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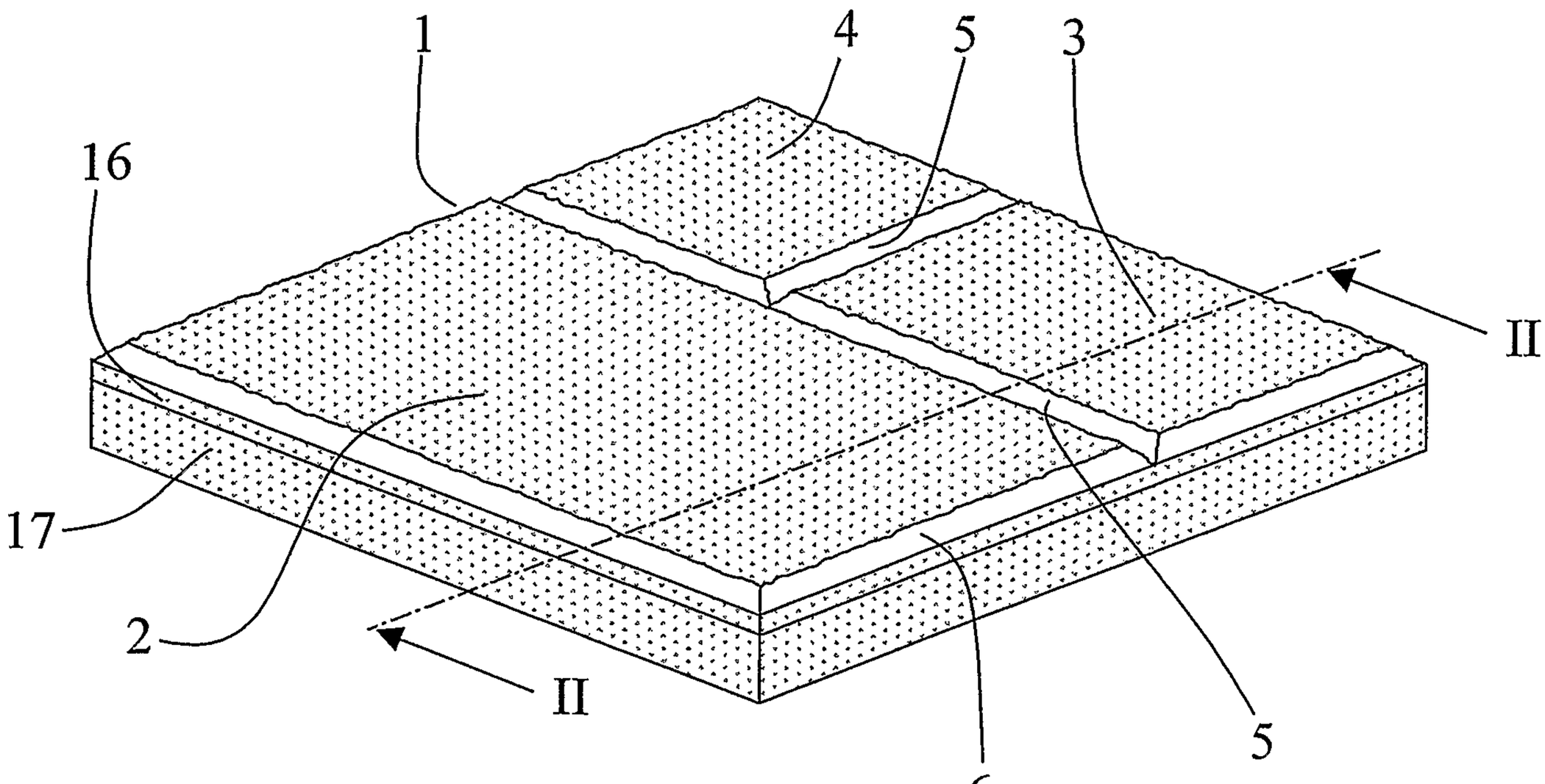

(57) Abrégé/Abstract:
Dividable slab made up of several sections separated by grooves allowing easy separation of the said sections on site during laying, thereby offering a variety of different sizes to imitate natural stone paving.

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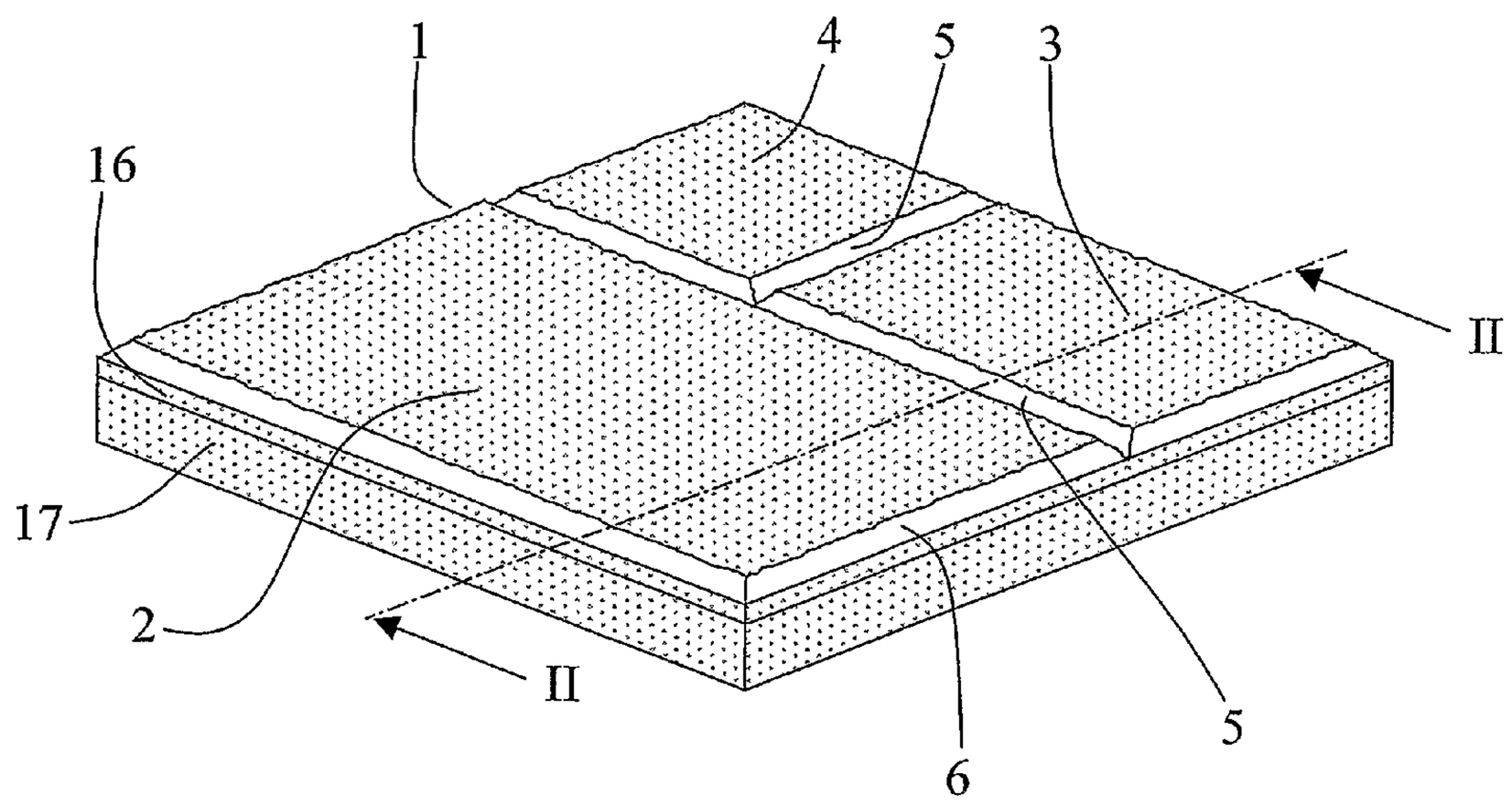
(54) Title: DIVIDABLE PAVING SLABS



(57) Abstract: Dividable slab made up of several sections separated by grooves allowing easy separation of the said sections on site during laying, thereby offering a variety of different sizes to imitate natural stone paving.

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Dividable paving slabs

The invention relates to a relatively thick concrete paving slab used to cover a ground surface. It also relates to its manufacturing process and the associated mold, its distribution and its laying.

The esthetics of natural stone paving is highly attractive and sought after. The major characteristics explaining this esthetic effect are as follows: the various stones used are thick, have an irregular surface and are all of different sizes. The disadvantage of this paving is of course its cost. Thus, many manufacturers opt for a more economical solution, which involves producing imitation slabs based on concrete slabs produced by molding.

A first, currently used process for manufacturing concrete slabs allows so-called "pressed slabs" to be produced. In this process, concrete is poured into a mold and then pressed, which causes it to harden structurally to a sufficient degree to allow de-molding and immediate handling of the slab. In this process, a mold is used only for a very short time for each slab. The advantage is therefore to enable many slabs to be manufactured in one day using the six to eight molds equipping a machine. However, these molds are expensive and difficult to change on the machine. This process is thus quite unsuitable for producing slabs of various sizes, which represents a limit to reproducing the variety of natural stone sizes. Paving slab manufacturers use this process to manufactured a standard slab size, usually 40 × 40, 50 × 50 or 60 × 40 centimeters. They sometimes produce slabs featuring surface geometrical shapes, whose function is solely esthetic, to mask this uniformity.

A second manufacturing process of the prior art involves casting slabs then awaiting their hardening for 24 hours before manufactureding them. The advantage of this process results from the fact that it is sufficient to choose molds of various sizes to obtain readily slabs of different sizes. Its disadvantage results from the fact that a mold is only used once a day, which means that as many molds as the number of slabs to be manufactured per day are required.

An alternative allowing different size slabs to be obtained involves factory sawing 50 × 50 centimeter slabs produced, for example, according to the pressed slab process, and delivering them cut to the customer. However, this process complicates and lengthens significantly slab manufacture. This is because the slabs according to the invention seek to imitate effectively natural stones and are relatively thick, at least 35 centimeters, which does not make their cutting easy.

Moreover, distribution of the different size slabs obtained according to the previous processes is complex and represents a second disadvantage. Specifically, their placement on a pallet, called palletization, requires a number of slabs of each size to be prespecified per pallet to optimize the space available on a pallet and to offer a suitable assortment with a view to laying.

A general object of the invention involves proposing slabs that do not have the disadvantages of the prior art.

More specifically, a first object of the invention involves proposing slabs allowing the installation of paving made up of different size slabs to imitate the esthetics of natural stone paving.

A second object of the invention involves proposing thick slabs with an irregular surface to imitate the esthetics of natural stone paving.

A third object of the invention involves proposing slabs whose manufacturing process allows high productivity at low cost, using an automatic rotary press.

A fourth object of the invention involves proposing slabs whose distribution, especially palletization, is simple.

The concept of the invention involves manufacturing single size pressed slabs according to the most advantageous manufacturing process of the prior art, incorporating means for easily dividing them prior to laying, to obtain slabs of different sizes for laying imitating natural stone paving.

To this end, the invention is based on a slab for covering a ground surface, which comprises at least two sections separated by a groove defining a breaking line allowing the slab to be divided along this breaking line to separate the two sections.

For a slab thickness greater than or equal to 35 millimeters, the groove can be V-shaped and between 6 and 10 millimeters deep.

The slab is thus suitable for straightforward dividing.

The slab may have a square or rectangular overall shape, the length of whose sides is between 40 and 100 centimeters approximately, and may comprise between 2 and 4 dividable sections.

It may comprise three sections.

It may be overall square in shape will sides approximately 50 centimeters in length and comprise sections whose sides are between 20 and 50 centimeters in length. More specifically, it may be overall square with sides approximately 50 centimeters in length and comprises a first approximately 50 × 30 centimeter sized section, a second approximately 30 × 20 centimeter sized section and a third approximately 20 × 20 centimeter sized section. In an alternative embodiment, it is overall square in shape with sides approximately 50 centimeters in length and comprises a first approximately 50 × 20 centimeter section, a second approximately 30 × 30 centimeter section and a third approximately 30 × 20 centimeter section.

The invention also relates to the mold for manufacturing a slab according to the invention, which comprises several sections separated by a rib suitable for forming slab fractions separated by grooves.

The invention also relates to a slab manufacturing process comprising a molding step, a pressing step and a subsequent demolding step using the mold according to the invention.

The invention also relates to a method for laying slabs that includes the step of straightforward slab division. In this laying method, dividing can be simply performed by striking the slab on the projecting edge of a hard surface or by striking the slab with a club hammer and a wide chisel. A joint comprising polymer filler or cement mortar can be introduced between the slab sections.

These objects, features and advantages of the present invention will be detailed in the following description

of one particular embodiment provided without limitation in conjunction with the appended figures, amongst which:

- figure 1 represents a perspective view of a dividable slab according to an embodiment;
- figure 2 represents a sectional view along axis II-II of the dividable slab according to one embodiment;
- figures 3a and 3b represent processes for dividing a dividable slab according to one embodiment;
- figure 4 represents a possible assortment of slabs according to one embodiment;
- figure 5 represents an example of paving obtained using slabs according to one embodiment;
- figure 6 illustrates a mold for implementing the manufacturing process according to the invention for manufacturing a slab such as the one represented in figure 1.

The solution is based on a dividable slab 1 for which one embodiment is represented in figure 1. It is overall 50 × 50 centimeters in size and it is composed of a first 50 × 30 centimeter sized section 2, a second 30 × 20 centimeter sized section 3 and a third 20 × 20 centimeter sized section 4.

Such a slab is manufactured according to the pressed slab manufacturing process of the prior art, but using a special mold allowing the formation of several sections 2, 3, 4, with a surface texture, separated by deep V-shaped grooves 5 penetrating over a thickness 6 of the slab surface. In this embodiment, the slab is 40 millimeters thick and has grooves 5 approximately 7 millimeters deep. The slab features a surface layer 16 of facing concrete, for example reconstituted stone obtained by binding fragments of crushed stone with cement of the same color as the stone. This layer 16 is

slightly thicker than the thickness 6 corresponding to the depth of the grooves 5. The bottom layer 17 of the slab 1 is made of ordinary concrete.

The purpose of the grooves 5 is to allow the slab to be easily divided to separate the various sections 2, 3, 4, each of these sections, once divided, having a breaking surface flat enough to be used in paving, in other words, a surface whose unevenness does not exceed the usual thickness of a joint between two slabs.

The dividable slab 1 is shown in cross section in figure 2. The two sections 2 and 3 of the slab are separated by a groove 5, which pre-defines a breaking line 7 within the slab thickness. The depth of the groove is designed to allow relatively easy breakage, as detailed hereafter, whilst avoiding excessive weakening, leading to accidental breakage during manufacturing or transport, for example. Compared with the existing esthetic surface contours, a deep groove, between 6 and 10 millimeters for an approximately 40 millimeter thick slab, must be chosen to ensure this. Moreover, a pointed shape will be chosen for the bottom part of the groove for clearly pre-defining the breaking line 7 so as to obtain a relatively clean break. A V-shaped groove is most suitable. A groove with a wide bottom, of rectangular shape, for example, or of insufficient depth, would be unsuitable because the probability of obtaining breaking surfaces with protuberances larger than the acceptable width of a joint between two slabs would be too high. Use of such a groove for dividing in the sense of the invention would result in a large number of unusable slabs, which would not fulfill the objective of an economic solution.

According to figure 3a, a few blows of the club hammer 8 with a wide chisel on the face opposite the groove

also allows the slab to be divided along the line 7. According to the illustration in figure 3b, the slab can be divided by striking it cleanly, yet effortlessly, at its breaking line, against the projecting edge of a hard material, for example a pack of slabs. These very straightforward dividing methods are particularly suitable for implementation when laying slabs on site. They require neither complex tooling nor great force, unlike what the use of a sawing method could represent.

Figure 4 represents an assortment of dividable slabs according to one possible form of division. This assortment comprises two types of dividable slabs 1 and 11 associated with a conventional, solid slab 10 of 50 × 50 centimeter size. The slab 1 corresponds to the previously described slab and the slab 11 is made up of the 50 × 20 centimeter sized section 12, the 30 × 30 centimeter sized section 13 and the 30 × 20 centimeter sized section 14. All these slabs come from the manufacturing process in the same 50 × 50 centimeter size, allowing easy, optimal palletization. Their distribution is therefore equivalent to that of the single size slabs.

Figure 5 illustrates the laying of an assortment of slabs, such as that proposed in figure 4, comprising three slabs 10, three slabs 1 and three slabs 11 to form a square with approximately 1.5-meter sides. Advantageously, joints 15 filled with polymer filler, a material with the property of hardening with water whilst remaining soft and porous, are introduced between these slabs. These joints offer the advantage of sustaining well any slight deformation of the paving, whilst remaining in position oven time despite bad weather and other wearing factors. They also allow the slab side faces or the breaking surfaces, which were not clean following the breaking thay they were

subjected to during dividing, to be effectively concealed. In an alternative embodiment, a cement mortar joint can be used.

The invention also relates to the process for manufacturing the slabs according to the invention, described hereafter with a view to obtaining a slab as shown in figure 1.

This manufacturing process is based on a special plastic mold 20, illustrated in figure 6, featuring three sections 22, 23, 24, whose sizes correspond respectively to the sections 2, 3 and 4 of the slab 1. Each surface of the sections 22, 23, 24 has a specific granularity obtained by fabricating the mold 20 by molding it on three real natural stones of corresponding size to the sections 2, 3 and 4 of the slab 1. The mold sections 22, 23 and 24 are separated by a projecting rib 25 of triangular cross section, in the form of a point, whose dimensions correspond to those of the groove 5 in the slab 1.

The manufacturing process is based on an automatic rotary press comprising between six and eight molds, each mold 20 being used according to the following steps:

- the bottom of the mold is filled with facing concrete to a depth slightly greater than the height of the ribs 25;
- the remaining volume of the mold is filled with ordinary concrete;
- the assembly is pressed;
- then the slab is immediately demolded.

The slab 1 is then formed. It must harden for approximately 24 hours before being totally consolidated. As the mold 20 was produced from three real natural stones, so the surface obtained on the

facing concrete of the slab 1 represents a true image of these three stones and, after dividing the three sections 2, 3, 4, the three slabs obtained are faithful imitations of the three original stones.

The previous embodiment was described with slabs of 50 × 50 centimeter overall size, but it could be applied to slabs of other sizes. Sizes having sides between 40 and 100 centimeters such as, for example, 40 × 40 centimeters, 60 × 40 centimeters, 50 × 100 centimeters, 60 × 60 centimeters, are especially suited to application of the invention because they allow slabs to be produced with an overall size representing a weight that allows them to be handled, particularly with a view to dividing them, whilst offering possibilities of dividing sections of reasonable size.

Furthermore, the previous embodiment proposed slabs that can be divided into three sections, but the invention also applies to any other geometry. However, it is particularly well suited to producing between two and four sections to maintain straightforward, easy dividing and obtain esthetic, mutually compatible sizes. A larger section size would risk weakening the slab and complicating slab dividing.

Sections of 20 × 20 centimeter minimum size are preferable.

Finally, the choice of the slab dimensions and of the sizes of its three sections, as described in the embodiment in figures 1 to 5, is a choice that has a first technical effect of particularly easy dividing and a second technical effect of offering sections resulting from the dividing of slabs having sizes that are particularly mutually compatible sizes for being distributed over a ground surface in any geometry, so

as to obtain a crazy paving effect of the natural stone paving.

In brief, the principle of the invention applies in particular to slabs of rectangular shape with sides between 40 and 100 centimetersin in length, comprising two to four sections with a side at least 20 centimeters in length.

Finally, the invention has the following advantages:

- the manufacturing of the dividable slabs is simple and allows a multitude of sizes to be obtained, comparable with natural stone paving arrangements;
- the slabs obtained are thick and have an irregular surface, imitating natural stone;
- the manufacturing process is very efficient;
- the distribution and, in particular, the palletization of the dividable slabs is simple because the slabs are all of the same initial size;
- the laying of the dividable slabs is straightforward.

As a comments, slab dividing is conceivable at any time before laying, the example of dividing on site being advantageous but not limiting.

Claims

1. A thick slab for covering a ground surface, characterized in that it comprises at least a surface layer made of facing concrete, at least two sections (2, 3) separated by a deep groove (5) ending in a point to define a breaking line (7) allowing the slab to be divided along this breaking line to separate the two sections (2, 3) and obtain two slabs.

2. The slab as claimed in the previous claim, characterized in that the thickness of the slab is greater than or equal to 35 millimeters and wherein the groove is between 6 and 10 millimeters deep.

3. The slab as claimed in one of the previous claims, characterized in that it comprises a square or rectangular overall shape, the length of whose sides is between 40 and 100 centimeters approximately, and which comprises between 2 and 4 dividable sections.

4. The slab as claimed in claim 3, characterized in that it is overall square in shape with sides approximately 50 centimeters in length and comprises sections whose sides are between 20 and 50 centimeters in length.

5. A mold (20) for manufacturing a slab as claimed in one of claims 1 to 4, characterized in that it comprises several sections (22, 23, 24), whose surfaces feature textures reproducing the texture of natural paving stones, the sections being separated by a high, pointed rib (25).

6. Process for manufacturing a slab as claimed in one of claims 1 to 4, comprising the following steps:

a) placing of a mold as claimed in claim 5 in an automatic machine;

b) filling of the mold with concrete, the bottom of the mold at least being filled with facing concrete;

c) pressing of the slab and immediate demolding.

7. The process for manufacturing a slab as claimed in claim 6, wherein step b) comprises the following steps:

- filling of the mold with a first layer of facing concrete to a depth slightly greater than the height of the mold ribs;

- filling of the remaining volume of the mold with ordinary concrete.

8. A process for laying slabs, which includes the step of straightforward slab division, as claimed in one of claims 1 to 4.

9. The process for laying slabs as claimed in claim 8, characterized in that dividing is simply performed by striking the slab on the projecting edge of a hard surface or by striking the slab with a club hammer and a wide chisel.

10. The process for laying slabs as claimed in either of claims 8 and 9, characterized in that a joint comprising polymer filler or cement mortar is introduced between the slab divided sections.

11. The process for laying slabs as claimed in one of claims 8 to 10, characterized in that it uses an assortment of slabs overall square with sides approximately 50 centimeters in length and comprising:

- a first approximately 50 × 30 centimeter sized section, a second approximately 30 × 20 centimeter

sized section and a third approximately 20 x 20 centimeter sized section; and/or

- a first approximately 50 x 20 centimeter sized section, a second approximately 30 x 30 centimeter sized section and a third approximately 30 x 20 centimeter sized section.

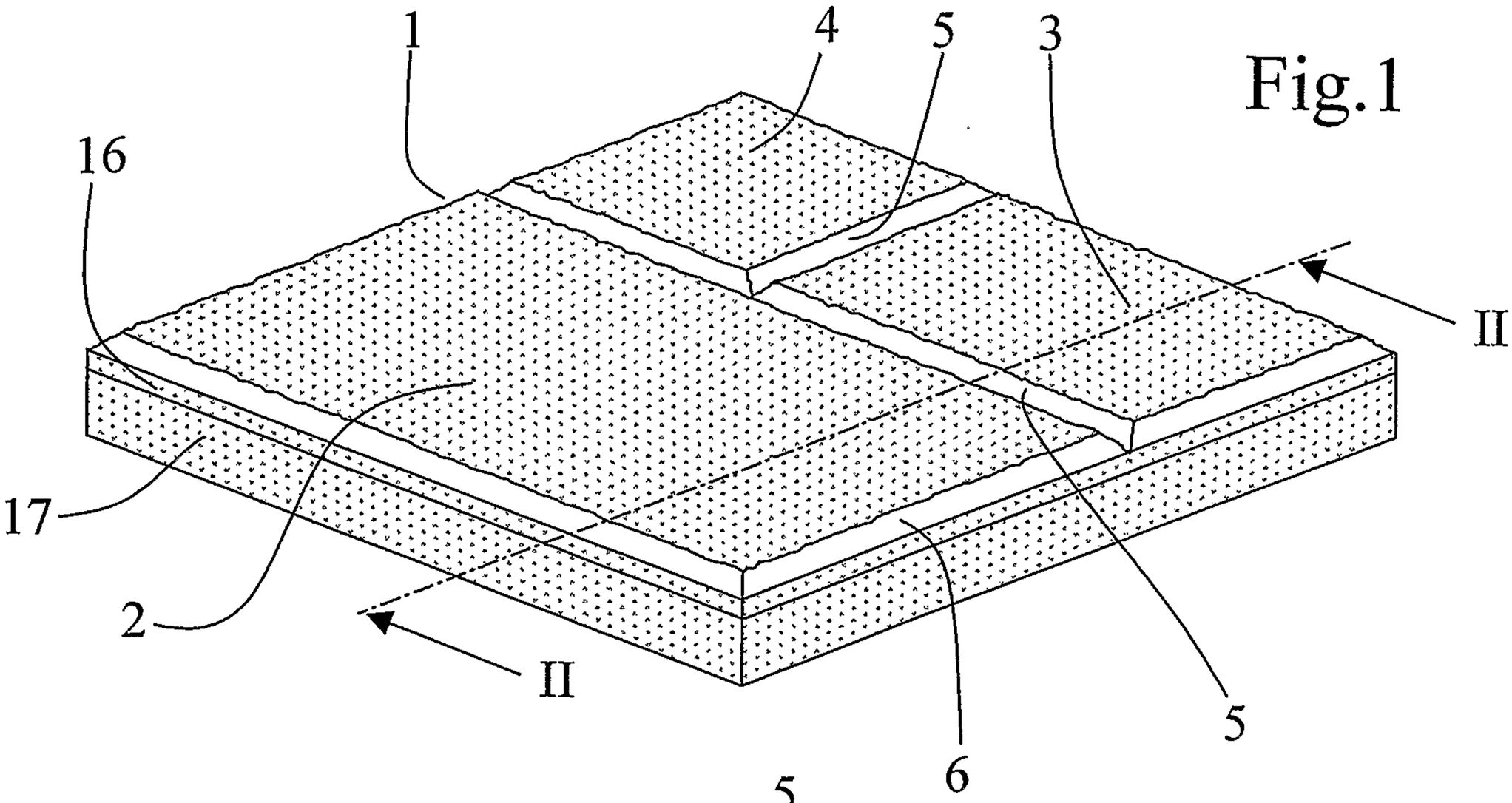


Fig.1

Fig.2

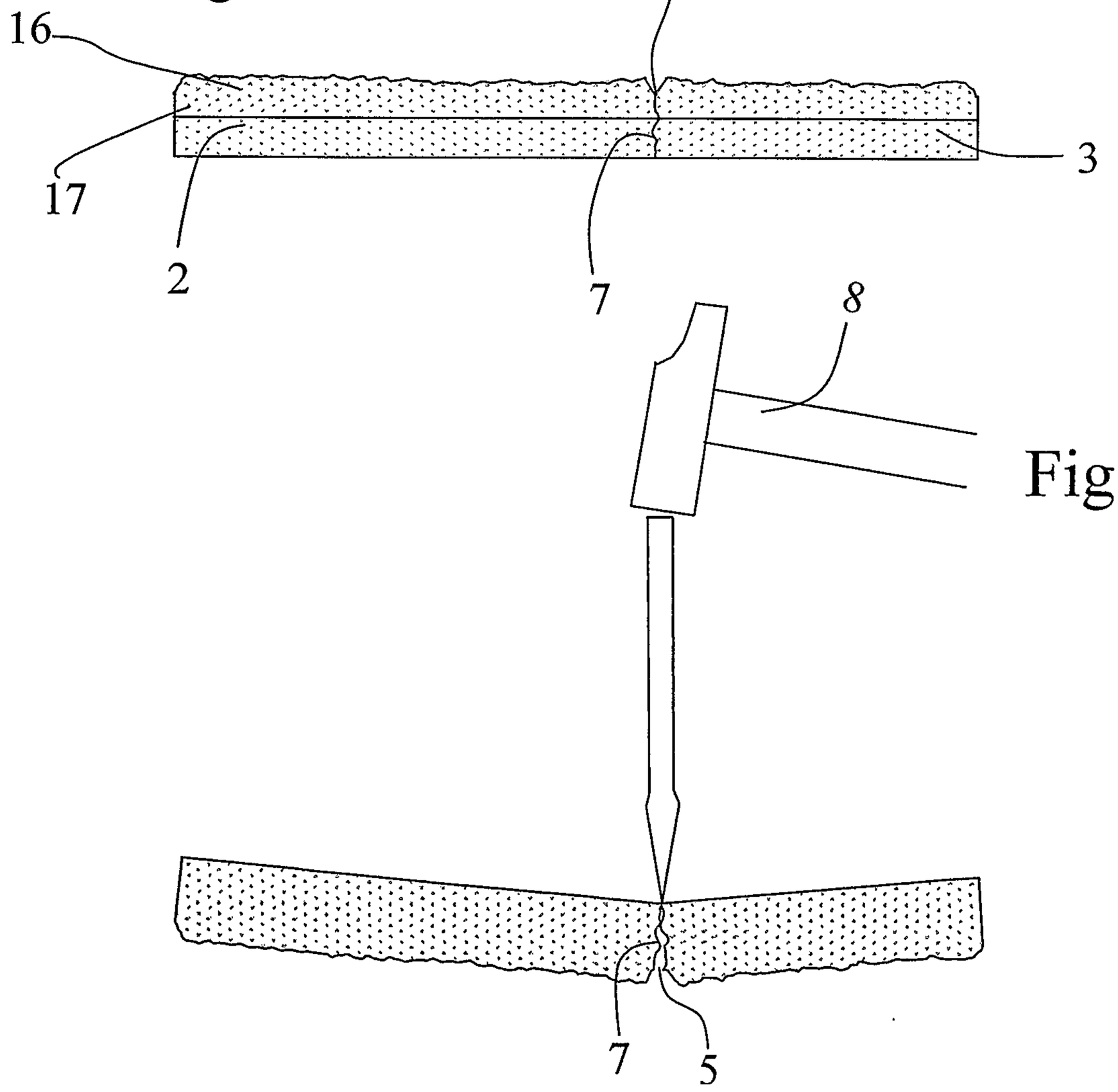


Fig.3a

Fig.3b

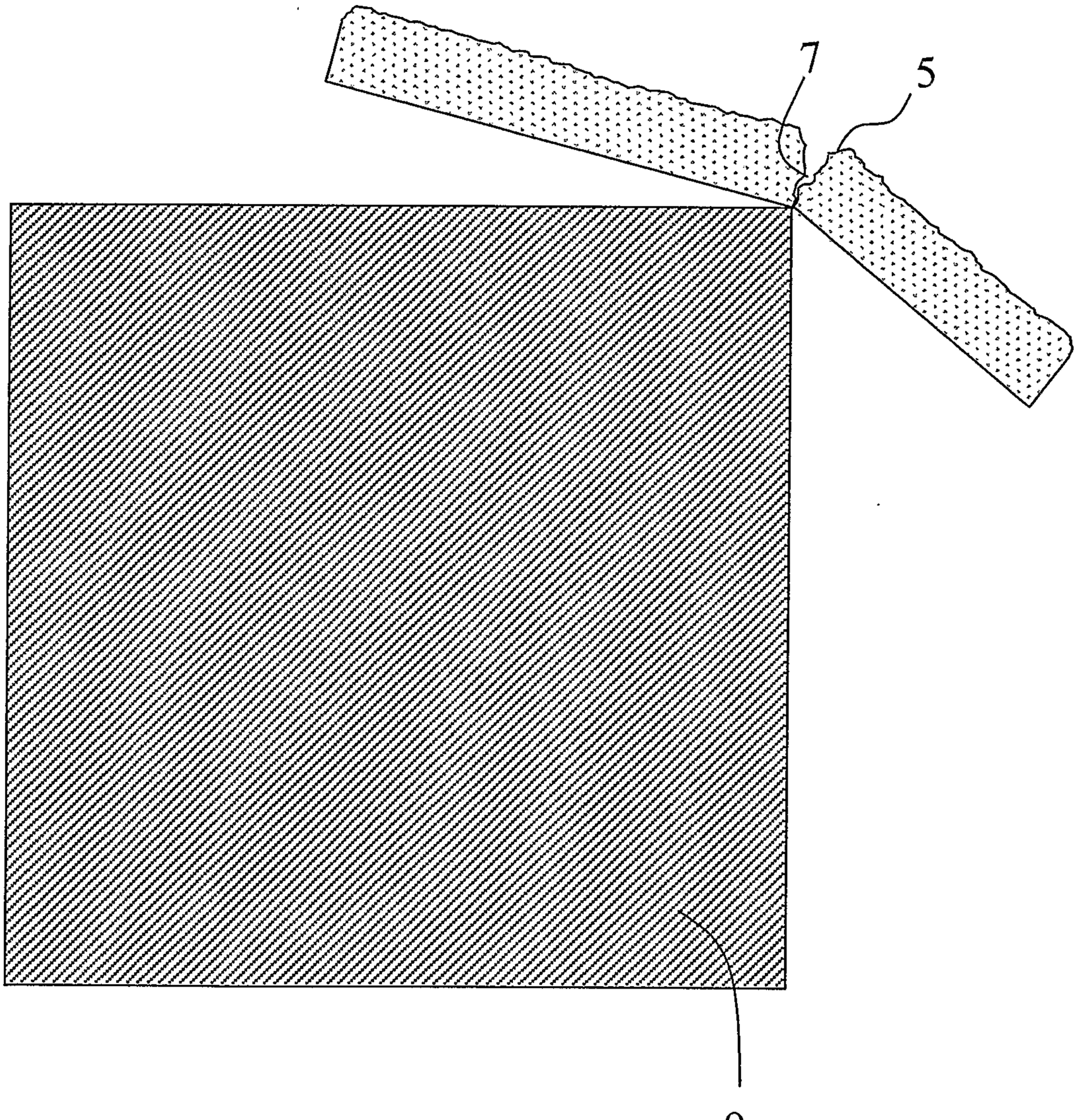


Fig.4

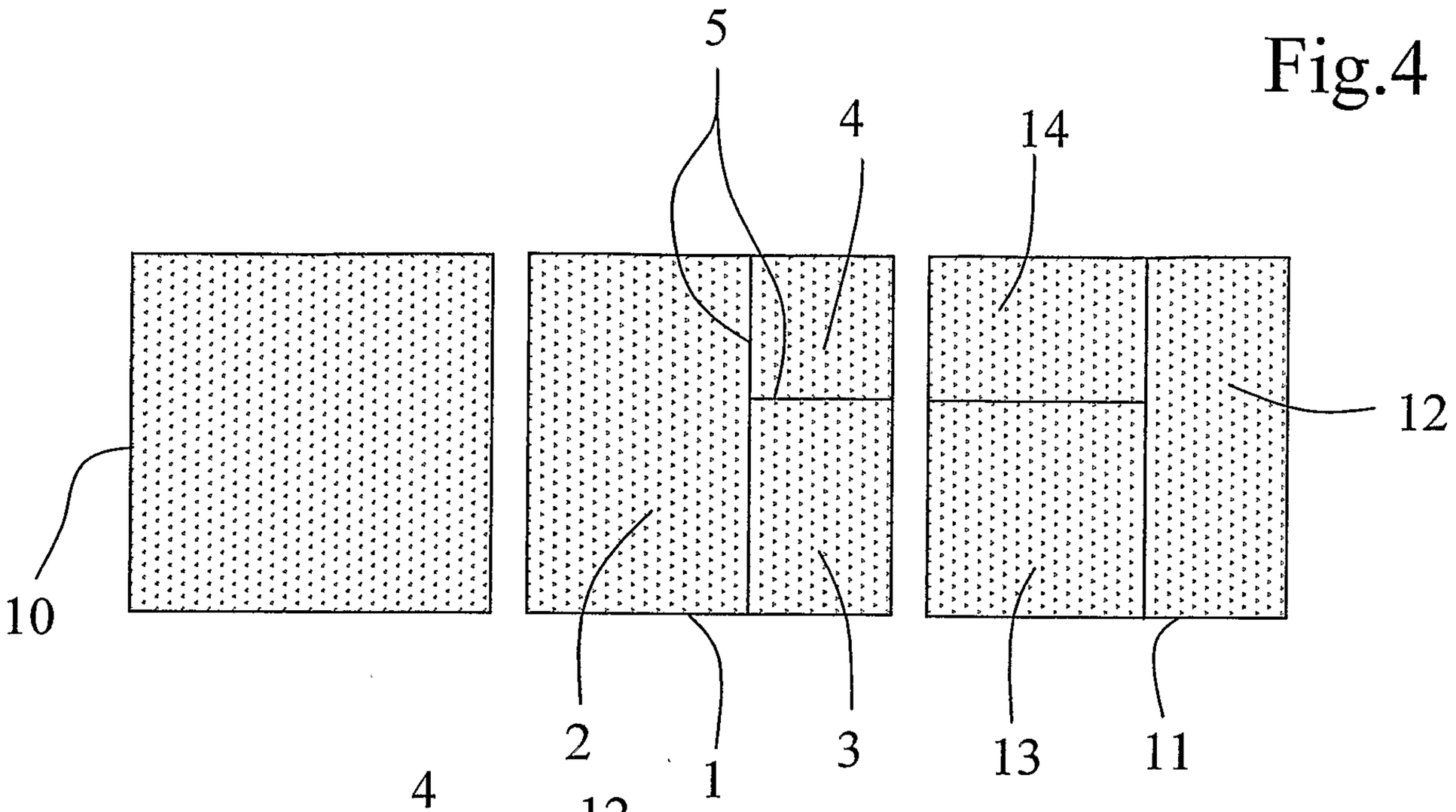
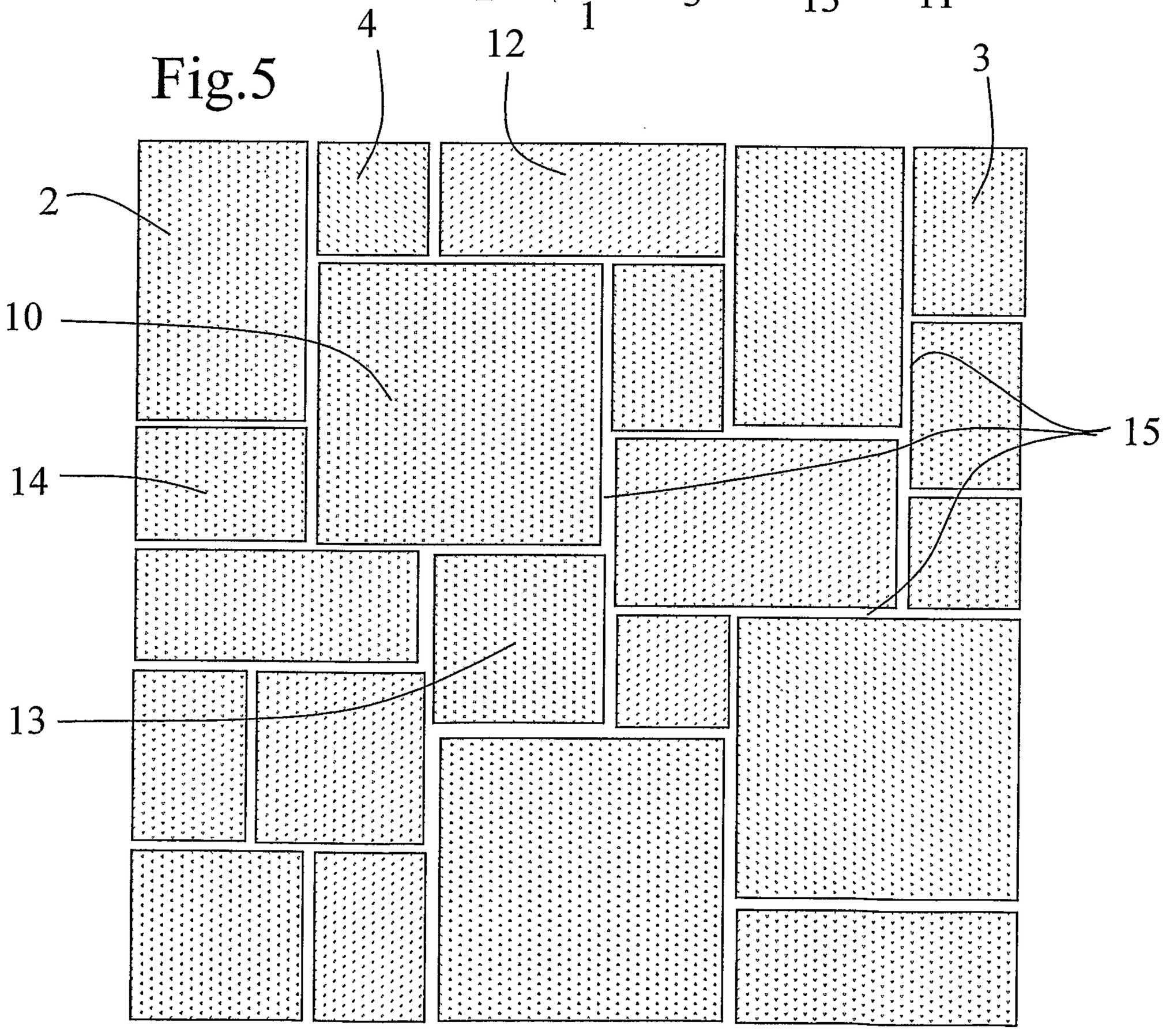


Fig.5



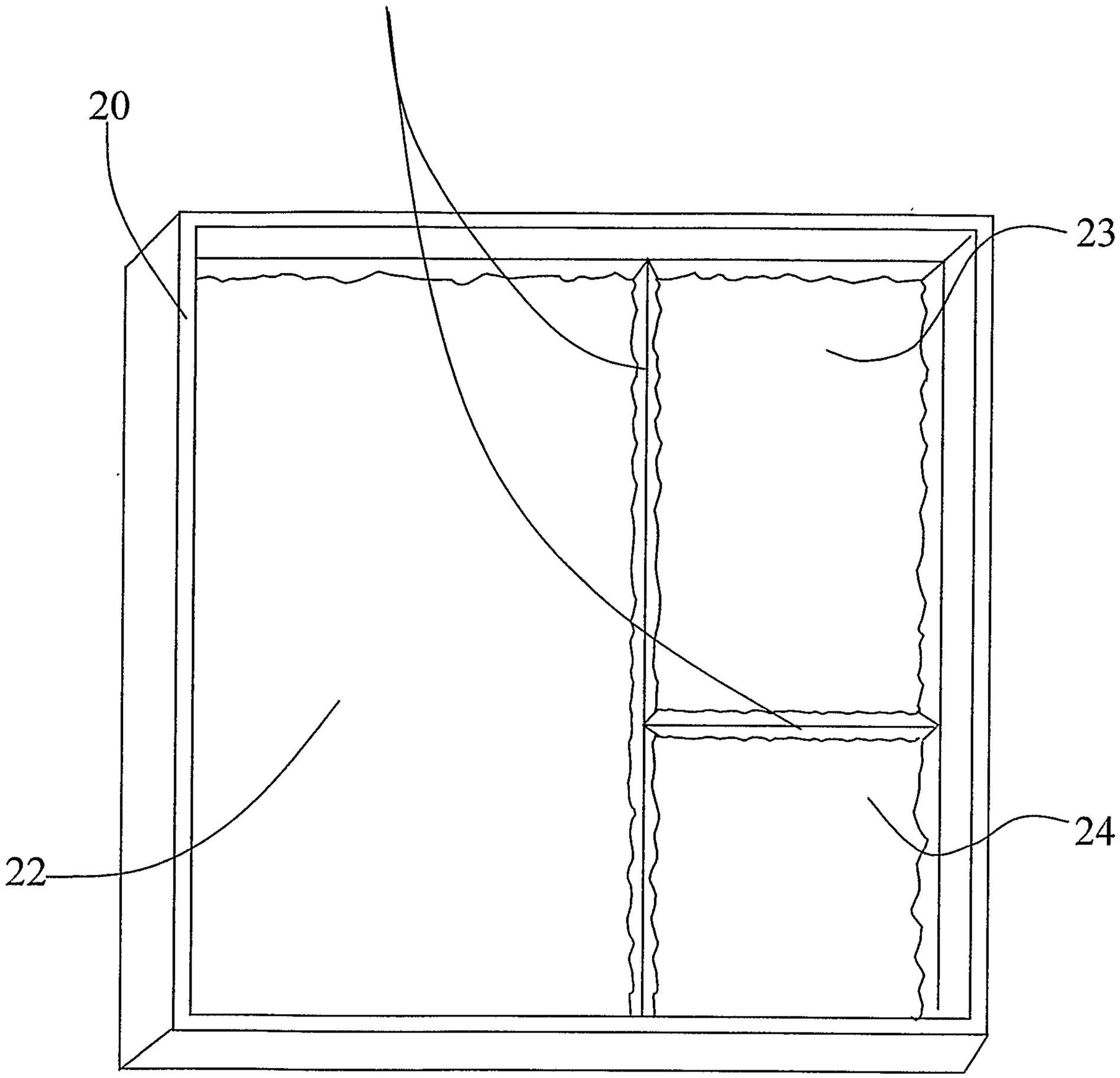
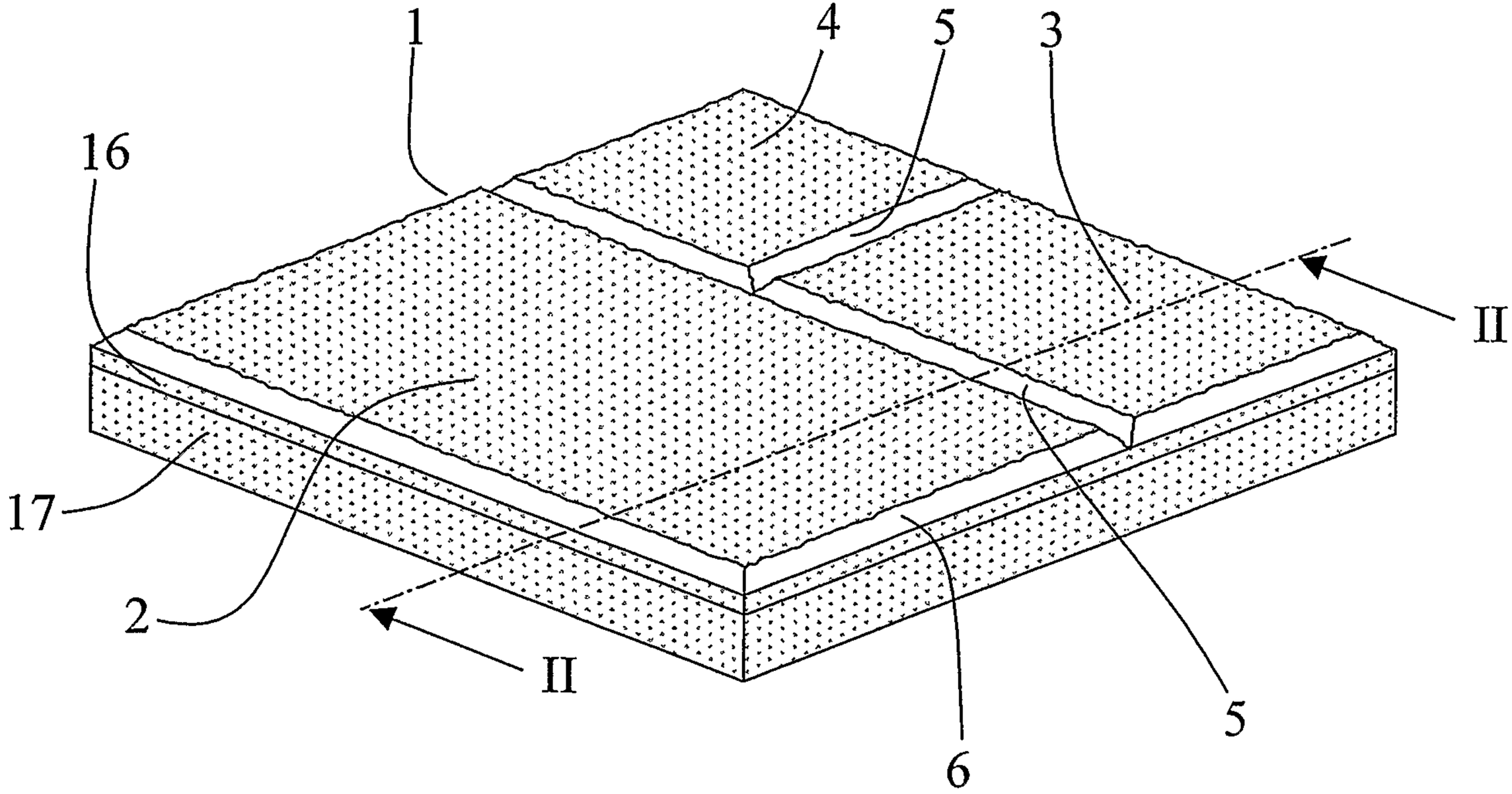


Fig.6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