[0017] In a yet further preferred embodiment of the means for demarcation of space according to the invention the frame is made also at edges parallel with said cross-cutting lines of said means for demarcation of space.

[0018] In a yet further preferred embodiment of the means for demarcation of space according to the invention the frame is realised so that it runs along the perimeter of said means for demarcation of space.

[0019] In a yet further preferred embodiment of the means for demarcation of space according to the invention it is realised bended around an imaginary axis parallel with cross-cutting lines.

[0020] In what follows, the invention will be described with the help of the attached drawing, representing some exemplary embodiments of the proposed space divider profile. In the drawing,

Figure 1 shows a possible embodiment of the space divider profile in default position,

Figure 2 shows a detail of the space divider profile according to Figure 1, partly extended in one extension direction,

Figure 3 shows the space divider profile according to Figure 1 in a more extended state,

Figure 4 shows the flexibility of the space divider profile according to the invention, and

Figure 5 shows an operational, utilisation, position of the space divider profile according to Figure 1, in which the originally plane space divider profile has been bended into a cylindrical form.

[0021] Figure 1 shows a possible and preferred embodiment of the space divider profile according to the invention. Space divider profile 1 is a substantially rectangular figure, in the given case of oblong shape, comprising components, flexible ones in the given case, interconnected with one another bi-dimensionally. Such space divider profiles are known from everyday usage; see the pergolas, i.e., the wooden division planes used in gardens etc. In the proposed space divider profile 1, however, cuttings 2 are made, and the referenced components are created with their help. Cuttings 2 mean that

the material of space divider profile 1 is cut through its entire depth. Cuttings 2 are designed, substantially, one after the other, periodically, and hence they constitute one cross-cutting line 3 each. As can be seen, in space divider profile 1, several such cross-cutting lines 3 are formed over substantially the entire area thereof, and in the cases presented here, the adjacent cross-cutting lines 3 are offset relative to one another, so that cuttings 2 in one cross-cutting line 3 are positioned opposite connecting section 4 between two subsequent cuttings 2 in the adjacent cross-cutting 3 line. It is also visible that the external cuttings 2 of every other cross-cutting line 3 extend to edge 5 of the space divider profile 1.

[0022] Space divider profile 1 presented here can be made basically of any deciduous tree species to be found in Europe and North America. According to my experiments, first of all the following tree species give good results: oak, beech, walnut, maple, elm, cherry, ash and birch. The experience is that the exotic and coniferous tree species are not suitable for making the proposed novel space divider profiles.

[0023] Space divider profile 1 according to the invention can only be made of densified wood. Densification is worth making primarily with the method called "comp-wood", since the experience is that this is the method that provides permanent, secure and adequate results. Space divider profile 1 can be made by sawing its material, unless it is available in a ready-to-use form, to the appropriate thickness. The thickness of space divider profile 1 is to be sized in the known manner according to the utilisation requirements ever, albeit space divider profile 1 according to the invention can be realised with materials of any thinness or thickness. The densification ratio of the densified timber being used as raw material is at least 20%, but timber with a higher densification ratio can also be used for space divider profiles 1 if solidity is not a crucial criterion, e.g. for decoration, lamp shades. In the timber material of adequate thickness, rectangular in shape in the case presented here, internal splits, i.e. cuttings 2, are made periodically, with one connecting section 4 being left between every two cuttings 2. The length of cuttings 2 and of the connecting sections 4 between them shall be determined in view of and depending on the surface to be covered by the finished space divider profile 1 according to the invention. The longer cuttings 2 are chosen, the wider the lattice or grid to which space divider profile 1 when ready can be extended, as can be seen in the examples in Figures 2 and 3. The length of connecting sections 4 between cuttings 2 has a significant effect on the structural solidity of space divider profile 1; that value is also determined based on the size of space divider profile 1, that of the area to be covered and other mechanic parameters of space divider profile 1 such as its weight, for example. Cuttings 2 falling in one line form a cross-cutting line 3 in the work-piece. Such cross-cutting lines 3 are formed side by side, parallel with one another in the work-piece. A cross-cutting line 3 adjacent to the next cross-cutting line 3 is designed so that

it is parallel to it, but it is also shifted relative to it by half the length. Shifting by half the length means that the specific 2 cuttings of the next cross-cutting line 3 are to be found opposite the connecting sections 4 of the previous adjacent cross-cutting 3 line, since in the ready-made space divider profile 1 it is this arrangement that will ensure the lattice-like extendibility and appearance. The denser the adjacent cross-cutting 3 lines, the wider the lattice shape that space divider profile 1 can be extended into. The flexibility of the material and hence of the components of space divider profile 1 allows also to extend the space divider profile to a larger extent on one side than on the other. This is ensured among other things by at least one or more fixing elements 7 at the edges 6 parallel with the cross-cutting lines 3 of space divider profile 1 resulting in the expansion of space divider profile 1, providing for the transmission of the traction force being applied vertically to the cross-cutting lines 3 to space divider profile 1.

[0024] Cuttings 2 can be made in any suitable manner, hence they can be made mechanically, e.g., by the edge of a knife, but it is preferred to apply "wet" or laser cutting. Mechanical cutting is less suitable because, on the one hand, the cutting device is difficult to control and, on the other, the knife is too thick and an excessive amount of waste is produced.

[0025] In my experiments so far I chose cutting 2 lengths in the range of 100-200 mm, in function of the desired solidity characteristics of the end-product space divider profile 1. The length of connecting sections 4 depends partly on the extent to which we plan to extend the grid constituting space divider profile 1, and it also affects the required aesthetic effect and the degree of light transmission. In the experiments, the use of lengths in the range of 8-25 mm proved to be the preferred option. The thickness of space divider profile 1 is preferably in the range of 0.5-8 mm in order to have planned results and for the sake of easier manufacturing; it is not expedient to produce a thicker material with the method presented here, albeit it is feasible. Preferably, a distance of at least 0.8 mm needs to be kept between two cross-cutting 3 lines, or else the solidity of space divider profile 1 will become insufficient.

[0026] Considering space divider profile 1 according to the invention, a lattice designed this way can cover maximum five times the ground floor area. The extent of the expansion is determined by the length of cutting 2, and the ratio between the length of cutting 2 and the rate of expansion is 1 to 4. This means that, for densified timber of a thickness of 4 mm, a cutting 2 of 150 mm makes it possible to cover an area of 600 mm, i.e., one that is sufficient to make the back rest or the seat of a chair.

[0027] In case of a plane design, if necessary, the rigidity of space divider profile 1 can be enhanced by fitting its edges 5 perpendicular to the cross-cutting lines 3 into a rigid frame that is not represented in the drawing. This frame may, if necessary, run around along the entire pe-

rimeter of space divider profile 1.

[0028] Since densified timber is bendable in every direction, the space divider profile so created can also be bended in any direction, within the limits permitted by the densifying method itself. Figure 5 shows a perspective view of a decorative lamp shade made this way. It is an essential criterion, well-known to a person skilled in the art, that space divider profile should be dried by being placed in a template of adequate shape, for it will only be capable of preserving its expected and designed shape this way.

[0029] Densified timber being approximately 20% denser than non-densified wood, its load-bearing capacity is also correspondingly higher. This is the reason why less material is needed for the end-product space divider profile, and it will preserve its solidity even after drying. Considering load-bearing alone, that of space divider profile 1 according to the invention is at least 20% higher than that of similar products made on non-densified wood. Considering surface load, it is easy to understand that space divider profile 1 will provide a value better by 400% than non-densified wood of the same thickness. Let us mention among the advantages of the proposed space divider profile 1 according to the invention that it replaces plastics, plywood and alumina, disadvantageous from the environmental point of view, and it is a cost- and material-saving method relative to those. It is an important point that wood being used as basic material will reproduce, and the product can be recycled. It is an essential advantage that the manufacturing of the product has no harmful side effects. The space divider profile has a light structure, it is much lighter than plywood, and hence its transportation is also easier.

[0030] As for its utilisation areas, it is an important criterion that the thickness of the material being used is always measured to the required solidity; for example, the minimum thickness for the back of a chair is 4 mm. For the seat of a chair, a thickness of 5-6 mm is necessary to produce a space divider profile 1 of a solid and stable structure.

[0031] By way of example, the proposed space divider profile can be used for the following purposes:

- chair seats and backs, largely reducing thereby the weight of the chair;
- decorative lamp shades;
- decoration;
- furniture, to be used at places where weight is crucial, such as ship and airplanes;
- replacement of plastics;
- internal decoration purposes;
- office partition walls.

[0032] Another novelty of the space divider profile according to the invention is that it is suitable for the full-scale utilisation of the plastic properties of timber, and hence it can be used in many industrial areas. In the vehicle industry, for example, seats and other parts can

be made of a natural material, originating from a reproducible energy source that is fully recyclable.

[0033] It is a further advantage that artificial drying can also be applied to make space divider profile according to the invention. That has the benefit that the form arrived at after drying will remain solid and stable. As will be known for a person skilled in the art, space divider profiles created this way would require appropriate surface treatment to keep their solidity for a long time.

List of reference signs:

[0034]

- | | |
|---|-----------------------|
| 1 | space divider profile |
| 2 | cutting |
| 3 | cross-cutting line |
| 4 | connecting section |
| 5 | edge |
| 6 | edge |
| 7 | fixing element |

Claims

1. Means for demarcation of space comprising flexible components interconnecting bi-dimensionally, **characterised in that**

- in one pre-defined extension direction of said means, said means for demarcation of space (1) comprising periodic cuttings (2) through its entire thickness;
- said periodic cuttings (2) made along a line in the given extension direction and along the entire length of said means for demarcation of space (1) comprise a cross-cutting line (3);
- in the means for demarcation of space (1), several cross-cutting lines (3) are made that are parallel with one another;
- adjacent cross-cutting lines (3) are offset relative to one another, so that cuttings (2) in one cross-cutting line (3) are opposite the connecting section between two adjacent cuttings (2) of the adjacent cross-cutting line (3);
- the distance between the adjacent cross-cutting lines (3) is selected commensurably with the thickness of means for demarcation of space (1);
- the flexible components interlinked bi-dimensionally are constituted of the material of means for demarcation of space (1) between the cross-cutting lines (3);
- the components are made of densified timber;
- the effective dimension of means for demarcation of space (1) is determined by the internal openings formed via the opening of cuttings (2) due to the traction power being applied perpen-

dicularly to the cross-cutting lines (3) and due to the flexibility of the components.

2. Means for demarcation of space according to claim 1, **characterised in that** it is made at least one of oak, walnut, maple, elm, cherry, ash and birch wood. 5

3. Means for demarcation of space according to claim 1 or 2, **characterised in that** the distance between the cross-cutting lines (3) is chosen so as to be identical with the thickness of said means for demarcation of space (1). 10

4. Means for demarcation of space according to any of claims 1 to 3, **characterised in that** the length of a connecting section (4) between the adjacent cuttings (2) of a cross-cutting line (3) is at most one fifth, preferably one tenth and even more preferably one fifteenth, of the length of a cutting (2). 15
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5. Means for demarcation of space according to any of claims 1 to 4, **characterised in that** at its edges parallel with cross-cutting lines (3) at least one fixing element (7) is formed, said at least one fixing element (7) providing for the transmission of traction power applied perpendicularly to cross-cutting lines (3) to said means for demarcation of space (1) and for the effective dimension of said means for demarcation of space (1). 25
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6. Means for demarcation of space according to any of claims 1 to 5 **characterised in that**, for an extended means for demarcation of space (1), it is equipped with a fixing frame keeping the ends of the means for demarcation of space (1) that are freestanding due to the cuttings (2) running to the perpendicular edge (5) of said means for demarcation of space (1) at edges (5) perpendicular to cross-cutting lines (3) of said means for demarcation of space (1), in the plane of said means for demarcation of space (1). 35
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7. Means for demarcation of space according to claim 6 **characterised in that** the frame is made also at edges (6) parallel with said cross-cutting lines (3) of said means for demarcation of space (1). 45

8. Means for demarcation of space according to claim 7, **characterised in that** the frame is realised so that it runs along the perimeter of said means for demarcation of space (1). 50

9. Means for demarcation of space according to any of claims 1 to 5, **characterised in that** it is realised bended around an imaginary axis parallel with cross-cutting lines (3). 55

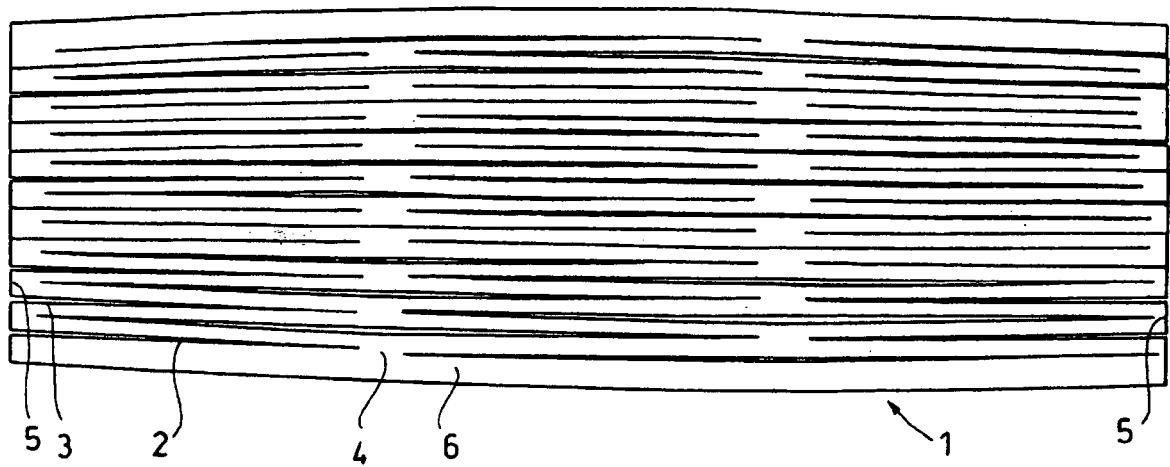


Fig. 1

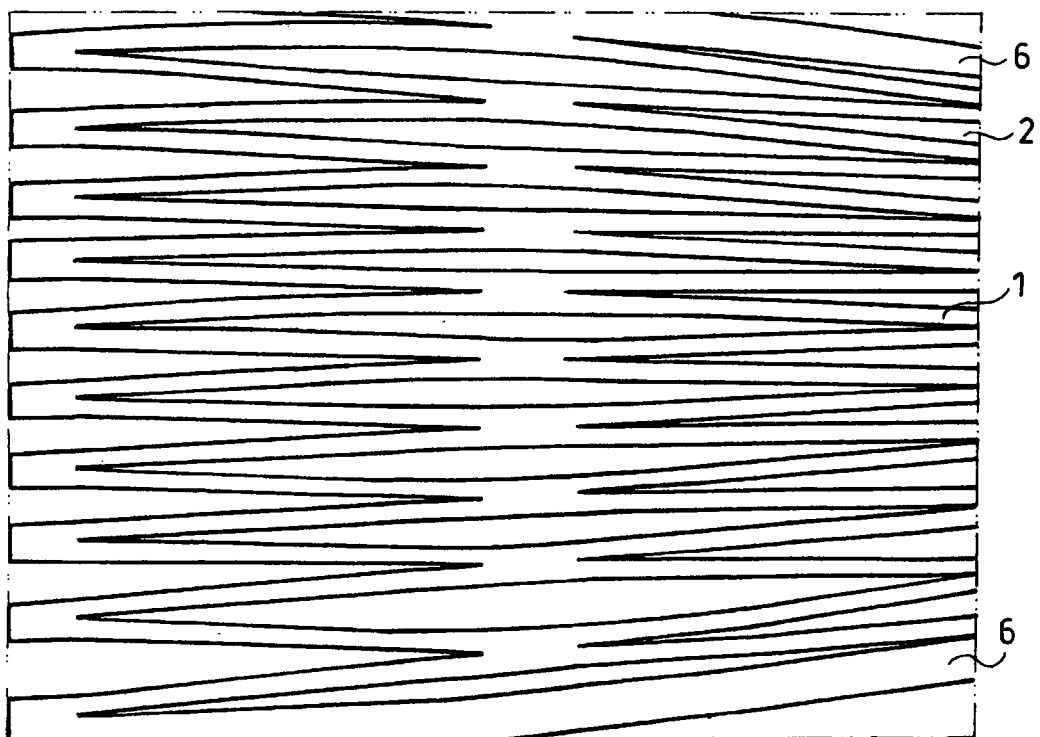


Fig. 2

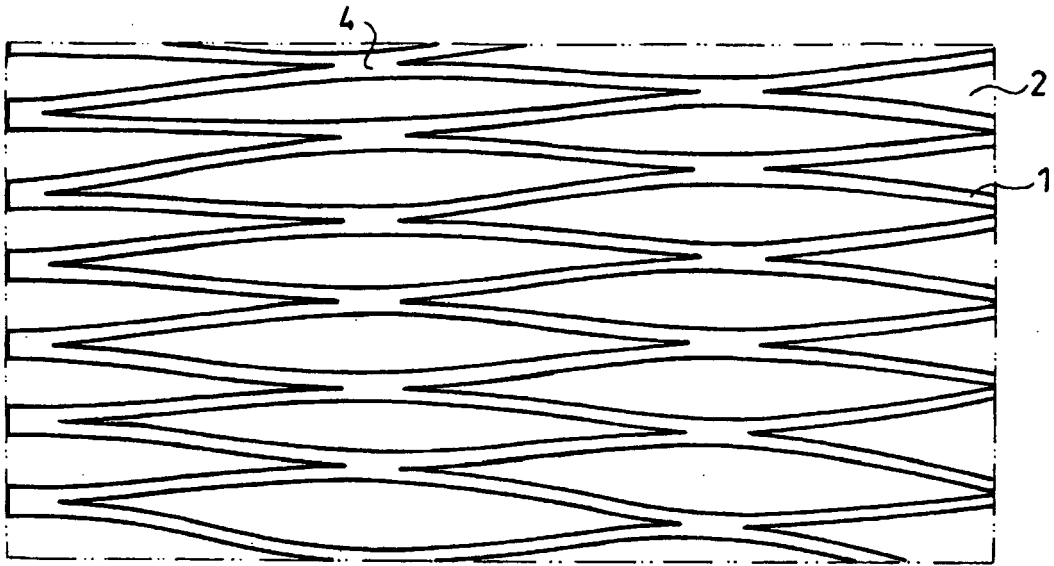


Fig. 3

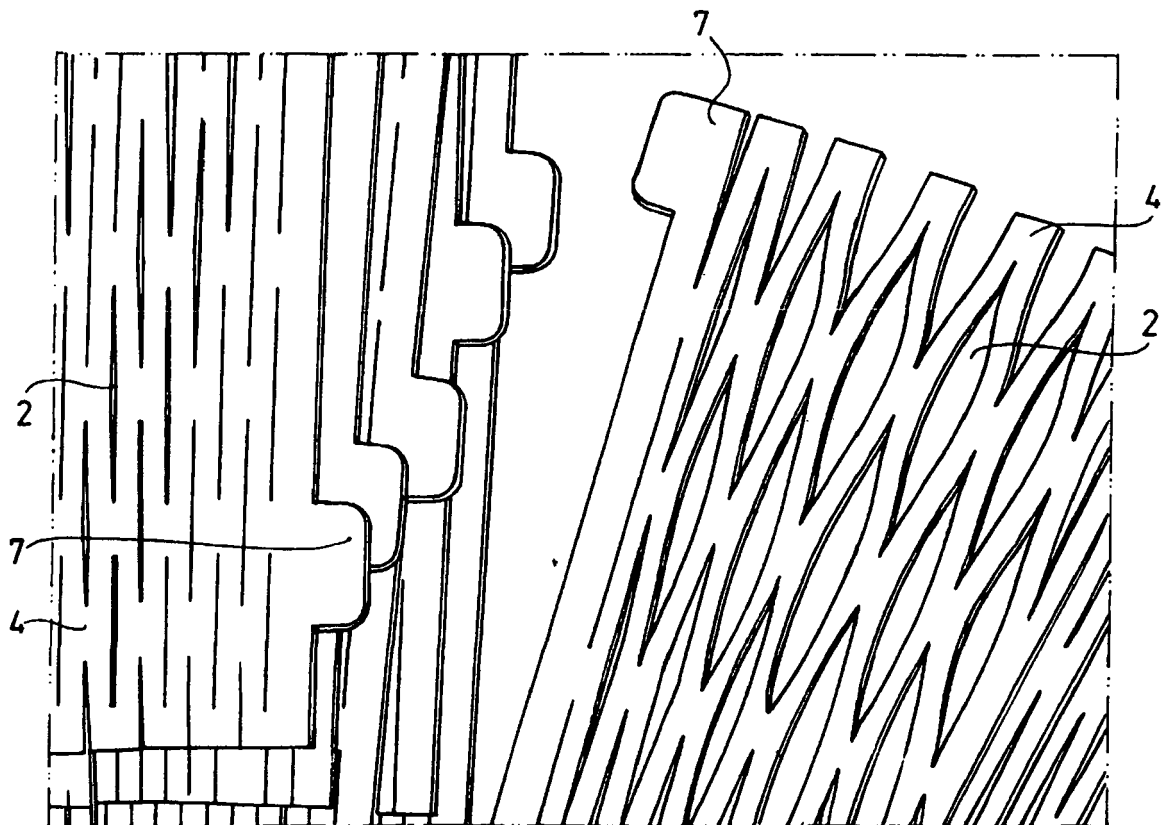


Fig. 4

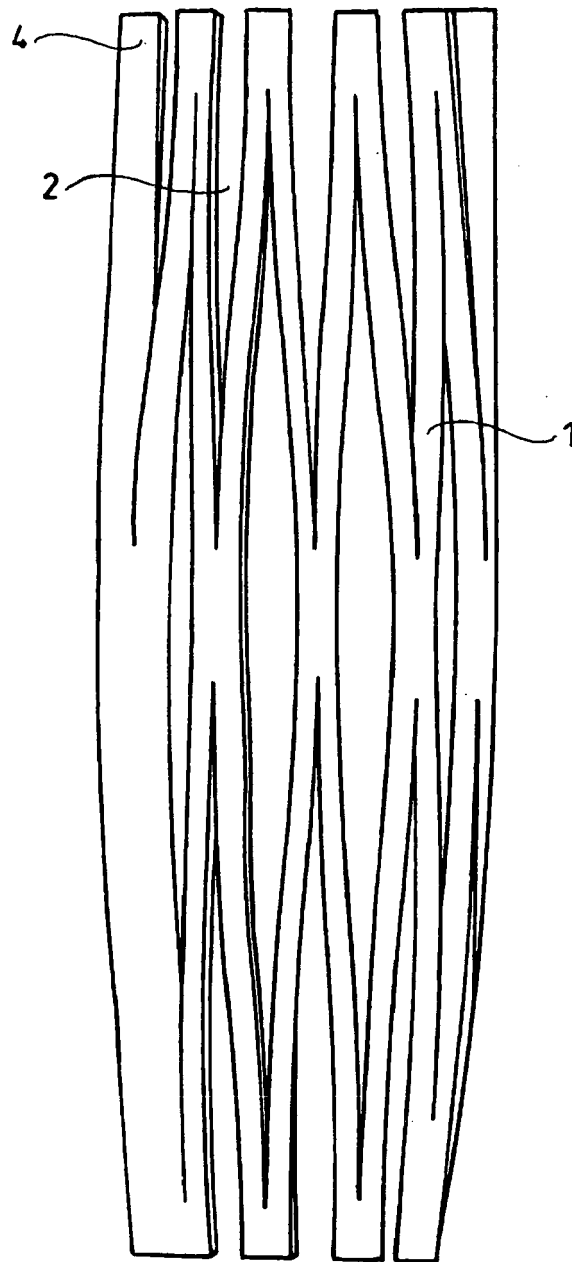


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 6308487 B1 [0003]
- WO 1996024731 A1 [0004]