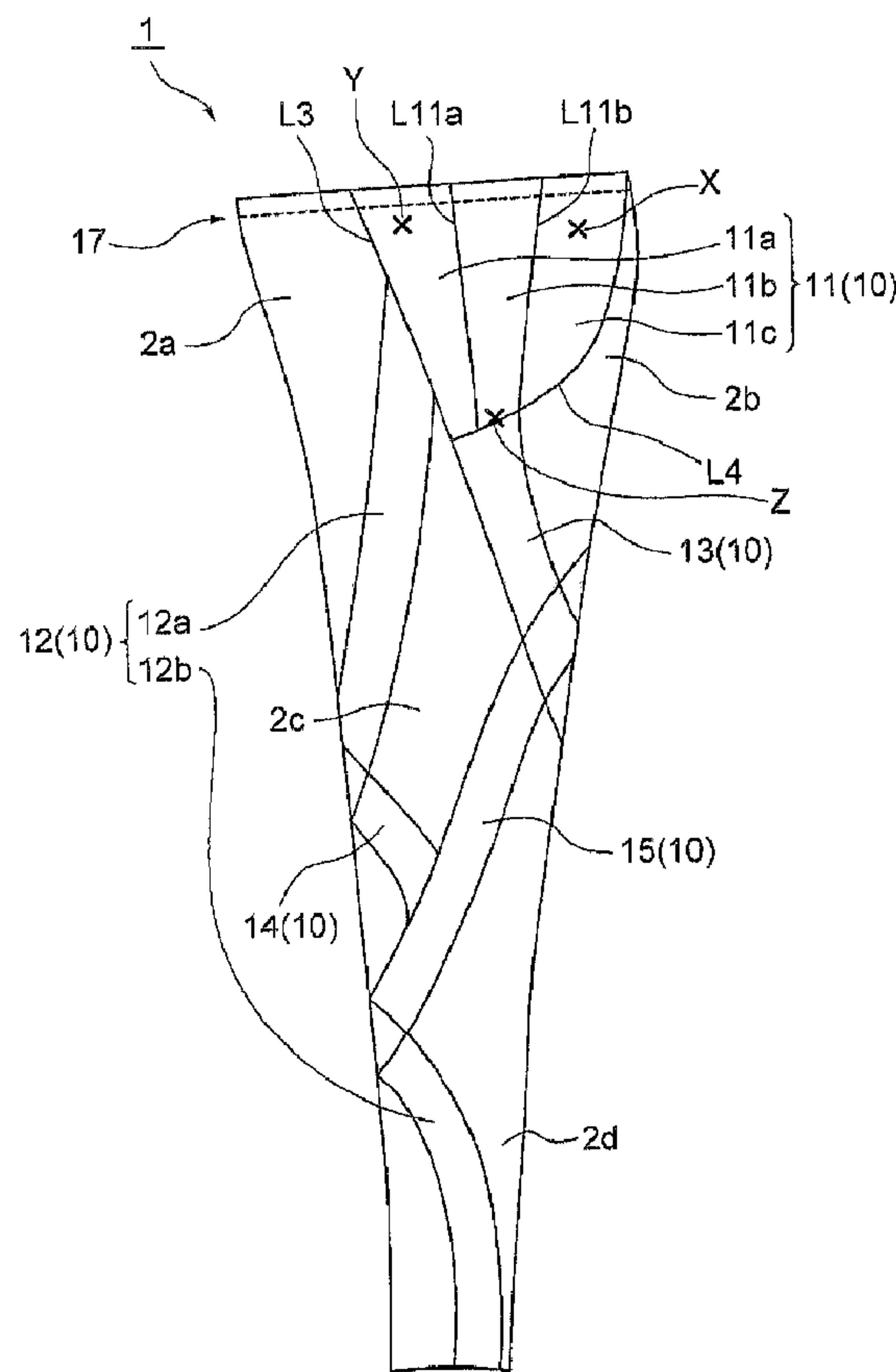




(86) **Date de dépôt PCT/PCT Filing Date:** 2012/04/10  
(87) **Date publication PCT/PCT Publication Date:** 2013/10/17  
(45) **Date de délivrance/Issue Date:** 2018/10/23  
(85) **Entrée phase nationale/National Entry:** 2014/10/09  
(86) **N° demande PCT/PCT Application No.:** JP 2012/059810  
(87) **N° publication PCT/PCT Publication No.:** 2013/153624

(51) **Cl.Int./Int.Cl. A41D 13/00** (2006.01),  
**A41D 1/08** (2018.01)  
(72) **Inventeurs/Inventors:**  
TANAKA, FUMIKO, JP;  
SEIKE, NOZOMU, JP  
(73) **Propriétaire/Owner:**  
WACOAL CORP., JP  
(74) **Agent:** BORDEN LADNER GERVAIS LLP

(54) **Titre : VETEMENT D'EXERCICE A FOURCHE D'ENTREJAMBE**  
(54) **Title: CROTCHED EXERCISE GARMENT**



(57) **Abrégé/Abstract:**

Provided is an exercise garment with a crotch part for covering at least a part of the lower body of a wearer, the exercise garment including a main body portion formed from a material having stretchability; and a tightening portion having higher tightening force

**(57) Abrégé(suite)/Abstract(continued):**

than the main body portion, in which the tightening portion includes a pair of right and left first tightening portions respectively covering an approximately triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of a position corresponding to the greater trochanter as the apex of the triangular region, in the right and left sides of the wearer; the first tightening portions include plural partitioned tightening portions extending in the vertical direction and adjoining in the width direction; and the partitioned tightening portions are formed such that the directions of high stretchability in the respective partitioned tightening portions approach closer to one another toward the lower side.

**ABSTRACT**

Provided is an exercise garment with a crotch part for covering at least a part of the lower body of a wearer, the exercise garment including a main body portion formed from a material having stretchability; and a tightening portion having higher tightening force than the main body portion, in which the tightening portion includes a pair of right and left first tightening portions respectively covering an approximately triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of a position corresponding to the greater trochanter as the apex of the triangular region, in the right and left sides of the wearer; the first tightening portions include plural partitioned tightening portions extending in the vertical direction and adjoining in the width direction; and the partitioned tightening portions are formed such that the directions of high stretchability in the respective partitioned tightening portions approach closer to one another toward the lower side.

**DESCRIPTION****Title of Invention**

CROTCHED EXERCISE GARMENT

**Technical Field**

5 [0001]

The present invention relates to an exercise garment with a crotch part that supports exercise of the legs of a wearer.

**Background Art**

[0002]

10 There have been conventionally known garments for supporting the muscle activity of the legs of a wearer, as described in Patent Literatures 1 and 2 mentioned below. The below-mentioned Patent Literature 1 describes a legwear in which inner patterns corresponding to the leg muscles such as the gluteus maximus muscle are sewed up.  
15 In this legwear, the respective patterns are allowed to stretch vertically. Also, the below-mentioned Patent Literature 2 describes a wet suit provided with strong tightening force portions having a strong tightening force. In this wet suit, strong tightening force portions are disposed along the leg muscles. For example, a strong tightening force portion disposed from the tensor fasciae latae muscle toward the  
20 abdominal region and the lumbar region is described.

**Citation List****Patent Literature**

[0003]

25 Patent Literature 1: Japanese Patent Application Laid-Open No. 2008-274493



Patent Literature 2: Japanese Patent Application Laid-Open No.  
2011-32599

### Summary of Invention

#### Technical Problem

5 [0004]

In the garments of the prior art described above, muscle activity and supportiveness for joint regions are assisted by stretchable materials having tightening force. Thereby, the load imposed on the legs of the wearer is reduced, and enhancement of the exercise performance is promoted.

10 [0005]

Here, as a specific condition of exercise, movement in a transverse direction or an oblique direction may be considered. Particularly, when a wearer moves in an instantaneous or sudden manner while moving in a transverse direction or an oblique direction, a large strain is added to the legs of the wearer. Specific examples of the movement include a movement of suddenly stopping while moving in a transverse direction or an oblique direction, a movement of suddenly twisting the body, and a movement of suddenly starting to run. Such movements can occur frequently in, for example, sports games such as baseball, volleyball and basketball.

15 [0006]

However, in the prior art technologies, support of the legs in relation to the movement in a transverse direction or an oblique direction is not taken into consideration. Therefore, when a wearer moves in an instantaneous or sudden manner in a transverse direction or

20  
25

an oblique direction, excessive loads may be imposed on the knees and the like, and thus there is a possibility of causing injuries. As such, it has been difficult to sufficiently support the exercise of the legs in relation to the movement in a transverse direction or an oblique direction.

[0007]

An object of the present invention is to provide an exercise garment with a crotch part capable of supporting the exercise of the legs sufficiently in relation to the movement in a transverse direction or an oblique direction.

#### **Solution to Problem**

[0008]

The exercise garment with a crotch part according to an aspect of the present invention is an exercise garment with a crotch part that covers at least a part of the lower body of a wearer, and includes a main body portion formed from a material having stretchability; and a tightening portion having higher tightening force than the main body portion, characterized in that the tightening portion includes a pair of right and left first tightening portions respectively covering an approximately triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of a position corresponding to the greater trochanter as the vertex of the triangular region, on the right side and the left side of the wearer; the first tightening portions each have plural partitioned tightening portions extending in the vertical direction and adjoining in the width direction; and the partitioned tightening portions are formed such that the

FP12-0212-00

directions of high stretchability in the respective partitioned tightening portions approach closer to one another toward the lower side.

[0009]

According to this exercise garment with a crotch part, the  
5 tightening portion includes a pair of right and left first tightening  
portions that cover an approximately triangular region formed by the  
upper part of the hip, the lateral side of the lumbar region, and the  
vicinity of a position corresponding to the greater trochanter as the  
vertex of the triangular region, on the right side and the left side of the  
10 wearer. The approximately triangular region formed by the upper part  
of the hip, the lateral side of the lumbar region, and the vicinity of a  
position corresponding to the greater trochanter, corresponds to the  
position of the gluteus medius muscle of the wearer. This gluteus  
medius muscle is a fan-shaped muscle extending from the ilium to the  
15 greater trochanter, and constitutes the basis of hip joints. Here, the  
first tightening portions have plural partitioned tightening portions  
extending in the vertical direction and adjoining in the width direction,  
and these partitioned tightening portions are formed such that the  
directions of high stretchability in the respective partitioned tightening  
20 portions approach closer to one another toward the lower side.  
Therefore, the partitioned tightening portions respectively cover the  
anterior side and the posterior side of the gluteus medius muscle.  
Furthermore, since the directions of high stretchability of the partitioned  
tightening portions respectively conform to the muscle fiber directions  
25 of the front side and the back side of the gluteus medius muscle that  
forms a fan shape, the partitioned tightening portions can reliably



support the gluteus medius muscle. As such, the exercise of the legs in relation to the movement in a transverse direction and in an oblique direction can be sufficiently supported by reliably supporting the gluteus medius muscle that constitutes the basis of the movement of hip joints.

5 [0010]

Furthermore, according to an embodiment, in the waist region, a width of a front side region in which the first tightening portions are not formed may be larger than a width of a back side region in which the first tightening portions are not formed. The gluteus medius muscle is  
10 located closer to the back side than the side of the body. Therefore, the first tightening portions can be disposed at positions appropriate for supporting the gluteus medius muscle.

[0011]

Furthermore, according to an embodiment, in the waist portion,  
15 the width of the front side region in which the first tightening portions are not formed may be two times or more and five times or less the width of the back side region in which the first tightening portions are not formed. In this case, since the width of the front side region in which the first tightening portions are not formed is larger, the sensation  
20 of pressure against the abdominal region can be reduced.

[0012]

Furthermore, according to another embodiment, the tightening portion may have a second tightening portion extending from a front part of the first tightening portion to the inner side of the knee region of  
25 the wearer via the anterior side of the femoral region of the wearer. In this case, since the second tightening portion is disposed in a region



FP12-0212-00

corresponding to the sartorius muscle, the second tightening portion can adequately support the legs in relation to the movement of suddenly stopping while moving in a transverse direction or an oblique direction. Therefore, the impact exerted on the legs can be alleviated.

5 [0013]

Also, according to another embodiment, the tightening portion may have a third tightening portion extending from a lower part of the first tightening portion to the inner side of the knee region of the wearer via the posterior side of the femoral region of the wearer. In this case, since the third tightening portion is disposed in a region corresponding to the hamstrings, the third tightening portion can adequately support the legs in relation to the movement of suddenly starting to run. Therefore, the impact exerted on the legs can be alleviated.

#### Advantageous Effects of Invention

15 [0014]

According to the present invention, the exercise of the legs in relation to the movement in a transverse direction or an oblique direction can be sufficiently supported.

#### Brief Description of Drawings

20 [0015]

Fig. 1 is a perspective view diagram obtained by viewing an exercise garment with a crotch part according to a first embodiment from the above.

Fig. 2 is a perspective view diagram obtained by viewing the exercise garment with a crotch part illustrated in Fig. 1 from the below.

Fig. 3 is a front view diagram of the state in which the exercise

garment with a crotch part illustrated in Fig. 1 is placed flat.

Fig. 4 is a rear view diagram of the state in which the exercise garment with a crotch part illustrated in Fig. 1 is placed flat.

5 Fig. 5 is a diagram of the state in which the exercise garment with a crotch part illustrated in Fig. 1 is placed flat with the right side facing downward.

Fig. 6 is a front view diagram corresponding to Fig. 3, and is a diagram illustrating the directions of high stretchability.

10 Fig. 7 is a rear view diagram corresponding to Fig. 4, and is a diagram illustrating the directions of high stretchability.

Fig. 8 is a diagram corresponding to Fig. 5, and is a diagram illustrating the directions of high stretchability.

15 Fig. 9(a) is a diagram illustrating the skeletal structure group of the human body lower limb region and the gluteus medius muscle viewed from the back side; and Fig. 9(b) is a diagram illustrating the skeletal structure group of the human body lower limb region and the gluteus medius muscle viewed from the left side.

20 Fig. 10 is a front view diagram of the state in which an exercise garment with a crotch part according to a second embodiment is placed flat.

Fig. 11 is a diagram of the state in which the exercise garment with a crotch part illustrated in Fig. 10 is placed flat with the right side facing downward.

25 Fig. 12 is a diagram of the state in which an exercise garment with a crotch part according to a third embodiment is placed flat with the right side facing downward.

Figs. 13(a) and 13(b) are diagrams of the state in which exercise garments with crotch parts according to modification examples are placed flat with the right sides facing downward.

5 Figs. 14(a) and 14(b) are explanatory diagrams for a method of performing a functional test for the tightening portions.

Fig. 15 is a diagram illustrating the results of a functional test concerning the load in the vertical direction imposed on the knee.

Fig. 16 is a diagram illustrating the results of a functional test concerning the load in the horizontal direction imposed on the knee.

10 Fig. 17 is a diagram illustrating the results of a functional test concerning the load in the vertical direction imposed on the knee.

Fig. 18 is a diagram illustrating the results of a functional test concerning the load in the horizontal direction imposed on the knee.

#### **Description of Embodiments**

15 [0016]

Hereinafter, embodiments of the exercise garments with crotch parts according to the present invention will be explained with reference to the drawings.

[0017]

20 As illustrated in Fig. 1 and Fig. 2, the exercise garment with a crotch part 1 according to a first embodiment is a sport tights that covers at least a part of the lower body of a wearer and supports the exercise of the legs of the wearer. The exercise garment with a crotch part 1 is a long type sport tights covering up to at least the knees of the wearer.

25 The exercise garment with a crotch part 1 supports the exercise of the legs in relation to the movement in a transverse direction or an oblique



direction of a wearer who performs sports. The exercise garment with a crotch part 1 is worn by, for example, a player of soccer, baseball, volleyball or basketball. The exercise garment with a crotch part 1 is not intended to be limited for vigorous exercise such as sports, and may also be applied to inner wears worn daily (for example, girdles and  
5 panties).

[0018]

The exercise garment with a crotch part 1 includes a main body portion 2 that sticks to the body of a wearer extending from the lumbar region to the femoral region and the knee, and tightening portions  
10 sewed up to the main body portion 2. The main body portion 2 is formed by a material having stretchability. The main body portion 2 is formed from a two-way material having high followability in a longitudinal direction and a transverse direction. Regarding the material that forms the main body portion 2, for example, Two-Way  
15 Tricot having a polyester yarn blend ratio of 70% and a polyurethane yarn blend ratio of 30% can be used. When a material which stretches significantly in a longitudinal direction and in a transverse direction and has high followability is employed in the main body portion 2, even if  
20 the support lines (tightening portions) are increased, easy movability is secured for the wearer.

[0019]

The right and left sides of the main body portion 2 are seamed to each other by a seam line L1 that passes through the central area  
25 extending from the front part 2a to the rear region 2b. The right and left leg regions 2c and the right and left hem regions 2d are formed by a

seam line L2 that intersects the seam line L1 at the center of the crotch region. In a waist portion 17, for example, a rubber-incorporated inside tape is passed therethrough, and the sense of fitting to the waist at the time of wearing can be increased.

5 [0020]

The tightening portion 10 is a supportive region formed by a material having tightening force. Regarding the material that forms the tightening portion 10, for example, Satin Powernet having a nylon yarn blend ratio of 79% and a polyurethane yarn blend ratio of 21% is  
10 used. The tightening portion 10 has higher tightening force than the main body portion 2. The tightening portion 10 supports the muscles and skeleton of the wearer corresponding to the allocated areas of the tightening portion 10, as a result of the action of the tightening force of the tightening portion.

15 [0021]

The tightening portion 10 has a pair of right and left first tightening portions 11 and 11 respectively covering an approximately triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of a position corresponding to the  
20 greater trochanter, on the right and left sides of the wearer. Furthermore, the tightening portion 10 includes a pair of right and left second tightening portions 12 and 12, a pair of right and left third tightening portions 13 and 13, a pair of right and left fourth tightening portions 14 and 14, and a pair of right and left fifth tightening portions  
25 15 and 15, which are formed into a band shape in the lower part of the first tightening portions 11, and stretches along the right and left leg



regions of the wearer.

[0022]

Fig. 9(a) is a diagram illustrating the skeletal structure group of the human body lower limb region and the gluteus medius muscles viewed from the back side, and Fig. 9(b) is a diagram illustrating the skeletal structure group of the human body lower limb region and the gluteus medius muscles viewed from the left side. As illustrated in Figs. 9(a) and 9(b), the pelvic girdle of the human body lower limb region is configured to include the pelvis composed of coxa and sacrum 902, and hip joints. The greater trochanter 904 is located in the upper part of the thighbone, and is protruded from a hip joint toward the outside. Mobility of the pelvic girdle involves many muscles such as the tensor fasciae latae muscle, the gluteus maximum muscle, the gluteus medius muscle 906, and the gluteus minimus muscle.

[0023]

In the exercise garment with a crotch part 1 of the present embodiment, attention is paid mainly to the gluteus medius muscle 906. The gluteus medius muscle 906 is primarily located in the deep part of the gluteus maximus muscle, and is positioned so as to join the gluteal surface 908 of the ala of the ilium 910 and the outer surface of the greater trochanter 904. The greater trochanter 904 is formed so as to extend in a fan shape from the gluteus maximus muscle toward the ala of the ilium 910. The front part of the gluteus medius muscle 906 (shown on the left side of Fig. 9(b)) is a muscle working for bending and internal rotation, and functions when, for example, the leg is twisted inward (at the time of internal rotation). The back part of the gluteus medius muscle 906 (shown on the right side of Fig. 9(b)) is a muscle working



for spreading and external rotation, and functions when, for example, the leg is twisted outward (at the time of external rotation).

[0024]

The first tightening portion 11 is a part that supports the gluteus medius muscle of a wearer. The first tightening portion 11 is formed at a position corresponding to the gluteus medius of the wearer. Here, the "upper part of the hip" described above is near the position X corresponding to a slightly anterior side of the posterior superior iliac spine 914 (see Fig. 9(b)), and the "lateral side of the lumbar region" is near the position Y corresponding to a slightly posterior side of the anterior superior iliac spine 912 (see Fig. 9(b)) (see Fig. 5). The approximately triangular region formed by the upper part of the hip (near the position X), the lateral side of the lumbar region (near the position Y), and the vicinity of the position Z corresponding to the greater trochanter 904 as the apex, corresponds to the position of the gluteus medius muscle 906 of the wearer. The first tightening portion 11 is formed to extend from the position of the ala of the ilium 910 of the wearer to the vicinity of the position Z of the greater trochanter, and covers the gluteus medius muscle 906 with the gluteus maximum muscle disposed therebetween. The first tightening portion 11 forms an approximate fan shape having a narrower width toward the lower side (see Fig. 5).

[0025]

The second tightening portion 12 is a part that supports the sartorius muscle of the wearer (see Fig. 1, Fig. 3, and Fig. 5). The sartorius muscle is positioned so as to join the anterior superior iliac 912 spine of the ilium and the inner side of the tibial tuberosity, and functions at the time of external rotation

of a hip joint. The second tightening portion 12 is composed of a first line 12a extending from the front part of the first tightening portion 11 to the inner side of a knee of the wearer via the anterior side of the femoral region of the wearer; and a second line 12b extending from the inner side of a knee to the outer side of the calf region via the anterior side of the shin region. The first line 12a of the second tightening portion 12 is formed at a position corresponding to the sartorius muscle of the wearer. The upper end of the first line 12a is sewed up to the front part of the first tightening portion 11. Meanwhile, the upper end of the first line 12a is not limited to be sewed up to the front part of the first tightening portion 11, and there may be provided a spacing between the upper end of the first line 12a and the first tightening portion 11.

[0026]

The third tightening portion 13 is a part that supports the hamstrings of the wearer (see Fig. 2, Fig. 4, and Fig. 5). The term hamstrings is a collective name for the biceps femoris muscle, semitendinous muscles, and semimembranous muscles. Hamstrings are located in the rear part of the thigh, and function at the time of starting to run or at the time of accelerating during running. The third tightening portion 13 extends from the lower part of the first tightening portion 11 to the inner side of a knee of the wearer via the posterior side of the femoral region of the wearer. The upper end of the third tightening portion 13 is sewed up to the lower part of the first tightening portion 11. Meanwhile, the upper end of the third tightening portion



13 is not limited to be sewed up to the lower part of the first tightening portion 11, and a spacing may be provided between the upper end of the third tightening portion 13 and the lower part of the first tightening portion 11.

5 [0027]

The fourth tightening portion 14 is a part that supports the upper part of the adductor muscle of the wearer (see Fig. 1 and Fig. 3). The fourth tightening portion 14 extends from the vicinity of the center of the crotch at which the seam line L1 and the seam line L2 intersect, to the lower part along the adductor muscle, and further extends to the outer side of a knee of the wearer via the anterior side of the femoral region of the wearer. The lower end of the fourth tightening portion 14 is sewed up to the fifth tightening portion 15 at a position on the outer side of a knee of the wearer.

15 [0028]

The fifth tightening portion 15 is a part that supports the outer side of a knee of the wearer and the inner side of a calf (see Fig. 1 to Fig. 5). The fifth tightening portion 15 extends from the vicinity of the center of the crotch at which the seam line L1 and the seam line L2 intersect, to the outer side of a knee of the wearer via the posterior side of the femoral region of the wearer, and further extends to the inner side of the calf region via the anterior side of the shin region. The fifth tightening portion 15 and the third tightening portion 13 intersect each other on the posterior side of the femoral region of the wearer (see Fig. 2, Fig. 4, and Fig. 5).

25 [0029]



FP12-0212-00

The first line 12a and the second line 12b of the second tightening portion 12, the fourth tightening portion 14, and the fifth tightening portion 15 pass around the kneecap. The first line 12a and the fourth tightening portion 14 intersect each other on the upper side of the kneecap, and the second line 12b and the fifth tightening portion 15 intersect each other on the lower side of the kneecap. At the position corresponding to the kneecap, a diamond-shaped hole 2e is formed, which is an area at which the main body portion 2 is exposed (see Fig. 1 and Fig. 3).

10 [0030]

Hereinafter, the first tightening portion 11 will be described in more detail. As illustrated in Fig. 2, Fig. 4 and Fig. 5, the first tightening portion 11 is formed near the posterior part (close to the back surface) based on the anterior-posterior direction. The area of the front side region A1 (see Fig. 3) in which the first tightening portion 11 is not formed is larger than the area of the back side region A2 (see Fig. 4) in which the first tightening portion 11 is not formed. In the waist portion 17, the width W1 of the front side region A1 (see Fig. 3) in which the first tightening portion 11 is not formed is larger than the width W2 of the back side region A2 (see Fig. 4) in which the first tightening portion 11 is not formed. The width W1 of the region A1 in the waist portion 17 is 2 times or more and 5 times or less the width W2 of the region A2 in the waist portion 17.

[0031]

25 As such, the first tightening portion 11 is formed so as to avoid the position corresponding to the abdominal region of the wearer.

Meanwhile, formed at the position corresponding to the abdominal region of the wearer is an abdominal region tightening portion 18. The abdominal region tightening portion 18 is seamed to the back surface side of the front part 2a, and has high stretchability in the horizontal direction (see Fig. 6 and Fig. 8). The elongation recovery force of the abdominal region tightening portion 18 is smaller than the elongation recovery force of other tightening portions 11 to 15. By lowering the elongation recovery force of the abdominal region tightening portion 18, it makes the wearer feel less pressure in the abdominal region. Meanwhile, line L10 in Fig. 8 represents the line of the crotch when the garment is placed flat.

[0032]

Furthermore, as illustrated in Fig. 2 and Fig. 5, the first tightening portion 11 includes plural partitioned tightening portions 11a, 11b and 11c extending in the vertical direction and adjoining in the width direction (horizontal direction of Fig. 5). The partitioned tightening portion 11a on the anterior side forms a quadrilateral shape that is vertically long and tapering downward, and is sewed up to the front part 2a by a seam line L3. The partitioned tightening portion 11b at the center forms a quadrilateral shape that is vertically long and tapering downward. The partitioned tightening portion 11c on the posterior side forms a vertically long shape, and is sewed to the rear region 2b by a seam line L4.

[0033]

The partitioned tightening portion 11a and the partitioned tightening portion 11b are sewed up by a seam line L11a extending in



the vertical direction, and are adjoining through the seam line L11a. The partitioned tightening portion 11b and partitioned tightening portion 11c are sewed up by a seam line L11b extending in the vertical direction, and are adjoining through the seam line L11b. A seam line  
5 L4 that seams the partitioned tightening portion 11c and the rear region 2b extends, while forming a smooth bending line, to the lower edges of the partitioned tightening portion 11a and the partitioned tightening portion 11b. The partitioned tightening portion 11a and the partitioned tightening portion 11b are respectively sewed up to the upper end of the  
10 third partitioned tightening portion 13 by this seam line L4. The width of the upper edge of the third tightening portion 13 is identical to the width combining the lower edge of the partitioned tightening portion 11a and the lower edge of the partitioned tightening portion 11b.

[0034]

15 In regard to the exercise garment with a crotch part 1 of the present embodiment, as illustrated in Fig. 6 to Fig. 8, the first tightening portion 11 is formed such that the directions of high stretchability D1, D2 and D3 in the partitioned tightening portions 11a, 11b and 11c, respectively, approach closer to one another toward the lower side.  
20 The directions of high stretchability D1, D2 and D3 in the partitioned tightening portions 11a, 11b and 11c, respectively, are non-parallel to one another, and the distances between the directions D1, D2 and D3 become narrower toward the lower side. In other words, the directions of high stretchability D1, D2 and D3 in the partitioned tightening  
25 portions 11a, 11b and 11c, respectively, intersect one another at the lower part of the first tightening portion (see the intersection points P1,



P2 and P3 in Fig. 8). Meanwhile, the positions of the intersection points P1, P2 and P3 shown in Fig. 8 are only for illustrative purposes, and the directions may intersect at positions other than the positions shown in the diagram.

[0035]

5           The directions of high stretchability D1, D2 and D3 in the partitioned tightening portions 11a, 11b and 11c, respectively, are configured to follow, at the time of wearing, the muscle fiber direction of the gluteus medius muscles respectively covered by the partitioned tightening portions 11a, 11b and 11c. As illustrated in Fig. 9, the gluteus medius muscle 906 have different muscle  
10 fiber directions in the front part and the rear region. The partitioned tightening portions 11a, 11b and 11c of the first tightening portion 11 exhibit an effective supportive function even for the gluteus medius muscle having such unique muscle fiber directions.

[0036]

15           In the exercise garment with a crotch part 1 of the present embodiment described above, the tightening portion 10 includes a pair of right and left first tightening portions 11 respectively covering an approximately triangular region formed by the upper part of the hip (near the position X), the lateral side of the lumbar region (near the position Y), and the vicinity of the position Z  
20 corresponding to the greater trochanter as the apex of the triangular region, respectively in the right and left sides of the wearer (see Fig. 5). The approximately triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of the position Z corresponding to

the greater trochanter as the apex of the triangular region, in each of the right and left sides of the wearer, corresponds to the position of the gluteus medius muscle of the wearer. This gluteus medius muscle is a fan-shaped muscle extending from the ilium to the greater trochanter, and constitutes the basis of the movement of hip joints. The first tightening portions 11 have plural partitioned tightening portions 11a, 11b and 11c extending in the vertical direction and adjoining in the width direction, and these partitioned tightening portions 11a, 11b and 11c are formed such that the respective directions of high stretchability thereof approach closer to one another toward the lower side. Therefore, at the time of wearing, the partitioned tightening portions 11a, 11b and 11c respectively cover the anterior side and the posterior side of the gluteus medius muscle. Furthermore, since the directions of high stretchability of the partitioned tightening portions 11a, 11b and 11c respectively follow the muscle fiber directions of the front part and the rear region of the gluteus medius muscle that forms a fan shape, the gluteus medius muscle can be reliably supported. As such, by reliably supporting the gluteus medius muscle that constitutes the basis of the movement of the hip joints, exercise of the legs in relation to the movement in a transverse direction or an oblique direction can be sufficiently supported.

[0037]

Particularly, the exercise garment with a crotch part 1 is effective when a wearer performs an instantaneous or sudden movement while moving in a transverse direction or an oblique direction, such as a movement of suddenly stopping while moving in a transverse direction



or an oblique direction, a movement of suddenly twisting the body, or a movement of suddenly starting to run. Such movements may frequently occur in, for example, sports games such as baseball, volleyball and basketball. When the wearer performs a highly  
5 instantaneous and sudden movement, there is a risk that a large strain may be imposed to the legs of the wearer. However, when the exercise garment with a crotch part 1 is used, the muscles for sustaining the body against an impact in a transverse direction or an oblique direction can be supported, and the strain imposed on the legs (for example, knees) of  
10 the wearer can be reduced. Thereby, the wearer can perform exercise without causing injuries.

[0038]

Furthermore, in the waist portion 17, the width W1 of the front side region A1 in which the first tightening portion 11 is not formed is  
15 larger than the width W2 of the back side region A2 in which the first tightening portion 11 is not formed. Since the gluteus medius muscle is located closer to the posterior side than the lateral side of the body, the first tightening portion 11 is disposed at a position appropriate for supporting the gluteus medius muscle.

20 [0039]

Furthermore, in the waist portion 17, since the width W1 of the front side region A1 in which the first tightening portion 11 is not formed is 2 times or more and 5 times or less the width W2 of the back side region A2 in which the first tightening portion 11 is not formed, the  
25 sense of pressure against the abdominal region is reduced.

[0040]



The tightening portion 10 has a second tightening portion 12 (first line 12a) extending from the front part of the first tightening portion 11 to the inner side of a knee of the wearer via the anterior side of the femoral region of the wearer, and this second tightening portion 12 is disposed in a region corresponding to the sartorius muscle. Therefore, the tightening portion 10 can adequately support the legs in relation to the movement of suddenly stopping while moving in a transverse direction or an oblique direction, and thus, an impact exerted on the legs is reduced.

10 [0041]

The tightening portion 10 has a third tightening portion 13 extending from the lower side of the first tightening portion 11 to the inner side of a knee of the wearer via the posterior side of the femoral region of the wearer, and this third tightening portion 13 is disposed in a region corresponding to the hamstrings. Therefore, the tightening portion 10 can adequately support the legs in relation to the movement of suddenly starting to run (for example, a movement at the time of abrupt start), and an impact exerted on the legs is alleviated.

[0042]

20 Furthermore, since the second tightening portion 12 is joined to the front part of the first tightening portion 11, and the third tightening portion 13 is joined to the lower part of the first tightening portion 11, more suitable supporting of muscle activity is enabled by the cooperation of the first tightening portion 11 and the second tightening portion 12 or the third tightening portion 13 in accordance with the interlocking movement of the muscles.

25

[0043]

Fig. 10 is a front view diagram of a state in which the exercise garment with a crotch part 1A according to a second embodiment is placed flat, and Fig. 11 is a diagram of a state in which the exercise garment with a crotch part 1A is placed flat with the right side facing downward. A difference between the exercise garment with a crotch part 1A illustrated in Fig. 10 and Fig. 11 and the exercise garment with a crotch part 1 of the first embodiment illustrated in Fig. 1 to Fig. 8, is that the exercise garment with a crotch part 1A includes, instead of the main body portion 2, a main body portion 2A that sticks from the lumbar region of the wearer to the femoral region and ends over the knee of the wearer. This exercise garment with a crotch part 1A is a so-called half-type sport tights. In the exercise garment with a crotch part 1A, the second tightening portion 12A, the third tightening portion 13A, the fourth tightening portion 14A, and the fifth tightening portion 15A end over the knee. The fourth tightening portion 14A extends down to the hem regions along the adductor muscle and supports the adductor muscle.

[0044]

This exercise garment with a crotch part 1A can also sufficiently support, similarly to the exercise garment with a crotch part 1, the exercise of the legs in relation to the movement in a transverse direction or an oblique direction by reliably supporting the gluteus medius muscle that constitutes the basis of the movement of the hip joints.

[0045]

Fig. 12 is a diagram of the state in which the exercise garment



with a crotch part 1B according to a third embodiment is placed flat with the right side facing downward. A difference between the exercise garment with a crotch part 1B illustrated in Fig. 12 and the exercise garment with a crotch part 1 of the first embodiment illustrated in Fig. 1 to Fig. 8, is that the exercise garment with a crotch part 1B includes, instead of the main body portion 2, a main body portion 2B sticking to the lumbar region of the wearer. This exercise garment with a crotch part 1B is a so-called short-type sport tights. In the exercise garment with a crotch part 1B, the second tightening portion, the third tightening portion, the fourth tightening portion, and the fifth tightening portion are not formed.

[0046]

This exercise garment with a crotch part 1B can also sufficiently support, similarly to the exercise garment with a crotch part 1, the exercise of the legs in relation to the movement in a transverse direction or an oblique direction by reliably supporting the gluteus medius muscle that constitutes the basis of the movement of hip joints.

[0047]

[Functional test]

As illustrated in Figs. 14(a) and 14(b), six monitors were allowed to perform a motion of jumping down diagonally forward from the top of a platform, and the acceleration in the downward direction and the acceleration in the inward direction imposed on the knees were measured using a triaxial acceleration sensor 1400 attached to an area corresponding to the lateral condyle of the femur of each monitor. The sampling frequency at the time of measurement was 2.56 kHz. It may



be construed that the downward acceleration obtained by the measurement corresponded to the amount of load in the vertical direction, and the inward acceleration corresponding to the amount of load in the horizontal direction.

5 [0048]

As Example 1, the monitors were made to wear samples similar to the exercise garment with a crotch part 1. As Comparative Example 1, the monitors were made to wear samples in which tightening portions were not at all formed. Fig. 15 and Fig. 16 are diagrams presenting the test results. The number of data obtained was 17. As shown in Fig. 15, the average of the downward acceleration was 10.453 G in Comparative Example 1, while the average was 8.600 G in Example 1. As shown in Fig. 16, the average of the inward acceleration was 6.474 G in Comparative Example 1, while the average was 5.675 G in Example 1. From these results, it was confirmed that in Example 1 having tightening portions similar to those of the exercise garment with a crotch part 1, the loads imposed on the knees in both the vertical direction and the horizontal direction were reduced as compared with Comparative Example 1 having no tightening portions.

20 [0049]

Next, as Example 2, the monitors were made to wear samples similar to the exercise garment with a crotch part 1. As Comparative Example 2, the monitors were made to wear samples having tightening portions that covered the gluteus medius muscle but were not partitioned in the width direction. Fig. 17 and Fig. 18 are diagrams showing the test results. The number of data obtained was 6. As

shown in Fig. 17, the average of the downward acceleration was 8.168 G in Comparative Example 2, while the average was 6.524 G in Example 2. As shown in Fig. 18, the average of the inward acceleration was 8.169 G in Comparative Example 2, while the average was 6.113 G in Example 1. From these results, it was confirmed that in Example 2 having tightening portions similar to those of the exercise garment with a crotch part 1, the loads imposed on the knees in both the vertical direction and the horizontal direction were reduced as compared with Comparative Example 2 having tightening portions that were not partitioned in the width direction.

[0050]

The present invention is not intended to be limited to the embodiments described above. For example, as illustrated in Fig. 13(a), an exercise garment with a crotch part 1C having a first tightening portion 21 that is bisected in the width direction and includes a partitioned tightening portion 21a and a partitioned tightening portion 21b, is also acceptable. In this case as well, since the directions of high stretchability D4 and D5 in the partitioned tightening portion 21a and the tightening portion 21b, respectively, are formed so as to approach closer to each other toward the lower side, the exercise garment with a crotch part can reliably support the gluteus medius muscle.

[0051]

Furthermore, as illustrated in Fig. 13(b), an exercise garment with a crotch part 1D having a first tightening portion 31 that is trisected in the width direction and includes a partitioned tightening portion 31a,



FP12-0212-00

a partitioned tightening portion 31b, and a partitioned tightening portion 31c, in which any one partitioned tightening portion of the partitioned tightening portion 31a, the partitioned tightening portion 31b and the partitioned tightening portion 31c (in Fig. 13(b), the partitioned tightening portion 31b at the center) has a rectangular shape that is vertically long and tapering upward, is also acceptable. In this case as well, since the directions of high stretchability D6, D7 and D8 in the partitioned tightening portion 31a, the partitioned tightening portion 31b, and the partitioned tightening portion 31c, respectively, are formed so as to approach closer to one another toward the lower side, the exercise garment with a crotch part can reliably support the gluteus medius muscle.

[0052]

It is desirable if a first tightening portion having partitioned tightening portions is formed, and the second tightening portion to the fifth tightening portion may be omitted. It is acceptable not to have a diamond-shaped hole 2e formed at a position corresponding to the kneecap. It is not limited to the case in which the various tightening portions are sewed up to the main body portion, and it is still acceptable to have the various tightening portions seamed to the front surface side or the back surface side of the main body portion, or it is acceptable to have the various tightening portions formed by resin printing. The various tightening portions may also be formed by etching processing (opal processing).

**Industrial Applicability**

[0053]



FP12-0212-00

According to the present invention, the exercise of the legs in relation to the movement in a transverse direction or an oblique direction can be sufficiently supported.

### Reference Signs List

5	[0054]			
		1, 1A, 1B, 1C, 1D	EXERCISE GARMENT WITH A	
			CROTCH PART	
		2	MAIN BODY PORTION	
		10	TIGHTENING PORTION	
10		11	FIRST TIGHTENING PORTION	
		11a to 11c	PARTITIONED TIGHTENING PORTION	
		12	SECOND TIGHTENING PORTION	
		13	THIRD TIGHTENING PORTION	
		17	WAIST PORTION	
15		21	FIRST TIGHTENING PORTION	
		21a, 21b	PARTITIONED TIGHTENING	
			PORTION	
		31	FIRST TIGHTENING PORTION	
		31a to 31c	PARTITIONED TIGHTENING PORTION	
20		D1 to D8	DIRECTION OF HIGH	
			STRETCHABILITY	

## CLAIMS:

1. An exercise garment with a crotch part for covering at least a part of the lower body of a wearer, the exercise garment comprising:

a main body portion formed from a material having stretchability; and

a tightening portion having higher tightening force than the main body portion,

wherein the tightening portion comprises a pair of right and left first tightening portions respectively covering a triangular region formed by the upper part of the hip, the lateral side of the lumbar region, and the vicinity of a position corresponding to the greater trochanter as the apex of the triangular region, on the right and left sides of the wearer;

the first tightening portions include plural partitioned tightening portions extending in the vertical direction and adjoining in the width direction; and

each of the partitioned tightening portions has a direction of high stretchability, wherein the partitioned tightening portions are formed such that the directions of high stretchability in the respective partitioned tightening portions approach closer to one another toward a lower side.

the partitioned tightening portions are adjoined by a boundary line or boundary lines.

2. The exercise garment with a crotch part according to claim 1, wherein in a waist portion, a width of a front side region in which the first tightening portions are not formed is larger than a width of a back side region in which the first tightening portions are not formed.

3. The exercise garment with a crotch part according to claim 2, wherein in the waist portion, the width of the front side region in which the first tightening portions are not formed is 2 times or more and 5 times or less the width of the back side region in which the first tightening portions are not formed.

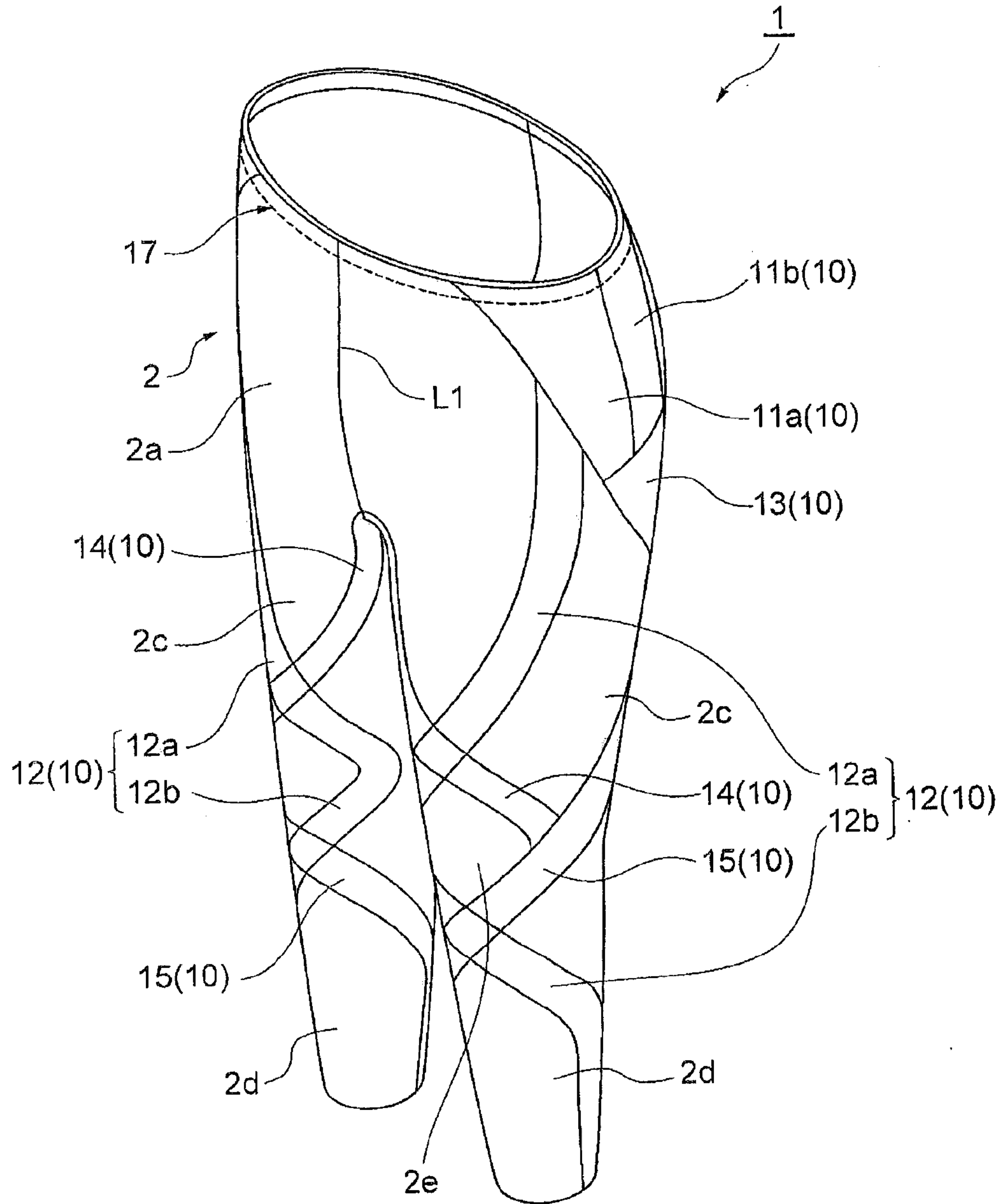
4. The exercise garment with a crotch part according to any one of claims 1 to 3, wherein the tightening portion comprises a second tightening portion extending from a front part of the first tightening portion to the inner side of the knee region of the wearer via the anterior side of the femoral region of the wearer.

5. The exercise garment with a crotch part according to any one of claims 1 to 4, wherein the tightening portion comprises a third tightening portion extending from a lower part of the first tightening portion to the inner side of the knee region of the wearer via the posterior side of the femoral region of the wearer.



FP12-0212-00

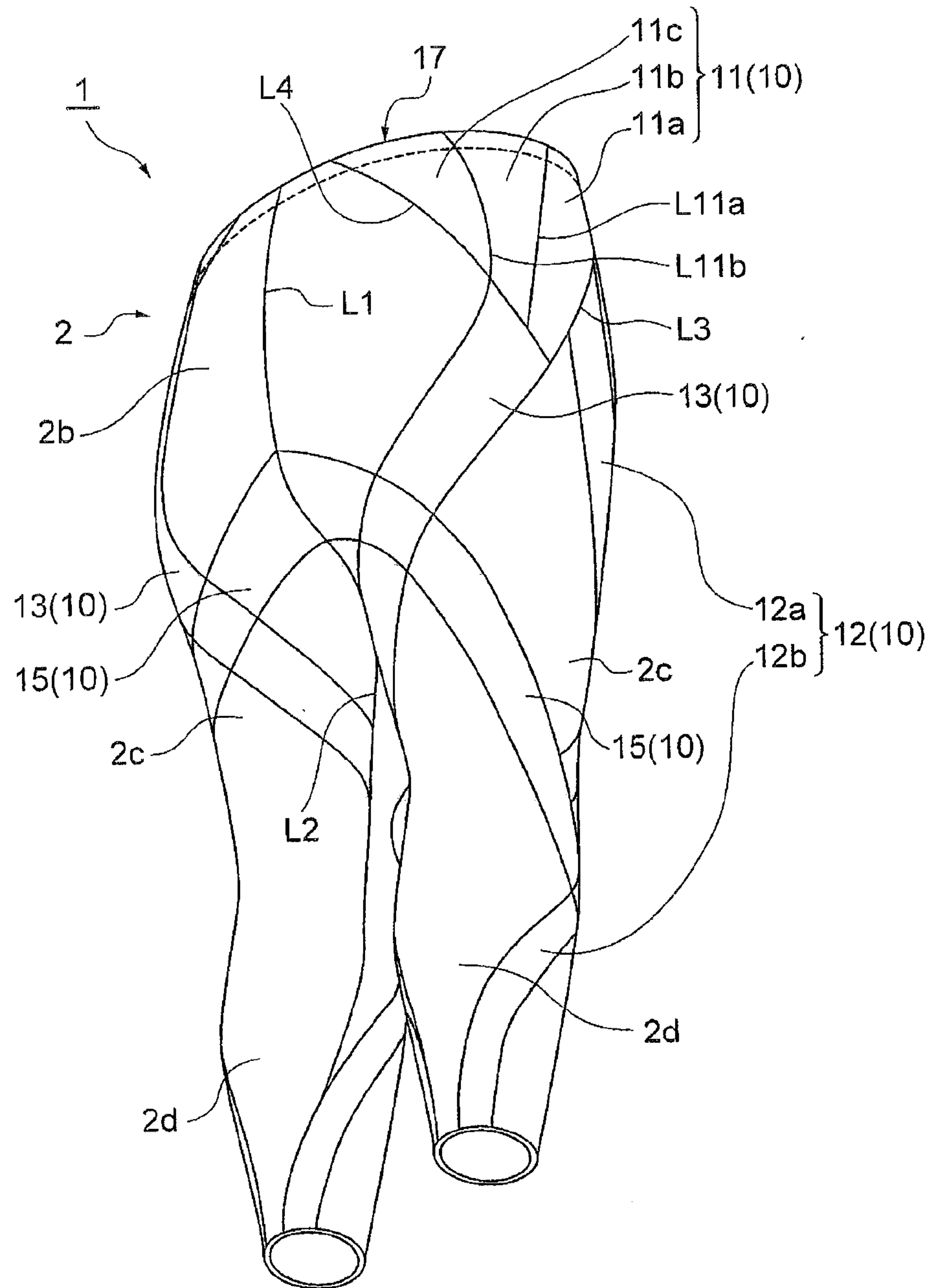
1/18

**Fig.1**

FP12-0212-00

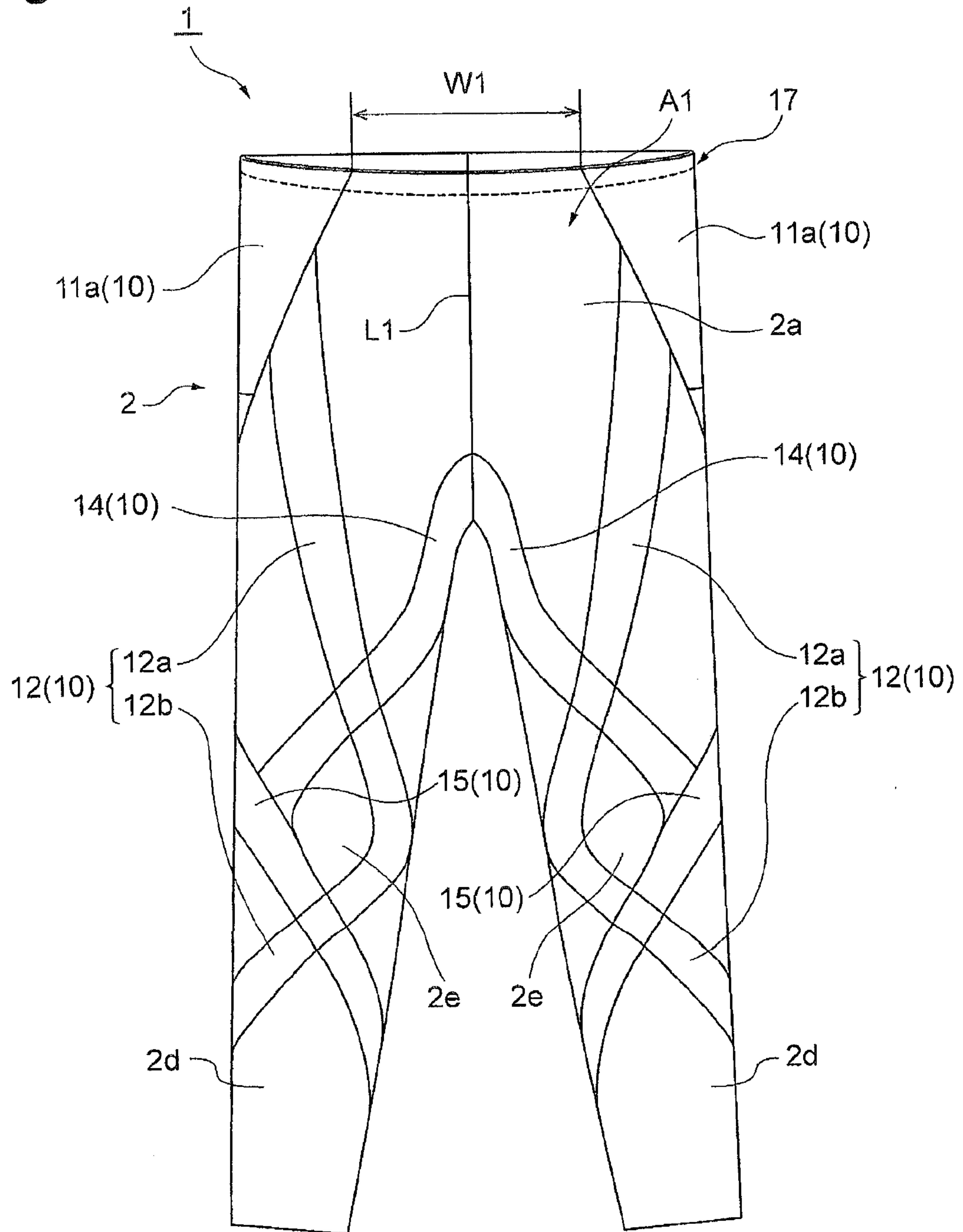
2/18

**Fig. 2**



FP12-0212-00

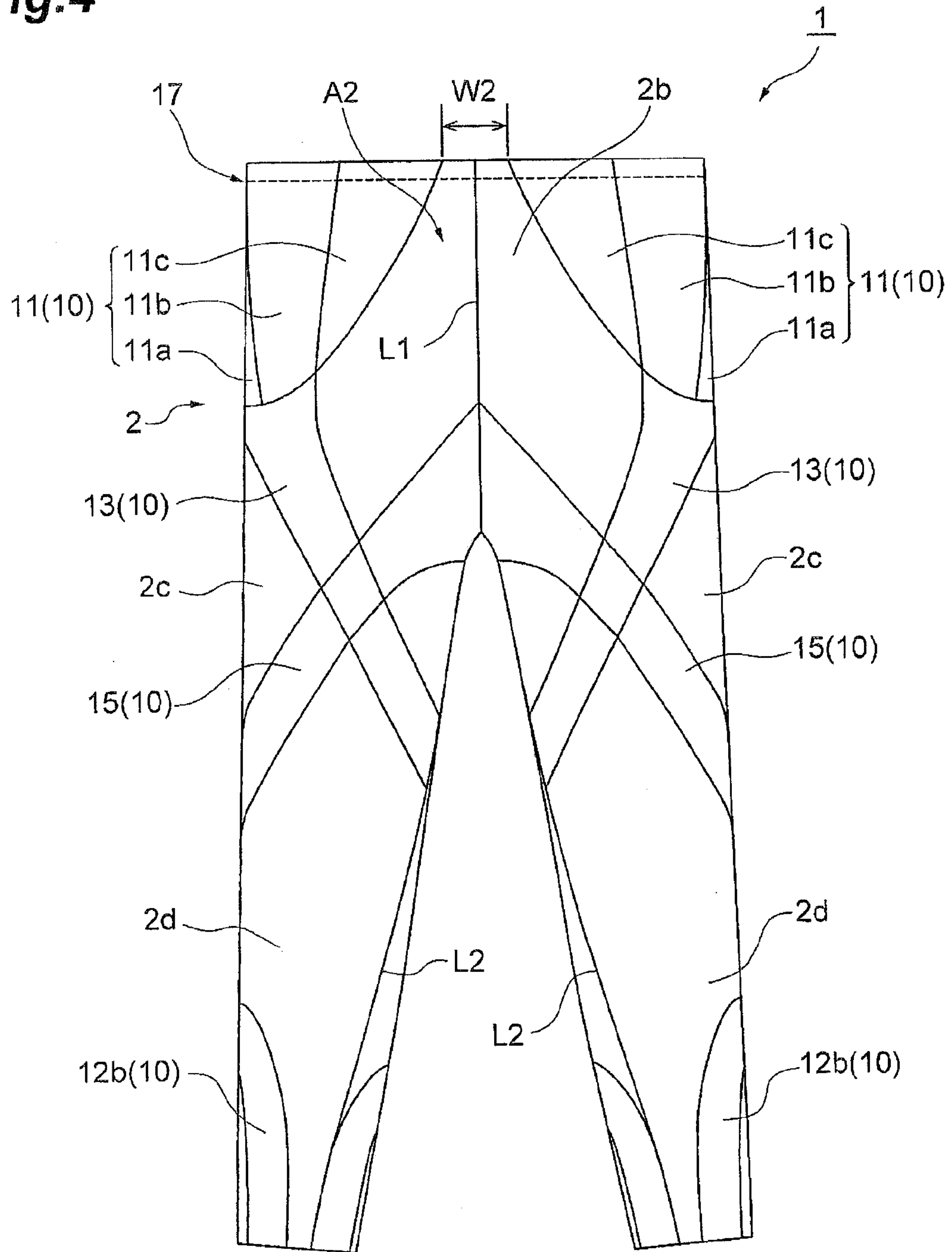
3/18

**Fig.3**



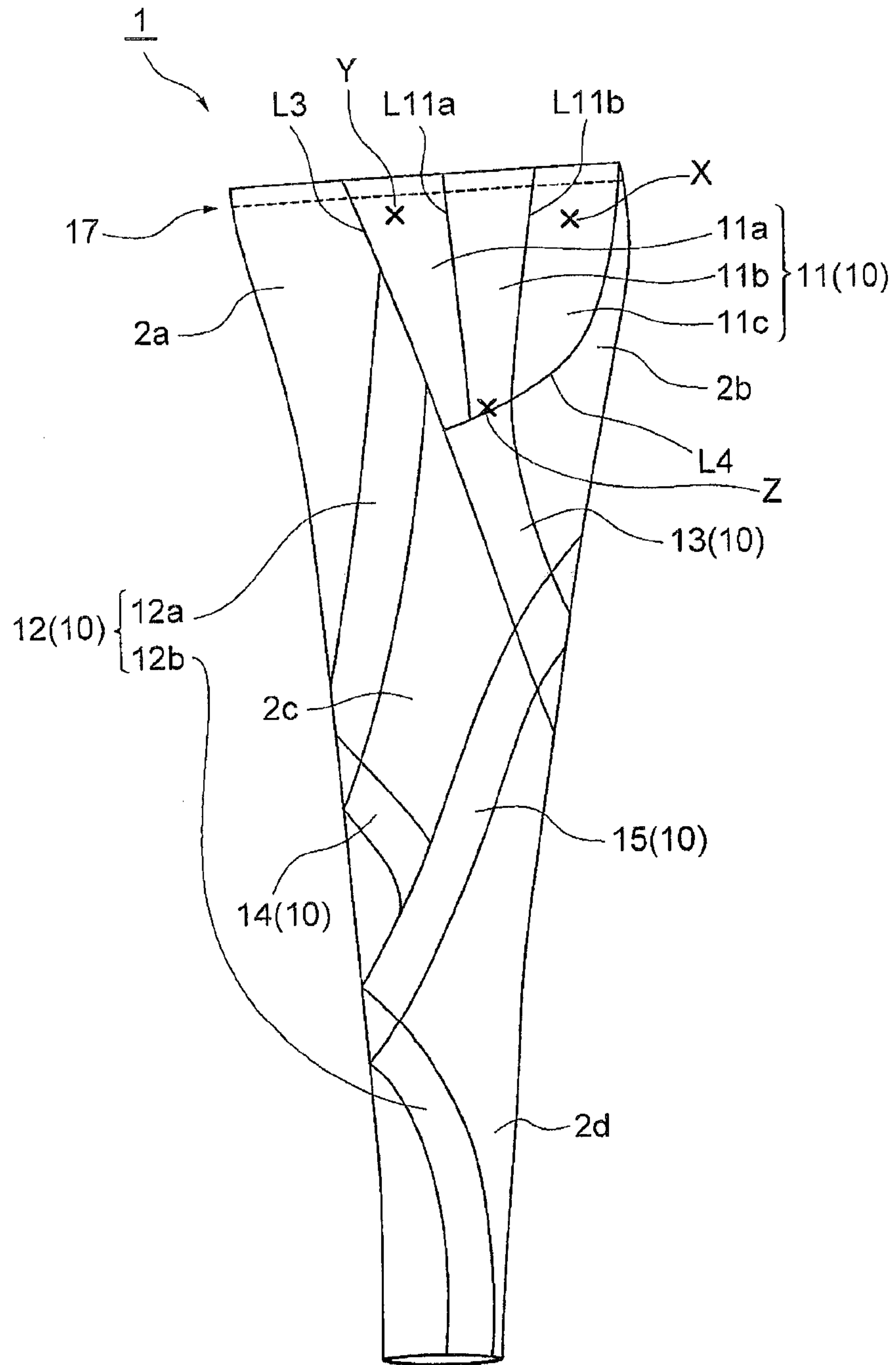
FP12-0212-00

4/18

**Fig.4**

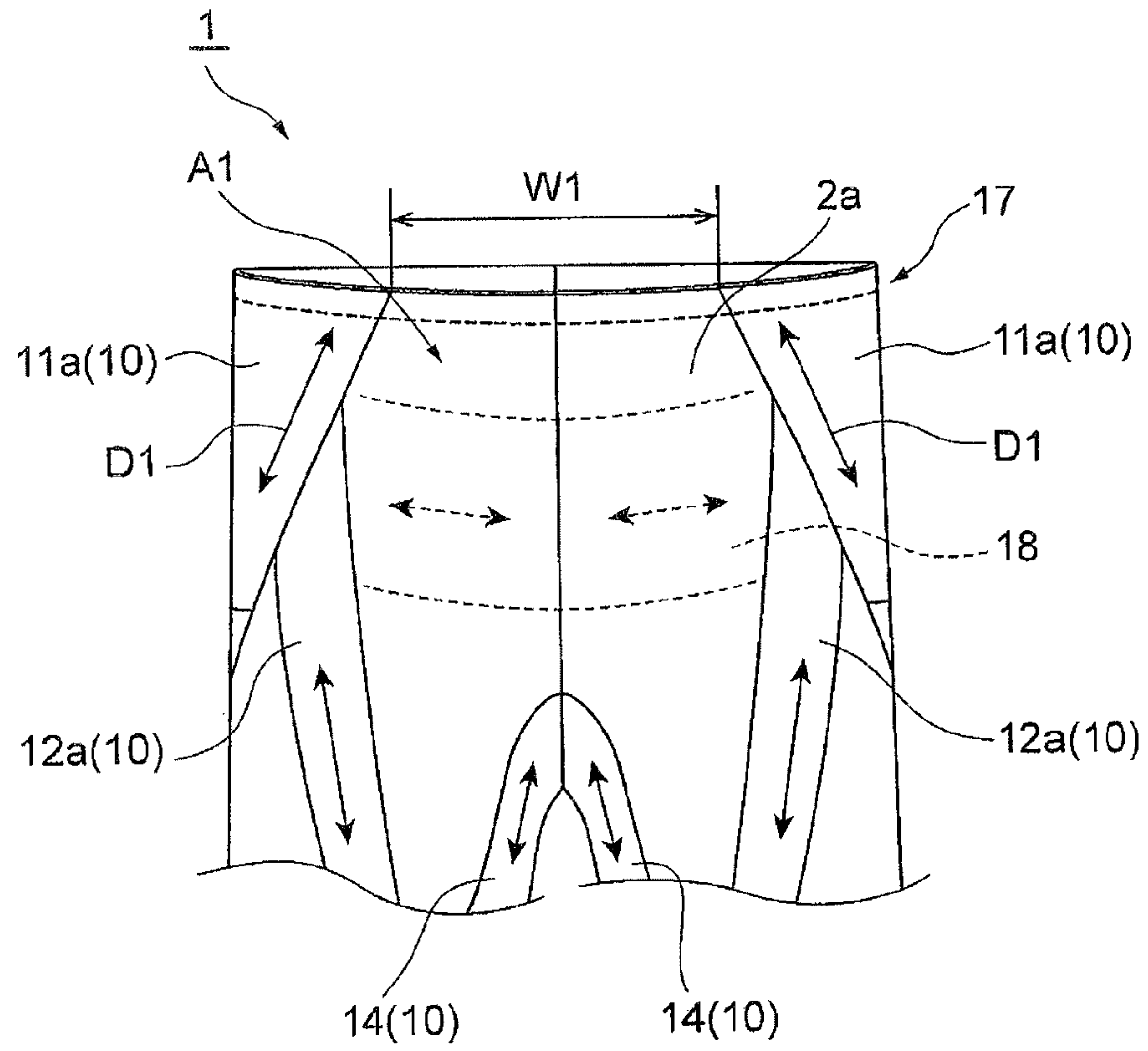
FP12-0212-00

5/18

**Fig.5**

FP12-0212-00

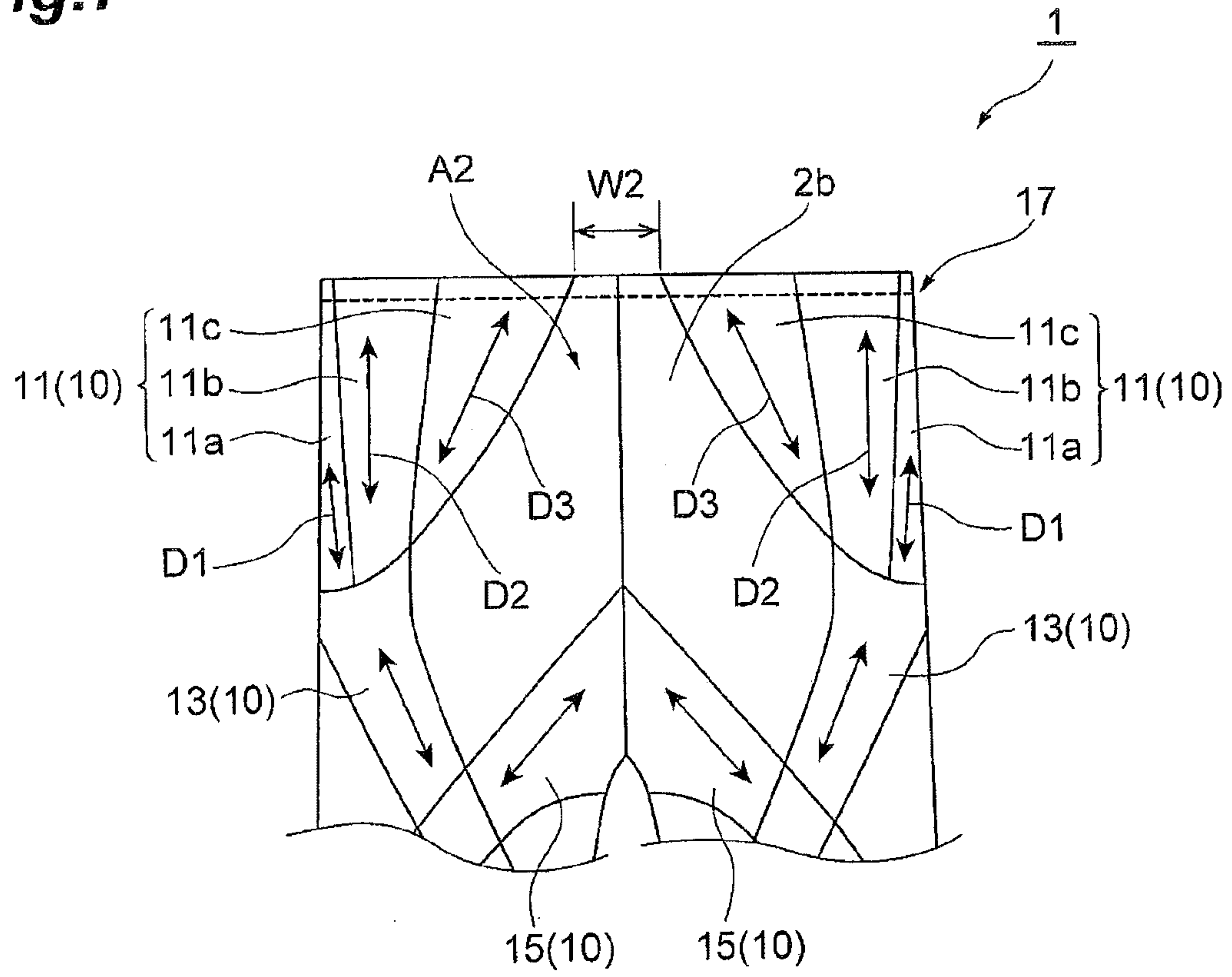
6/18

**Fig.6**



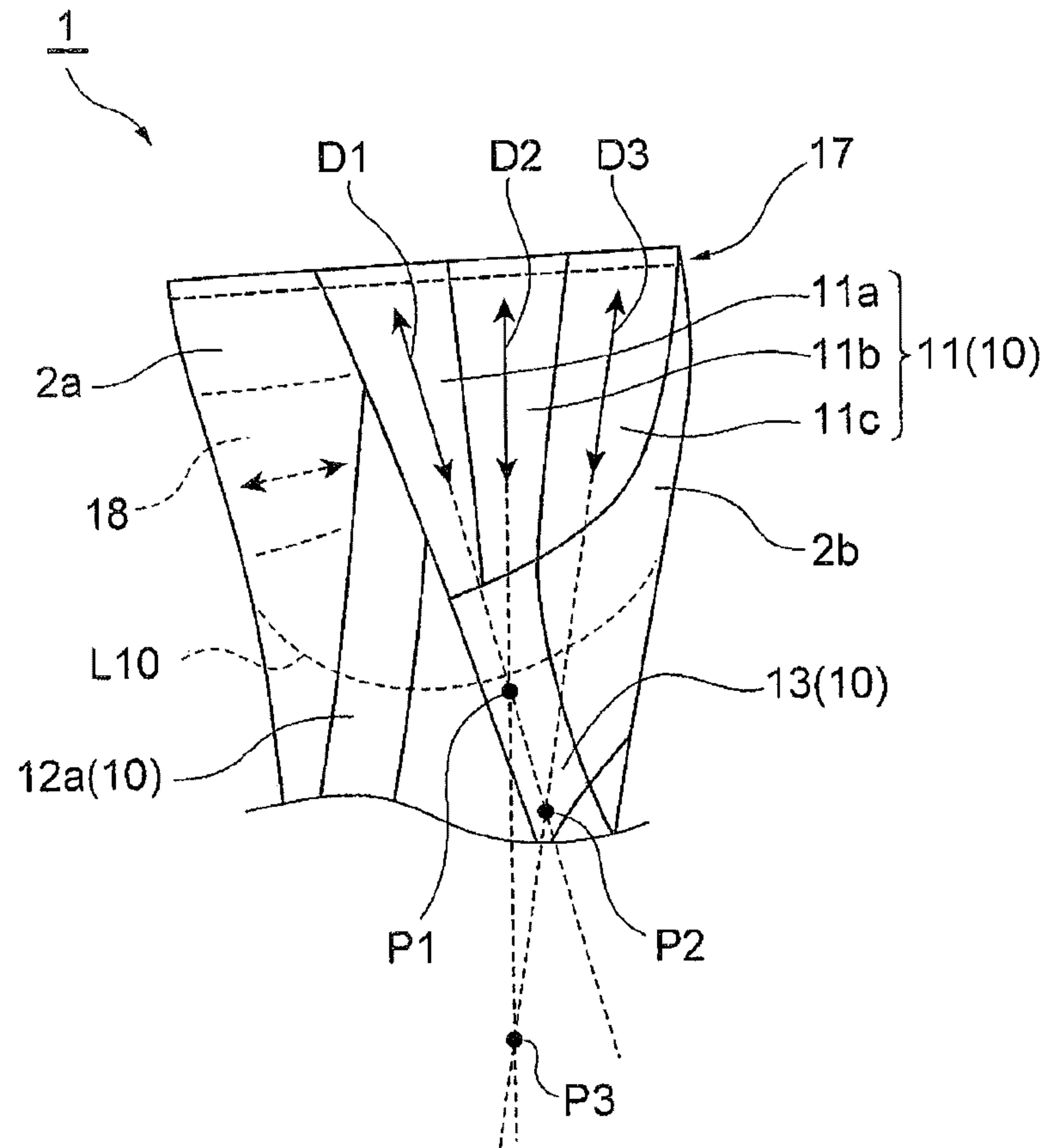
FP12-0212-00

7/18

**Fig.7**

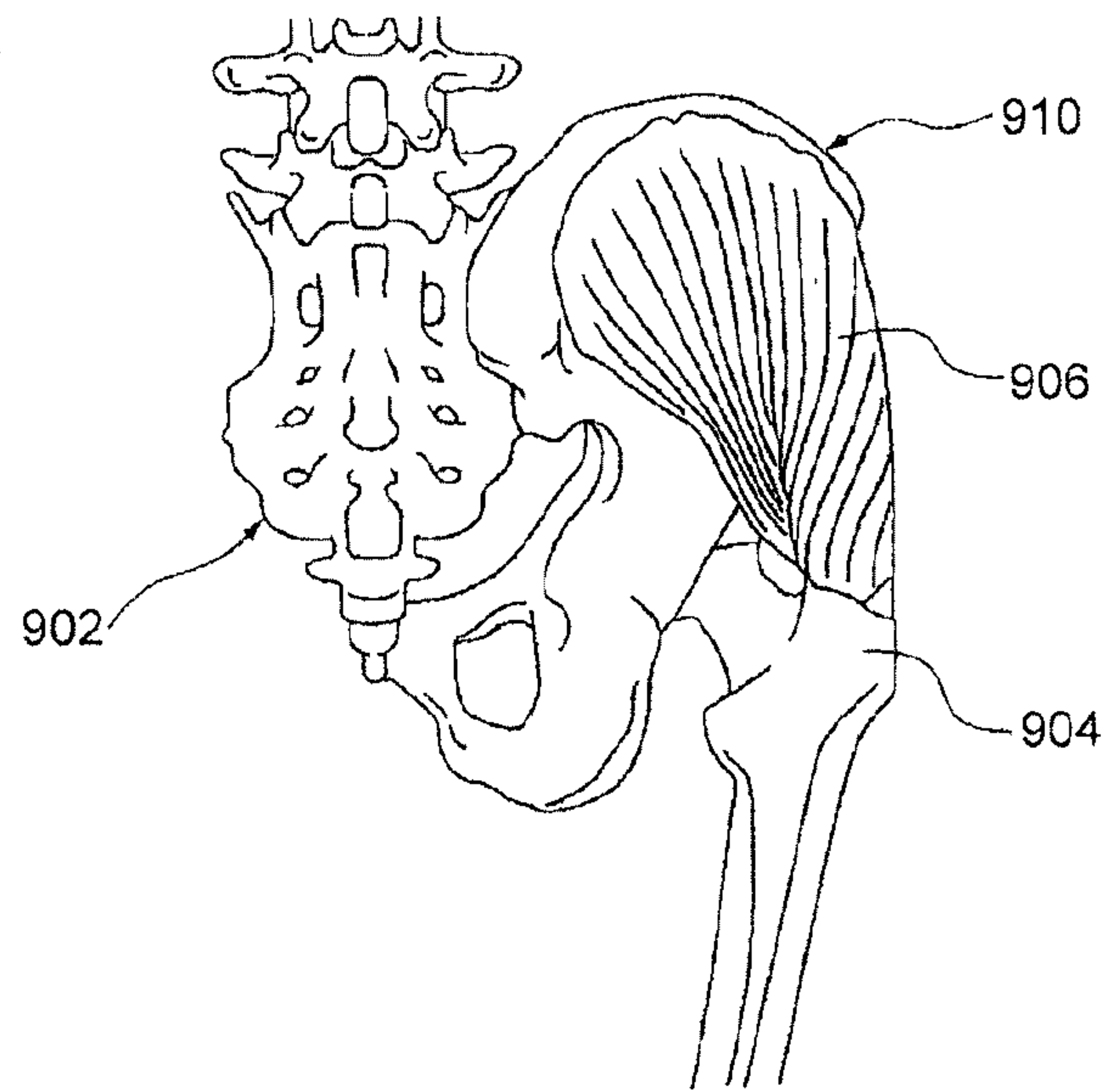
FP12-0212-00

8/18

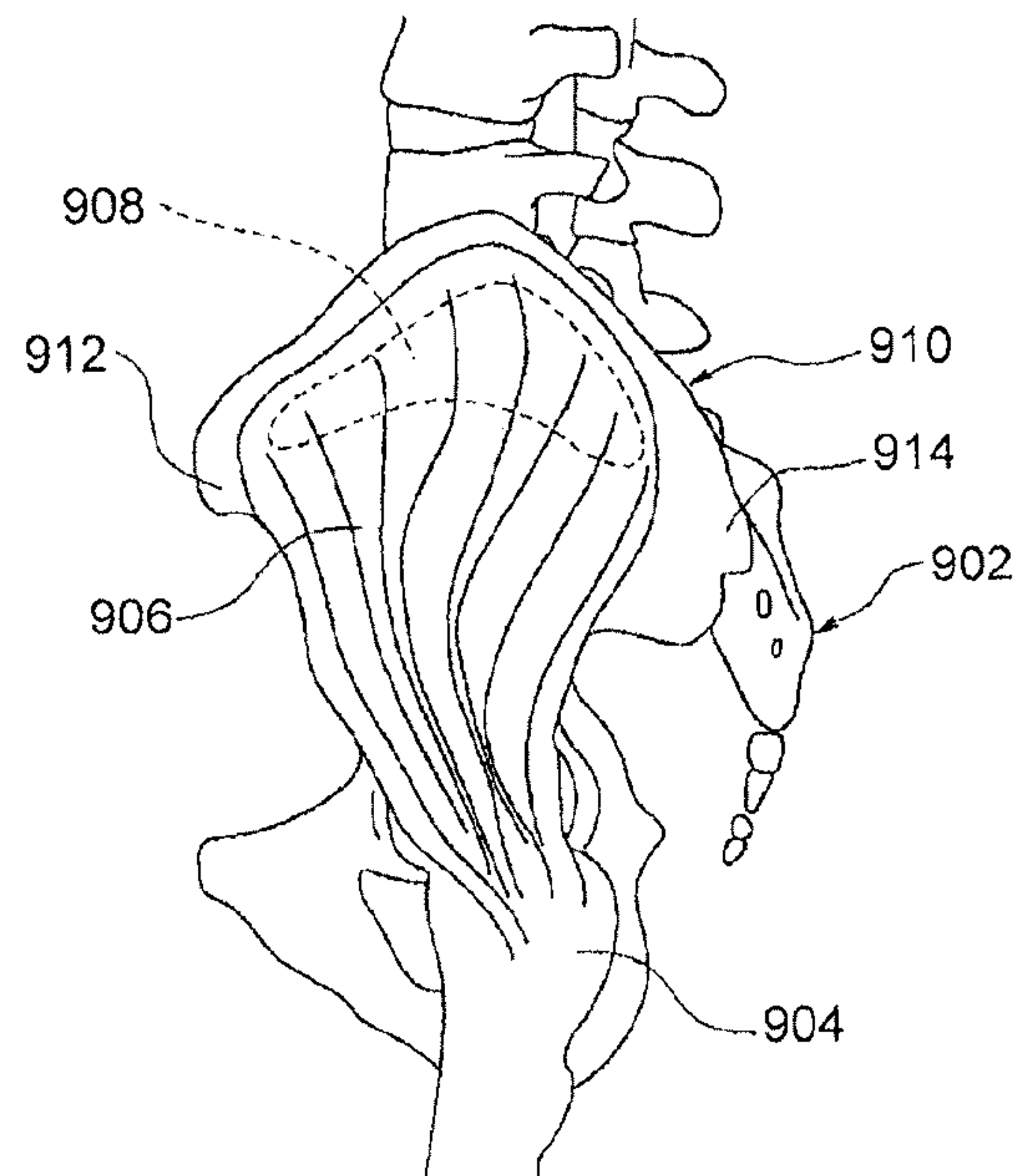
**Fig.8**

**Fig.9**

(a)



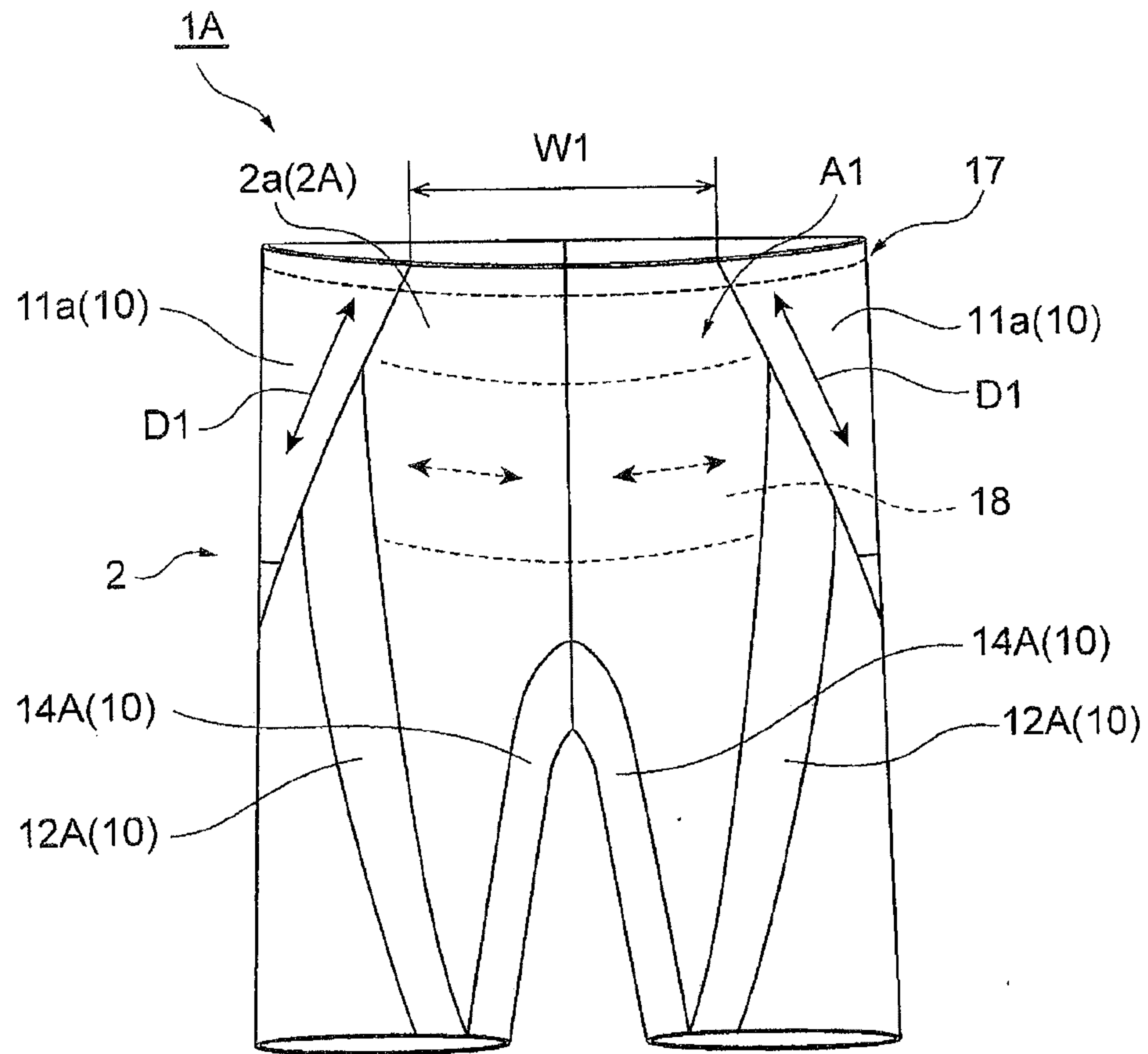
(b)





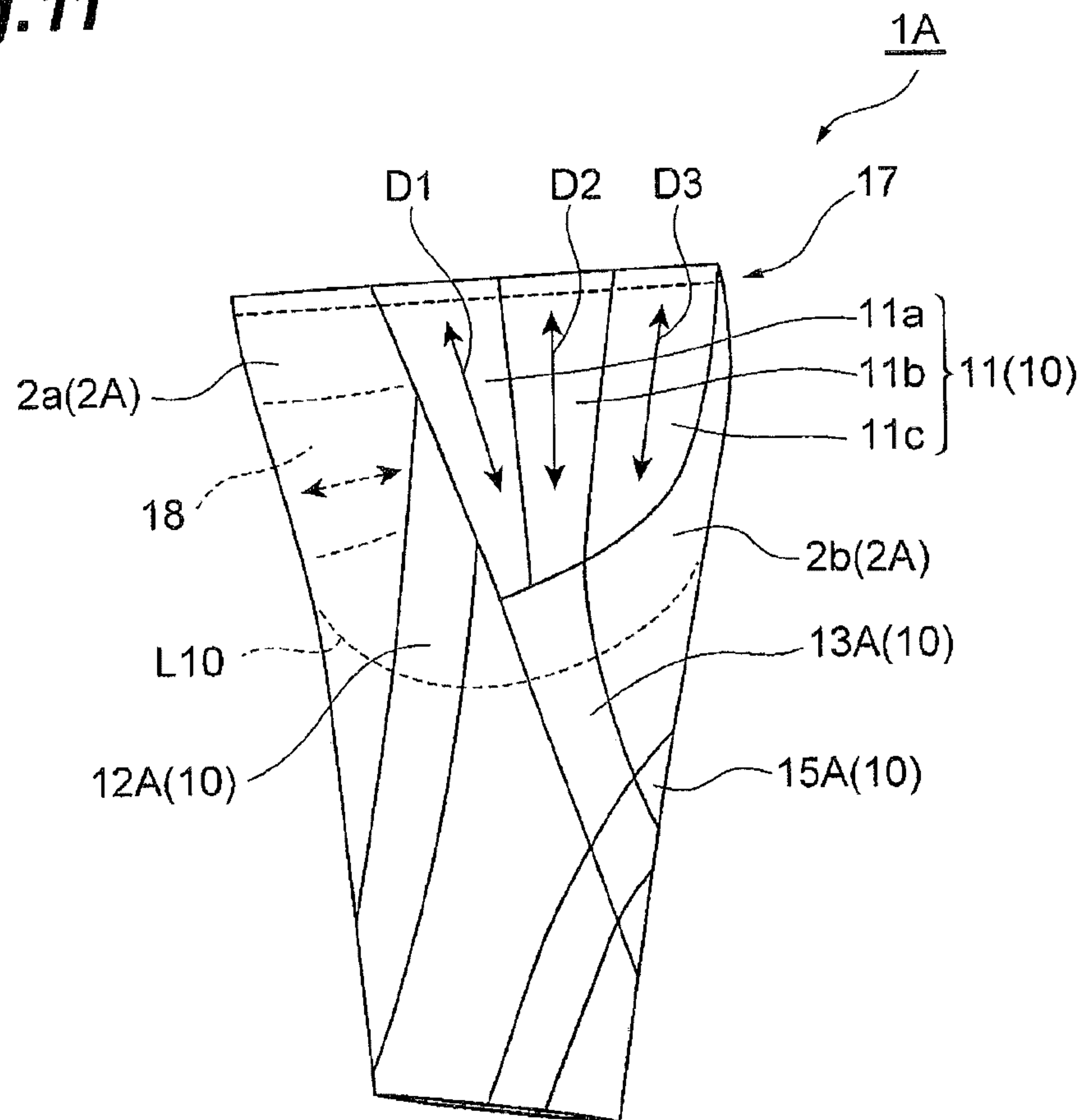
FP12-0212-00

10/18

**Fig.10**

FP12-0212-00

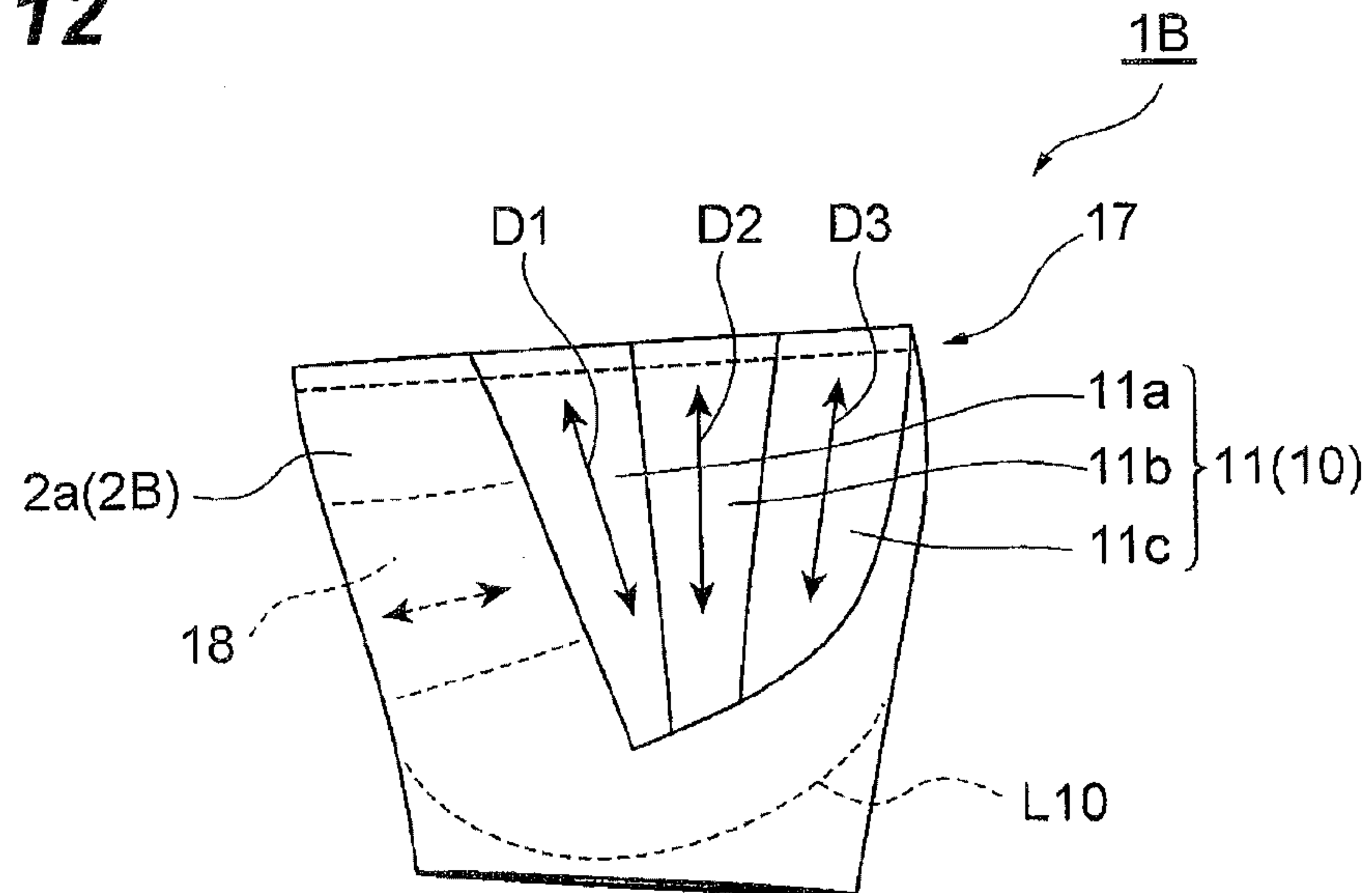
11/18

**Fig.11**

FP12-0212-00

12/18

**Fig.12**



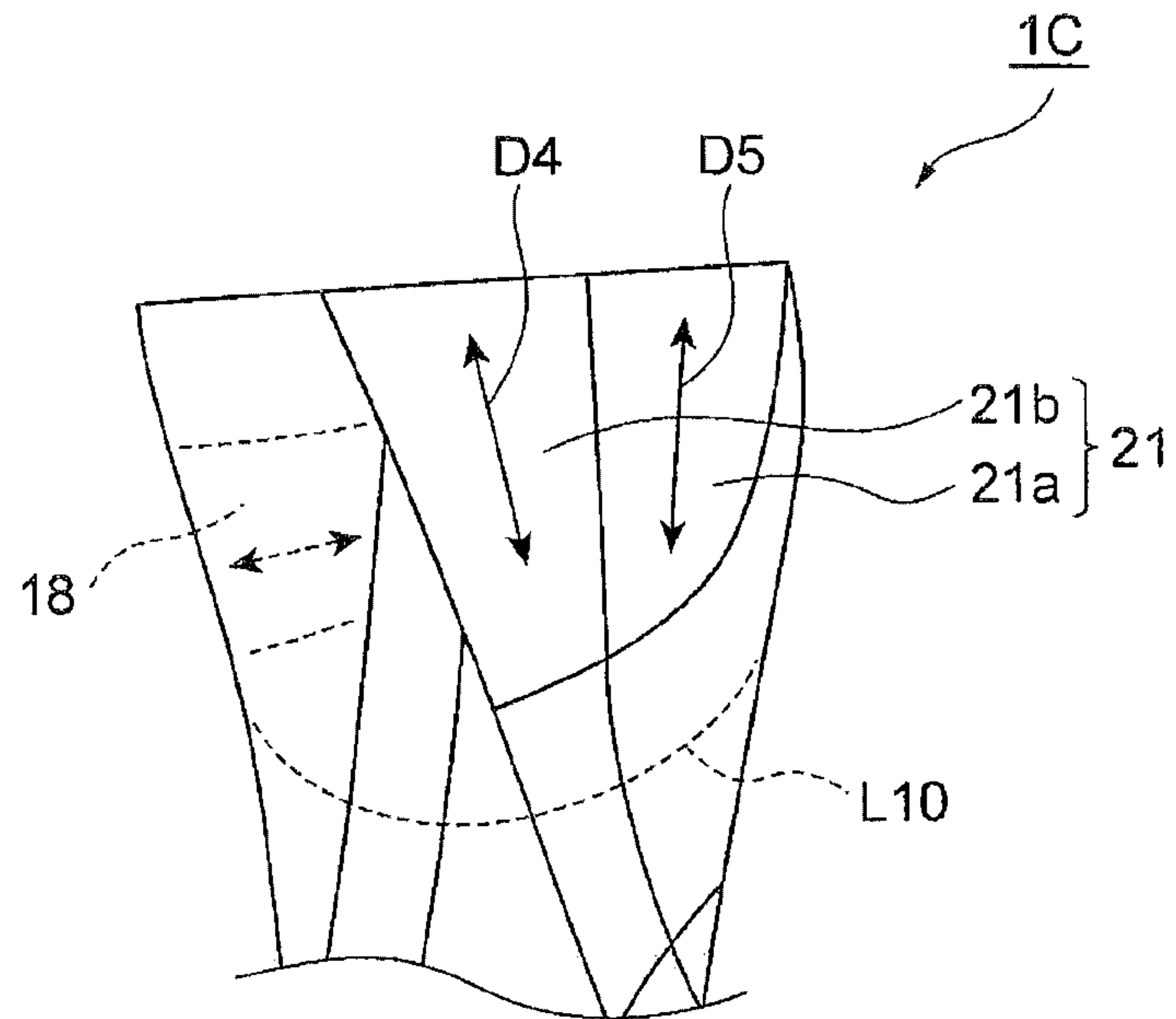


FP12-0212-00

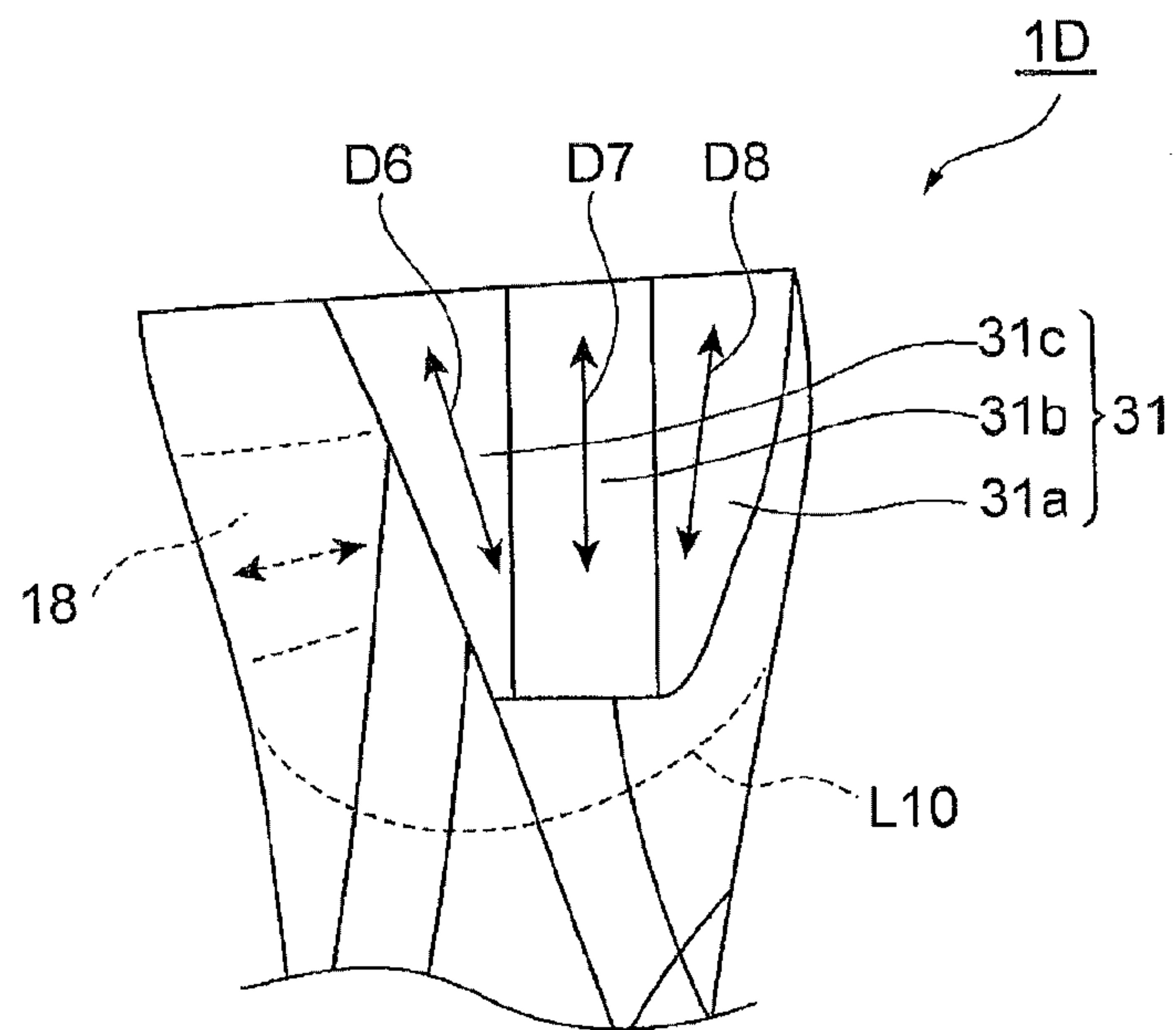
13/18

**Fig. 13**

(a)

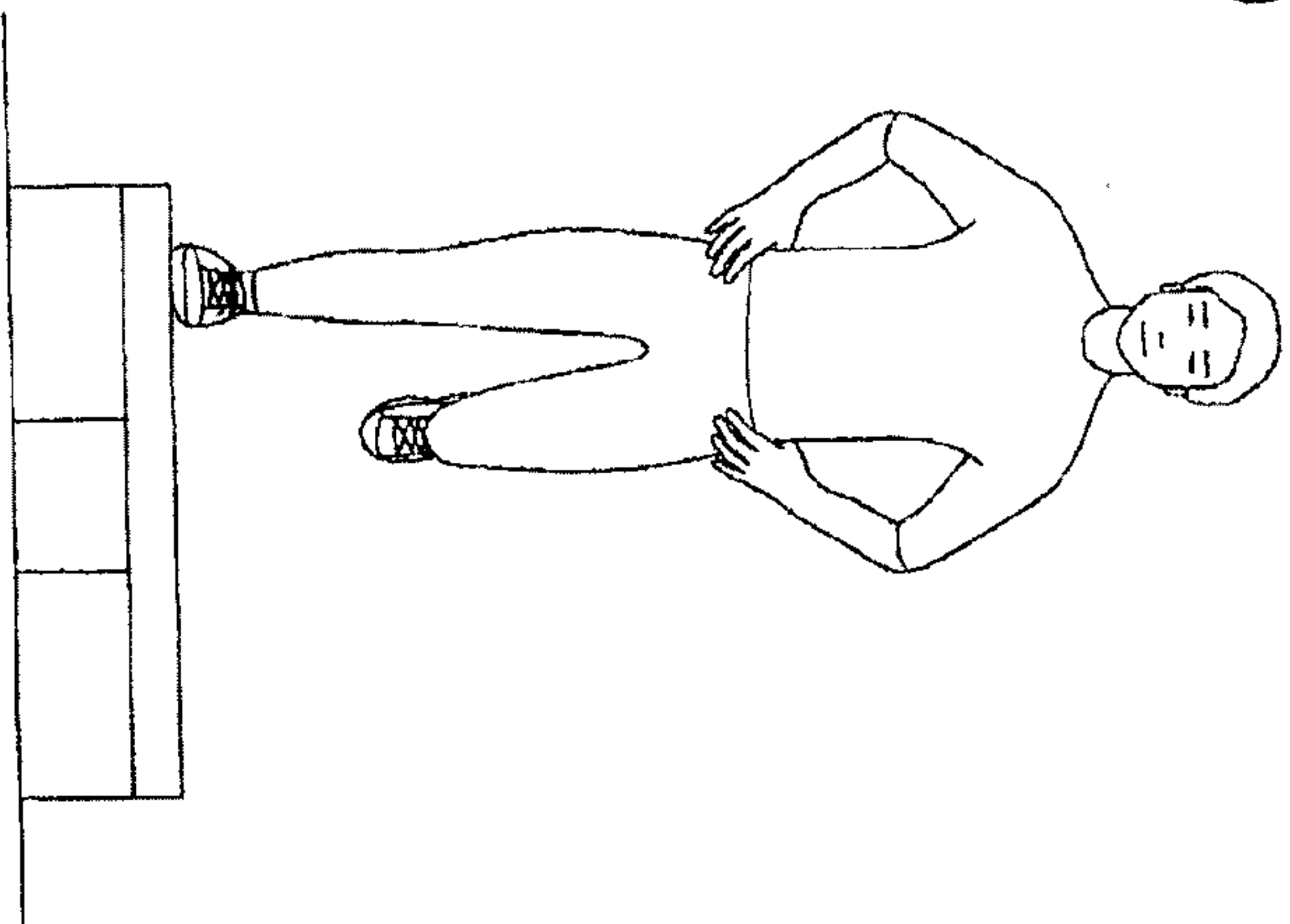


(b)

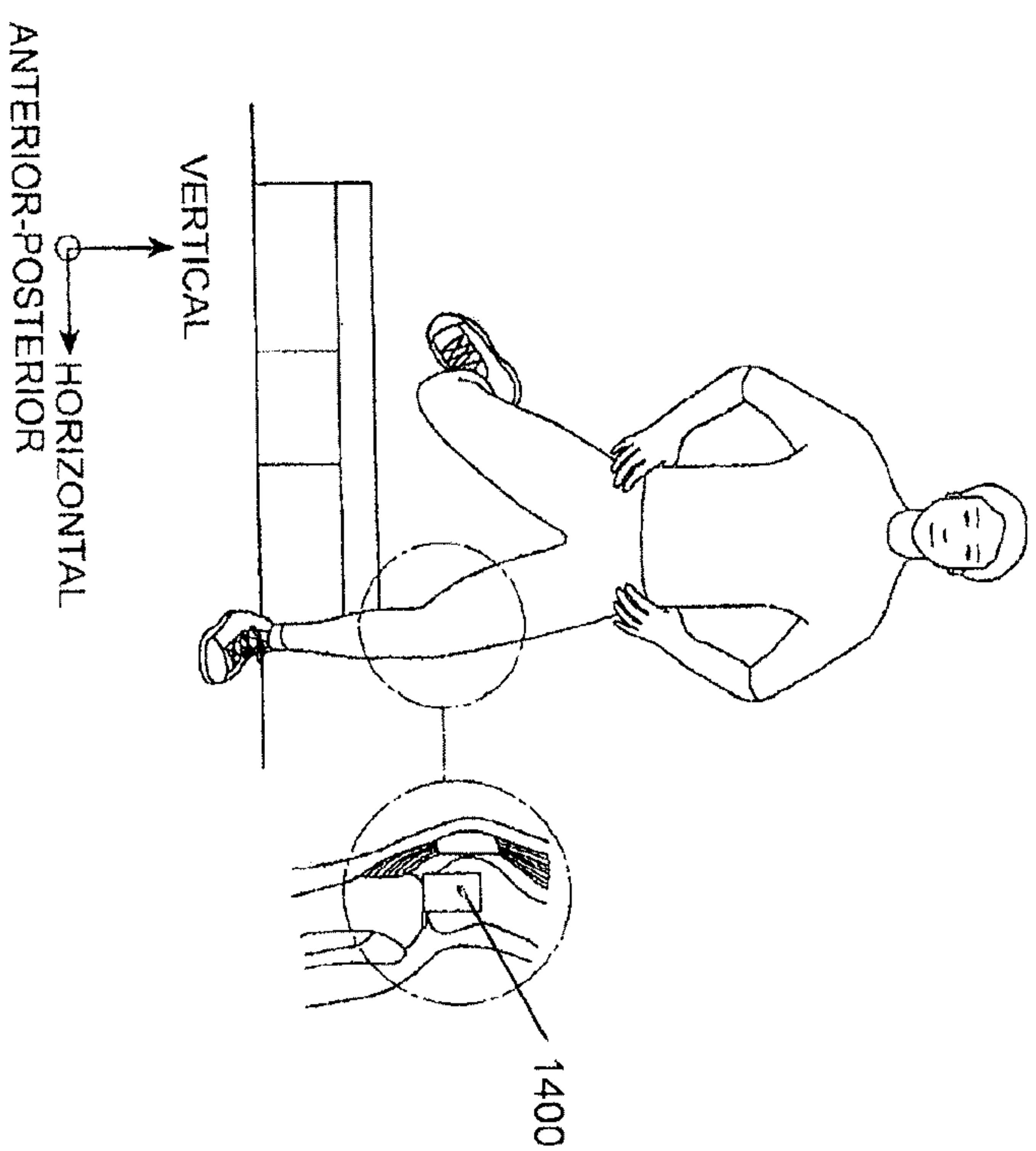


**Fig. 14**

(a)



(b)

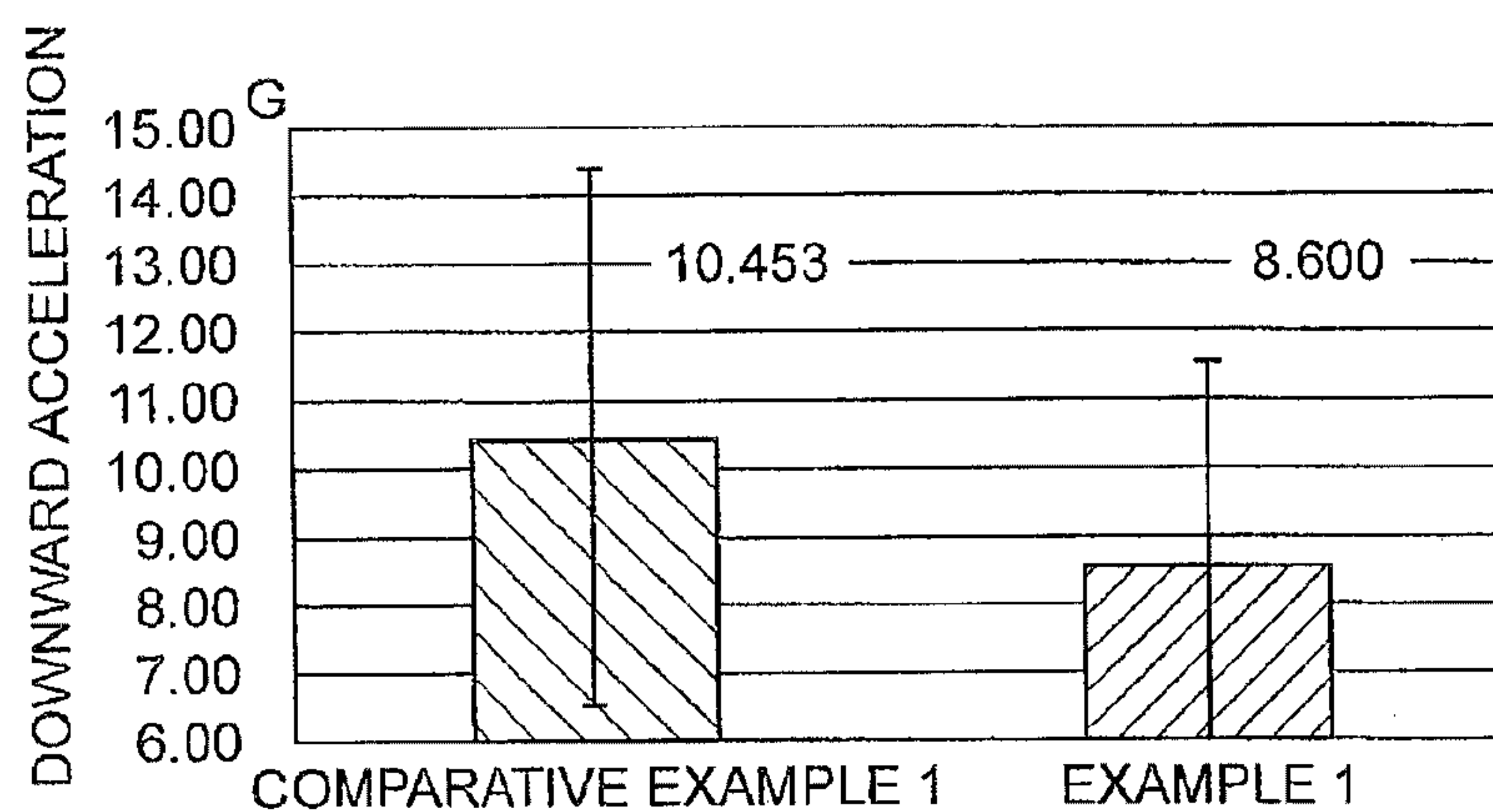


14/18

FP12-0212-00

15/18

**Fig.15**

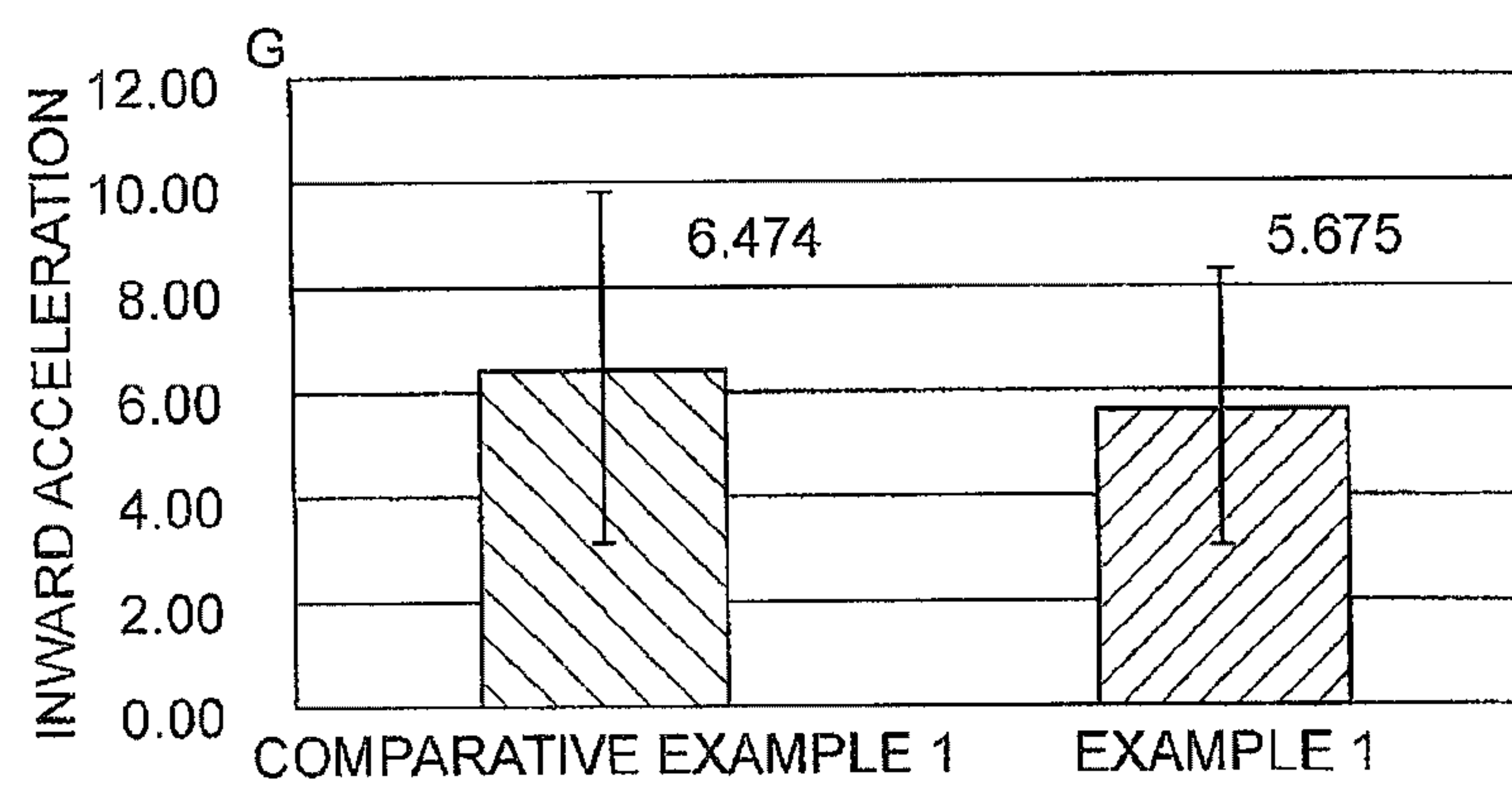




FP12-0212-00

16/18

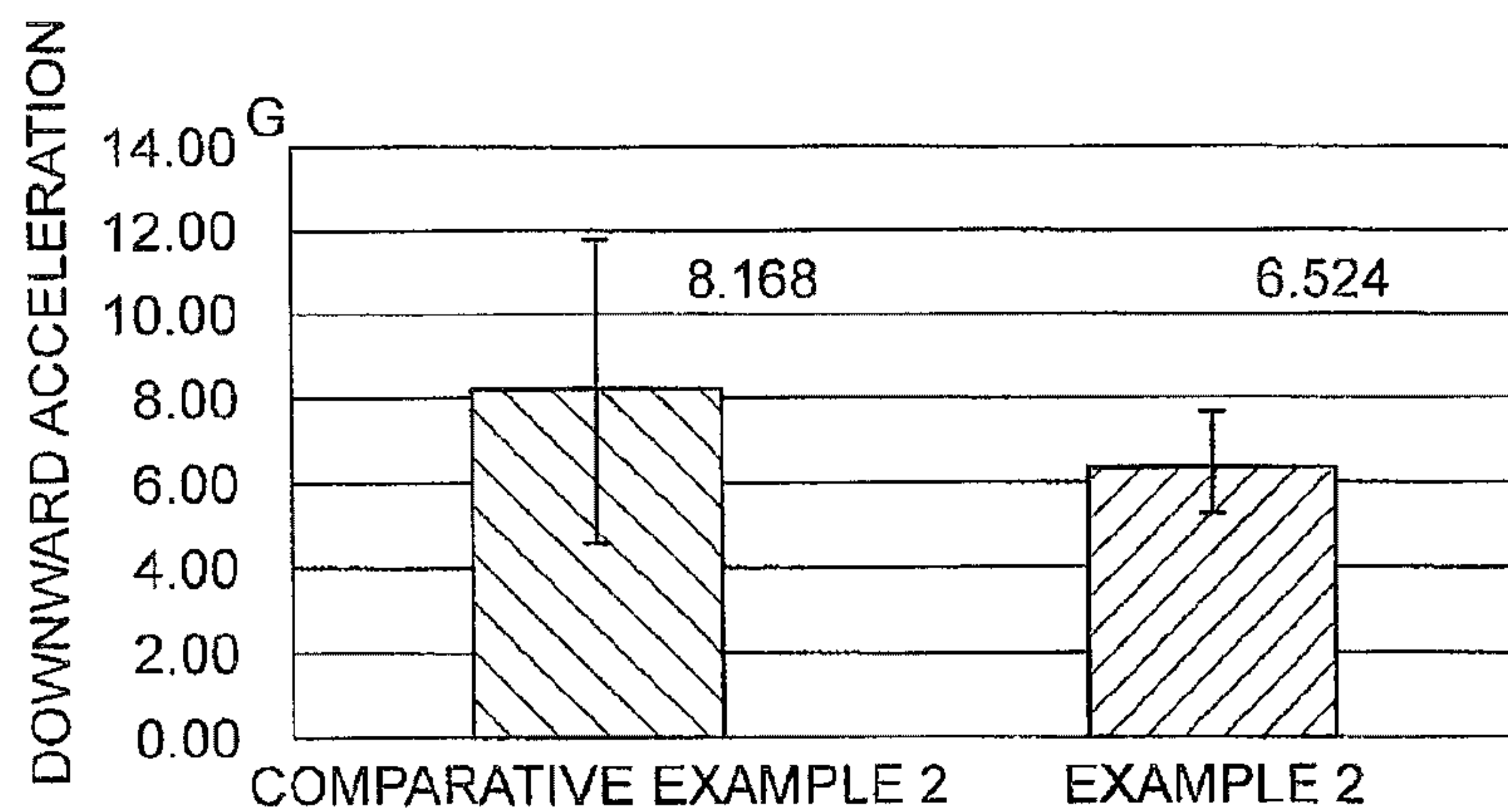
**Fig.16**



FP12-0212-00

17/18

**Fig. 17**



FP12-0212-00

18/18

**Fig. 18**