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(54) **ELASTIC FILAMENT AND CUTTING METHOD AND CUTTING STRUCTURE THEREOF AND TEXTILE WITH THE ELASTIC FILAMENT**

(57) The invention provides a method and a structure for cutting out elastic filaments. The cutting structure has a conveying device and a cutting device; the cutting method cutting an elastic membrane material, the elastic membrane material being combined with at least one cushion layer, conveying the elastic membrane material

to the cutting device to cut the elastic membrane material a plurality of times, cutting the elastic membrane material into elastic filaments with certainty, and even cutting out fine elastic filaments. The elastic filament can be woven into a textile, or used as a sewing thread or an embroidery thread for apparel.

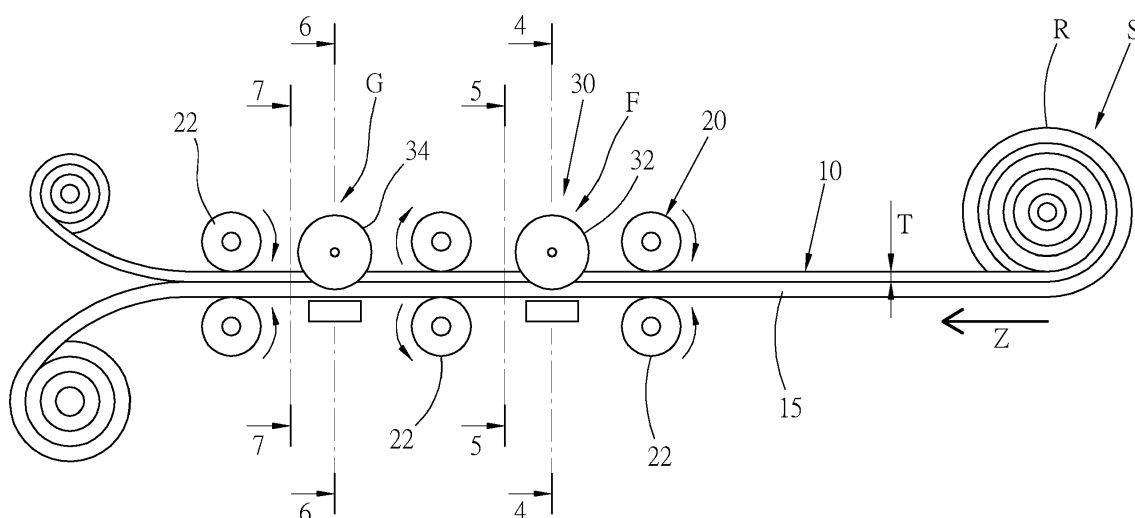


Fig. 1

Description

BACKGROUND OF THE INVENTION

Field of Invention

[0001] The invention relates to an elastic filament, a textile of the elastic filament, and a cutting method and a cutting structure for cutting an elastic membrane material into fine elastic filaments.

Related Art

[0002] Yarn made of membrane material by the current technology has a certain rigidity, and lacks elasticity and flexibility. The reason why the existing membrane material can be cut into yarns is because of the rigidity of PET membrane material to enable cutting, such as metallic yarn, and metallic yarn with metallic effect cannot be made by drawnwork. PET polyester membrane material is quite hard and is the same material for making mineral water bottle, and fabric made of such yarns is not flexible and comfortable, causes a tingling sensation and is not suitable for wearing. For the currently existing reflective yarn, if it is a double-sided reflector, a layer of PET membrane is adhered between two layers of reflective membrane, and then cut into yarns; and if it is a single-sided reflector, a layer of PET membrane is adhered on the back side of one layer of reflective membrane, and then cut into yarns. The current technical skill for cutting membrane material into filaments is incapable of cutting soft materials. In addition, materials with low toughness and elasticity (such as hard PVC or OPP materials) can also be cut into filaments (yarns), but they are not used for textile fabrics due to problems with environmental protection factors and heat resistance, etc.

SUMMARY OF THE INVENTION

[0003] If elastic yarns or filaments that can be woven are to be made by cutting, an elastic membrane material with a considerable length and considerable thin thickness has to be cut into fine filaments or yarns. However, the inventor of the present invention conducted tests and market inspection and asked the manufacturers who cut membrane materials into filaments if there is a way to cut the membranous, flexible and elastic membrane material into fine filaments, and found that the current technique is incapable of achieving the task. There are several main reasons. Firstly, due to the elasticity and flexibility of the elastic membrane material, it is easy to deform and flex, and it is easy for cutters to fail to cut the elastic membrane material reliably, causing the cut filaments to be thick and thin, and jagged (edges of the filament are uneven). The greater the elasticity and toughness of the elastic membrane material, the more difficult the cutter being capable of cutting off the elastic membrane material. If multiple cutters are used to cut one

sheet of elastic membrane material into a plurality of filaments at the same time, and if one of the cutters does not cut off the elastic membrane material, it will become a defective product, and the elastic membrane material must be scrapped. Moreover, the flexible and elastic membrane material is likely to be corrugated during cutting, part of its material will be stacked on top of each other, which affects the implementation of cutting and is easy to form defective products.

[0004] Secondly, when pulling the elastic membrane material with elasticity, due to the elasticity, the stretching condition and tension of each part of the membrane material will be uneven. At a position with an excessive tension, the cut filament will be corrugated, and at a position with a tension that is too small, the cut filament will be wavy, and due to the uneven tension, the cut filaments will have different thicknesses, resulting in poor quality. Thirdly, because the stretching condition is uneven and a width of the filament to be cut is small, it is easy to cut off the filament at positions before it reaches a full length intended to be cut, which also becomes a defective product and reduces the yield.

[0005] Due to the above reasons, there is no technique or method available on the market that is capable of making elastic filaments by pulling and cutting the elastic membrane material, especially elastic filaments with a very small diameter.

[0006] An object of the present invention is to provide a cutting method and a cutting structure to cut an elastic membrane material into fine elastic filaments.

[0007] Another object of the present invention is to provide a fine elastic filament that can be used to make a textile, or used as an embroidery thread or a sewing thread.

[0008] The cutting method for elastic filaments provided by the present invention cuts out a plurality of elastic filaments from an elastic membrane material, and the cutting method includes:

40 preparing an elastic membrane material, separably combining the elastic membrane material with at least one cushion layer to form a material to be cut, ductility of the cushion layer being lower than that of the elastic membrane material; and

45 conveying the material to be cut to a cutting device to cut the elastic membrane material at least two times, a first cutting of the cutting device cutting to form a plurality of first cut marks at equal intervals in the elastic membrane material, a second cutting of the cutting device cutting to form a plurality of second cut marks at equal intervals in the elastic membrane material, the first cut marks and the second cut marks having a same interval, and each of the second cut marks being located between the two adjacent first cut marks.

[0009] The cutting structure for elastic filaments pro-

vided by the invention cuts an elastic membrane material into a plurality of elastic filaments, and the cutting structure includes: a conveying device and a cutting device; the conveying device conveys the elastic membrane material toward the cutting device, causing the cutting device to cut the elastic membrane material; and the cutting device has at least two rows of a plurality of cutters disposing anteriorly and posteriorly in a conveying direction of the elastic membrane material, the cutters in each of the rows have a same blade distance, in the conveying direction of the elastic membrane material, the at least two rows of the cutters have at least a positional difference; and the at least two rows of the cutters cut the elastic membrane material into a plurality of elastic filaments.

[0010] With the cutting method and the cutting device mentioned above, the elastic membrane material with elasticity is cut at least two times of multiple times of cutting, not only can the elastic filaments be cut out with certainty, but even the fine elastic filaments with a width of 0.05mm~0.5mm, preferably 0.05mm~0.25mm can be cut out.

[0011] A cross-section of the elastic filament of the present invention has a width and a thickness, two side surfaces of the elastic filament are cut surfaces, the width is formed between the two side surfaces, and the width of the elastic filament is not greater than the thickness thereof. The two cut surfaces form a pair of parallel sides of the elastic filament.

[0012] The elastic filament made by the invention can be woven into a textile and made into clothes for wearing, or used as an embroidery thread or a sewing thread. Due to elasticity of the elastic filament, the textile produced is flexible, comfortable and elastic. A cross-section of the elastic filament of the textile has a width and a thickness, and the width and the thickness can be equal or unequal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The objects, features and achieved efficacies of the present invention can be understood from the description and figures of the following preferred embodiments, wherein:

FIG. 1 is a schematic diagram of a cutting structure and a manufacturing process of a cutting method to show cutting of an elastic membrane material according to a first preferred embodiment of the present invention;

FIG. 2 is a top view of FIG. 1;

FIG. 3 is a top view of a first row of cutters and a second row of cutters in FIG. 1 to show a relative relationship of the two rows of the cutters on a larger scale;

FIG. 4 is a cross-sectional view taken along section

line 4-4 of FIG. 1 to show the first row of the cutters performing a first cutting on the elastic membrane material;

FIG. 5 is a cross-sectional view taken along section line 5-5 of FIG. 1 to show a state of the elastic membrane material after the first cutting;

FIG. 6 is a cross-sectional view taken along section line 6-6 of FIG. 1 to show the second row of the cutters performing a second cutting on the elastic membrane material;

FIG. 7 is a cross-sectional view taken along section line 7-7 of FIG. 1 to show a state of the elastic membrane material after the first cutting;

FIG. 8 is a partial perspective view of FIG. 1 showing elastic filaments after cutting are wound into rolls;

FIG. 9 is a schematic diagram of the cutting structure and the cutting method according to a second preferred embodiment of the present invention;

FIG. 10 is a top view of the first row of the cutters to a third row of the cutters in FIG. 9 to show a relative relationship of the three rows of the cutters on a larger scale;

FIG. 11 is a cross-sectional view taken along section line 11-11 of FIG. 9;

FIG. 12 is a perspective view of the elastic filament made by the present invention;

FIG. 13 to FIG. 17 are cross-sectional views of the five different types of elastic filaments; and

FIG. 18 is a schematic diagram of a textile made with the fine elastic filaments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] The invention provides a cutting method and a cutting structure for cutting an elastic membrane material with stretchable elasticity into a plurality of elastic filaments 50 with a considerable length and continuous length as shown in FIG. 12, and the elastic filament 50 is made with stretchable elasticity. The method and a device of the present invention are suitable for cutting out the fine elastic filaments (elastic yarns) 50, such as cutting out the elastic filaments 50 with a width of 0.05mm to 0.5mm, and the fine elastic filaments 50 can be made into a textile by weaving technology (for example, can be directly made into clothes or vamps by knitting) or used as embroidery threads or sewing threads, so as to solve the problem that the existing technology is incapable of cutting out fine filaments or yarns with elasticity that can

be made into textiles.

[0015] The figures of the present invention are for illustration, and do not show the actual quantities. For example, only several cutters of a cutting device are shown, the figures do not show an actual quantity of the cutters.

[0016] The inventor has tested cutting out fine elastic filaments from an elastic membrane material, for example, cutting an elastic membrane material 10 having a width W of 3.2cm and a thickness of 0.16mm into 200 elastic filaments, each of the elastic filaments has a width of 0.16mm, and 200 cutters are arranged at an interval of 0.16mm to cut out the 200 elastic filaments at the same time. The inventor's test found that it is difficult for the traditional cutting method to cut out the fine elastic filaments with a width of 0.16mm and a thickness of 0.16mm. When cutting out the elastic filaments with a width of 0.16mm, because the cutter has a thickness, and a gap between the two adjacent cutters is less than 0.16mm; when the elastic membrane material 10 being cut enters each of the gaps, the elastic membrane material 10 will be deformed and pressed in the gaps, resulting in being sandwiched between the two adjacent cutters. Large pressure and resistance will be formed between the elastic filaments and the cutters, causing the membrane material to be incapable of moving to make cutting difficult, and because the elastic membrane material 10 is squeezed, the cutters may even break, and cutting cannot be performed at all.

[0017] The cutting method of the present invention is capable of cutting out the elastic filaments 50 from the elastic membrane material 10, and even capable of cutting out the fine elastic filaments 50 with a width as small as 0.05mm, for example, the elastic filaments 50 with a width of 0.05mm to 0.25mm, preferably, cutting out the fine elastic filaments 50 with a width of 0.1mm to 0.14mm. The fine elastic filaments 50 can be made into textiles (such as fabrics) for making clothes to provide soft and comfortable wear; or made into shoes, bags (handbag, backpack), pouches (hand-pouch, shoulder pouch), straps (belt, webbing), etc., can also be used as embroidery threads or sewing threads.

[0018] FIG. 1 and FIG. 2 are schematic diagrams of the cutting method and a cutting structure according to a first preferred embodiment of the present invention. An elastic membrane material 10 of high polymer material with stretchable elasticity is cut into the elastic filaments 50. The elastic membrane material 10 with stretchable elasticity and flexibility in the preferred embodiment of the present invention is a plastic or rubber film made of a high polymer material such as PU (Polyurethane), PVC (Polyvinyl Chloride), TPU (Thermoplastic Polyurethane) elastomer rubber, TPE (Thermoplastic Elastomer), TPR (Thermoplastic Rubber) or silicone rubber. A thickness T of the elastic membrane material 10 is in a range of 0.09-0.5mm, preferably 0.1~0.28mm.

[0019] In this preferred embodiment, 200 fine elastic filaments 50 with a width of 0.11mm being cut out from the elastic membrane material 10 with the width W of

2.2cm and the thickness T of 0.2mm are taken as an example. Before cutting, the elastic membrane material 10 is in the form of a roll R with a considerable length, and continuously conveyed by a conveying device 20, and the elastic membrane material 10 is cut into the fine elastic filaments 50 by a cutting device 30.

[0020] In order to facilitate cutting of the flexible, stretchable elastic membrane material 10, the present invention provides at least one cushion layer 15 that is harder than the elastic membrane material 10 and can make cutting easier to support the elastic membrane material 10. The elastic membrane material 10 is separably combined with the cushion layer 15. The cushion layer 15 is in the form of a sheet or film, which is a material with low elasticity, low flexibility, low ductility, and rigidity greater and flexibility less than that of the elastic membrane material 10. The cushion layer 15 can be a high polymer material or paper, but is not limited thereto, for example, a release paper or a release film, and PET (polyethylene terephthalate) membrane, OPP (Oriented Polypropylene) or hard PVC can be used for the release film. The cushion layer 15 is combined with the elastic membrane material 10 to form a material S to be cut.

[0021] Separable combination of the elastic membrane material 10 and the cushion layer 15 includes: electrostatic bonding or bonding with an adhesive. If bonding with an adhesive, for example, an adhesive is coated on one surface of the elastic membrane material 10 or the cushion layer 15, and then the elastic membrane material 10 and the cushion layer 15 are adhered together. Bonding between the elastic membrane material 10 and the cushion layer 15 only needs to be at a minimum strength, that is, as long as the bonding allows the elastic membrane material 10 and the cushion layer 15 to be pulled and cut together and easily separated. The adhesive does not have adhesiveness after drying, or although the adhesive has adhesiveness, its adhesiveness will not be transferred to the elastic membrane material 10, that is, when separating the elastic membrane material 10 from the cushion layer 15 that are bonded with each other, the surface of the elastic membrane material 10 does not have adhesiveness. In the present invention, requirement of bonding force between the elastic membrane material 10 and the cushion layer 15 only needs to meet the following conditions: when the material S to be cut is being cut, the elastic membrane material 10 and the cushion layer 15 can be kept being bonded with each other, and there is no limitation on how the elastic membrane material 10 and the cushion layer 15 are bonded or which substance is used for bonding.

[0022] Please refer to FIG. 1, the present invention cuts out the fine elastic filaments 50 from the elastic membrane material 10 with a considerable length. The material S to be cut is pulled and moved by a plurality of rollers 22 of the conveying device 20 in order to convey the elastic membrane material 10 toward the cutting device 30, and in the process of conveying the material S to be cut and the elastic membrane material 10, the elastic

membrane material 10 is cut by cutters of the cutting device 30, and then the elastic filaments 50 are cut out in a manufacturing process.

[0023] In this preferred embodiment, the cutting device 30 is provided with two rows F, G of a plurality of cutters 32, 34 disposing anteriorly and posteriorly in a conveying direction Z of the elastic membrane material 10 to perform two times of cutting on the elastic membrane material 10. Please refer to FIG. 3, for example, each of the rows F, G has about 50 of the cutters 32, 34, the cutters 32, 34 in each of the rows F, G are disposed at equal intervals, a tip distance between the two adjacent cutters 32 of the first row F is X, defined as a cutter distance, a tip distance between the two adjacent cutters 34 of the second row G is also X, and the cutter distance X in this embodiment is 0.22mm. In the conveying direction Z of the material S to be cut, the cutters 32, 34 of the two rows F, G are staggered and have a positional difference D, and the positional difference D is exactly half of the cutter distance X. Therefore, each of the cutters 34 of the second row G is exactly positioned at a center of the two adjacent cutters 32 of the first row F. The cutters 32 and 34 can be round cutters (as shown in FIG. 1) or straight cutters (as shown in FIG. 8).

[0024] Please refer to FIG. 1 and FIG. 4, the material S to be cut is pulled by the rollers 22 of the conveying device 20 and continuously fed toward the cutting device 30, the material S to be cut is cut by the cutting device 30, the cutters 32 of the first row F cut and form a plurality of first cut marks 42 in the material S to be cut, and a cut depth of the cutters 32 reaches the cushion layer 15, that is, the cutters 32 cut off the elastic membrane material 10, but do not cut off the cushion layer 15. Please refer to FIG. 5, after being cut by the cutter 32 of the first row F, the elastic membrane material 10 is cut into a plurality of filaments 40, and a width of each of the filaments 40 is 0.22mm, which is the same as a size of the cutter distance X. Although the cutters 32 cut off the elastic membrane material 10, since the elastic membrane material 10 is bonded with the cushion layer 15 and the cushion layer 15 is not cut off and remains complete, the elastic membrane material 10 and the filaments 40 remain complete and are positioned on the cushion layer 15 without falling apart.

[0025] Please refer to FIG. 1 and FIG. 6, the material S to be cut is pulled by the rollers 22 and continuously fed toward the cutters 34 of the second row G to be cut by the cutters 34 of the second row G for a second time. The cutters 34 of the second row G cut and form a plurality of second cut marks 44 in the material S to be cut. A cut depth of the cutters 34 at least reaches the cushion layer 15, that is, the cutters 34 cut off the elastic membrane material 10, but whether the cutters 34 cut off or do not cut off the cushion layer 15 is a choice in implementation. The preferred embodiment shows that the cutters 34 do not cut off the cushion layer 15.

[0026] Please refer to FIG. 6 and FIG. 7. After the cutters 32 of the first row F and the cutters 34 of the second

row G perform the two times of cutting, the elastic membrane material 10 is cut with the first cut marks 42 and the second cut marks 44. Please refer to FIG. 3, since a position of each of the cutters 34 of the second row G is exactly at a center of the two adjacent cutters 32 of the first row F, the second cut mark 44 of each of the cutters 34 of the second row G is cut and formed at a center of each of the filaments 40, and each of the filaments 40 is evenly cut into two halves. After the above cutting procedure, the elastic membrane material 10 is cut into the fine elastic filaments 50 of the present invention. A width B of each of the elastic filaments 50 in this preferred embodiment is 0.11mm, that is, half of a size of the cutter distance X, and is also a size of the aforementioned positional difference D. After cutting is completed, the elastic filaments 50 are separated from the cushion layer 15. Since this embodiment cuts the elastic membrane material 10 with a considerable length, such as 3000 meters to 4000 meters long, each of the elastic filaments 50 with a length from 3000 meters to 4000 meters long can be cut out. Please refer to FIG. 8, each of the elastic filaments 50 after cutting is wound into a roll for use. After the cushion layer 15 is separated from the elastic filaments 50, the cushion layer 15 is also wound into a roll.

[0027] The cutting method and the cutting structure provided by the present invention are capable of cutting out the elastic filaments from the elastic membrane material, and can also be used to cut out the fine elastic filaments with a width of 0.05mm to 0.25mm to be woven into elastic fabrics for making clothes. Furthermore, the cutting method of the present invention is capable of cutting out the elastic filaments with a width smaller than the thickness T of the elastic membrane material 10. During cutting, since a width of the cutter distance X is greater than the thickness T, the elastic filaments will not be stuck between the cutters, and the cutting operation can be performed with certainty.

[0028] FIG. 9 is a second preferred embodiment of the cutting method and the cutting structure provided by the present invention. Components that are the same as that of the first preferred embodiment use the same reference numerals to facilitate understanding and avoid redundant description.

[0029] In this embodiment, the elastic membrane material 10 is cut three times with three rows F, G, H of cutters 32, 34, 36, and the elastic membrane material 10 is cut into the fine elastic filaments 50. Please refer to FIG. 10, the cutters 32, 34, 36 of the rows F, G, H are disposed with the same cutter distance X. In this embodiment, the cutter distance X is three times a width of the elastic filament 50 to be manufactured. The cutters 32, 34, 36 of the three rows F, G, H are disposed with the positional difference D, that is, the position difference D between the cutter 32 of the first row F and the cutter 34 of the second row G is the same as the position difference D between the cutter 34 of the second row G and the cutter 36 of the third row H, and the cutters 32, 34, 36 of the three rows F, G, H are arranged with the equal posi-

tional difference D. Therefore, in the conveying direction Z of the elastic membrane material 10, one of the cutters 34 of the second row G and one of the cutters 36 of the third row H are located between two adjacent cutters 32 of the first row F, and positions where the cutter 34 of the second row G and the cutter 36 of the third row H are located at evenly divide a gap between the two adjacent cutters 32 of the first row F into three equal parts.

[0030] Please refer to FIG. 11, the cutters 32 of the first row F cut and form the first cut marks 42 in the elastic membrane material 10 and cut out the filaments 40, and the cutters 34 of the second row G cut and form the second cut marks 44 in the elastic membrane material 10. As can be understood from FIG. 10 and FIG. 11, each of the second cut marks 44 is located between the two adjacent first cut marks 42. The cutters 36 of the third row H cut and form a plurality of third cut marks 46 in the elastic membrane material 10, and each of the third cut marks 46 is also located between the two adjacent first cut marks 42, and is located between the two adjacent second cut marks 44. One of the second cut marks 44 and one of the third cut marks 46 are located between the two adjacent first cut marks 42, and the second cut mark 44 and the third cut mark 46 equally divide a gap between the two adjacent first cut marks 42. That is, as shown in FIG. 11, each of the filaments 40 is cut by the second cut mark 44 and the third cut mark 46, and the second cut mark 44 and the third cut mark 46 exactly divide a width of each of the filaments 40 evenly into three equal parts. The positional difference D between the cutters shown in the embodiment of FIG. 10 is exactly the width B of the elastic filament 50 after cutting. After the elastic membrane material 10 is cut three times, the elastic filaments 50 with the same width B are cut out. After that, the cut elastic filaments 50 are separated from the cushion layer 15 and the elastic filaments 50 are wound into rolls.

[0031] The method of the present invention is capable of cutting the elastic membrane material 10 more than three times, for example, four times of cutting to form several first cut marks, several second cut marks, several third cut marks, and several fourth cut marks. The second cut mark, the third cut mark and the fourth cut mark are provided in a gap between the two adjacent first cut marks, and the second, third, and fourth cut marks equally divide the gap between the two adjacent first cut marks; that is, the first cutting cuts out a plurality of filaments with an equal width from the elastic membrane material 10, and the subsequent cuttings (second to fourth cuttings) cut each of the filaments into four elastic filaments with an equal width. In this way, the elastic filaments after cutting have a same cut width.

[0032] The cutting method of the present invention is capable of cutting various elastic membrane materials into the fine elastic filaments 50, as shown in cross-sections of the several elastic filaments shown in FIG. 13 to FIG. 17, each of the elastic filaments 50 is formed by cutting, and the cross-section thereof is rectangular or

approximately rectangular, with the width B and the thickness T, two side surfaces 56 are cut surfaces, and the two side surfaces 56 form a pair of parallel sides. The width B is formed between the two side surfaces 56; the thickness T is a thickness of the elastic membrane material 10, a top surface of the elastic filament 50 is a top surface of the elastic membrane material 10, and a bottom surface of the elastic filament 50 is a bottom surface of the elastic membrane material 10. The width B of the elastic filament 50 is not greater than (less than or equal to) the thickness T thereof. An elastic filament 50A shown in FIG. 13 is a homogeneous elastic filament, not a composite layered structure; elastic filaments 50B and 50C shown in FIG. 14 and FIG. 15 are elastic filaments with a composite structure having a reflective function, the elastic filaments 50B and 50C respectively have a body 51 and at least one surface of the body 51 is provided with a reflective layer 52; and elastic filaments 50D and 50E shown in FIG. 16 and FIG. 17 are elastic filaments with a composite structure having a luminous function, and at least one surface of the body 51 of the elastic filaments 50D and 50E has a luminous layer 54. The functional surface layer provided on the surface of the elastic filament is not limited to the luminous surface layer and the reflective surface layer, and can be, for example, a color surface layer or a surface layer with other functions.

[0033] The cutting method of the present invention is capable of cutting the elastic membrane material into the elastic filaments, especially capable of cutting out the elastic filaments with a very small width, so that the elastic filaments can be woven into various textiles by various weaving techniques. For example, a textile 60 shown in FIG. 18 is made of the fine elastic filaments 50 of the present invention. Textiles woven with the fine elastic filaments 50 can be made into apparels for the human body to wear, such as made into clothes, shoes, or bags (handbag, backpack). The apparels that can be made include: general clothes, swimwear, sportswear, leggings, T-shirts, ribbons and various other types of clothing. The elastic filament of the present invention is flexible, and the apparels made with the elastic filament are flexible, suitable for wearing and have an excellent tactile impression.

[0034] The elastic filaments of the present invention can also be used as embroidery threads or sewing threads on textiles or fabrics.

[0035] With the cutting method of the present invention, the cutter distance X between the two adjacent cutters is several times greater than the width B of the elastic filament 50, so that during cutting, a gap between the two adjacent cutters has enough space to accommodate the elastic membrane material 10 to reduce the pressing pressure and frictional resistance between the elastic membrane material 10 and the cutters, enabling effective implementation of cutting operation for the elastic membrane material 10 to cut out the elastic filament 50 with a fine diameter.

[0036] It is to be understood that the above description is only preferred embodiments of the present invention and is not used to limit the present invention, and changes in accordance with the concepts of the present invention may be made without departing from the spirit of the present invention, for example, the equivalent effects produced by various transformations, variations, modifications and applications made to the configurations or arrangements shall still fall within the scope covered by the appended claims of the present invention.

Claims

1. A cutting method for elastic filaments cutting out a plurality of elastic filaments from an elastic membrane material, and the cutting method including steps of:

preparing a membrane material with elasticity, the elastic membrane material being separably combined with at least one cushion layer to form a material to be cut, ductility and flexibility of the cushion layer being lower than that of the elastic membrane material;

conveying the material to be cut to a cutting device to cut the elastic membrane material at least two times including a first cutting and at least one subsequent cutting after the first cutting, each of the cuttings cutting off the elastic membrane material, wherein the first cutting cuts the elastic membrane material into a plurality of filaments with a same width; the subsequent cutting cuts each of the filaments into at least two elastic filaments with a same width; and separating the elastic filaments from the cushion layer to make the elastic filaments.

2. The cutting method as claimed in claim 1, wherein a cut width of the elastic filament being cut is 0.05mm~0.5mm.
3. The cutting method as claimed in claim 1, wherein in the at least two times of cutting, the cutting does not cut off the cushion layer before performing a last cutting.
4. The cutting method as claimed in claim 1, the cutting device cutting the elastic membrane material two times; and each second cut mark being located at a center of two adjacent first cut marks.
5. The cutting method as claimed in claim 1, wherein the cutting device cuts the elastic membrane material at least three times; a gap between the two adjacent first cut marks has a plurality of cut marks formed by a second cutting and at least a third cutting, and the cut marks between two adjacent first

cut marks evenly divide the gap between the two adjacent first cut marks.

6. The cutting method as claimed in claim 1, wherein a thickness of the elastic membrane material is 0.09mm to 0.5mm.
7. The cutting method as claimed in claim 1, wherein the cushion layer is PET material.
8. A cutting structure for elastic filaments cutting an elastic membrane material into a plurality of elastic filaments, and the cutting structure including: a conveying device and a cutting device;

the conveying device conveying the elastic membrane material toward the cutting device, the cutting device cutting the elastic membrane material; and

the cutting device having at least two rows of a plurality of cutters disposing anteriorly and posteriorly in a conveying direction of the elastic membrane material, the cutters in each of the rows having a same blade distance, in the conveying direction of the elastic membrane material, the at least two rows of the cutters having at least a positional difference; and the at least two rows of the cutters cutting the elastic membrane material into a plurality of elastic filaments.

9. The cutting structure as claimed in claim 8, wherein the positional difference of the two adjacent rows of the cutters is a width of each of the elastic filaments being cut.
10. The cutting structure as claimed in claim 8, wherein the elastic membrane material is separably combined with at least one cushion layer, and ductility and flexibility of the cushion layer are lower than that of the elastic membrane material.
11. An elastic filament made by the cutting method as claimed in any one of claims 1 to 7, the elastic filament being a filament with a considerable length, and a cross-section thereof having a pair of parallel sides.
12. The elastic filament as claimed in claim 11, wherein the elastic filament has a width between 0.05mm and 0.5mm.
13. The elastic filament as claimed in claim 11, wherein the cross-section of the elastic filament is rectangular, has a width and a thickness, two side surfaces of the elastic filament are cut surfaces, the width is formed between the two side surfaces, and the width of the elastic filament is not greater than the thickness thereof.

14. The elastic filament as claimed in claim 11, wherein the elastic filament being capable of being made into a sewing thread or an embroidery thread.

15. A textile being a fabric woven with the elastic filament as claimed in any one of claims 11 to 13.

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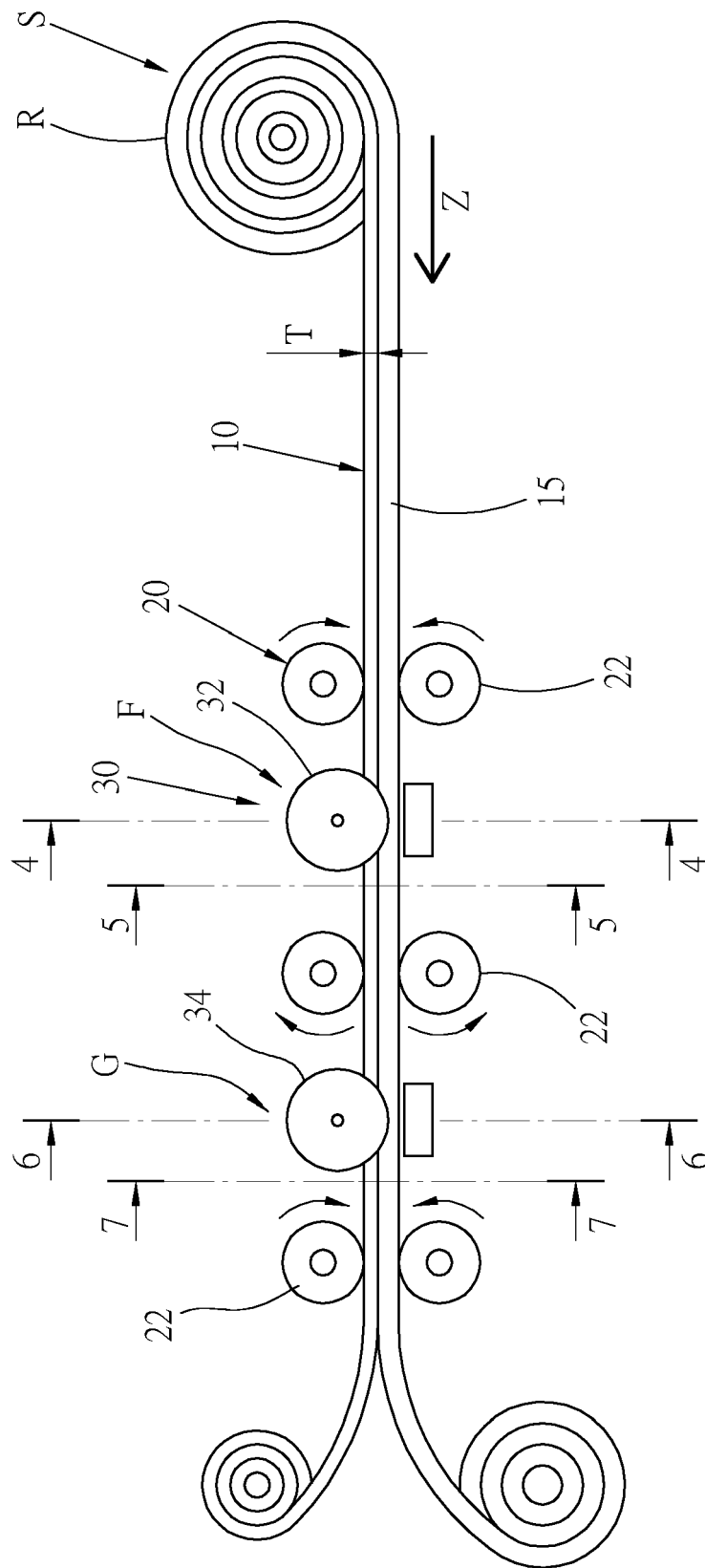


Fig. 1

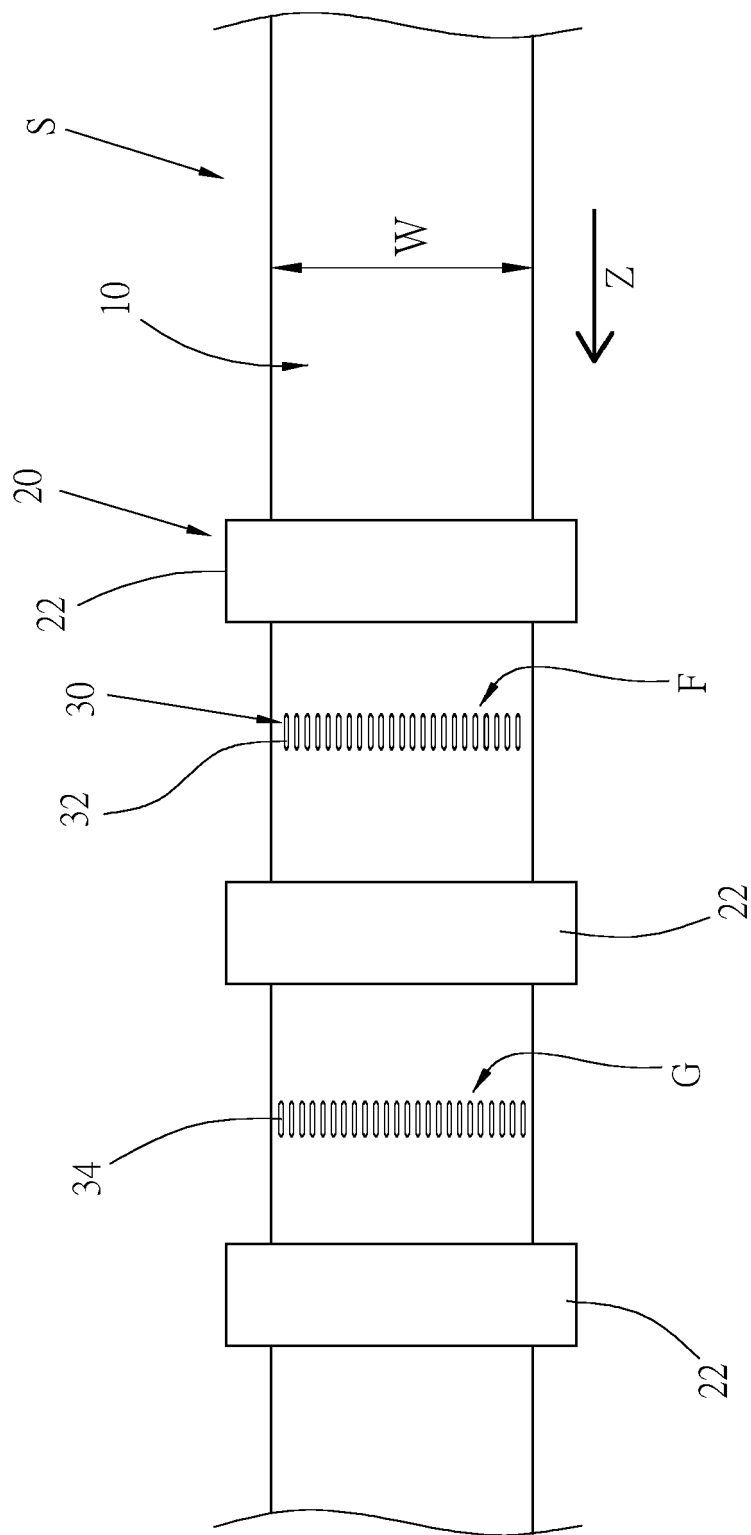
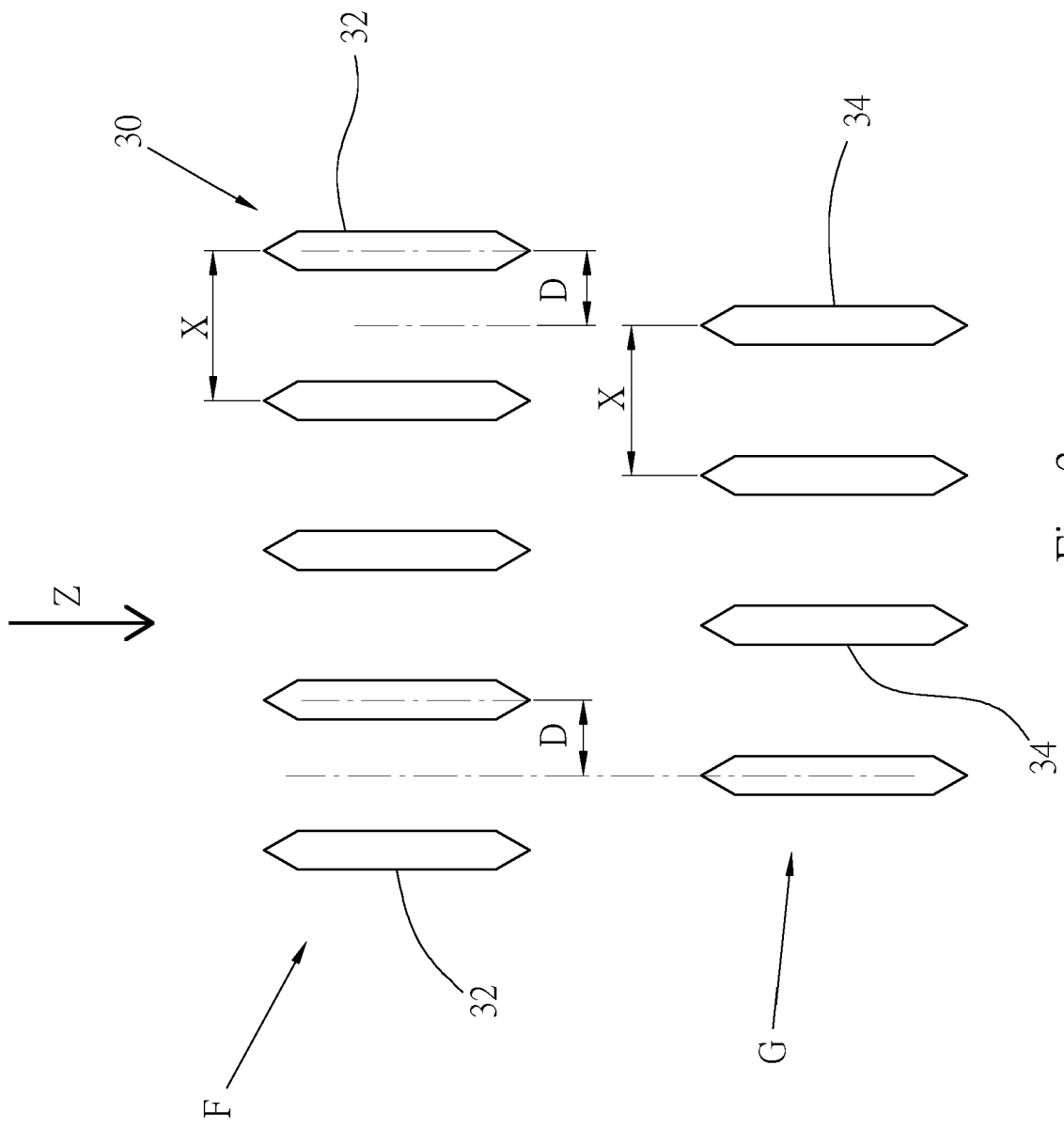
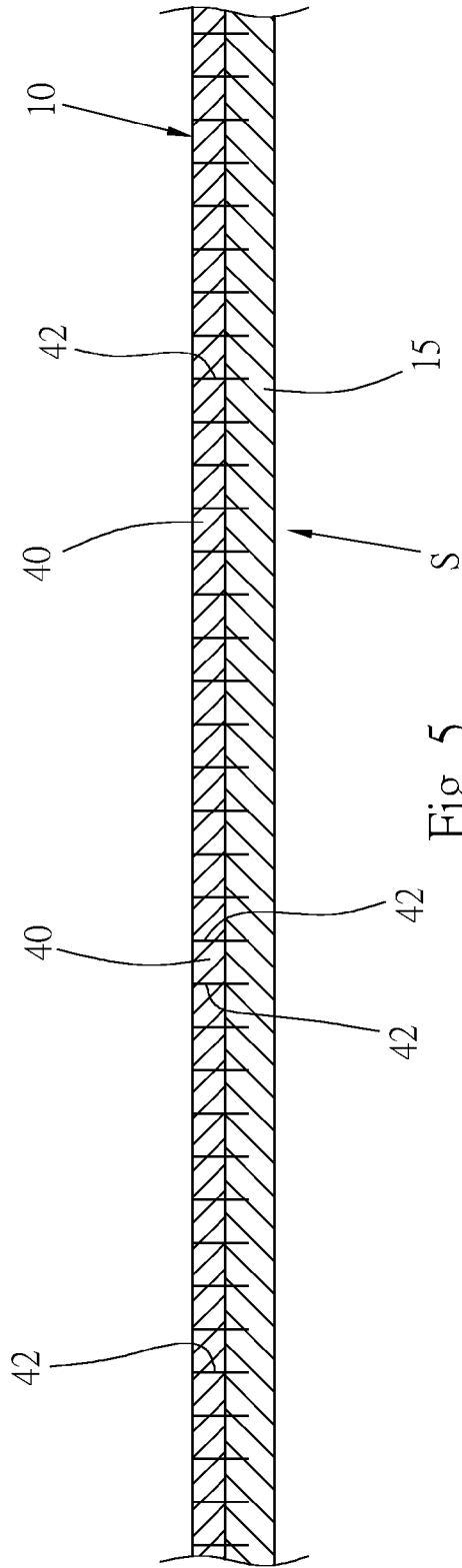
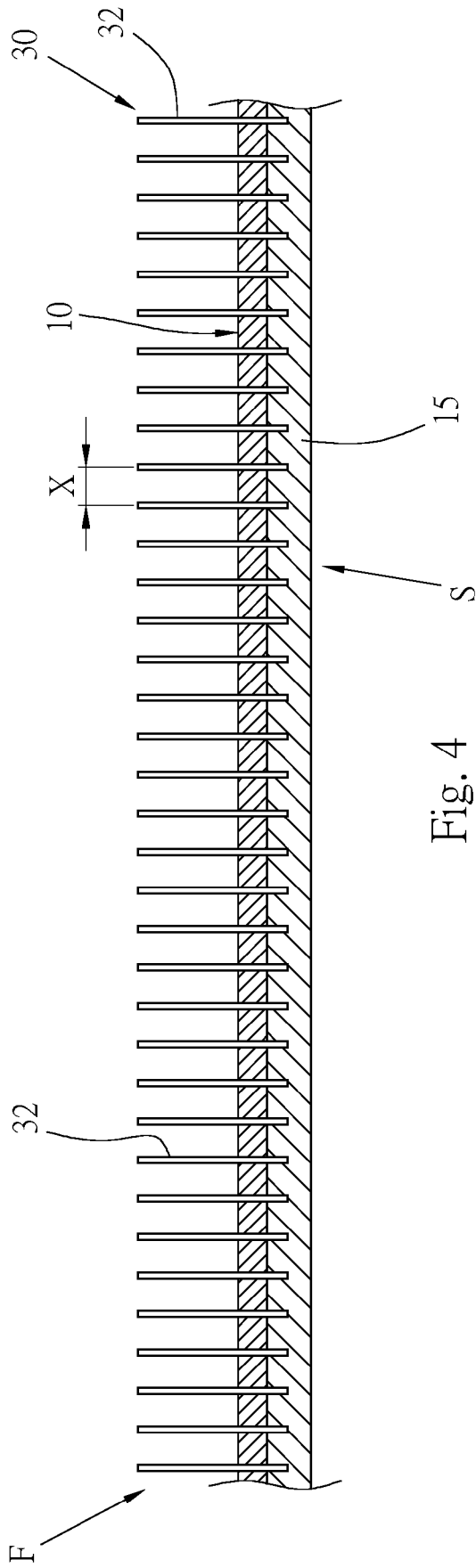


Fig. 2





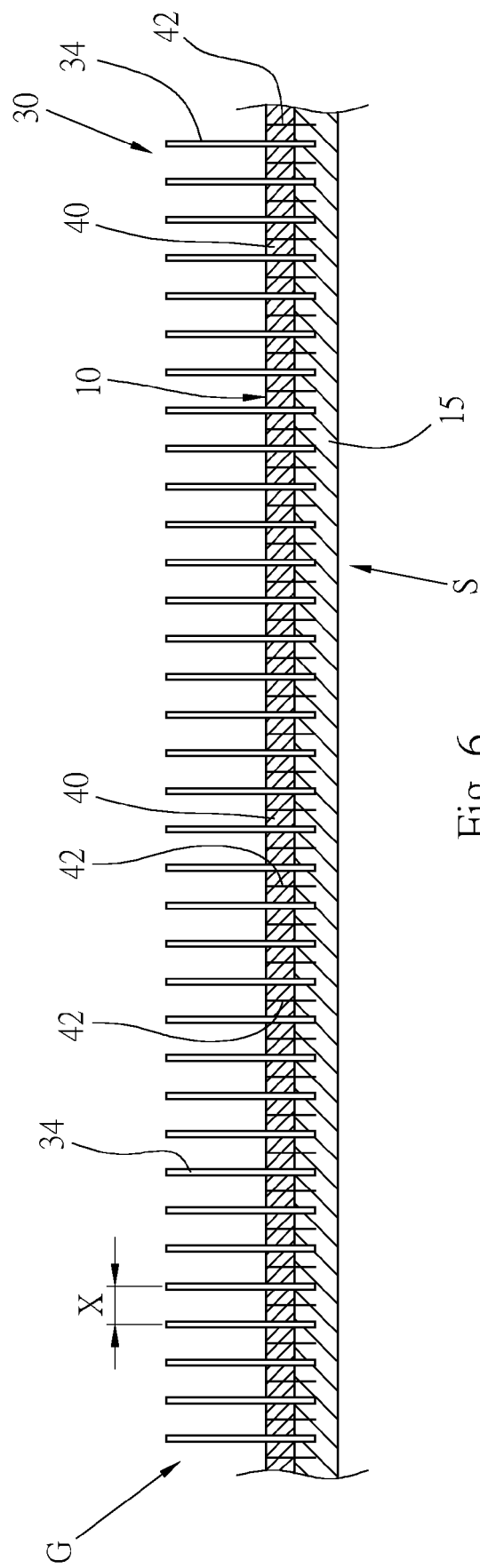


Fig. 6

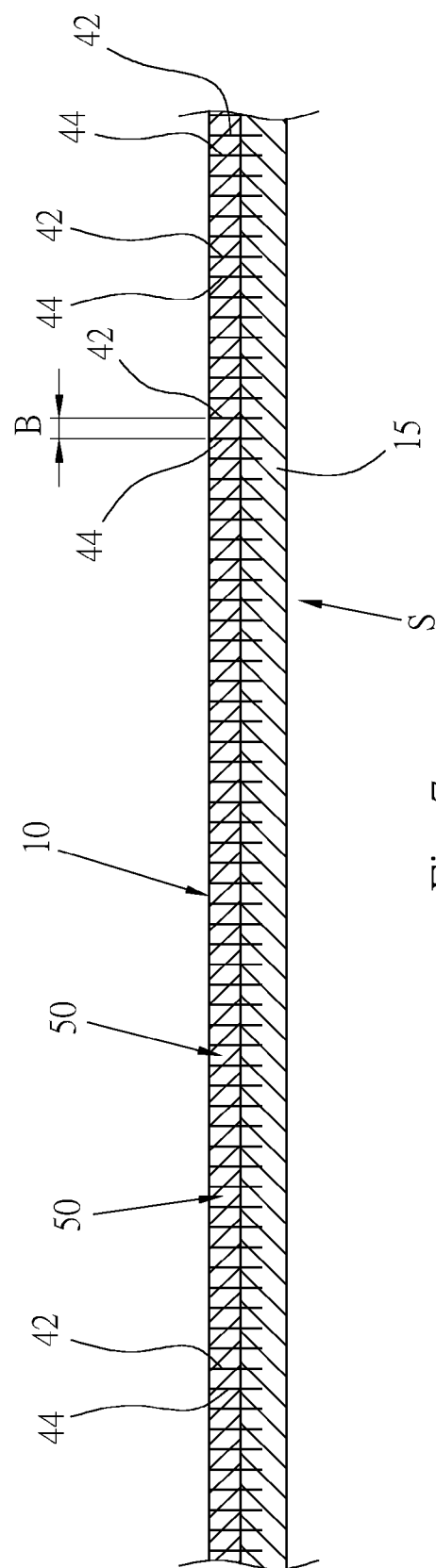


Fig. 7

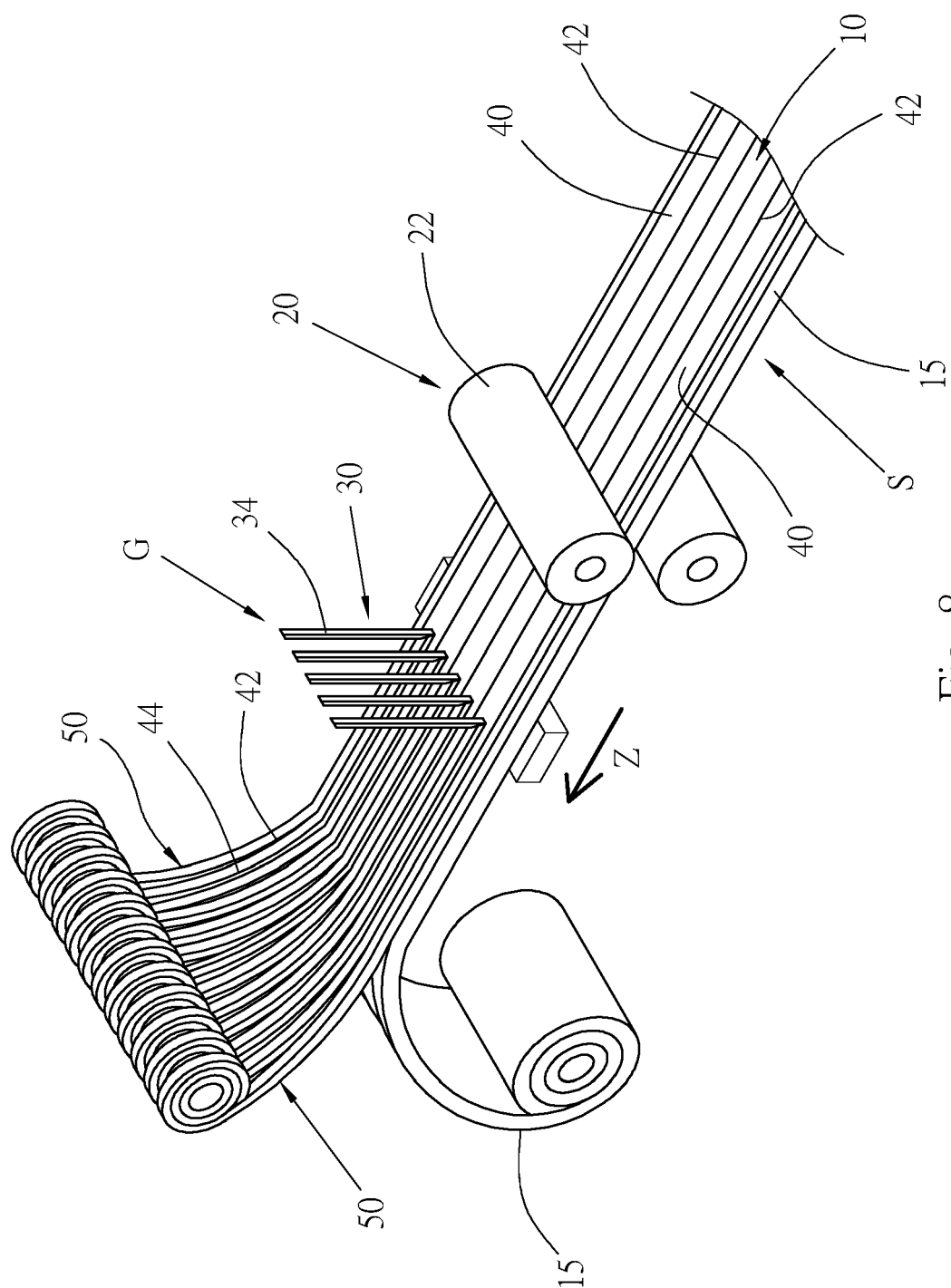


Fig. 8

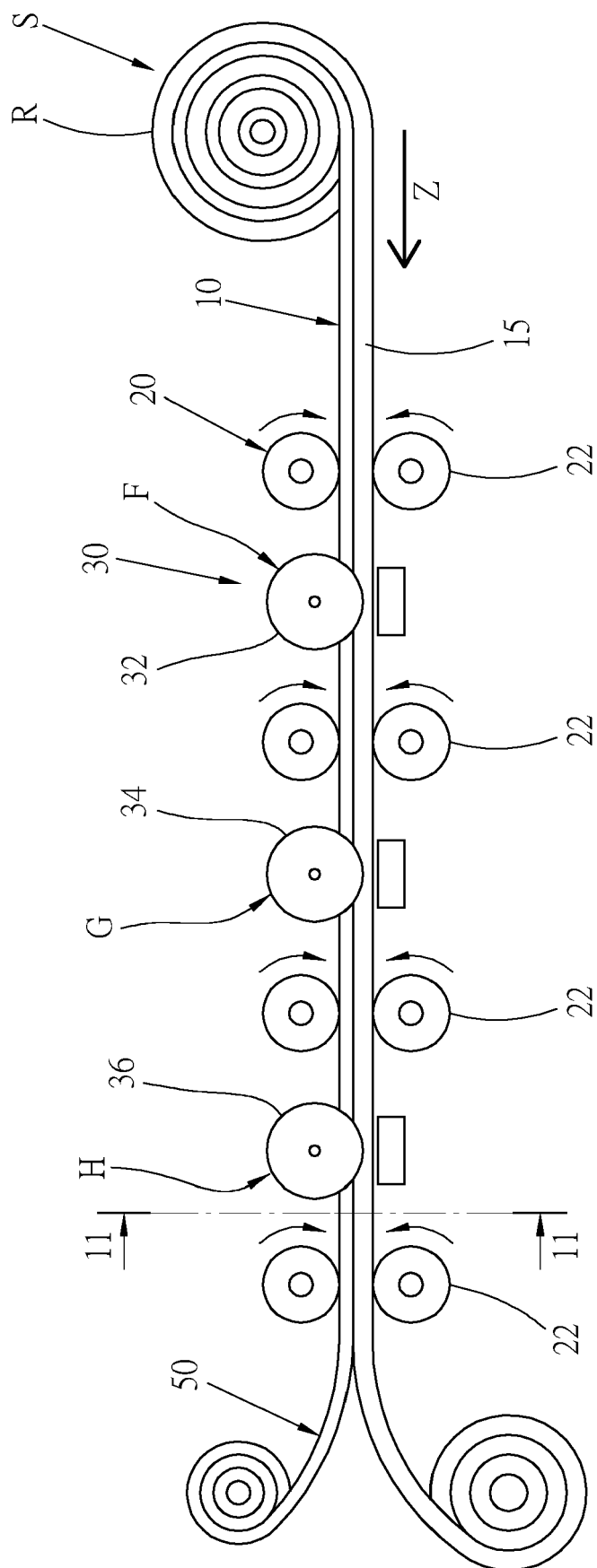


Fig. 9

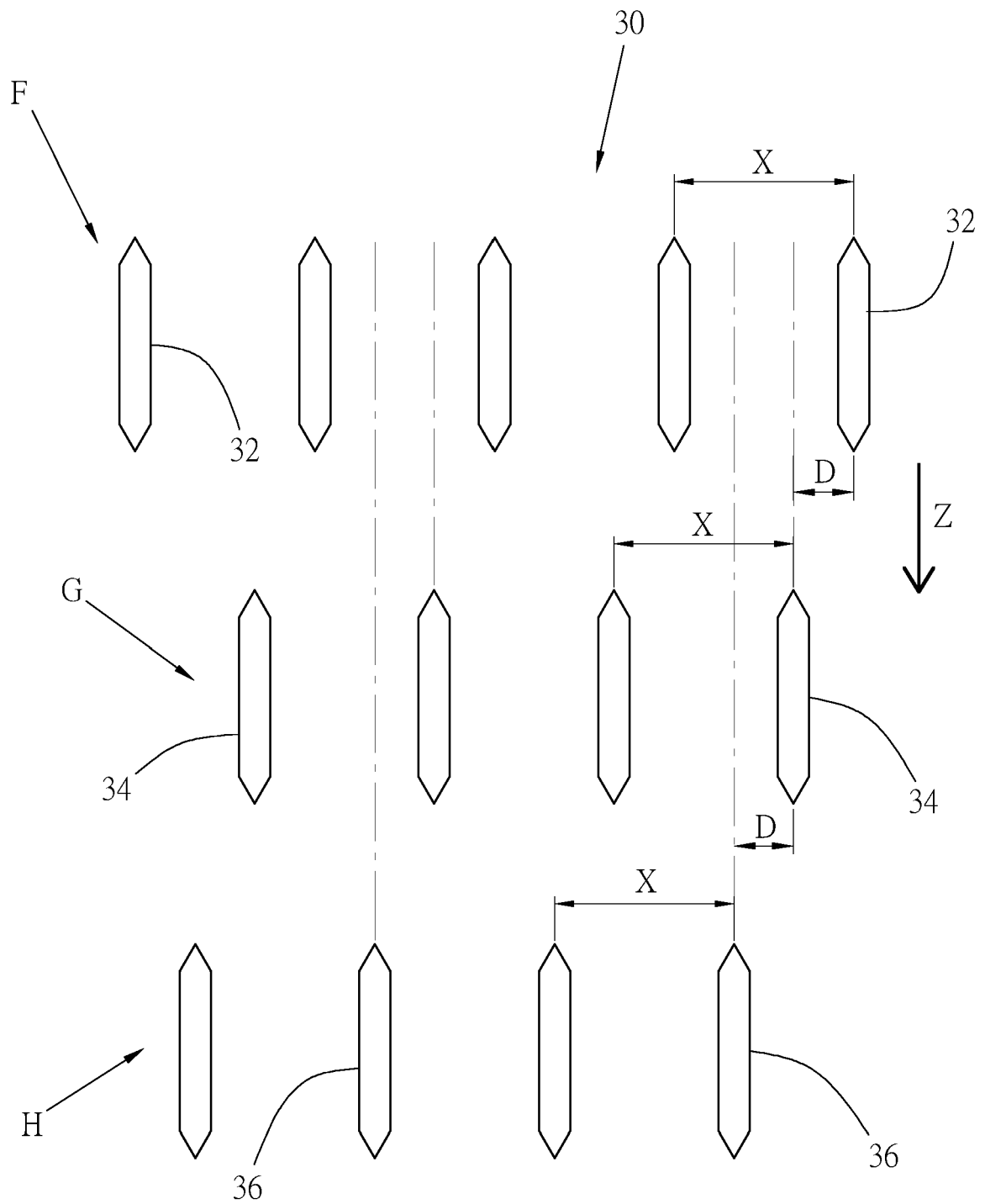


Fig. 10

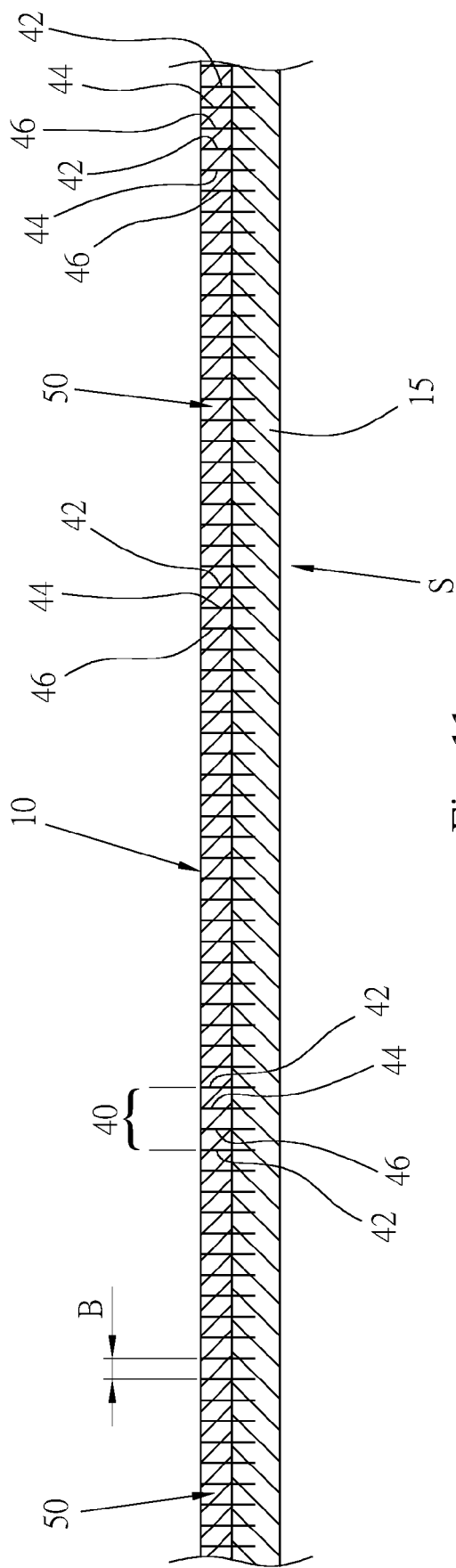


Fig. 11

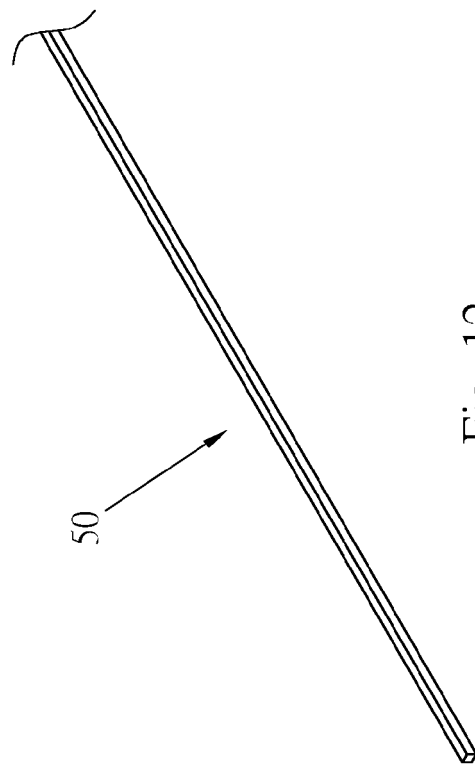


Fig. 12

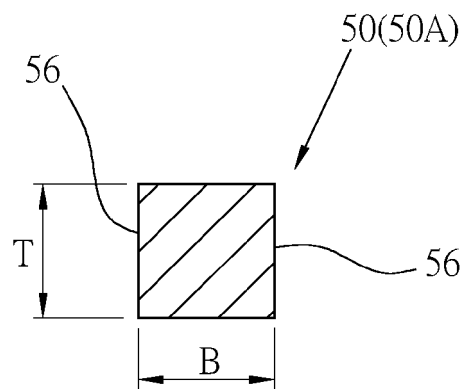


Fig. 13

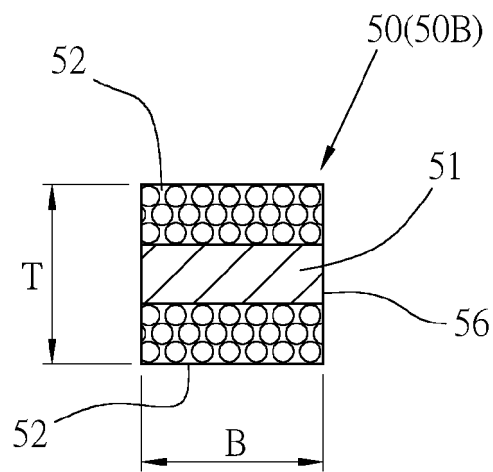


Fig. 14

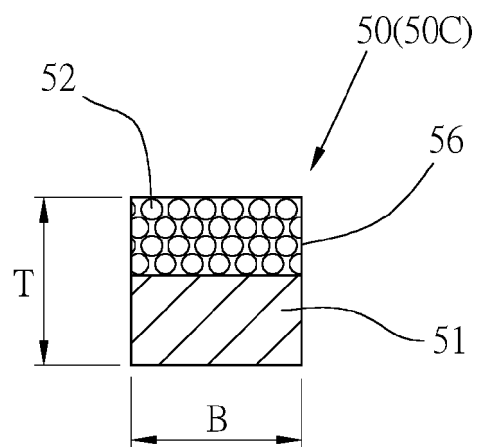


Fig. 15

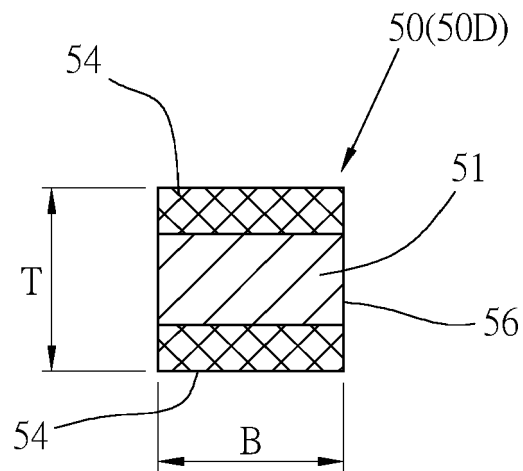


Fig. 16

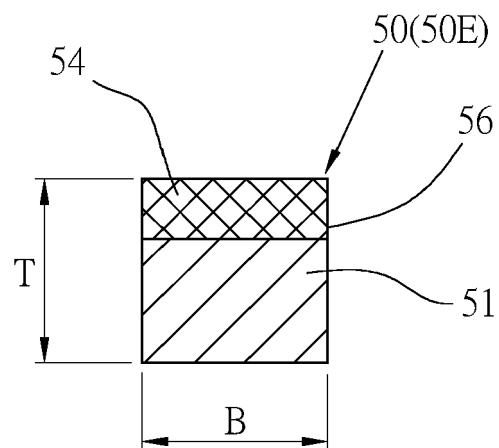


Fig. 17

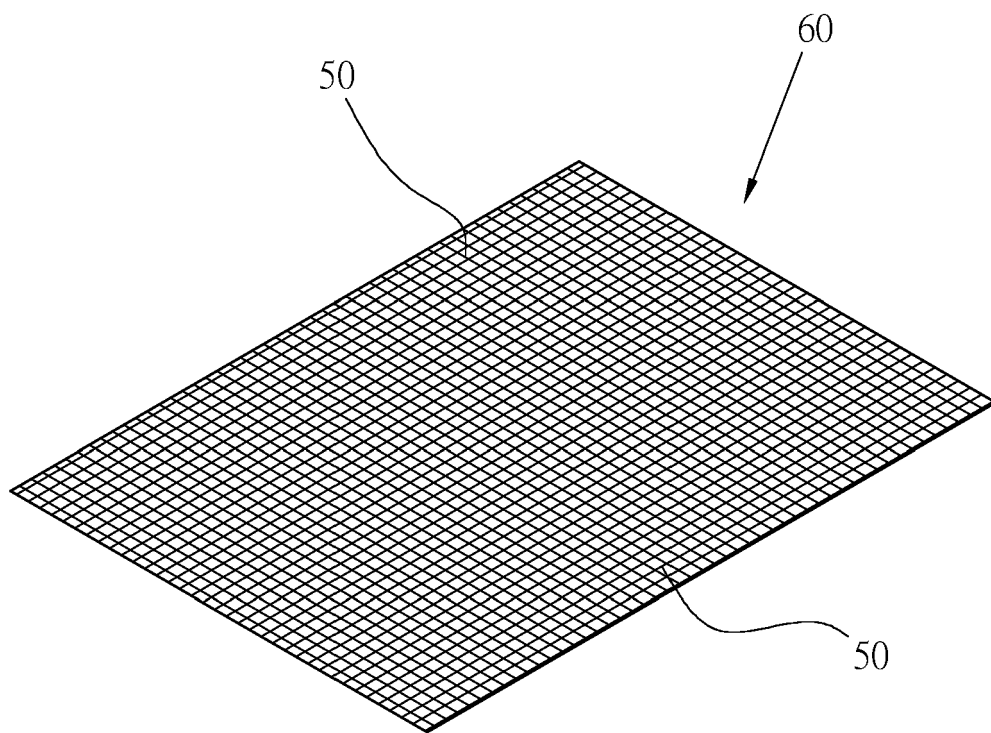


Fig. 18



EUROPEAN SEARCH REPORT

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Place of search Munich		Date of completion of the search 3 June 2021	Examiner Pollet, Didier
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82