



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
09.01.2013 Bulletin 2013/02

(51) Int Cl.:
A41D 13/00 (2006.01) **A41B 11/00** (2006.01)
A41B 11/14 (2006.01)

(21) Application number: **11750434.0**

(86) International application number:
PCT/JP2011/051872

(22) Date of filing: **31.01.2011**

(87) International publication number:
WO 2011/108321 (09.09.2011 Gazette 2011/36)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

- **NOMURA, Hiroki**
Miyazu-shi
Kyoto 626-0043 (JP)
- **NAKAHARA, Kohei**
Ayabe-shi
Kyoto 623-8512 (JP)
- **WATANABE, Masayuki**
Miyazu-shi
Kyoto 626-0043 (JP)

(30) Priority: **01.03.2010 JP 2010044667**

(71) Applicant: **Gunze Limited**
Ayabe-shi, Kyoto 623-8511 (JP)

(74) Representative: **Merrifield, Sarah Elizabeth**
Boult Wade Tennant
Verulam Gardens
70 Gray's Inn Road
GB-London WC1X 8BT (GB)

(72) Inventors:
• **KAWASAKI, Yoko**
Miyazu-shi
Kyoto 626-0043 (JP)

(54) **LEGWEAR**

(57) Disclosed is legwear that can decrease compression in a graduated way from the ankle upwards regardless of the wearer's shape. The legwear is comprised of a strong fabric with a 30% extension stress of 0.5-0.7N and a weak fabric with a 30% extension stress of 0.2-0.4N, in accordance with JIS L1018. On the lower leg, the strong fabric is continuously disposed from the ankle part to the knee part over the area covered by the small saphenous vein, and the ration of the circumference of the strong fabric to the weak fabric on the lower leg in a cross-sectional width-wise direction is between 9:1 and 5.5 wherein the proportion of the strong fabric in relation to the whole decreases from the ankle part towards the knee part; and on the thigh, the strong fabric is continuously disposed from the knee part to the groin, and the ratio of the circumference of the strong fabric to the weak fabric on the thigh in a cross-sectional width-wise direction is between 5:5 and 1:9 wherein the proportion of the strong fabric in relation to the whole decreases from the knee part towards the groin part.

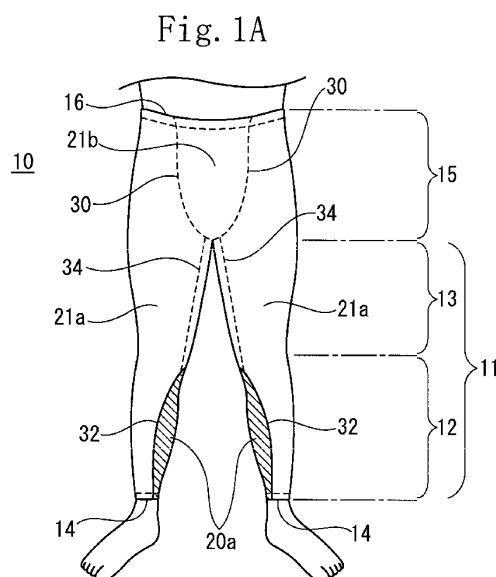
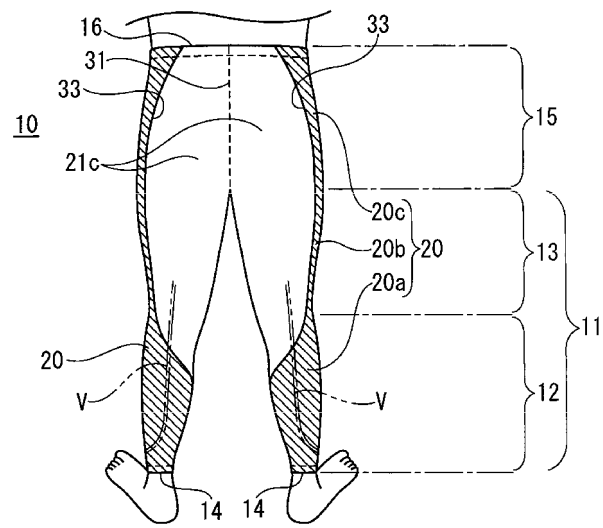


Fig. 1B



Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a legwear. More particularly the present invention is intended to provide a legwear capable of decreasing a pressure in stages upward from the ankles of wearer's legs irrespective of a wearer's body shape.

BACKGROUND ART

10 **[0002]** As a legwear for improving the blood circulation through the legs, the stockings for long-distance runners are disclosed in Japanese Utility Model Application Laid-Open No. 5-22504 (Japanese patent document 1). The stockings are so designed that the pressing force (pressure to be applied to legs by stockings) is increasingly applied toward the lower parts of the legs. As shown in Fig. 7, the stockings 1 are composed of the gluteal part 2 covering the lumbar part and the leg part 3 covering the femoral part and the lower leg part. The stockings 1 are produced by round braid by integrating the gluteal part 2 and the leg part 3 with each other. With reference to Fig. 8, the pressures applied to the point b disposed at the Achilles tendon, the point c thickest in the lower leg part, the point b1 disposed between the point c and the point b, the point d disposed at the top of cleft bone parted a little downward from the knee toward the foot, the point f parted above the knee by 15cm, and the point g parted below the groin by 10cm are set between the curve A and the curve B shown in Fig. 8.

20 **[0003]** According to the disclosure, the stockings 1 is so constructed that the highest pressure is applied to the neighborhood of the ankle and pressures are decreasingly applied upward from the legs. Thereby the blood sluggish in the veins of the legs is circulated to the heart to supply fresh blood to the muscle. In some wearers (for example, athletes), the muscle of the lower leg part is developed more than other parts of the legs, whereas in other wearers, the muscle of the femoral part is developed more than other parts of the legs. That is, in these wearers, the balance between the thickness of the lower leg part and that of the femoral part is different from the standard balance therebetween. But in the stockings 1 produced by integrating the gluteal part 2 and the leg part 3 with each other, in the case where the balance between the thickness of the lower leg part and that of the femoral part is different from the standard balance therebetween, there is a case in which pressures cannot be decreasingly applied in stages upward from the ankle.

PRIOR ART DOCUMENT

PATENT DOCUMENT

35 **[0004]** Patent Document 1: Japanese Utility Model application Laid-Open No. 5-22504

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

40 **[0005]** The present invention has been made in view of the above-described problems. Therefore it is an object of the present invention to provide a legwear capable of decreasingly applying pressures to a wearer's body in stages upward from the ankle irrespective of a difference in the balance between the thickness of a lower leg part and that of a femoral part.

MEANS FOR SOLVING THE PROBLEMS

45 **[0006]** To solve the above-described problems, the present invention provides a legwear having a lower leg part covering a range from an ankle to a knee and a femoral part covering a range from the knee to a groin. The legwear is composed of a strong power knitted fabric in which a 30% extensional stress measured by a cut strip method in accordance with JIS L 1018 is 0.5 to 0.7N and a weak power knitted fabric in which the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is 0.2 to 0.4N. In the lower leg part, the strong power knitted fabric is continuously disposed in an area covering at least a small saphenous vein located within a range from an ankle part to a knee part.

50 In a cross-sectional surface of the lower leg part in a width direction thereof, a ratio between a circumferential length of the strong power knitted fabric of the lower leg part and a circumferential length of the weak power knitted fabric, namely, the ratio of [(circumferential length of the strong power knitted fabric):(circumferential length of the weak power knitted fabric)] is set to 9:1 to 5:5 in a state in which the legwear is not worn; and a ratio of the circumferential length of the strong power knitted fabric to a total of the circumferential length of the strong power knitted fabric and the circumferential

length of the weak power knitted fabric at the knee part is set smaller than the ratio at the ankle part.

In the femoral part, the strong power knitted fabric is continuously disposed in a range from the knee part to a groin part. In a cross-sectional surface of the femoral part in a width direction thereof, a ratio between a circumferential length of the strong power knitted fabric and a circumferential length of the weak power knitted fabric, namely, the ratio of [(circumferential length of the strong power knitted fabric):(circumferential length of the weak power knitted fabric)] is set to 5:5 to 1:9 in a state in which the legwear is not worn; and a ratio of the circumferential length of the strong power knitted fabric to a total of the circumferential length of the strong power knitted fabric and the circumferential length of the weak power knitted fabric is decreased from the knee part toward the groin part.

[0007] As described above, in the present invention, the legwear is formed by combining the strong power knitted fabric having 0.5 to 0.7N and preferably 0.55 to 0.65N in the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 with the weak power knitted fabric having 0.2 to 0.4N and preferably 0.25 to 0.35N in the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018. In the cross-sectional surface of the lower leg part in the width direction thereof, the ratio between the circumferential length of the strong power knitted fabric of the lower leg part and the circumferential length of the weak power knitted fabric is set to 9:1 to 5:5 and preferably 8:2 to 5:5 in the state in which the legwear is not worn. In the cross-sectional surface of the femoral part in the width direction thereof, the ratio between the circumferential length of the strong power knitted fabric of the femoral part and the circumferential length of the weak power knitted fabric is set to 5:5 to 1:9 and preferably 5:5 to 2:8 in the state in which the legwear is not worn to decrease the ratio of the circumferential length of the strong power knitted fabric to the total of the circumferential length of the strong power knitted fabric and the circumferential length of the weak power knitted fabric from the ankle part toward the knee part and from the knee part toward the groin part. In other words, the ratio of the circumferential length of the weak power knitted fabric to the total of the circumferential length of the strong power knitted fabric and the circumferential length of the weak power knitted fabric is increased from the ankle part toward the knee part and from the knee part toward the groin part.

[0008] Owing to the above-described construction, even though there is a difference in the balance between the thickness of the lower leg part and that of the femoral part, it is possible to securely decrease pressures in stages from the ankle to the groin and thus obtain a pressure application construction capable of applying pressures to the legs in stages and unlikely to be affected by the shape of a wearer's body. In the lower leg part, because the strong power knitted fabric part is disposed in the area which covers at least the small saphenous vein, it is possible to further increase the amount of the venous return and thus accelerate the decompart speed of fatigue substances accumulated by exercise and rapidly remove and decrease fatigue. Because the small saphenous vein is disposed in the part which starts from the lateral border in the neighborhood of the ankle at the rear side of the lower leg part to the part where the small saphenous vein is confluent with the vein disposed below and at the rear side of the knee, it is important to dispose the strong power knitted fabric at the rear side of the lower leg part in such a way as to cover the above-described part. Further by keeping the 30% extensional stress of the strong power knitted fabric and the ratio between the circumferential length of the weak power knitted fabric and that of the strong power knitted fabric part of the lower leg part as well as that of the strong power knitted fabric part of the femoral part within the above-described range, it is possible for the wearer to easily put on and off the tights.

[0009] It is preferable that in the cross-sectional surface of the lower leg part in the width direction thereof, the ratio of the strong power knitted fabric of the lower leg part to the total of the circumferential length of the strong power knitted fabric and the circumferential length of the weak power knitted fabric is almost constant in a range from the ankle part to an intermediate part of the lower leg part and is decreased from the intermediate part of the lower leg part toward the knee part.

[0010] In the present invention, as described above, the legwear is so constructed that the strong power knitted fabric of the lower leg part is disposed continuously from the ankle part at the rear side of the lower leg part where the small saphenous vein is located to the knee part and that the strong power knitted fabric of the femoral part is disposed continuously from the knee part to the groin part. But the strong power knitted fabric of the lower leg part and that of the femoral part are not necessarily continuous with each other, but the strong power knitted fabric of the femoral part may be disposed at any of the front side, rear side, outer lateral side, and inner lateral side of the femoral part.

[0011] It is preferable that the strong power knitted fabric of the femoral part is continuous with the strong power knitted fabric of the lower leg part in such a way that the strong power knitted fabric of the femoral part is extended to the outer lateral side of the femoral part. It is also preferable that the legwear has a gluteal part covering the range from the groin to the lumbar part and that in the gluteal part, the strong power knitted fabric of the gluteal part is disposed continuously with the strong power knitted fabric of the femoral part in such a way that the strong power knitted fabric of the gluteal part is extended to the upper end of the gluteal part.

[0012] As described above, because the strong power knitted fabric of the femoral part is continuous with the strong power knitted fabric of the lower leg part in such a way that the strong power knitted fabric of the femoral part is extended to the outer lateral side of the femoral part, the strong power knitted fabric of the femoral part continuous with the groin part is capable of stably retaining the muscle disposed at the rear side of the lower leg part by holding it up and improving

the design of the legwear. Further as described above, by disposing the strong power knitted fabric continuous with the strong power knitted fabric of the femoral part in the gluteal part covering the range from the groin to the lumbar part in such a way that the strong power knitted fabric is extended to the upper end of the gluteal part, it is possible to support the lumbar part and prevent the legwear from falling.

[0013] The kind of thread to be used for the knitted texture and knitting of the strong power knitted fabric and the weak power knitted fabric is not limited to a specific kind of thread so long as the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is obtained. It is preferable that the strong power knitted fabric is formed by raschel knitting by using elastic polyurethane thread and nylon thread, that the weak power knitted fabric is formed by flat knitting of composed of ground thread consisting of polyester thread and added thread consisting of elastic polyurethane thread, and that the strong power knitted fabric and the weak power knitted fabric are integrated with each other by sewing the strong power knitted fabric and the weak power knitted fabric to each other. Although the elastic polyurethane thread is not limited to a specific kind of elastic thread so long as elastic thread to be used contains elastic thread containing polyurethane, bare polyurethane thread and single covering thread composed of core thread consisting of the polyurethane thread and nylon thread wound one turn the outer circumference of the core thread are preferable. The bare polyurethane thread is especially preferable.

[0014] By joining the strong power knitted fabric and the weak power knitted fabric cut to a required configuration with each other, the power of the knitted fabrics is clearly changed from sewing parts. Thereby it is possible to effectively set the degrees of pressures to be applied to legs in stages irrespective of a difference in body shapes.

[0015] According to the present invention, even though the balance between the thickness of the lower leg part and that of the femoral part is different according to a wearer, in measurement of pressures applied to the following parts by using an air-pack type pressure measuring apparatus, it is possible to obtain a pressure of 20 to 35 hPa in the periphery of the ankle, a pressure of 15 to 25 hPa in a maximum-diameter part of the calf of the lower leg part, and a pressure of 5 to 15 hPa in the periphery of a maximum thigh circumference part disposed between the knee part of the femoral part and the groin part.

[0016] It is preferable that the legwear of the present invention is tights which are to be worn during exercise and do not have a foot part covering the range from the ankle to a toe. The legwear of the present invention is not limited to an athletic use, but may be worn daily. The legwear of the present invention may have the foot part covering the range from the ankle to the toe and may be produced as long stockings not having the gluteal part.

EFFECT OF THE INVENTION

[0017] As described above, in the present invention, the legwear is formed by combining the strong power knitted fabric in which the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is 0.5 to 0.7N and the weak power knitted fabric in which the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is 0.2 to 0.4N with each other. In the cross-sectional surface of the lower leg part in the width direction thereof, the ratio between the circumferential length of the strong power knitted fabric of the lower leg part and the circumferential length of the weak power knitted fabric is set to 9:1 to 5:5 in the state in which the legwear is not worn. In the cross-sectional surface of the femoral part in the width direction thereof, the ratio between the circumferential length of the strong power knitted fabric of the femoral part and the circumferential length of the weak power knitted fabric is set to 5:5 to 1:9 in the state in which the legwear is not worn to decrease the ratio of the circumferential length of the strong power knitted fabric to the total of the circumferential length of the strong power knitted fabric and the circumferential length of the weak power knitted fabric from the ankle part toward the knee part and from the knee part toward the groin part. Owing to the above-described construction, even though there is a difference in the balance between the thickness of the wearer's lower leg part and that of the femoral part, it is possible to securely decrease pressures in stages from the ankle to the groin and thus obtain a pressure application construction capable of applying pressures to various parts the legs in stages and is unlikely to be affected by the shape of a wearer's body. In the lower leg part, because the strong power knitted fabric part is disposed in the area which covers at least the small saphenous vein, it is possible to further increase the amount of the venous return and thus accelerate the decompart speed of fatigue substances accumulated by exercise and rapidly remove and decrease fatigue. Further by keeping the 30% extensional stress of the strong power knitted fabric and the ratio between the circumferential length of the weak power knitted fabric and that of the strong power knitted fabric part of the lower leg part as well as that of the strong power knitted fabric part of the femoral part within the above-described range, it is possible for the wearer to easily put on and off the tights.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 is a schematic perspective view showing a legwear of an embodiment of the present invention, in which (A) is a view seen from a front side, and (B) is a view seen from a rear side.

Fig. 2 is a schematic perspective view in which a legwear of the embodiment is seen from a lateral side.

Fig. 3 is a development view in which each knitted fabric of the legwear is exploded.

Fig. 4 shows measuring points to which pressures are applied in an example of the present invention.

Fig. 5 shows a distribution of pressures applied to measuring points in the example of the present invention.

Fig. 6 shows a distribution of pressures applied to measuring points in a comparison example.

Fig. 7 shows an example of prior arts.

Fig. 8 shows an example of prior arts.

MODE FOR CARRYING OUT THE INVENTION

[0019] Embodiments of the present invention are described below with reference to the drawings.

Figs. 1 through 3 show an embodiment of the present invention. The legwear of this embodiment is tights 10 a person wears when the person performs exercise such as baseball, athletic sports, and the like. As shown in Figs. 1 and 2, the tights 10 are constructed of a leg part 11 composed of a lower leg part 12 covering a range from an ankle to a knee and a femoral part 13 covering a range from the knee to a groin and a gluteal part 15 covering a range from the groin to a lumbar part. A lower end part 14 formed by a braid-over-braid knitting method is disposed at a lower end of the leg part 11. A put-on part 16 formed by the braid-over-braid knitting method is disposed at an upper end of the gluteal part 15. The tights 10 of this embodiment do not have a foot part covering a range from the ankle to toe. The tights 10 of this embodiment are for men, but can be for women and worn by women and men alike.

[0020] The tights 10 are composed of a strong power knitted fabric 20 in which a 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is 0.5 to 0.7N (0.65N in this embodiment) and a weak power knitted fabric 21 in which the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 is 0.2 to 0.4N (0.34N in this embodiment). More specifically, as shown in Fig. 3, the tights 10 are formed by sewing a pair of front body weak power knitted fabrics 21a formed by cutting the weak power knitted fabric 21 into a required configuration, a front central weak power knitted fabric 21b, a pair of rear body weak power knitted fabrics 21c, and a pair of the strong power knitted fabrics 20 having a required configuration together to integrate the knitted fabrics with one another.

The front body weak power knitted fabric 21a is the member to be disposed at a front side of the leg part 11 and the gluteal part 15. The front central weak power knitted fabric 21b is the member to be disposed between a pair of the front body weak power knitted fabrics 21 to cover the wearer's private parts. The rear body weak power knitted fabric 21c is the member to be disposed at a rear side of the leg part 11 and the gluteal part 15. The strong power knitted fabric 20 is the member to be disposed adjacently to the front body weak power knitted fabric 21a and the rear body weak power knitted fabric 21c.

[0021] By sewing along a sewing line 30, the front body weak power knitted fabric 21a and the front central weak power knitted fabric 21b are joined with each other. By sewing along a sewing line 31, a pair of the rear body weak power knitted fabrics 21c is joined with each other. By sewing along a sewing line 32, the front body weak power knitted fabric 21a and the strong power knitted fabric 20 are joined with each other. By sewing along a sewing line 33, the rear body weak power knitted fabric 21c and the strong power knitted fabric 20 are joined with each other. By sewing along a sewing line 34, the front body weak power knitted fabric 21a and the rear body weak power knitted fabric 21c are joined with each other. By sewing the knitted fabrics together, the tights 10 can be formed.

[0022] The strong power knitted fabric 20 of this embodiment is constructed of a strong power knitted fabric part 20a of the lower leg part, a strong power knitted fabric part 20b of the femoral part, and a strong power knitted fabric part 20c of the gluteal part. By continuously forming the strong power knitted fabric part 20a of the lower leg part, the strong power knitted fabric part 20b of the femoral part, and the strong power knitted fabric part 20c of the gluteal part, the strong power knitted fabric 20 is formed as one piece. The strong power knitted fabric part 20a of the lower leg part, the strong power knitted fabric part 20b of the femoral part, and the strong power knitted fabric part 20c of the gluteal part are not necessarily continuous, but may be disposed as separate strong power knitted fabrics.

[0023] In the lower leg part 12, the strong power knitted fabric part 20a of the lower leg part is continuously disposed over the whole length from the ankle part to the knee part to cover the entire rear side of the lower leg part including the small saphenous vein V with the strong power knitted fabric part 20a of the lower leg part.

In a cross-sectional surface of the lower leg part 12 in a width direction thereof, the ratio between a circumferential length S of the strong power knitted fabric part 20a of the lower leg part 12 and a circumferential length T of the weak power knitted fabric 21 (the front body weak power knitted fabric 21a and the rear body weak power knitted fabric 21c) adjacent to the strong power knitted fabric part 20a of the lower leg part 12 is set as follows: S:T = 8:2 at the ankle part, and S:T (=T1 + T2) = 5:5 at the knee part in a state in which the tights 10 are not worn to set the ratio of the circumferential length S of the strong power knitted fabric part 20a of the lower leg part 12 to the total circumferential length S + T at the knee

part lower than the above-described ratio at the ankle part. In this embodiment, the ratio of the circumferential length S of the strong power knitted fabric part 20a of the lower leg part 12 to the total circumferential length S + T in a part from the ankle part to a neighborhood of a maximum-diameter part of the calf is set almost equally to the above-described ratio at the ankle part and decreased from the neighborhood of the maximum-diameter part of the calf toward the knee part.

[0024] The strong power knitted fabric part 20b of the femoral part 13 continuous with the strong power knitted fabric part 20a of the lower leg part 12 is disposed continuously from the knee part to the groin part in such a way that the strong power knitted fabric part 20b of the femoral part 13 is extendedly disposed on an outer lateral side of the femoral part 13.

In a cross-sectional surface of the femoral part 13 in a width direction thereof, the ratio between the circumferential length S of the strong power knitted fabric part 20b of the femoral part 13 and the circumferential length T of the weak power knitted fabric 21 (the front body weak power knitted fabric 21a and the rear body weak power knitted fabric 21c) adjacent to the strong power knitted fabric part 20b is set as follows: $S:T (=T1 + T2) = 5:5$ at the knee part, and $S:T (=T1 + T2) = 2:8$ at the groin part in the state in which the tights 10 are not worn to decrease the ratio of the circumferential length S of the strong power knitted fabric part 20b of the femoral part 13 to the total circumferential length S + T from the knee part toward the groin part.

[0025] The strong power knitted fabric part 20c of the gluteal part 15 continuous with the strong power knitted fabric part 20b of the femoral part 13 is extended to the upper end of the gluteal part 15. To prevent a lumbar support and the tights 10 from falling, the width of the strong power knitted fabric part 20c of the gluteal part 15 is gradually increased toward its upper end.

[0026] The strong power knitted fabric 20 is formed by raschel knitting by using elastic polyurethane threads having a fineness of 310 decitex and 44 decitex and nylon thread having a fineness of 33 decitex.

The weak power knitted fabric 21 is formed by flat knitting of plated fabric composed of ground thread consisting of polyester thread having a fineness of 84 decitex and thread consisting of bare polyurethane added thread having a fineness of 33 decitex.

[0027] The above-described 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 means an extensional stress measured when a specimen having a dimension of 2.5cm x 20cm is stretched up to 30% at a tensile speed of 30 ± 2 cm/minute with the specimen being fixed to a gripping part (gripping interval: 10cm) of a tensile tester.

[0028] As described above, in this embodiment, the tights 10 are formed by combining the strong power knitted fabric 20 having 0.5 to 0.7N in the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018 with the weak power knitted fabric 21 having 0.2 to 0.4N in the 30% extensional stress measured by the cut strip method in accordance with JIS L 1018. In the cross-sectional surface of the lower leg part 12 in the width direction thereof, the ratio between the circumferential length S of the strong power knitted fabric part 20a of the lower leg part 12 and the circumferential length T of the weak power knitted fabric 21 adjacent to the strong power knitted fabric part 20a is set to 8:2 to 5:5 in the state in which the tights 10 are not worn. In the cross-sectional surface of the femoral part 13 in the width direction thereof, the ratio between the circumferential length S of the strong power knitted fabric part 20b of the femoral part 13 and the circumferential length T of the weak power knitted fabric 21 adjacent to the strong power knitted fabric part 20b is set to 5:5 to 2:8 in the state in which the tights 10 are not worn to decrease the ratio of the circumferential length S of the strong power knitted fabric part 20a of the lower leg part 12 to the total circumferential length S + T from the ankle part toward the knee part, and the ratio of the circumferential length S of the strong power knitted fabric part 20b of the femoral part 13 to the total circumferential length S + T from the knee part toward the groin part.

[0029] Owing to the above-described construction, even though there is a difference in the balance between the thickness of the lower leg part and that of the femoral part in dependence on a wearer, in measurement of pressures applied to the following parts carried out by using an air-pack type pressure measuring apparatus, it is possible to obtain the pressure of 20 to 35 hPa in the periphery of the ankle, the pressure of 15 to 25 hPa in the periphery of a maximum-diameter part of the calf of the lower leg part, and the pressure of 5 to 15 hPa in the periphery of the maximum thigh circumference part disposed between the knee part of the femoral part and the groin part. As apparent from the above description, it is possible to securely decrease pressures in stages upward from the ankle and thus obtain a pressure application construction capable of applying pressures to various parts of the legs in stages and unlikely to be affected by the shape of the wearer's body. In the lower leg part 12, because the strong power knitted fabric part 20a is disposed in the area which covers at least the small saphenous vein V, it is possible to further increase the amount of the venous return and thus accelerate the decompartment speed of fatigue substances accumulated by exercise and rapidly remove and decrease fatigue. Further by keeping the 30% extensional stress of the strong power knitted fabric 20 and the ratio between the circumferential length of the weak power knitted fabric 21 and that of the strong power knitted fabric part 20a of the lower leg part 12 as well as that of the strong power knitted fabric part 20b of the femoral part 13 in the above-described range, it is possible for the wearer to easily put on and off the tights 10.

EXAMPLES AND COMPARISON EXAMPLES

[0030] As an example of the present invention, three subjects A, B, and C were requested to wear the tights 10 produced in the above-described embodiment to measure pressures applied to four measuring points 40 to 43 shown in Fig. 4 by using the air-pack type pressure measuring apparatus. The measuring point 40 is the ankle. The measuring point 41 is the lower leg part (maximum-diameter part of the calf). The measuring point 42 is the femoral part (maximum thigh circumference part disposed between the knee part and the groin). The measuring point 43 is the gluteal part (part bulgiest in the gluteal part). Table 1 shows the maximum circumference of the femoral and lower leg parts of the subjects A, B, and C. The subject B had a body shape standard (maximum circumference of the lower leg part/maximum circumference of the femoral part = 0.69) in the balance between the thickness of the lower leg part and that of the femoral part. The subject A had a body shape in which the thickness of the lower leg part is thick (maximum circumference of the lower leg part/maximum circumference of the femoral part = 0.73) in relation to the thickness of the femoral part. The subject C had a body shape in which the thickness of the lower leg part is thin (maximum circumference of the lower leg part/maximum circumference of the femoral part = 0.67) in relation to the thickness of the femoral part. Table 1 also shows the pressures applied to the measuring points 40 through 43 of the subjects A, B, and C. Fig. 5 in which the measuring points are located on the axis of abscissa and the pressures applied thereto are located on the axis of ordinate shows the distribution of the pressures applied to the measuring points 40 through 43.

[0031] As a comparison example, the subjects A, B, and C were requested to wear tights integrally formed with tricot knitted texture by using elastic polyurethane thread having a fineness of 130 decitex and nylon thread having a fineness of 44 decitex to measure pressures applied to the measuring points 40 through 43 located at the same parts as those set in the example 1. The tights of the comparison example were so constructed that the circumferential length of the tights was gradually increased from the ankle part to the groin part to decrease pressures to be applied to the wearer's body upward from the ankle part in stages. Table 2 shows the pressures applied to the measuring points 40 through 43 of the subjects A, B, and C in the comparison example. Fig. 6 in which the measuring points are located on the axis of abscissa and the pressures applied thereto are located on the axis of ordinate shows the distribution of the pressures applied to the measuring points 40 through 43.

Table 1

[0032]

	Maximum circumference of femoral part (cm)	Maximum circumference of lower leg part (cm)	Applied pressure (hPa)			
			Ankle (measuring point 40)	Lower leg part (measuring point 41)	Femoral part (measuring point 42)	Gluteal part (measuring point 43)
Subject A	50.5	37.0	22.0	17.6	9.1	5.4
Subject B	53.4	36.7	25.0	17.9	10.2	6.0
Subject C	56.0	37.5	26.6	19.0	10.8	6.9

Table 2

[0033]

	Applied pressure (hPa)			
	Ankle (measuring point 40))	Lower leg part (measuring point 41)	Femoral part (measuring point 42)	Gluteal part (measuring point 43)
Subject A	2.2	11.5	7.3	6.0
Subject B	0	11.7	14.5	6.7
Subject C	5.8	14.8	18.5	7.7

[0034] As apparent from table 1, it is possible to obtain the pressure application construction capable of decreasing pressures in stages from the ankle to the gluteal part and unlikely to be affected by a difference in the balance between the thickness of the lower leg part and that of the femoral part.

On the other hand, in the tights of the comparison example intended to provide an ordinary dispart of pressure application

to the legs in stages, in the case of the subject A, the pressure applied to the measuring point 42 (femoral part) was lower than the pressure applied to the measuring point 41 (lower leg part). But in the case of the other subjects, the pressures were not decreasingly applied to the measuring points of the legs in stages from the ankle to the groin.

5 EXPLANATION OF REFERENCE NUMERALS AND SYMBOLS

[0035]

10:	tights
11:	leg part
12:	lower leg part
13:	femoral part
14:	lower end part
15:	gluteal part
16:	put-on part
20:	strong power knitted fabric
20a:	strong power knitted fabric of lower leg part
20b:	strong power knitted fabric of femoral part
20c:	strong power knitted fabric part of the gluteal part
21:	weak power knitted fabric
21a:	front body weak power knitted fabric
21b:	front central weak power knitted fabric
21c:	rear body weak power knitted fabric
30 through 34:	sewing line
40 through 43:	measuring points

Claims

1. A legwear comprising a lower leg part covering a range from an ankle to a knee and a femoral part covering a range from said knee to a groin;
said legwear being composed of a strong power knitted fabric in which a 30% extensional stress measured by a cut strip method in accordance with JIS L 1018 is 0.5 to 0.7N and a weak power knitted fabric in which said 30% extensional stress measured by said cut strip method in accordance with JIS L 1018 is 0.2 to 0.4N;
wherein in said lower leg part, said strong power knitted fabric is continuously disposed in an area covering at least a small saphenous vein located within a range from an ankle part to a knee part;
in a cross-sectional surface of said lower leg part in a width direction thereof, a ratio between a circumferential length of said strong power knitted fabric of said lower leg part and a circumferential length of said weak power knitted fabric, namely, said ratio of [(circumferential length of said strong power knitted fabric):(circumferential length of said weak power knitted fabric)] is set to 9:1 to 5:5 in a state in which said legwear is not worn; and a ratio of said circumferential length of said strong power knitted fabric to a total of said circumferential length of said strong power knitted fabric and said circumferential length of said weak power knitted fabric at said knee part is set smaller than said ratio at said ankle part; and
in said femoral part, said strong power knitted fabric is continuously disposed in a range from said knee part to a groin part;
in a cross-sectional surface of said femoral part in a width direction thereof, a ratio between a circumferential length of said strong power knitted fabric and a circumferential length of said weak power knitted fabric, namely, said ratio of [(circumferential length of said strong power knitted fabric):(circumferential length of said weak power knitted fabric)] is set to 5:5 to 1:9 in a state in which said legwear is not worn; and a ratio of said circumferential length of said strong power knitted fabric to a total of said circumferential length of said strong power knitted fabric and said circumferential length of said weak power knitted fabric is decreased from said knee part toward said groin part.
2. A legwear according to claim 1, wherein in said cross-sectional surface of said lower leg part in said width direction thereof, said ratio of said strong power knitted fabric of said lower leg part to said total of said circumferential length of said strong power knitted fabric and said circumferential length of said weak power knitted fabric is almost constant in a range from said ankle part to an intermediate part of said lower leg part and is decreased from said intermediate part of said lower leg part toward said knee part.

3. A legwear according to claim 1, wherein said strong power knitted fabric is formed by raschel knitting by using elastic polyurethane thread and nylon thread; said weak power knitted fabric is formed by flat knitting composed of ground thread consisting of polyester thread and added thread consisting of elastic polyurethane thread; and said strong power knitted fabric and said weak power knitted fabric are integrated with each other by sewing said strong power knitted fabric and said weak power knitted fabric to each other.
4. A legwear according to any one of claims 1 through 3, wherein said strong power knitted fabric of said femoral part is continuous with said strong power knitted fabric of said lower leg part in such a way that said strong power knitted fabric of said femoral part is extended to an outer lateral surface of said femoral part; a gluteal part covering a range from said groin to a lumbar part is provided; and in said gluteal part, said strong power knitted fabric is disposed continuously with said strong power knitted fabric of said femoral part in such a way that said strong power knitted fabric is extended to an upper end of said gluteal part.
5. A legwear according to any one of claims 1 through 4, which is tights to be worn during exercise and do not have a foot part covering a range from an ankle to a toe.

Fig. 1A

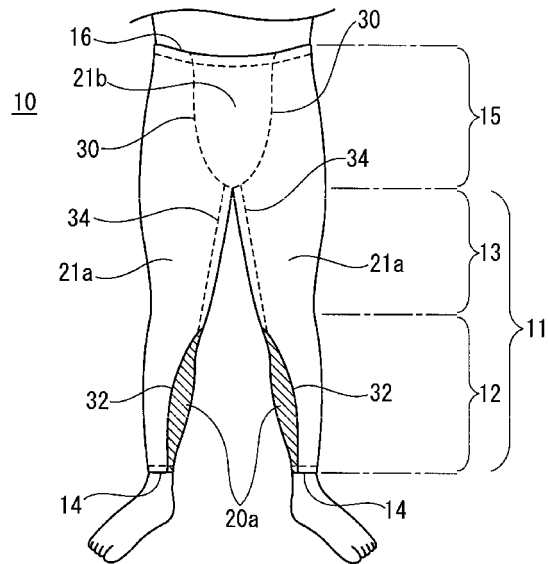


Fig. 1B

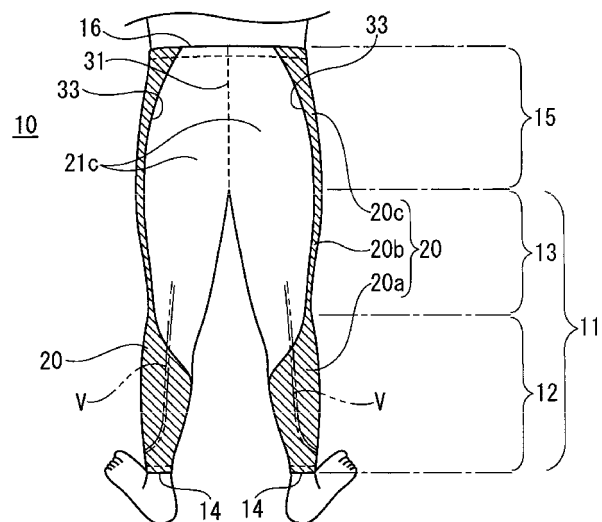


Fig. 2A

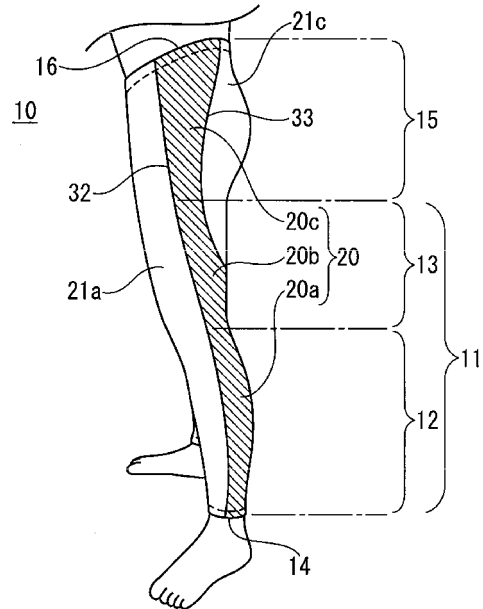
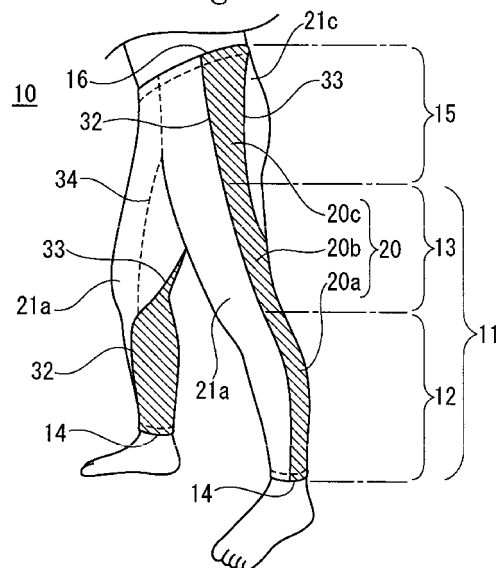


Fig. 2B



Fi.
b.
3

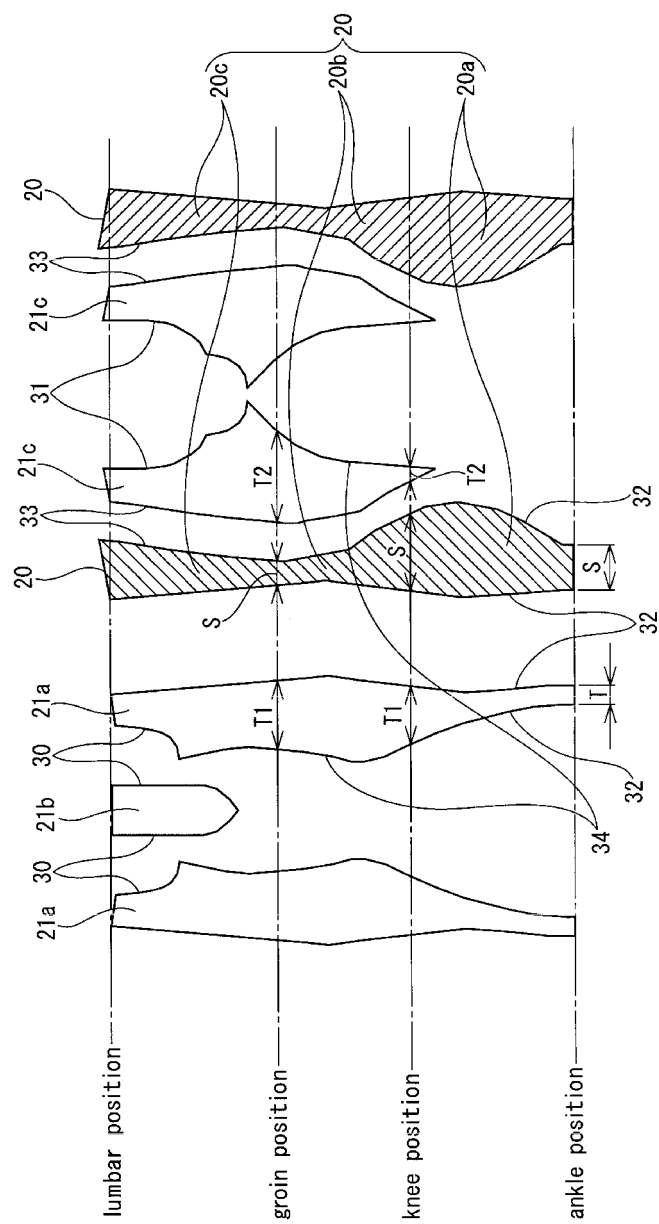


Fig. 4

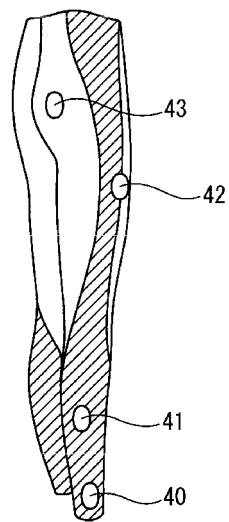


Fig. 5

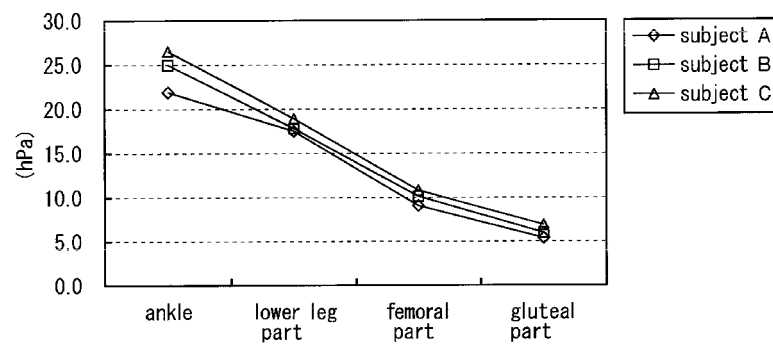


Fig. 6

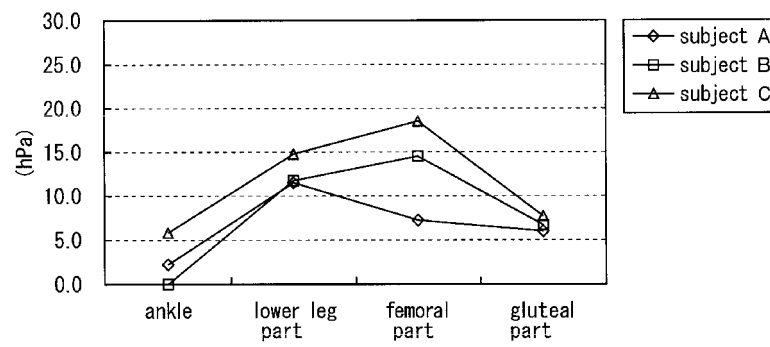
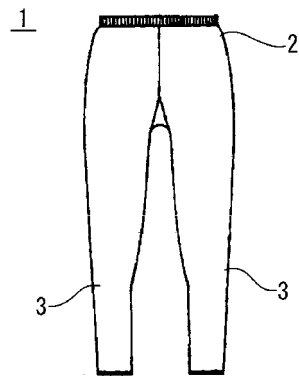
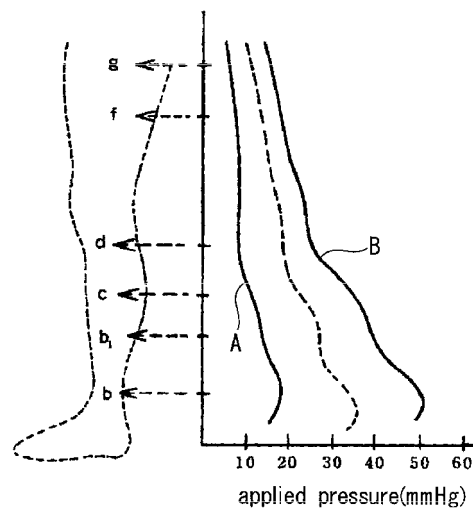


Fig. 7



[Prior Art]

Fig. 8



[Prior Art]

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/051872

A. CLASSIFICATION OF SUBJECT MATTER A41D13/00(2006.01)i, A41B11/00(2006.01)i, A41B11/14(2006.01)i														
According to International Patent Classification (IPC) or to both national classification and IPC														
B. FIELDS SEARCHED														
Minimum documentation searched (classification system followed by classification symbols) A41D13/00, A41B11/00, A41B11/14														
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2011 Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011														
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)														
C. DOCUMENTS CONSIDERED TO BE RELEVANT														
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.												
X Y	JP 2008-50705 A (Alcare Co., Ltd.), 06 March 2008 (06.03.2008), claims 1 to 3, 5; paragraphs [0001] to [0002], [0005] to [0032]; fig. 1 to 4 (Family: none)	1-3 4-5												
Y	JP 11-350205 A (CSP International Industria Calze S.p.A.), 21 December 1999 (21.12.1999), claims; paragraphs [0003], [0007] to [0016]; fig. 1 to 3 & EP 964091 A2 & KR 10-2000-0005572 A & CN 1238927 A	4-5												
☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.														
<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family	"O" document referring to an oral disclosure, use, exhibition or other means		"P" document published prior to the international filing date but later than the priority date claimed	
* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention													
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone													
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art													
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family													
"O" document referring to an oral disclosure, use, exhibition or other means														
"P" document published prior to the international filing date but later than the priority date claimed														
Date of the actual completion of the international search 18 April, 2011 (18.04.11)		Date of mailing of the international search report 26 April, 2011 (26.04.11)												
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer												
Facsimile No.		Telephone No.												

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/051872

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 4-57904 A (Wacoal Corp.), 25 February 1992 (25.02.1992), page 2, lower right column to page 4, lower right column; fig. 2 (Family: none)	4-5
A	JP 9-241906 A (Onyone Co., Ltd.), 16 September 1997 (16.09.1997), paragraph [0023]; fig. 4 (Family: none)	1-5
A	JP 3076289 U (Yugen Kaisha Yuki), 30 March 2001 (30.03.2001), claim 1; paragraphs [0010], [0015] to [0017]; fig. 1 (Family: none)	1-5
A	JP 3069736 U (Kabushiki Kaisha Revuaru), 30 June 2000 (30.06.2000), claims; fig. 7 to 9 (Family: none)	1-5
A	JP 2000-328305 A (Kabushiki Kaisha Toyama Gorudouin), 28 November 2000 (28.11.2000), claims; paragraphs [0031], [0034]; fig. 1 to 3 (Family: none)	1-5

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 5022504 A [0002] [0004]