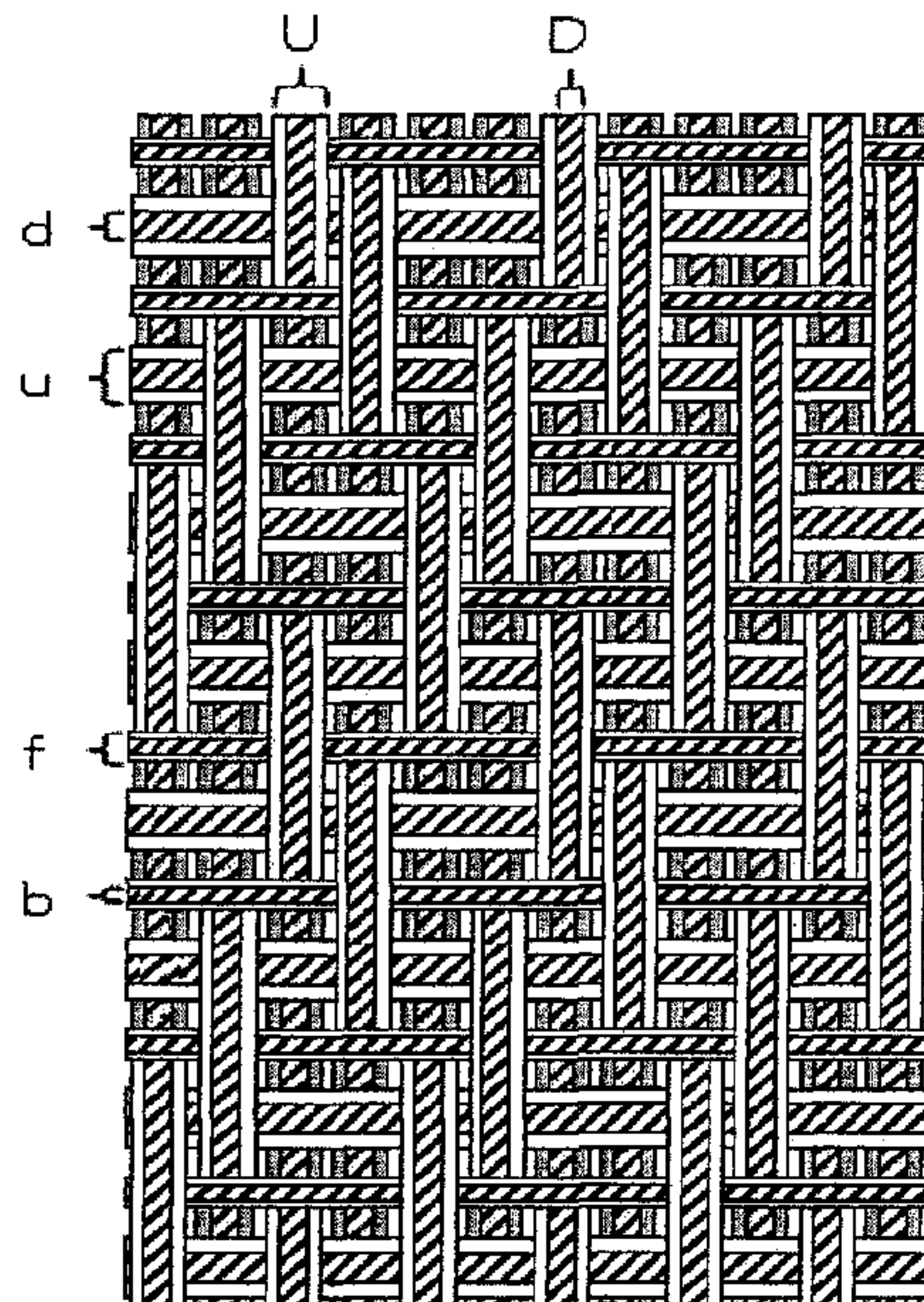




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 (54) Title: TWO-LAYERED FABRIC



(57) Abrégé/Abstract:

A two-layered fabric used for producing a non-woven fabric fulfills the required characteristics of weaves for unwoven fabrics such as stiffness while increasing the effect of presenting the adhesion of fibers, etc., and maintains an antifouling effect despite surface wear occasioned by long-term use in industrial processes involving nonwoven fabric. In this fabric for producing a nonwoven fabric, a top weave constituted from top warp threads and top weft threads and a bottom weave constituted from bottom warp threads and bottom weft threads are bonded by weft-binding threads. The weft-binding threads are woven together so as to bond internally, and the top warp threads and the top weft threads are characterized by being formed from a fluororesin.

Abstract

A two-layered fabric used for producing a non-woven fabric fulfills the required characteristics of weaves for unwoven fabrics such as stiffness while increasing the effect of presenting the adhesion of fibers, etc., and maintains an antifouling effect despite surface wear occasioned by long-term use in industrial processes involving nonwoven fabric. In this fabric for producing a nonwoven fabric, a top weave constituted from top warp threads and top weft threads and a bottom weave constituted from bottom warp threads and bottom weft threads are bonded by weft-binding threads. The weft-binding threads are woven together so as to bond internally, and the top warp threads and the top weft threads are characterized by being formed from a fluororesin.

TWO-LAYERED FABRIC

TECHNICAL FIELD OF THE INVENTION

[0001]

The present invention relates to a fabric used for manufacturing unwoven fabric, in particular, relates to an anti-dirt two-layered fabric for an unwoven fabric which can keep the anti-dirt effect for a long time.

BACKGROUND ART

[0002]

Conventionally, an industrial fabric woven by wefts and warps has been used for a transporting or filtering application in a manufacturing process of papers, unwoven fabric, building material, etc.. Such an industrial fabric needs to possess a high rigidity, a good dimensional stability, and anti-dirt characteristics, etc. for any application.

More specifically, a high rigidity is required in order to hold and transport an object such as material, flotation material component, etc.. In particular, in the case of a manufacturing process of the building material or a filtering process, a high rigidity is essential for the fabric which deals with the heavy material or the flotation material component. Further, a dimensional stability is needed in order to constantly run the fabric in a stable manner. In addition, in order to always supply products of papers, unwoven fabric, or the building material with stable quality, the anti-dirt characteristics are important for efficient filtering and transportation.

In particular, the anti-dirt characteristics of the fabric are important for an air laid process which is one of the processes of manufacturing unwoven fabric, since it is closely associated with the problem of the adhesion of fibers. Here, the air laid process is a process in which pulp sheet and synthetic fibers of short fibers are dispersed in air to be formed on a wire. A main process of binding fibers is an adhesive type in which the fibers are fused to be bound by using adhesive fibers, etc.. However, in the air laid process using the adhesion type, it was pointed out that the adhesive fibers are fused with the fabric on the wire.

[0003]

Therefore, recently, yarns and plastic material with a view of attaining the anti-dirt effect have been developed, in particular. For instance, a technology in which the yarn constituted by blending fluoro polymer such as a copolymer of ethylene-tetrafluoroethylene (referred to as "ETFE" hereinafter) and dicarboxylic acid in an aromatic series such as polyethylene terephthalate (referred to as "PET" hereinafter) (refer to Patent Publication 1).

Nowadays, the above fluorine plastic with an excellent anti-dirt characteristic has been widely used for the anti-dirt application.

However, high rigidity such as predetermined breaking strength and predetermined tension strength was required in addition to the anti-dirt effect, in order to use the fabric for unwoven fabric. Since the fabric woven only by the above fluorine plastic, such as ETFE, exhibits a poor rigidity, it was technically difficult to

obtain a sufficient strength as the fabric used in the process of manufacturing the unwoven fabric.

Here, the rate of an amount of polymer blended with a high rigidity such as PET, etc. only needs to be increased in order to improve the rigidity, while on the other hand, the rate of an amount of fluorine plastic only needs to be increased in order to improve the anti-dirt characteristics.

Accordingly, the composition of the yarn for attaining the rigidity is not compatible with that for attaining the anti-dirt characteristics, so that it was pointed out that it was technically difficult to sufficiently obtain both the rigidity and the anti-dirt characteristics required for the industrial fabric only by the composition of the yarn constituting the fabric.

[0004]

Such being the case, in view of fully obtaining both the rigidity and the anti-dirt characteristics required for the industrial fabric, the technology related to the fabric for a web, the surface of which is coated with at least two kinds of plastics among a fluorine plastic, silicon plastic, and epoxy plastic, was disclosed (refer to Patent Publication 2). In addition, the technology related to an anti-dirt industrial fabric which uses composite yarns forming a film made of a silicon or fluorine plastic was developed (refer to Patent Publication 3).

However, if these fabrics are used for the process of manufacturing the unwoven fabric, as the term of use becomes longer, a risk of the plastic film coming away due to the wear of these fabrics arises, so that it is presumed that it becomes technically difficult to keep the anti-dirt effect for a long time.

[0005]

Patent Publication 1: Japanese Unexamined Publication Number JP11-189947

Patent Publication 2: Japanese Unexamined Publication Number JP57-171790

Patent Publication 3: Japanese Unexamined Publication Number 2008-133570

SUMMARY OF THE INVENTION

[0006]

An object of the present invention is to provide an anti-dirt two-layered fabric for an unwoven fabric which is capable of maintaining the anti-dirt effect, even if its surface gets worn due to its use for a long time in a process of manufacturing the unwoven fabric, while at the same time, enhancing an anti-adhesion effect by adopting fluorine plastic and attaining the characteristics required for a fabric for an unwoven fabric such as rigidity, etc..

[0007]

In order to address the above technical problems, the present inventor adopted the following two-layered fabric for an unwoven fabric which attains a high rigidity and extension, and maintains the anti-dirt effect for a long time.

A two-layered fabric for an unwoven fabric comprises an upper surface side fabric at least constituted by an upper surface side warp and an upper surface side weft, and a lower surface side fabric at least constituted by a lower surface side warp and a

lower surface side weft, said upper surface side fabric and said lower surface side fabric are bound by weft binding yarns, said weft binding yarns are woven so as to be arranged in an inner binding condition, said upper surface side warp and said upper surface side weft are made of fluorine plastic.

In some embodiments of the present invention, a pair of said upper surface side warps and a pair of said upper surface side wefts are woven so as to be arranged to be perpendicular to the surface of the fabric to form an on-stack structure.

[0008]

In some embodiments of the present invention, an auxiliary weft is arranged at the upper surface side of said weft binding yarns so as to weave said upper surface side fabric and said lower surface side fabric.

In some embodiments of the present invention, said fluorine plastic is copolymer of ethylene and tetrafluoroethylene (ETFE).

In some embodiments of the present invention, said lower surface side warp and said lower surface side weft and said weft binding yarns are formed by general yarn.

According to an aspect of the present invention, there is provided a two-layered textile fabric comprises an upper surface side fabric at least constituted by an upper surface side warp and an upper surface side weft, and a lower surface side fabric at least constituted by a lower surface side warp and a lower surface side weft, said upper surface side fabric and said lower surface side fabric are bound by weft binding yarns, said weft binding yarns are woven so as to be arranged in an inner binding condition by which the binding weft yarns and the upper surface side warps are woven with each other at a portion where the upper surface side warps are woven inside the textile fabric, said upper surface side warp and said upper surface side weft are made of fluorine plastic yarn, and said lower surface side warp and said lower surface side weft and said weft binding yarns are formed by a yarn having a higher rigidity than the fluorine plastic yarn.

[0009]

According to the anti-dirt two-layered fabric for an unwoven fabric of the present invention, the anti-adhesion effect by which fibers, etc. are prevented from being adhered thereto is enhanced by adopting a fluorine plastic and the characteristics required for the fabric for an unwoven fabric such as rigidity is attained, while at the same time, the anti-dirt effect is kept even if its surface gets worn due to its use for a long time in a process of manufacturing the unwoven fabric.

BRIEF EXPLANATION OF DRAWINGS

Fig.1 is a design view showing a complete structure of the first embodiment according to the present invention.

Fig.2 is a cross section view taken along warp 1 of the first embodiment.

Fig.3 is a design view showing a complete structure of the second embodiment related to the first embodiment.

Fig.4 is a cross section view taken along warp 1 of the second embodiment.

Fig.5 is a cross section view taken along warp 1' of the second embodiment.

Fig.6 is a plain view showing the surface of the upper surface side of the second embodiment.

Fig.7 is a photograph showing the surface of the two-layered unwoven fabric of the second embodiment.

[0010]

DETAILED DESCRIPTION OF THE INVENTION

Now, the structure and the effect of the two-layered fabric for an unwoven fabric of the present invention will be described below. Embodiments of the two-layered fabric for the unwoven fabric of the present invention will be described thereafter with reference to the drawings.

The two-layered fabric for an unwoven fabric of the present invention is the one which includes at least one upper surface side fabric constituted by upper surface side warps and upper surface side wefts, at least one lower surface side fabric constituted by lower surface side warps and lower surface side wefts, and binding weft yarns, each of which binds the upper surface side fabric and the lower surface side fabric.

Here, one of the technical features of the present invention is that, in the upper surface side fabric, a fluorine plastic is adopted for the upper surface side warps and the upper surface side wefts. As such, the upper surface side fabric is constituted only by the fluorine plastic, while, in the lower surface side fabric, the lower surface side warps and the lower surface side wefts are constituted by general yarns. In addition, the binding weft yarns are adapted to be woven so as to effect an inner binding in a case where they are bound by the upper surface side warps. Here, the inner binding is defined to arrange the binding weft yarns so as not to appear on the surface of the fabric. Another of the technical features of the present invention is that the two-layered fabric for an unwoven fabric adopts an on-stack structure in which the upper and lower surface side warps, and the upper and lower surface side wefts are woven to be arranged in a perpendicular positional relation, respectively.

[0011]

In the present invention, a complete structure of the fabric is defined to be the minimum unit to be repeated of the fabric structure. The fabric is completed by combining any number of such complete structures in the longitudinal direction and the direction perpendicular to the longitudinal direction.

In the present invention, a knuckle is a portion of a warp which passes above or below one or a plurality of wefts to protrude from the surface. In addition, a crimp is a long floating structure which is formed on the surface by the wefts passing above or below one or a plurality of warps.

Further, the on-stack structure is the one in which upper and lower yarns in the same direction are vertically overlapped with each other.

[0012]

Conventionally, in order to improve the anti-dirt effect, the fabric in which yarns made of a fluorine plastic are used for surface wefts are publicly known. However, since the yarns made of the fluorine plastic lack in durability, the rigidity of the fabric decreases in a case where all the wefts are constituted by the yarns made of the

fluorine plastic, whereby it becomes technically difficult to use such a fabric for the process of manufacturing an unwoven fabric in a practical basis. In addition, it was not feasible to adopt the yarns made of the fluorine plastic for the warps which largely influence the extension characteristics of the fabric. Such being the case, general yarns have been used for the surface which contacts the unwoven fabric, so that a fabric with sufficient anti-dirt characteristics could not be obtained.

Accordingly, the present inventor created the two-layered fabric for an unwoven fabric which adopts yarns made of a fluorine plastic for the yarns constituting the surface contacting the unwoven fabric to be transported, and adopts yarns made of a fluorine plastic for the upper surface side layer, while the general yarns for the lower surface side layer, in order to attain the characteristics required for the fabric for the unwoven fabric, and is constituted by the upper and lower surface side layers woven by the binding weft yarns.

The two-layered fabric for an unwoven fabric of the present invention is one which attains the characteristics required for the fabric for the unwoven fabric, while at the same time, uses yarns made of a fluorine plastic. The two-layered fabric for an unwoven fabric of the present invention is constituted by the upper surface side warps, the upper surface side wefts, the lower surface side warps, the lower surface side wefts, and the binding weft yarns which weave the upper surface side warps and the lower surface side warps.

[0013]

The yarns made of a fluorine plastic are used for the upper surface side warps and the upper surface side wefts constituting the upper surface side layer. Accordingly, in the present invention, the anti-dirt characteristics of the fabric can be obtained by using yarns made of a fluorine plastic for the yarns at the upper surface side directly contacting the unwoven fabric, while the rigidity and the extension characteristics of the fabric can be secured by using the general yarns for the lower surface side warps and the lower surface side wefts constituting the lower surface side layer.

In addition, the binding weft yarns are arranged so as not to appear on the surface of the fabric by the inner binding by which the binding weft yarns and the upper surface side warps are woven with each other at a portion where the upper surface side warps are woven inside the fabric.

The fabric which attains the characteristics required for the fabric for an unwoven fabric can be provided by the fact that the upper surface side layer and the lower surface side layer are woven with each other by the binding weft yarns and all of the surface contacting the unwoven fabric is constituted by the yarns made of a fluorine plastic.

In addition, by adopting the on-stack structure, the lower surface side fabric is prevented from being exposed due to the cover of the upper surface side fabric, so that only the upper surface side fabric which enhances the anti-dirt effect contacts the unwoven fabric on the surface of the fabric.

Further, in the fabric of the present invention, auxiliary wefts with a diameter smaller than that of the upper side surface side weft may be arranged between the

upper surface side wefts. For instance, the surface properties can be improved by the fact that the upper surface side wefts and the auxiliary wefts are arranged in an alternate manner.

[0014]

The fluorine plastic which is the material for the upper surface side warps and the upper surface side wefts of the fabric of the present invention may be preferably a composite plastic containing fluorine with high anti-dirt properties. For instance, at least one material can be selected from a group of polytetrafluoroethylene (PTFE), copolymer of tetrafluoroethylene and hexafluoropropylene (FEP), copolymer of tetrafluoroethylene and fluoro vinyl ether (PFA), polyvinylidene fluoride (PVDF), copolymer of ethylene and tetrafluoroethylene (ETFE), and copolymer of ethylene and chlorotrifluoroethylene (ECTFE). In particular, ETFE is suitable for its anti-dirt characteristics and cost.

In this connection, it is preferable to impregnate a silicon plastic in the fluorine plastic material (water dispersion) in order to improve its flexibility. In addition, the color of the surface of the fabric can be freely changed by adding various kinds of pigments to the fluorine plastic material (water dispersion).

[0015]

The general yarn used for the lower surface side fabric can be made of polyester, polyamide, polyphenylene sulfide, polypropylene, aramid, polyether ketone, polyethylene naphthalate, polytetrafluoroethylene, etc.

The configuration of the yarn includes, in addition to monofilaments, multifilaments, spun yarns, finished yarns subjected to crimping or bulking such as so-called textured yarn, bulky yarn and stretch yarn, and yarns obtained by intertwining them. As the cross-section of the yarn, not only a circular form but also a square or short form such as a stellar form, or elliptical or hollow form can be used.

The unwoven fabric needs to have a high rigidity, since it is used being stretched in the warp direction. In view of this, the configuration of the yarn is preferably monofilaments. The fabric of the present invention can be suitably used under a high tension by adopting monofilaments with a high rigidity as the lower surface side warp.

In addition, the structure in which the upper surface side fabric and the lower surface side fabric are woven with each other by arranging the auxiliary weft at the upper surface side of the binding weft yarn may be adopted.

Here, the auxiliary weft cooperates with the binding weft yarn to form the on-stack structure to improve the surface smoothness.

[0016]

Now, the embodiments of the present invention will be described below with reference to the drawings. Here, the design view corresponds to the complete structure of the fabric defining the minimum unit to be repeated of the fabric structure. The fabric recited in the claims corresponds to this complete structure. The final product is completed by combining any number of such complete structures in the longitudinal direction and the direction perpendicular to the longitudinal direction.

In each of the design views, the warp is indicated by a reference number such as 1,2,3..... . The upper and lower warps are indicated by the reference number to which U and D are attached, respectively.

The weft is indicated by a reference number such as 1',2',3' The upper surface side weft and the lower surface side weft are indicated by the reference number to which u and d are attached, respectively, such as 1'u, 2'd, etc.. In addition, the binding weft yarn and the auxiliary weft are indicated by the reference number to which b and f are attached, respectively, such as 1'u, 1'd, 2'b, 2' f, etc.

In each of the design views, a symbol "×" indicates that the upper surface side warp is arranged above the upper surface side weft or the auxiliary weft, and a symbol "○" indicates that the lower surface side warp is arranged below the lower surface side weft. A solid square symbol "■" indicates that the binding weft yarn is arranged above the upper surface side warps, and an open square symbol "□" indicates that the binding weft yarn is arranged below the lower surface side warps. In this connection, the symbols "■" and "□" are depicted as an elongate rectangle at the upper portion of the grid in each of the design views.

[0017]

First Embodiment

Fig.1 is a design view showing the complete design of the two-layered fabric for an unwoven fabric according to the first embodiment. Fig.2 is a cross sectional view taken along the warp 1 in Fig.1.

The two-layered fabric for an unwoven fabric of the first embodiment in Fig.1 constitutes a two-layered fabric including the upper surface side warp U, the lower surface side warp D, the upper surface side weft u, the lower surface side weft d, and the binding weft yarn b.

As shown in Fig.1, a knuckle at the upper surface side is formed by the fact the upper surface side warp 1U passes above the upper surface side weft 1'u, and passes above the upper surface side weft 2'u and the binding weft yarn 4'b. Then, the upper surface side warp 1U passes below the upper surface side weft 5'u and passes below the binding weft yarn 6'b and the upper surface side weft 7'u and passes above the binding weft yarn 8'b.

In addition, a knuckle at the lower surface side is formed by the fact the lower surface side warp 1D passes above the lower surface side weft 1'd, and passes above the binding weft yarn 2'b and the lower surface side weft 3'd, and then, passes below the binding weft yarn 4'b, the lower surface side weft 5'd, the lower surface side weft 7'd and the binding weft yarn 8'b.

Here, with respect to the binding weft yarn b, the binding weft yarn 6'b passes above the upper surface side warp 1U to weave the upper surface side layer, and then, passes between the upper surface side warp 2U and the lower surface side warp 2D and between the upper surface side warp 3U and the lower surface side warp 3D and passes below the lower surface side warp 4D to bind the upper and lower surface side layers.

[0018]

As shown in Fig.2, the binding weft yarn 6'b is shown to be located inside the upper surface side knuckle forming the upper surface side layer and the upper surface side wefts 5'u and 7'u at a portion where the binding weft yarn 6'b weaves the upper surface side layer. As such, the inner binding is formed at the binding weft yarn 6'b and the upper surface side warp 1U, so that the upper surface side layer is woven without the binding weft yarn being exposed to the surface.

In addition, the yarns constituting the lower surface side fabric are prevented from directly contacting the unwoven fabric to be transported by the fabric, due to the on-stack structure of the warps and the wefts.

By the above configuration, the two-layered anti-dirt fabric for an unwoven fabric in the first embodiment enhances the anti-adhesion effect by which the fibers are not adhered to the fabric, while attaining the physical properties required for the fabric such as rigidity by adopting the fluorine plastic, and keeps the anti-dirt effect even when the surface of the fabric gets worn out.

[0019]

Second Embodiment

Fig.3 is a design view showing the complete design of the second embodiment. Fig.4 is a cross sectional view taken from the warp 1 in Fig.3. Fig.5 is a cross sectional view taken from the weft 2' in Fig.3. Fig.6 is a plane view of the upper surface side in Fig.3. In Fig.6, the lower surface side yarns are indicated by a diagonal line in order to show the upper surface side warp constituted by the fluorine plastic and the lower surface side yarns constituted by the general yarns under the upper surface side weft. In addition, the lower surface side warps and wefts are shown to be thinner than the upper surface side warps and wefts in the above Figs, in order to indicate the overlapped yarns. In fact, the diameters of the lower surface side warps and wefts, and the upper surface side warps and wefts may be appropriately selected. Fig.7 is a photograph of the surface of the fabric of the second embodiment.

[0020]

As shown in Fig.3, the two-layered fabric for an unwoven fabric of the second embodiment in Fig.3 constitute a two-layered fabric including the upper surface side warp U, the lower surface side warp D, the upper surface side weft u, the lower surface side weft d, and the binding weft yarn b.

As shown in Fig.3, a knuckle at the upper surface side is formed by the fact that the upper surface side warp 1U passes above the upper surface side weft 1'u, and passes above the binding weft yarn 2'f and the upper surface side weft 3'u. Then, the upper surface side warp 1U passes between the binding weft yarn 4'f and the binding weft yarn 4'b, and passes below the upper surface side weft 5'u, the binding weft yarn 6'b and the upper surface side weft 7'u, and passes between the binding weft yarn 8'f and the binding weft yarn 8'b.

In addition, a knuckle at the lower surface side is formed by the fact the lower surface side warp 1D passes above the lower surface side weft 1'd, and passes above the binding weft yarn 2'b and the lower surface side weft 3'd, and then, passes below

the binding weft yarn 4'b, the lower surface side weft 5'd, the binding weft yarn 6'b, the lower surface side weft 7'd and the binding weft yarn 8'b.

Further, in the fabric of the second embodiment, the binding weft yarn 6'f is arranged between the upper surface side wefts. The surface properties are improved by the fact that the binding weft yarn 6'f is arranged at the upper surface side of the binding weft yarn 6'b, and adopts the on-stack structure with the binding weft yarn 6'b.

[0021]

EXPLANATION OF SYMBOLS

1U, 2U, 3U, 4U:	upper surface side warp
1D, 2D, 3D, 4D:	lower surface side warp
1' u, 3'u, 5'u, 7'u:	upper surface side weft
1'd, 3'd, 5'd, 7'd:	lower surface side weft
2'b, 4'b, 6'b, 8'b:	weft binding yarn
2'f, 4'f, 6'f, 8'f:	auxiliary weft

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A two-layered textile fabric comprises an upper surface side fabric at least constituted by an upper surface side warp and an upper surface side weft, and a lower surface side fabric at least constituted by a lower surface side warp and a lower surface side weft, said upper surface side fabric and said lower surface side fabric are bound by weft binding yarns, said weft binding yarns are woven so as to be arranged in an inner binding condition by which the binding weft yarns and the upper surface side warps are woven with each other at a portion where the upper surface side warps are woven inside the textile fabric, said upper surface side warp and said upper surface side weft are made of fluorine plastic yarn, and said lower surface side warp and said lower surface side weft and said weft binding yarns are formed by a yarn having a higher rigidity than the fluorine plastic yarn.
2. The two-layered textile fabric according to claim 1, wherein a pair of said upper surface side warps and a pair of said upper surface side wefts are woven so as to be arranged to be perpendicular to the surface of the fabric to form an on-stack structure.
3. The two-layered textile fabric according to claim 1 or claim 2, wherein an auxiliary weft is arranged at the upper surface side of said weft binding yarns so as to weave said upper surface side fabric and said lower surface side fabric.
4. The two-layered textile fabric according to any one of claims 1 to 3, wherein said fluorine plastic is copolymer of ethylene and tetrafluoroethylene (ETFE).

Figure 1

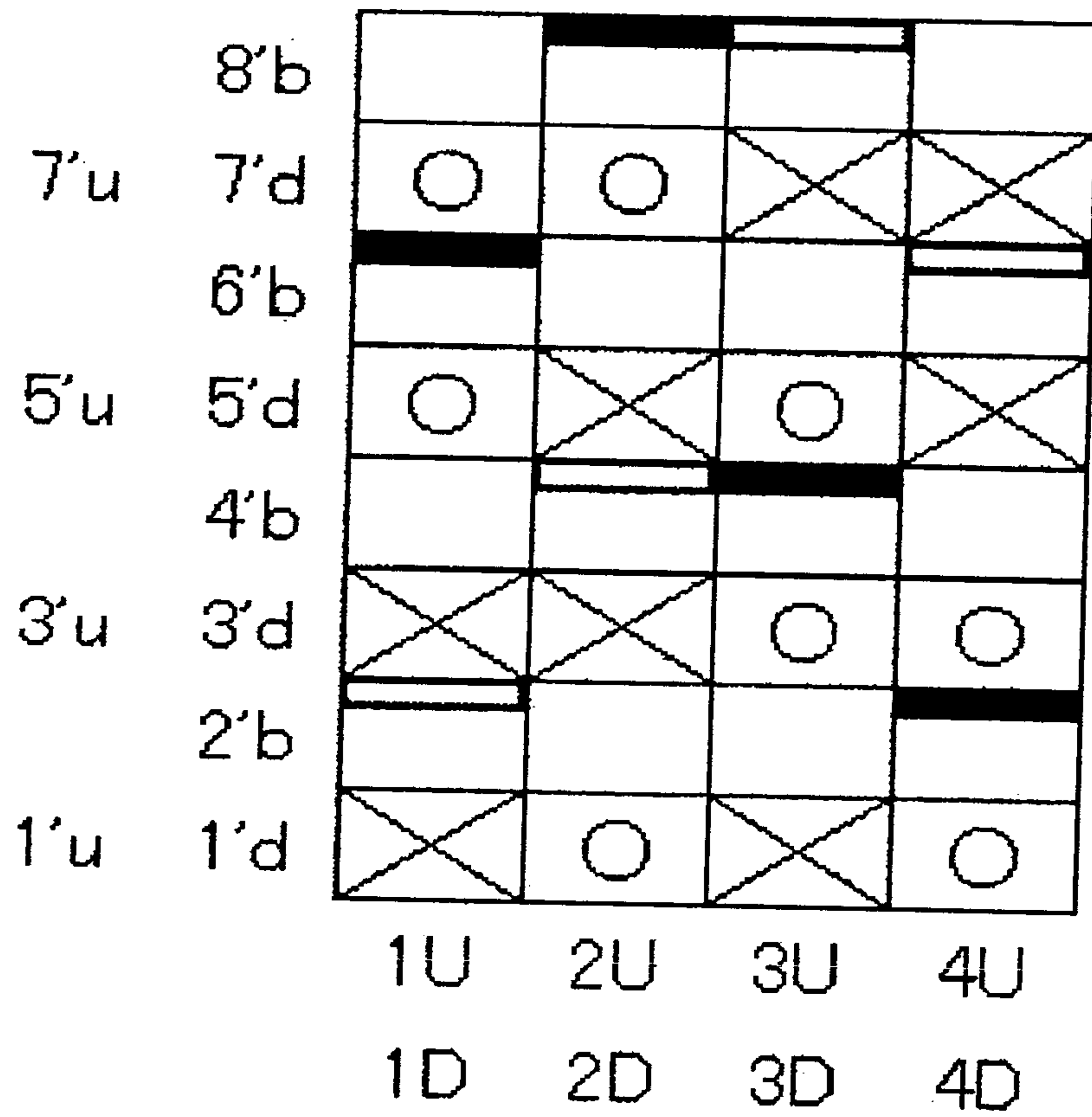
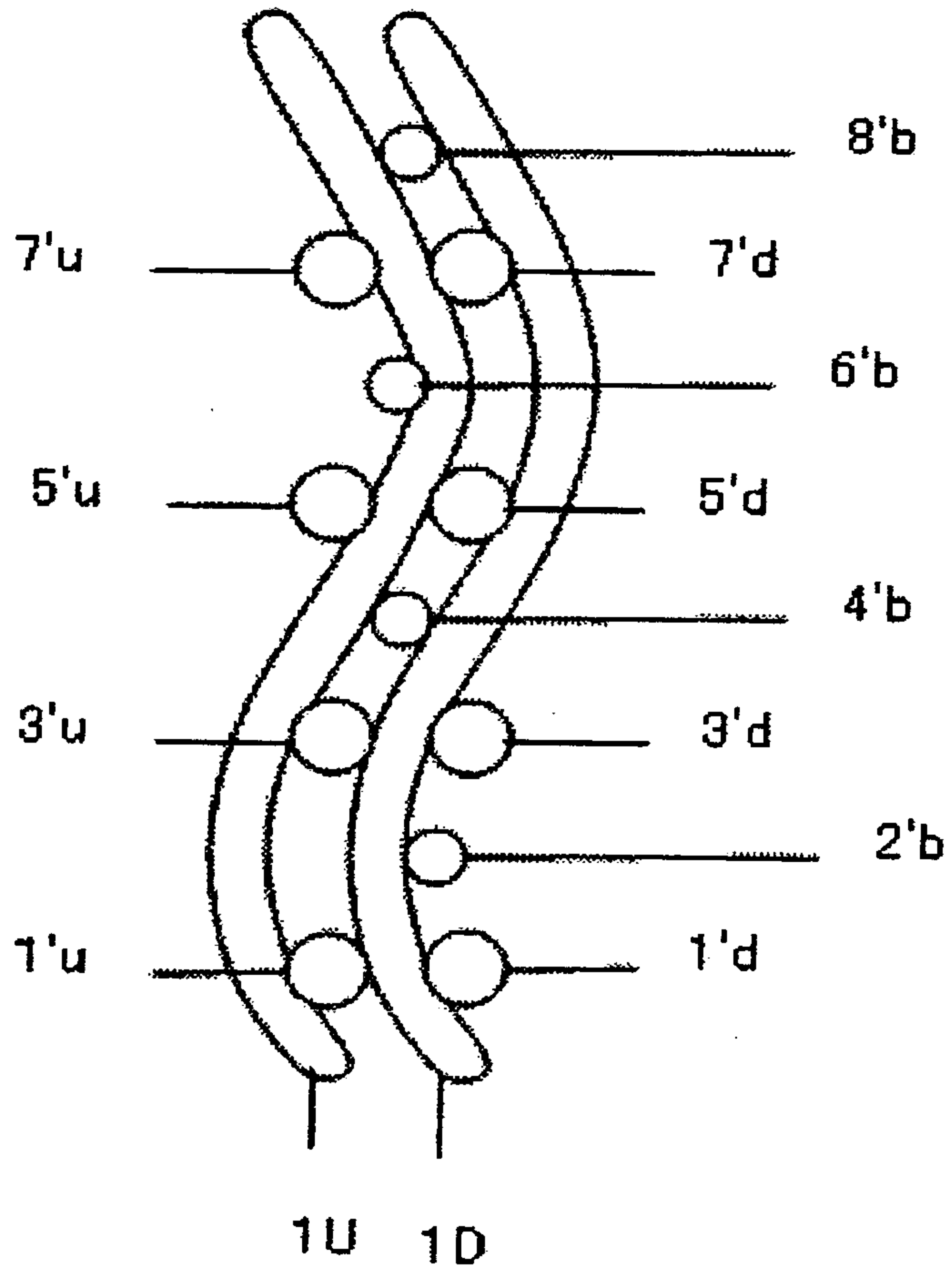


Figure 2



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Figure 3

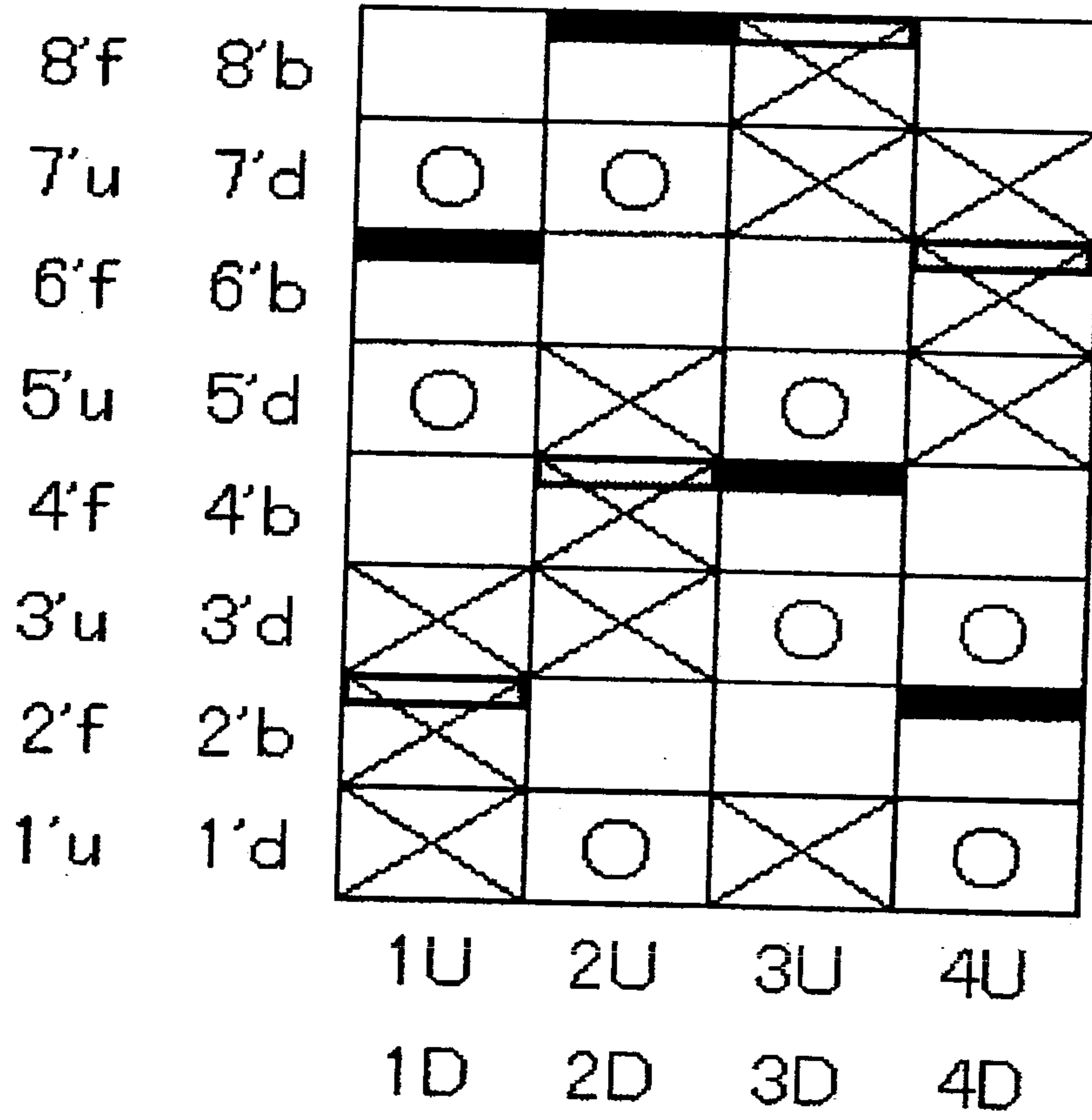


Figure 4

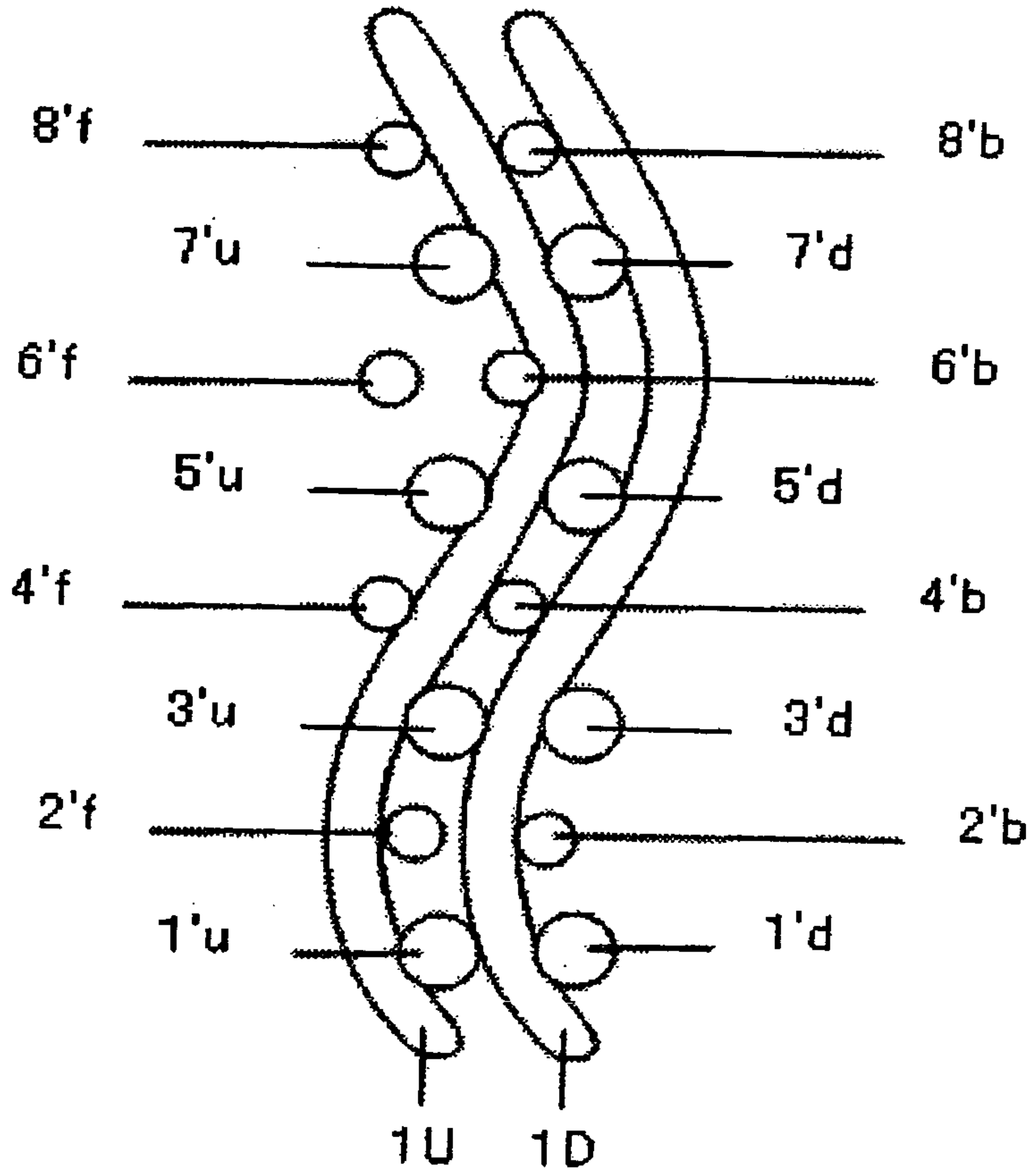


Figure 5

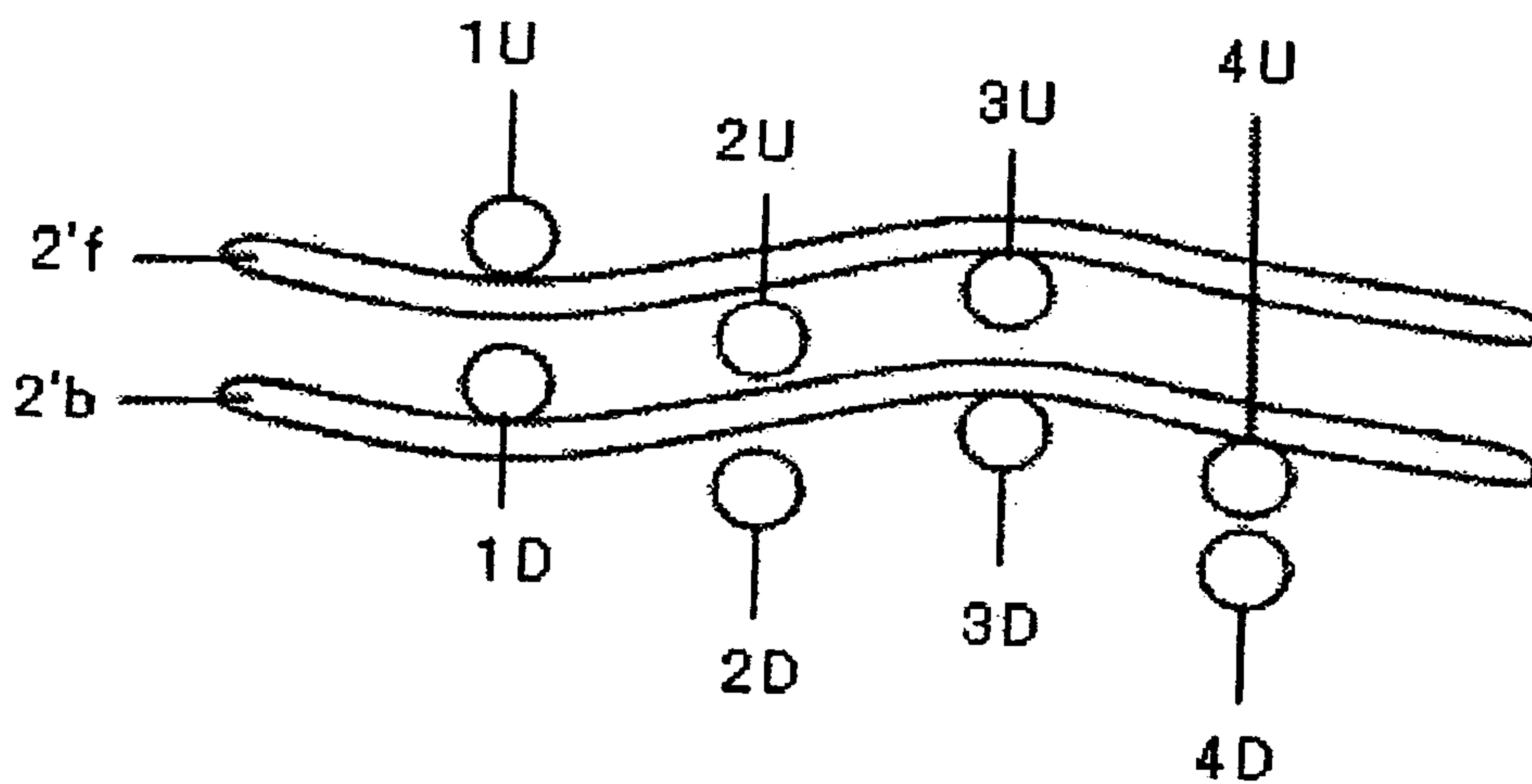


Figure 6

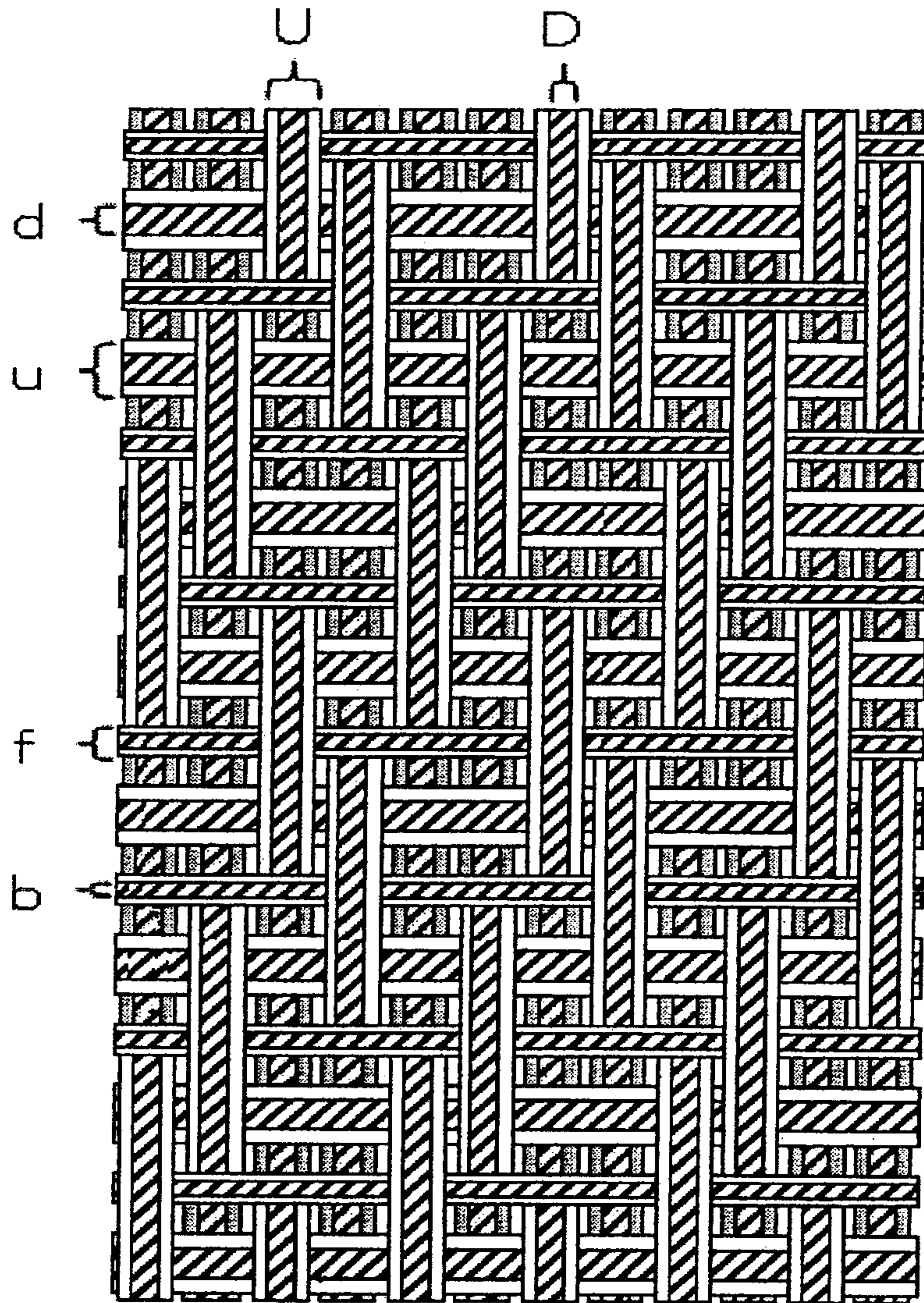


Figure 7

