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(54) **TROUSERS, WORK TROUSERS AND OVERALLS**

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CPC ***A41D 1/06*** (2013.01)
USPC **2/79**; 2/227

(57) **ABSTRACT**

Trousers including a stretchable material in a helical form with a predetermined width provided in a portion of each of the trousers extending from a region corresponding to a lumbar of a wearer to a near-knee inner side region being a region corresponding to an inner side of a thigh area near the corresponding knee, via a region corresponding to an outside of the corresponding hip joint.

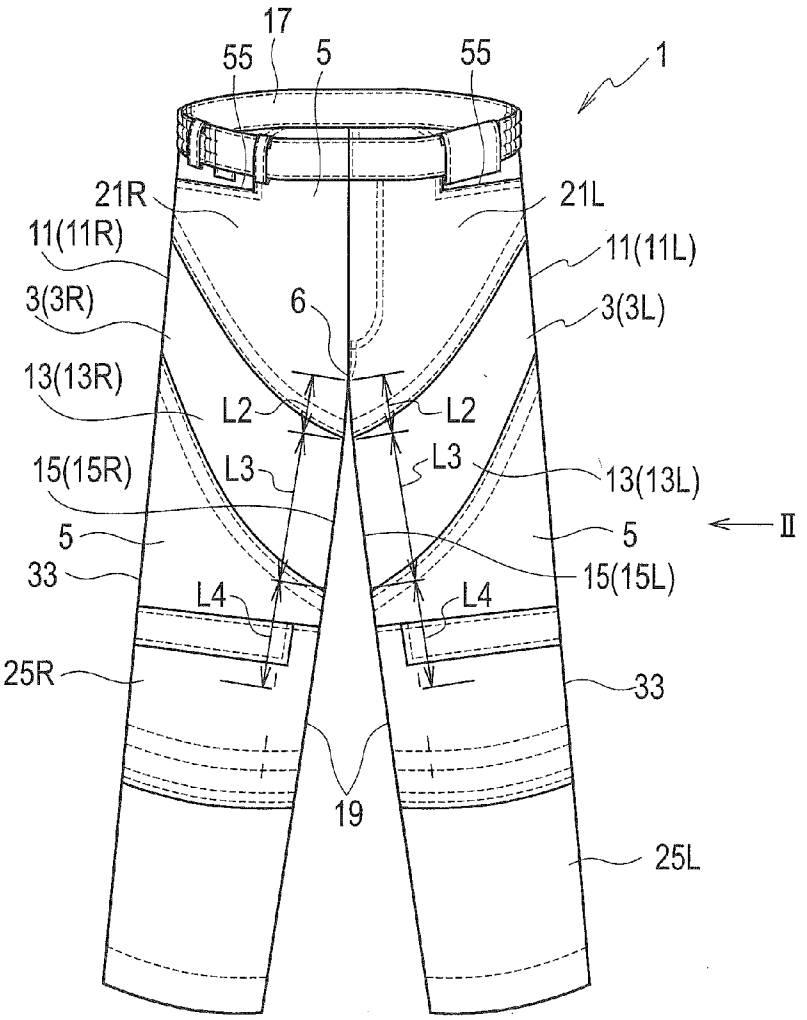


FIG. 1

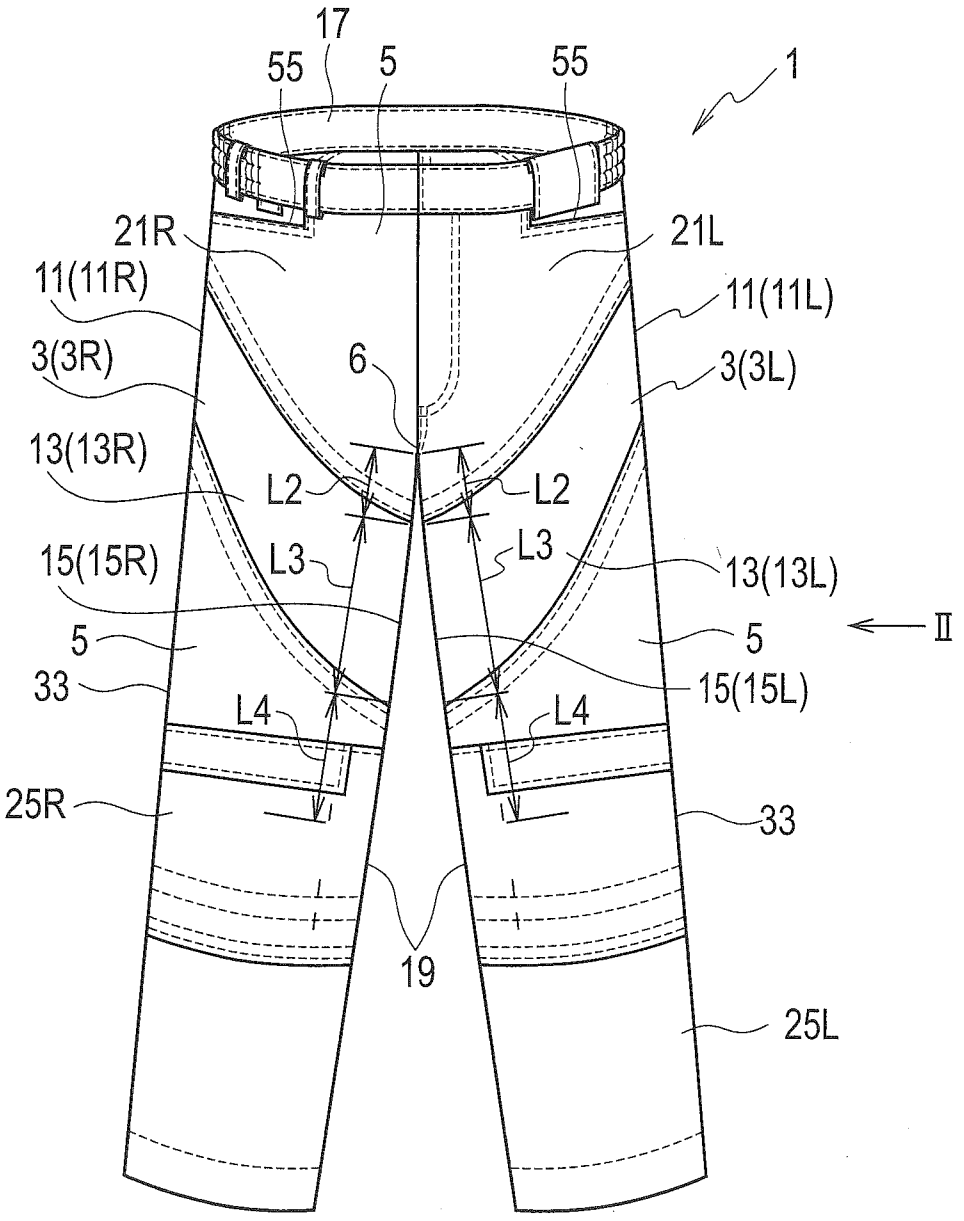

17
55
5
55
1
21R
21L
11(11R)
11(11L)
3(3R)
6
3(3L)
13(13R)
L2
L2
15(15R)
L3
L3
13(13L)
II
5
5
33
15(15L)
L4
L4
25R
33
19
25L

FIG. 2

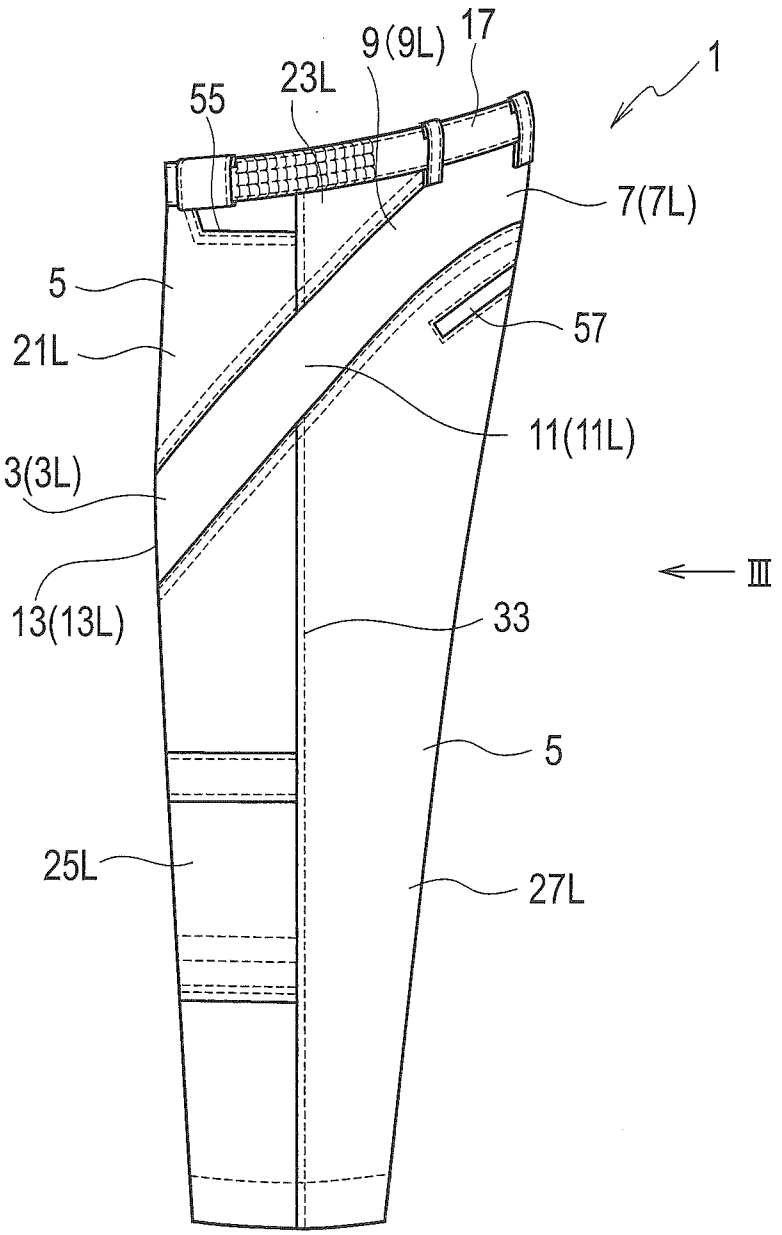
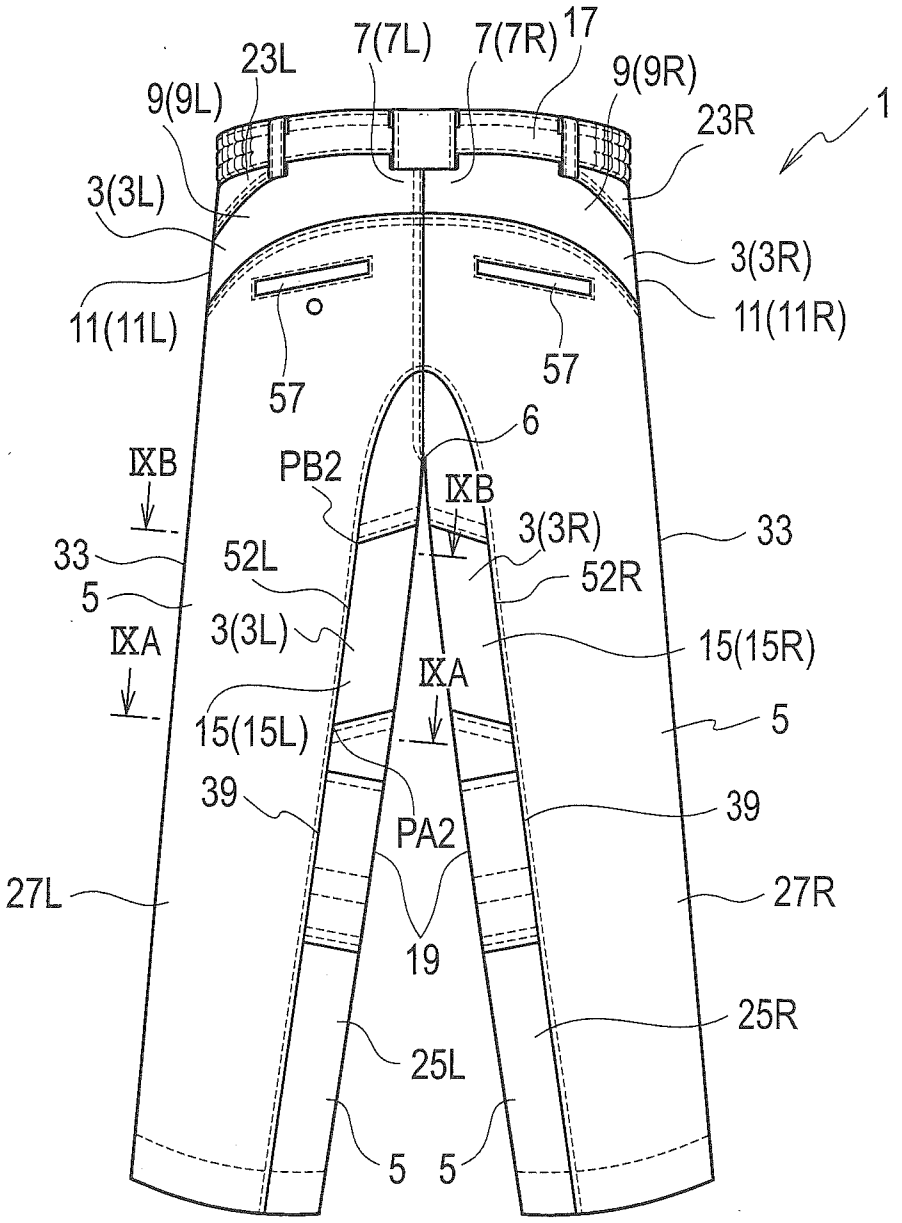


FIG. 3


23L
7(7L)
7(7R)
17
9(9R)
9(9L)
23R
1
3(3L)
3(3R)
11(11L)
11(11R)
57
57
6
IXB
PB2
IXB
33
52L
3(3R)
52R
33
5
IXA
3(3L)
15(15R)
IXA
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5
39
PA2
39
27L
27R
19
25R
25L
5
5

FIG. 4

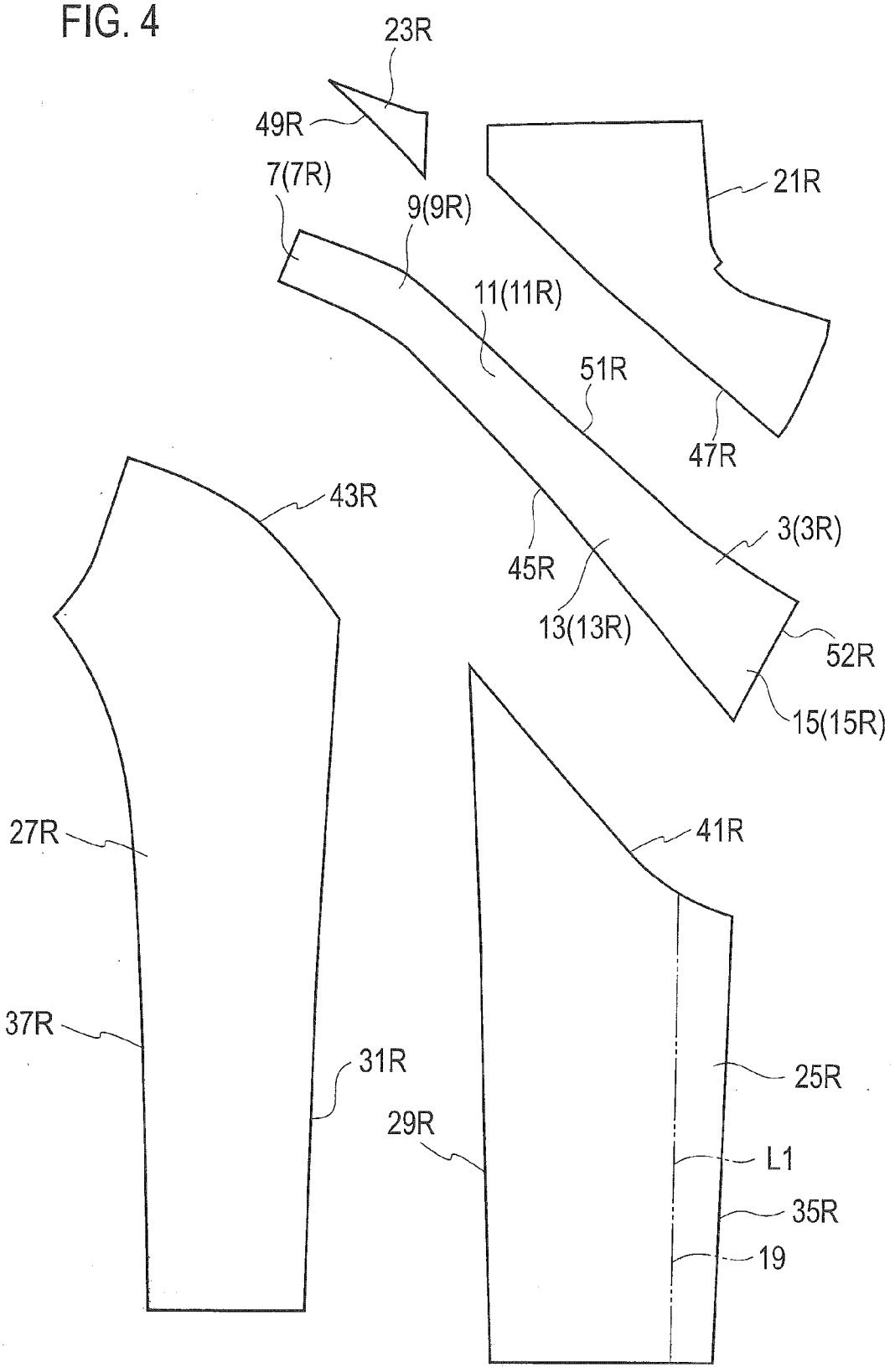

23R
49R
7(7R)
9(9R)
21R
11(11R)
51R
47R
43R
3(3R)
45R
13(13R)
52R
15(15R)
27R
41R
37R
31R
25R
29R
L1
35R
19

FIG. 5

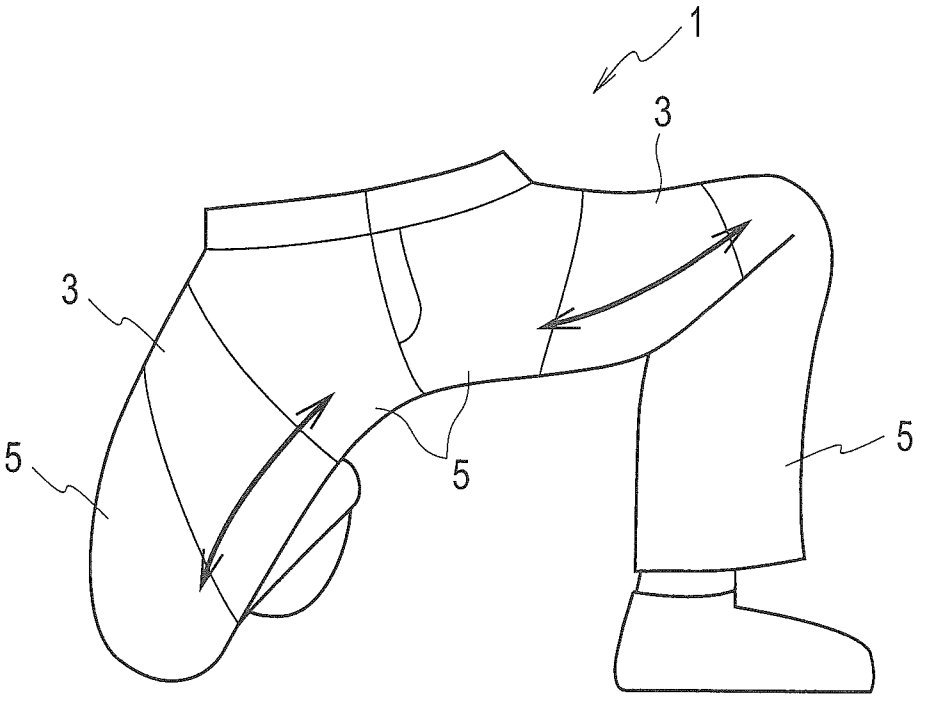


FIG. 6 (b)

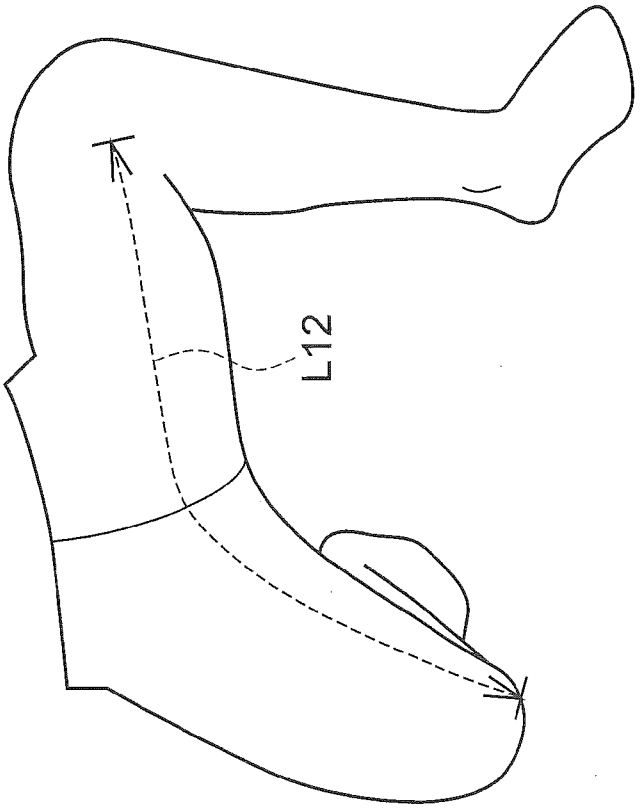


FIG. 6 (a)

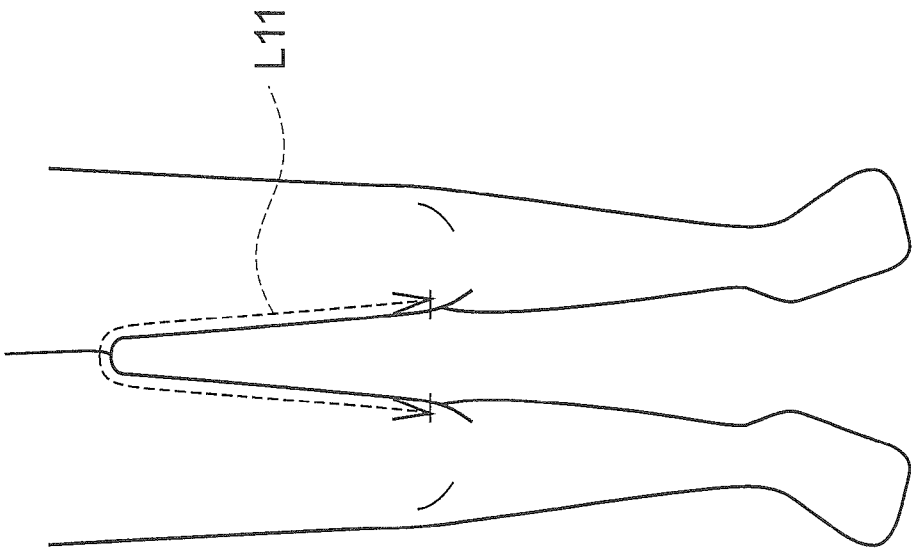


FIG. 7

(a)

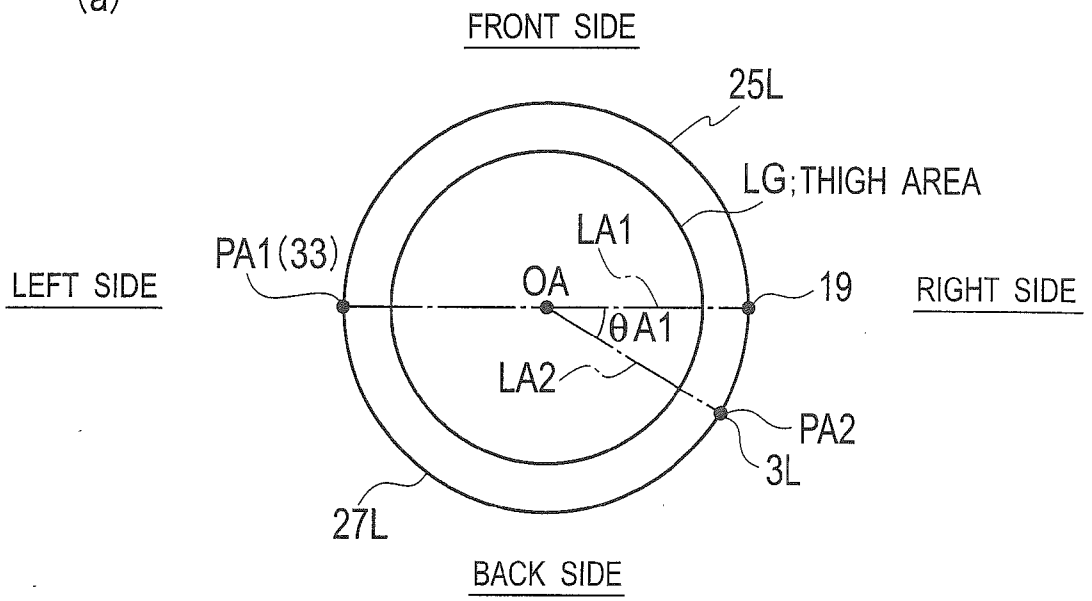

FRONT SIDE
25L
LG;THIGH AREA
LA1
PA1(33)
LEFT SIDE
OA
19
RIGHT SIDE
θA1
LA2
PA2
3L
27L
BACK SIDE

FIG. 7

(b)

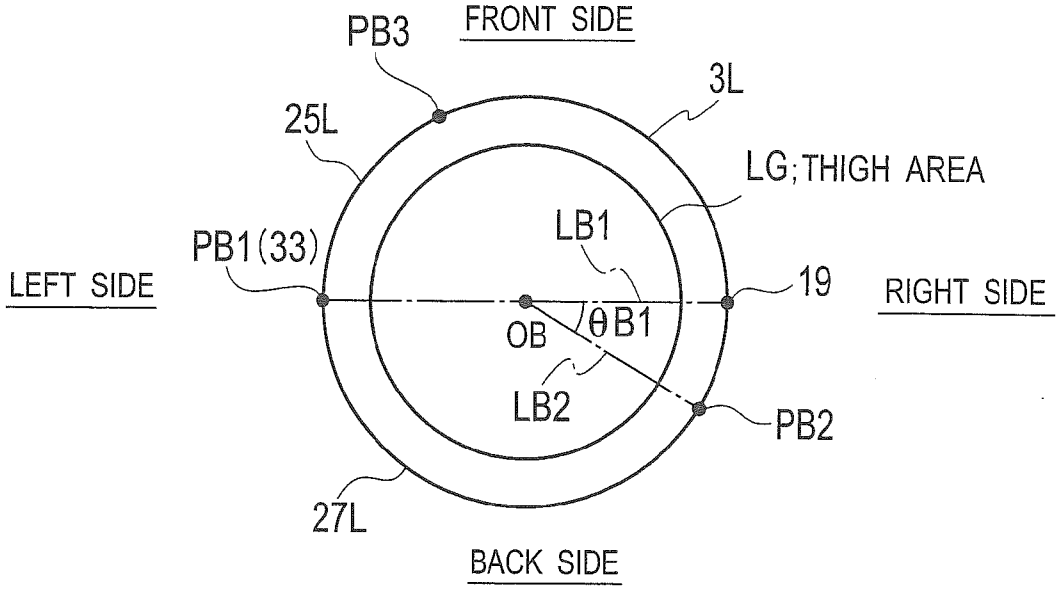

PB3
FRONT SIDE
3L
25L
LG;THIGH AREA
LB1
PB1(33)
LEFT SIDE
19
RIGHT SIDE
OB
θB1
LB2
PB2
27L
BACK SIDE

FIG. 8

(a)

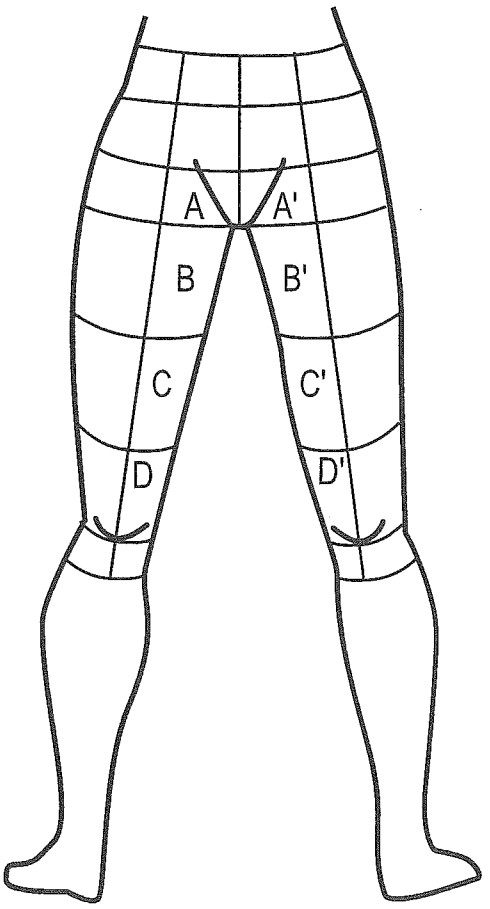
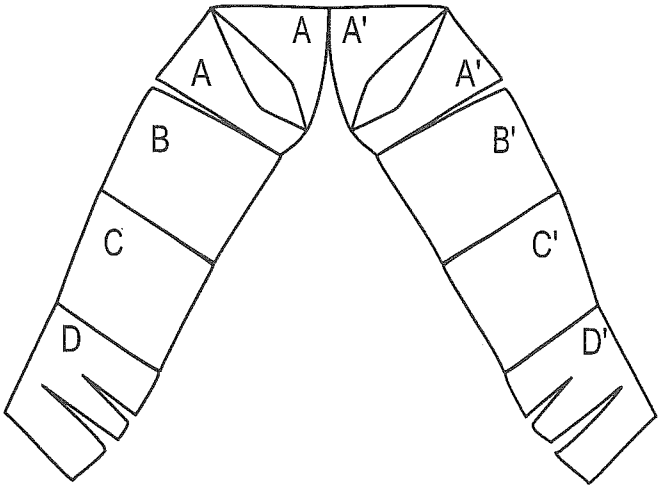


FIG. 8

(b)



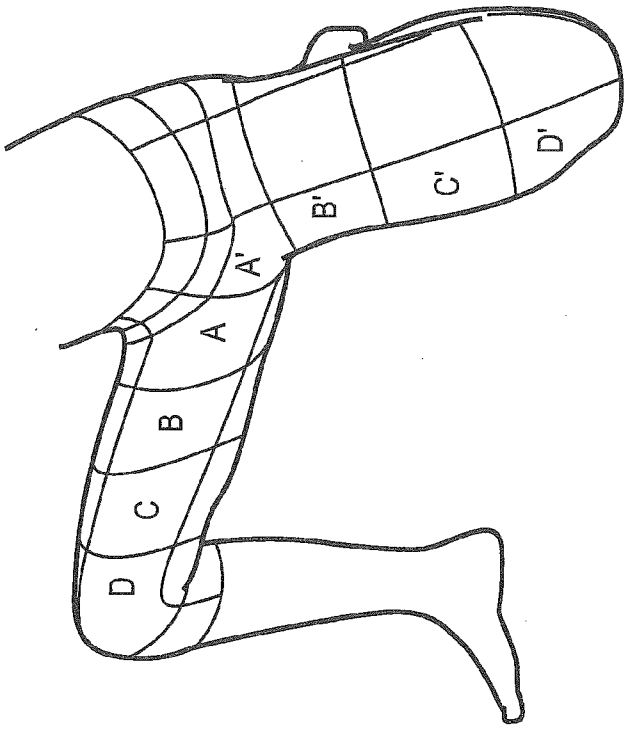


FIG. 9 (a)

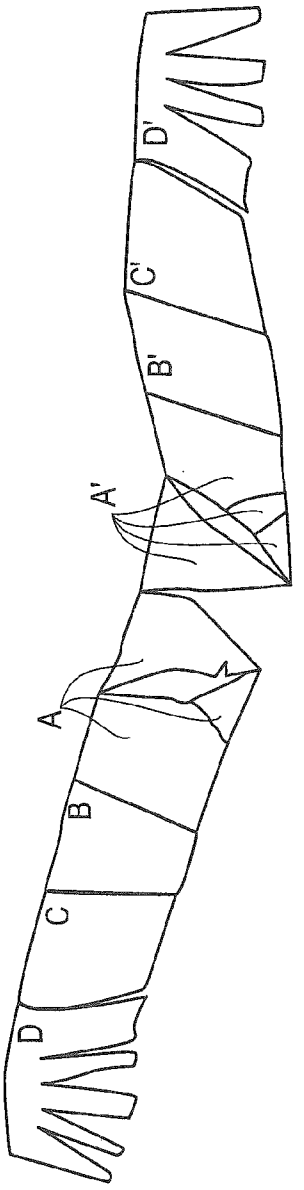


FIG. 9 (b)

FIG. 10

(a)

RIGHT LEG STANDING POSITION		STRETCH RATE	RIGHT LEG OPENED AND KNEE-RAISED POSITION	
A	129.79cm^2	196.7% ⇒	A	255.27cm^2
B	157.41cm^2	80.1% ⇒	B	126.15cm^2
C	138.65cm^2	104.3% ⇒	C	144.48cm^2
D	119.61cm^2	136.7% ⇒	D	163.42cm^2
TOTAL	545.46cm^2	126.4% ⇒	TOTAL	689.32cm^2

FIG. 10

(b)

LEFT LEG STANDING POSITION		STRETCH RATE	LEFT LEG OPENED AND KNEELING POSITION	
A'	129.79cm^2	162.7% ⇒	A'	211.09cm^2
B'	157.41cm^2	85.9% ⇒	B'	135.13cm^2
C'	138.65cm^2	114.8% ⇒	C'	159.17cm^2
D'	119.61cm^2	142.9% ⇒	D'	170.81cm^2
TOTAL	545.46cm^2	124.0% ⇒	TOTAL	676.2cm^2

FIG. 11

(a)

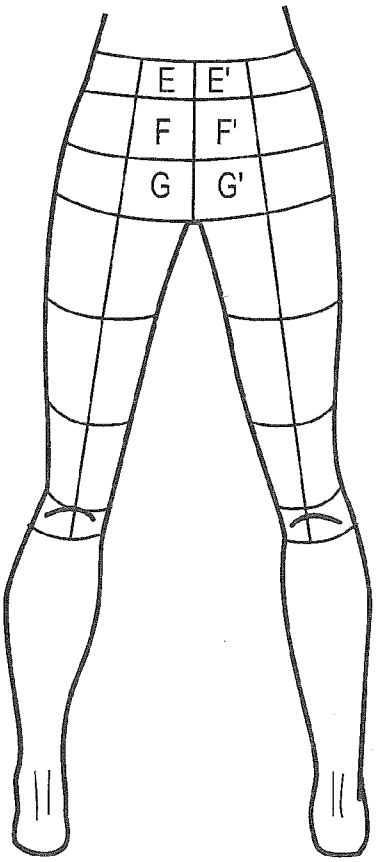


FIG. 11

(b)

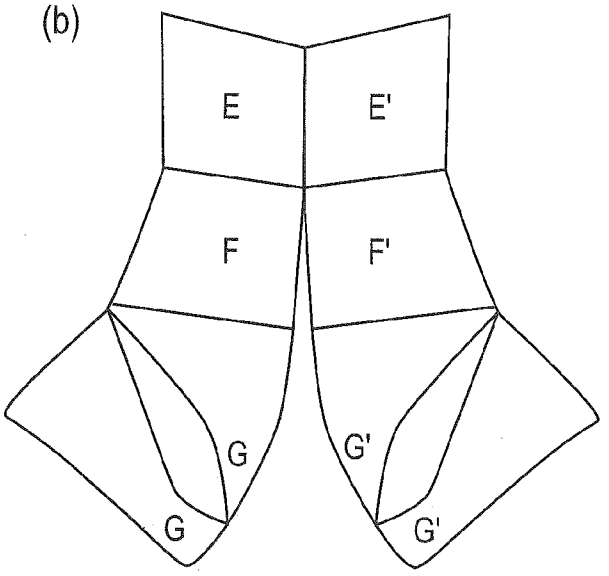


FIG. 12
(a)

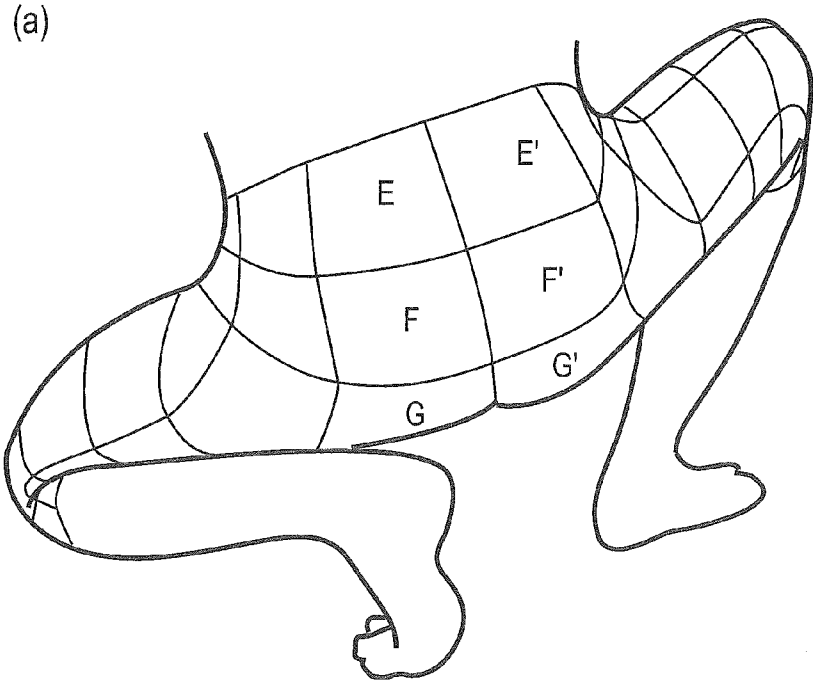


FIG. 12
(b)

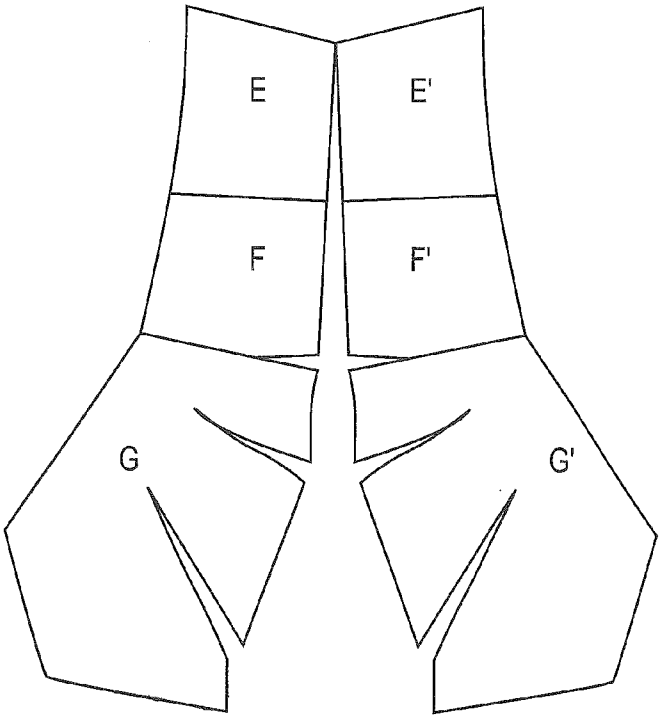


FIG. 13

RIGHT LEG STANDING POSITION		STRETCH RATE	RIGHT LEG KNEE-BENT POSITION	
E	75.37cm^2	134.5% ⇒	E	101.40cm^2
F	84.14cm^2	120.3% ⇒	F	101.24cm^2
G	129.78cm^2	222.5% ⇒	G	288.82cm^2
TOTAL	289.29cm^2	169.9% ⇒	TOTAL	491.46cm^2

FIG. 14

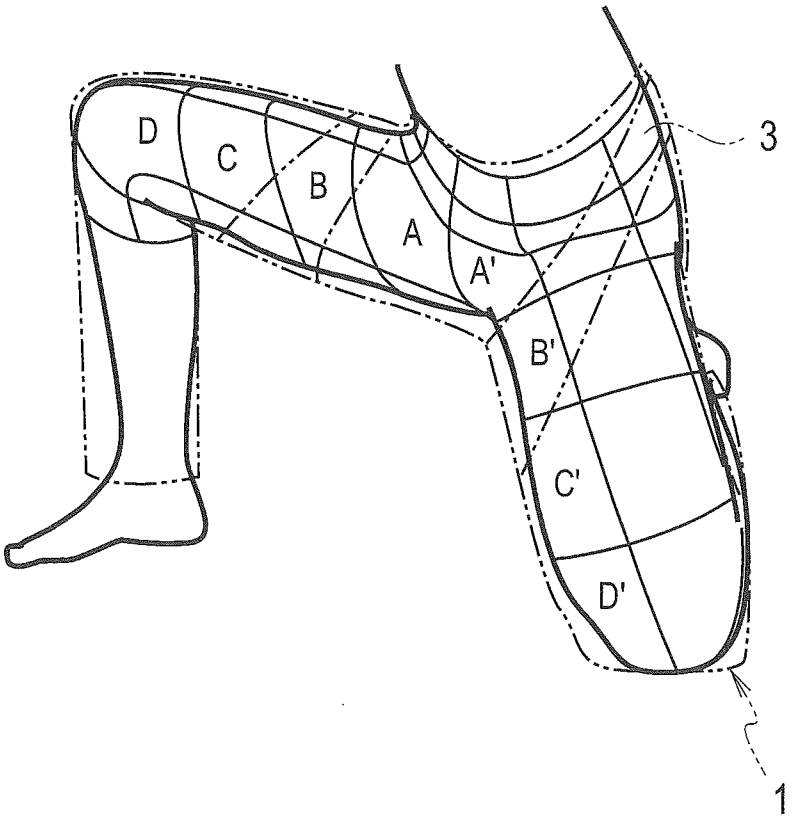


FIG. 15

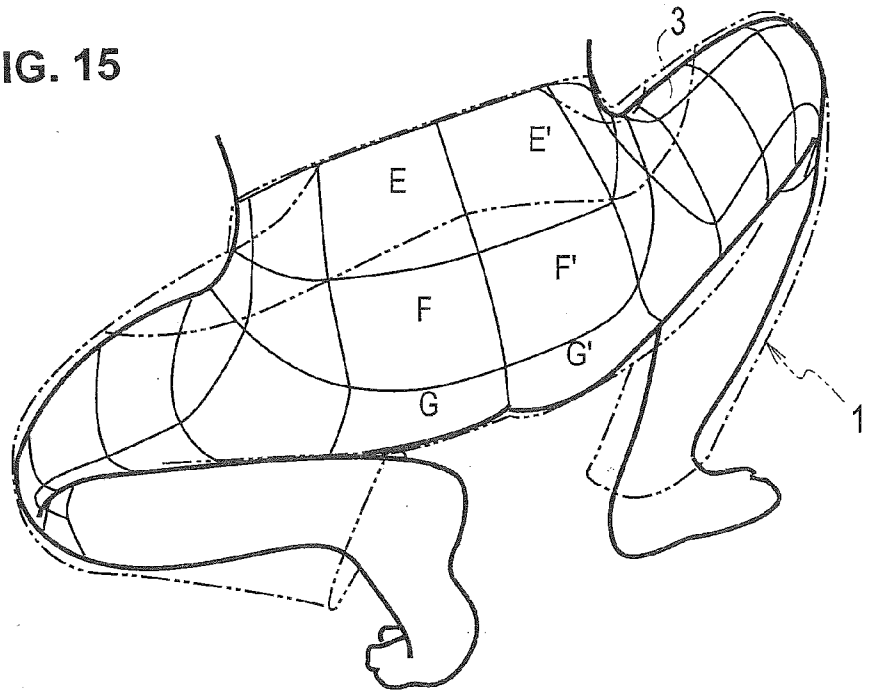


FIG. 16

FIG. 17

(a)

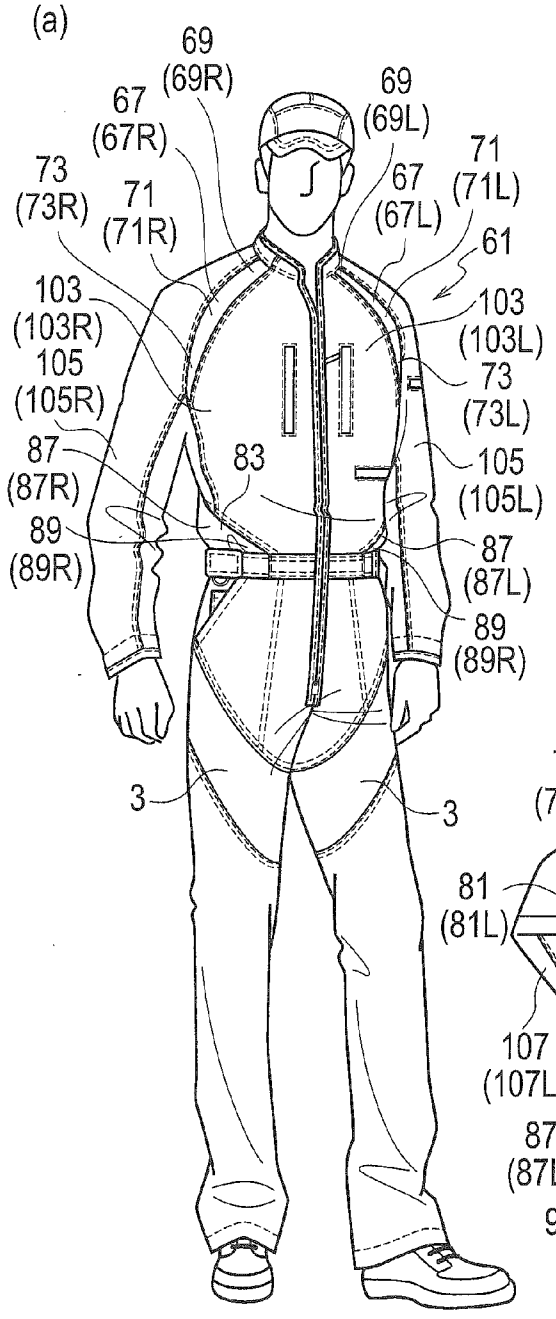


FIG. 17

(b)

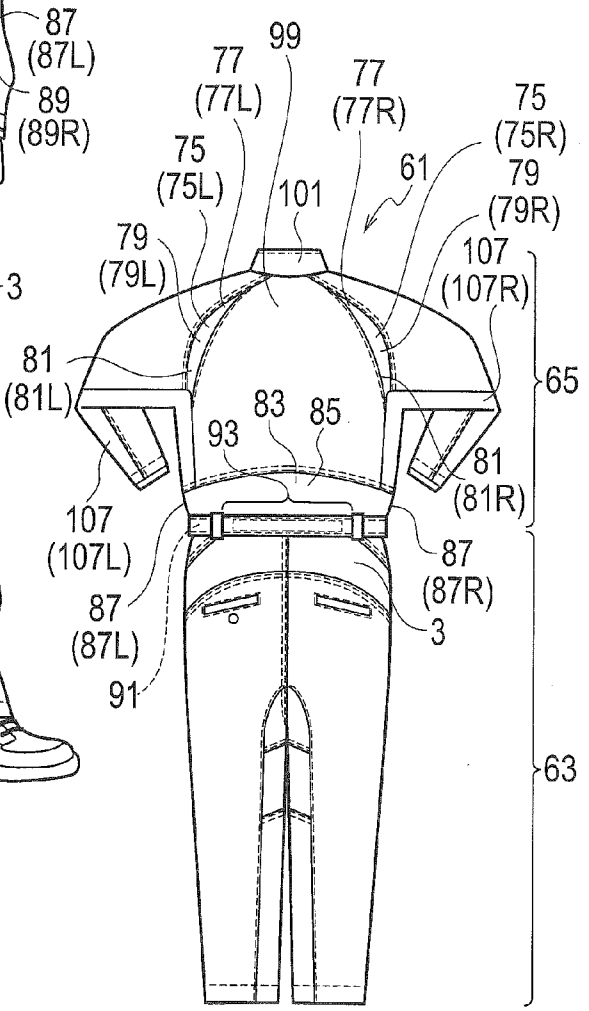


FIG. 18

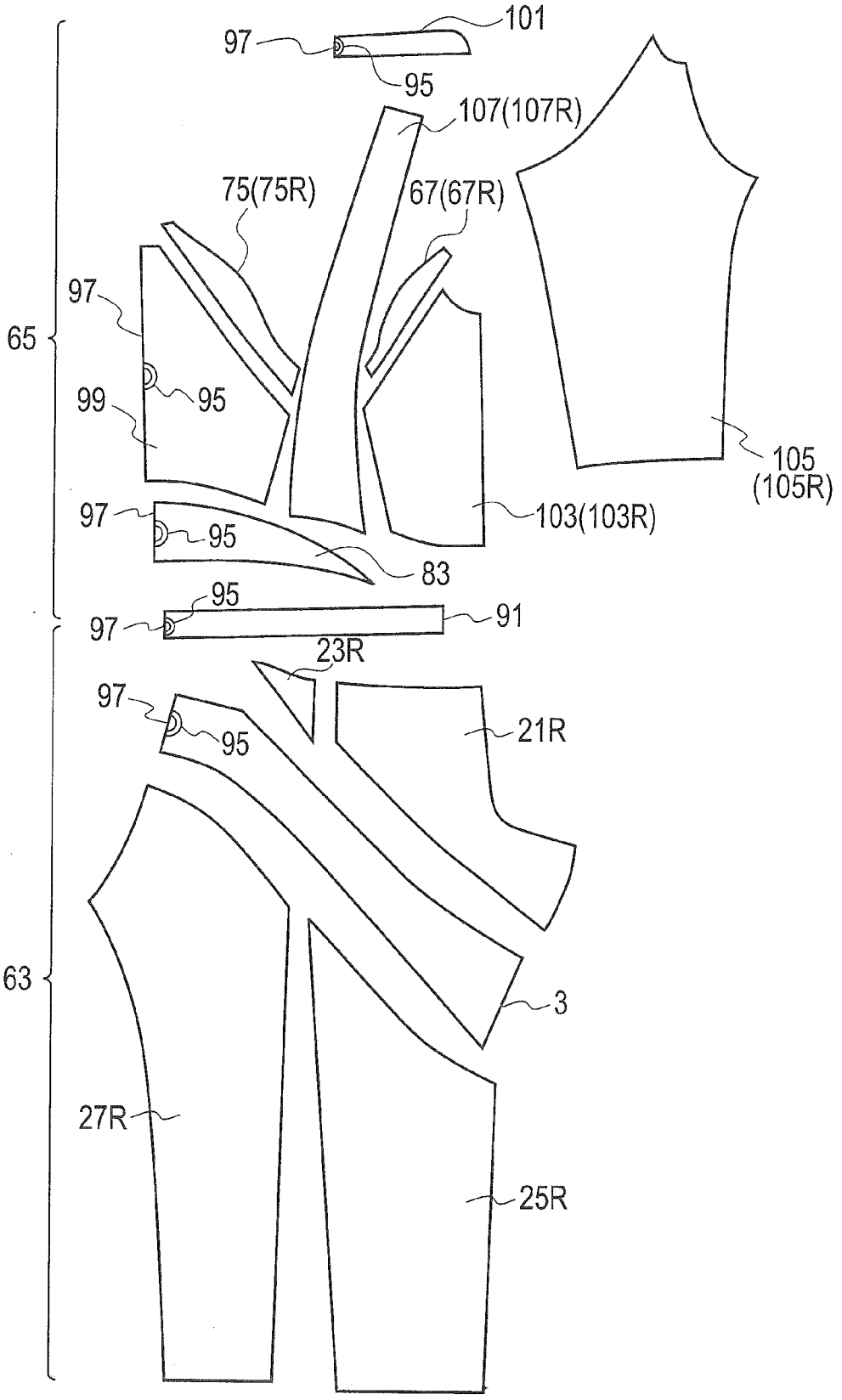

101
97
95
107(107R)
75(75R)
67(67R)
97
65
95
99
105
(105R)
97
95
103(103R)
83
95
97
91
23R
97
95
21R
63
3
27R
25R

FIG. 19

(a)

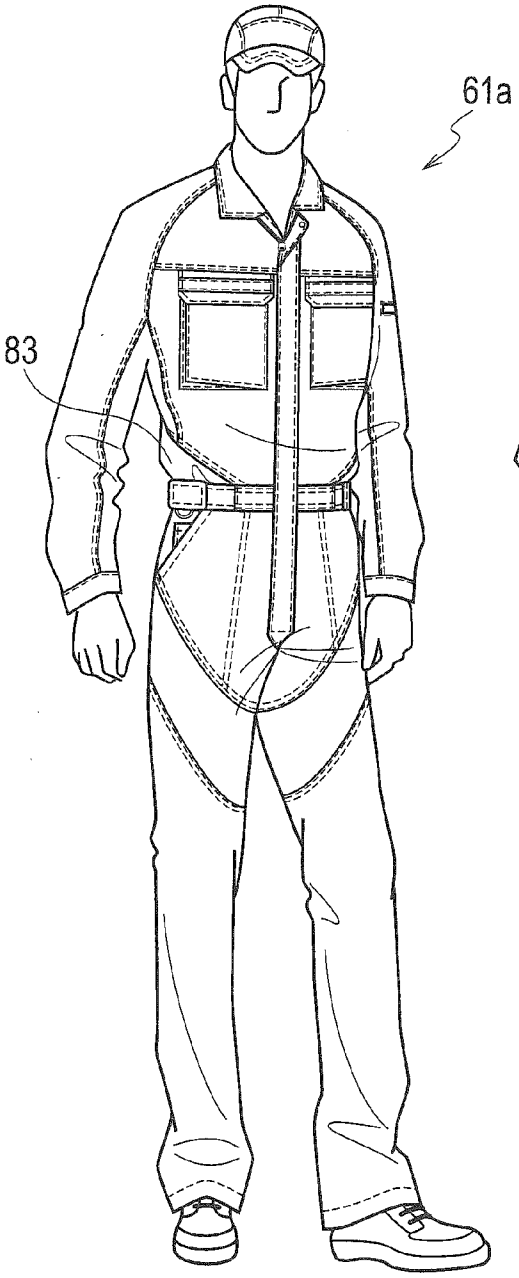


FIG. 19

(b)

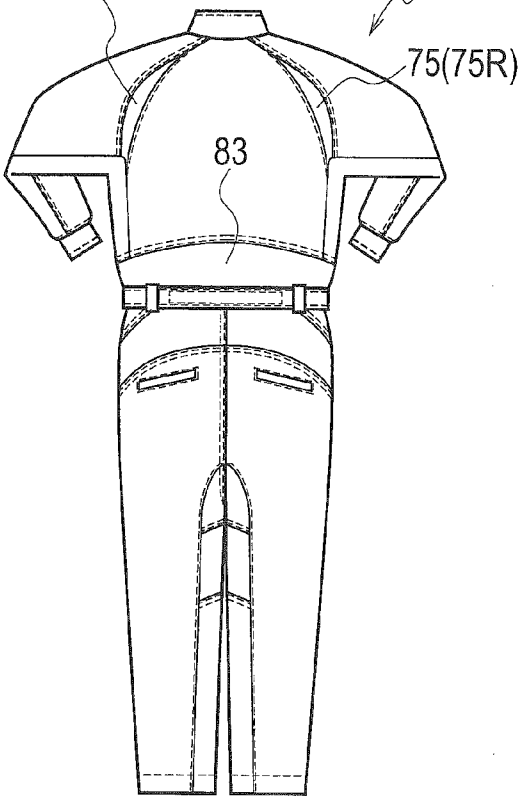
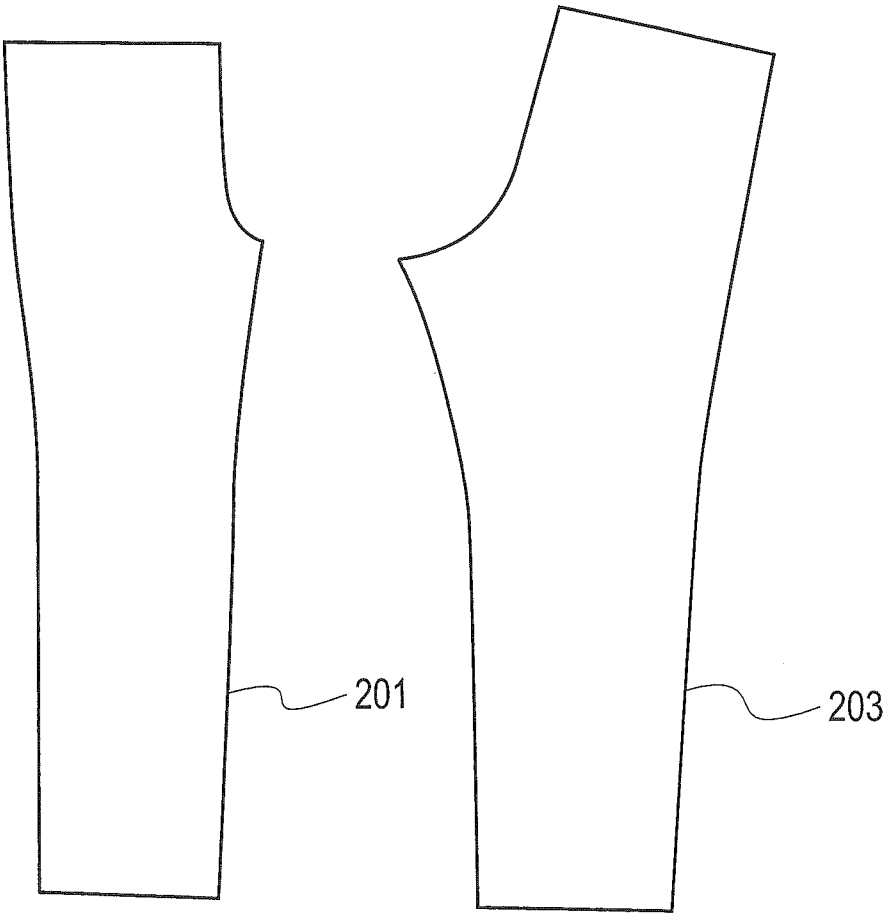


FIG. 20



TROUSERS, WORK TROUSERS AND OVERALLS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This is the U.S. national stage of application No. PCT/JP2011/072275, filed on 28 Sep. 2011. Priority under 35U.S.C. §119 (a) and 35 U.S.C. §365 (b) is claimed from Japanese Application Nos. 2010-221306.2, filed 30 Sep. 2010, and 2011-093084, filed 19 Apr. 2011, the disclosures of which are also incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to trousers, work trousers, and overalls, and particularly relates to ones which are partially formed of a stretchable material.

BACKGROUND ART

[0003] Conventionally, there have been known sportswear and dancewear partially provided with a stretchable material to demonstrate fastening force for facilitating exercises (see, for example, PTL 1, PTL 2).

[0004] Sportswear disclosed in PTL 1 is lower wear designed to improve movability in adduction or abduction exercise and provided with a stretchable material for fastening the body of a wearer, the stretchable material arranged spirally from the back side of the lumbar to the crotch through the lateral sides of the lower wear.

[0005] Also, dancewear disclosed in PTL 2 is formed by joining multiple different materials and a cloth having fastening force is provided in predetermined positions of the wear. This prevents fatigue and facilitates keeping of body balance.

[0006] In other words, the conventional sportswear and dancewear are designed to fasten the body of a wearer with a stretchable material (stretchable members) to a moderate degree that enables balance keeping and prevention of fatigue during exercises by applying a load to muscles, and thereby to demonstrate effects in heavy exercises such as running and dancing.

CITATION LIST

Patent Literature

[0007] [PTL 1] Japanese Patent Application Publication No. 2008-138322

[0008] [PTL 2] Japanese Patent Application Publication No. 2007-239160

SUMMARY OF INVENTION

Technical Problem

[0009] In this connection, workers working on a roof or the like for installing solar panels or doing the like often make movements of keeping a squat-down position for a long period of time, moving from a standing position to a squat-down position when lifting and carrying a load, and walking on the roof after shifting from the squat-down position to the standing position.

[0010] More specifically, since a worker may fall from the roof by losing the balance, the worker keeps the posture low (squat-down) to prevent the falling. Also, since installation sites of the solar panels are around the worker's foot side, the worker needs to be kept squatted down and work for a long time. Furthermore, there are cases where the worker frequently repeats movements from the squat-down position to the standing position and vice versa in order to carry solar cell panels or change work positions on the roof.

[0011] When the squat-down position or the squat-down movement is kept for a long period of time, the conventional sportswear or dancewear fastening one portion of the body of a wearer causes a problem of excessively fastening the one portion of the body of the wearer and fails to provide a sense of comfort.

[0012] In addition to the problem of comfort, if a wearer wearing conventional sportswear or dancewear keeps the squat-down position for a long period of time, there is a possibility that the wearer may lose balance when standing up because compression of blood vessels of the legs may make the legs numb. Also, if the trousers (the conventional sportswear or dancewear) are tight and hinders the squat-down position, the wearer cannot smoothly take the squat-down position. Thus, there is a possibility that the wearer may lose the balance when moving to the squat-down position.

[0013] Accordingly, there is a high risk of accidents of falling from the roof. That it, in works for low-rise houses, very many accidents of falling are occurring. In 2009, totally 114,152 death and injury accidents (death cases and injury cases with four or more days off) of falling happened in all industries in Japan. Among the accidents, 20,006 accidents, which are 17.5% of the total, were caused by falling (according to the states of death and injury accidents by cause and by industry type, "A workers' death and injury report" by Health, Labour and Welfare Ministry: Japan Advanced Information Center of Safety and Health). The death accidents due to falling dominate a high percentage in the engineering work related to low-rise houses in spite of its business scale. In the construction industry, 39.62% of the death accidents were caused by falling, and 17.00% of the falling was caused in the construction works (for low-rise houses) (according to the homepage of Construction Industry Safety and Health Association).

[0014] With the increase of solar power generation which draws attention as clean energy, for example, the number of works on the roof of the low-rise houses tends to increase. Also, with recent popularity of designed houses, the variety of low-rise houses has become wider, which makes it difficult to take security measures. Accordingly, to prevent falling accidents in the low-rise houses has become more important.

[0015] Also, for example, many accidents that occurred during roof works are reported in "Major Industrial Accidents in Aichi Association for Constructional Industry 2002." Workers underwent serious injury or death accidents by losing the balance or taking difficult positions on a roof or a ladder. Thus, the sense of comfort provided to the workers (wearers) in work sites can prevent accidents from occurring as much as possible.

[0016] An object of the present invention is to provide trousers, work trousers, and overalls which can provide a sense of comfort (do not harm comfort) in any position, such as a squat-down position, a knee-raised position, a tiptoe squat position, and a leg-crossed sit position.

Solution to Problem

[0017] A first aspect of the present invention is trousers, wherein a stretchable material in a helical form with a predetermined width is provided in a portion of each of the trousers

extending from a region corresponding to a lumbar of a wearer to a near-knee inner side region being a region corresponding to an inner side of a thigh area near the corresponding knee, via a region corresponding to an outside of the corresponding hip joint.

[0018] A Second aspect of the present invention is the trousers according to the first aspect, wherein the near-knee inner side region of the stretchable material reaches slightly behind an inseam region of each of the trousers.

[0019] A third aspect of the present invention is the trousers according to the first aspect or the second aspect, wherein the width of the stretchable material gradually increases downwardly.

[0020] A tenth aspect of the present invention is an overall wherein a stretchable material in a helical form with a predetermined width is provide in a portion extending from a region corresponding to a lumbar of a wearer to each near-knee inner side region being a region corresponding to an inner side of a thigh area near the corresponding knee, via a region corresponding to an outside of the corresponding hip joint.

[0021] An eleventh aspect of the present invention is the overall according to the tenth aspect, wherein the near-knee inner side region of the stretchable material reaches slightly behind an inseam region of each trouser portion of the overall.

[0022] A twelfth aspect of the present invention is the overall according to the tenth aspect or the eleventh aspect, wherein the width of the stretchable material gradually increases downwardly.

[0023] A thirteenth aspect of the present invention is the overall according to any one of the tenth to twelfth aspects, wherein a stretchable material in a belt form is provided in a portion extending from a region corresponding to a part located at a neck base of the wearer and diagonally in front, to a region corresponding to a part located at an armpit of the wearer and on a front side, via a region corresponding to a part located at an arm base of the wearer and on the front side.

[0024] A fourteenth aspect of the present invention is the overall according to any one of the tenth to thirteenth aspects, wherein a stretchable material in a belt form is provided in a portion extending from a region corresponding to a part located at a neck base of the wearer and diagonally in back to a region corresponding to a part located at an armpit of the wearer and on a back side, via a region corresponding to a part located at an arm base of the wearer and on the back side.

[0025] A fifteenth aspect of the present invention is the overall according to any one of the tenth to fourteenth aspects, wherein a stretchable material in a belt form is provided in a portion extending from the region corresponding to the lumbar of the wearer to a region corresponding to a diagonally-front belly part of the wearer via a region corresponding to a side belly part of the wearer.

Advantageous Effects of Invention

[0026] The present invention has an effect of providing trousers, work trousers, and overalls which provide comfort in any position, such as a squat-down position, a knee-raised position, a tiptoe squat position, and a leg-crossed sit position.

BRIEF DESCRIPTION OF DRAWINGS

[0027] FIG. **1** is a front view showing a schematic configuration of trousers according to an embodiment of the invention.

[0028] FIG. **2** is a side view of the trousers and is a drawing seen from II in FIG. **1**.

[0029] FIG. **3** is a rear view of the trousers and is a drawing seen from III in FIG. **2**.

[0030] FIG. **4** is an exploded view of the trousers and is a plan view of a stretchable material and the like forming the trousers.

[0031] FIG. **5** is a drawing showing a state where a wearer of the trousers is in a knee-raised position.

[0032] FIGS. **6**(*a*) and **6**(*b*) are drawings showing that the wearer is in a standing position and in the knee-raised position.

[0033] FIG. **7**(*a*) is a drawing showing a cross-section taken along the IXA-IXA line in FIG. **3** and FIG. **7**(*b*) is a drawing showing a cross-section taken along the IXB-IXB line in FIG. **3**.

[0034] FIGS. **8**(*a*) and **8**(*b*) are drawings for showing a change in a surface of a skin of the wearer, FIG. **8**(*a*) is a drawing of leg parts and a belly part seen from the front side when the wearer is in the standing position, the drawing showing skin parts (the front and inner parts of a thigh area including a femoral triangle) A to D and A' to D', and FIG. **8**(*b*) is an exploded view of the skin parts A to D and A' to D'.

[0035] FIGS. **9**(*a*) and **9**(*b*) are drawings showing a change in a surface of a skin of the wearer, FIG. **9**(*a*) is a drawing of leg parts and a belly part seen from the front side when the wearer is in the knee-raised position, the drawing showing skin parts (t the front and inner parts of a thigh area including a femoral triangle) A to D and A' to D', and FIG. **9**(*b*) is an exploded view of the skin parts A to D and A' to D'.

[0036] FIGS. **10**(*a*) and **10**(*b*) are tables showing the change in the surface of the skin of the wearer when the wearer in the standing position squats down.

[0037] FIGS. **11** (*a*) and **11**(*b*) are drawings showing the change in the surface of the skin of the wearer, FIG. **11**(*a*) is a drawing of leg parts and a belly part seen from the back side when the wearer is in the standing position, the drawing showing skin parts (a lumbar and a hip part) E to G and E' to G', and FIG. **11**(*b*) is an exploded view of the skin parts E to G and E' to G'.

[0038] FIGS. **12** (*a*) and **12** (*b*) are drawings showing the change in the surface of the skin of the wearer, FIG. **12**(*a*) is a drawing of leg parts and a belly part seen from the back side when the wearer is in the knee-raised position, the drawing showing skin parts (the lumbar and the hip part) E to G and E' to G', and FIG. **12** (*b*) is an exploded view of the skin parts E to G and E' to G'.

[0039] FIG. **13** is a table showing the change in the surface of the ski of the wearer when the wearer in the standing position squats down.

[0040] FIG. **14** is a drawing in which the trousers is overlaid on FIG. **9**(*a*).

[0041] FIG. **15** is a drawing in which the trousers is overlaid on FIG. **12**(*a*).

[0042] FIG. **16** is a drawing showing that the wearer folds up the conventional trousers.

[0043] FIG. **17** is a drawing showing a schematic configuration of overalls according to an embodiment of the invention, FIG. **17** (*a*) is a drawing of the overalls which are seen from the front side thereof and FIG. **17** (*b*) is a drawing of the overalls which are seen from the back side thereof.

[0044] FIG. **18** is an exploded view of the overalls and is a plan view of a stretchable material and the like forming the overalls.

[0045] FIG. **19** is a drawing showing a schematic configuration of overalls according to a modification, FIG. **19**(*a*) is a drawing of the overalls which are seen from the front side thereof and FIG. **19**(*b*) is a drawing of the overalls which are seen from the rear side thereof.

[0046] FIG. **20** is an exploded view of the conventional trousers without a stretchable material.

DESCRIPTION OF EMBODIMENTS

[0047] Trousers **1** are long pants (work trousers) which are used for works with the configuration in which a skin of a wearer does not come in tight contact therewith during being worn, in other words, in a state where small space is present between the skin of the wearer and the trousers **1**. Note that when the wearer wearing the trousers **1** is in a standing position, the state of the trousers **1** is as shown in FIGS. **1** to **3**.

[0048] The trousers **1** includes a predetermined portion formed of a stretchable material (an inner side stretchable material; an outer side stretchable material) **3**. The stretchable material is a two-way stretch type which is formed of knit (knitted). In other words, the stretchable material **3** has a stretching property in an in-plane direction (any direction perpendicular to a direction of a thickness of the stretchable material **3**). Note that the stretchable material **3** is not provided with a purpose of tightening the body of the wearer of the trousers **1**.

[0049] As the stretchable material **3**, a stretchable material with a stretch rate (an extending rate) of approximately 170% is employed but one with a stretch rate of approximately 160% to 190% may be employed, or one with a stretch rate of approximately 140% to 220% may be employed. Furthermore, one with a stretch rate of approximately 120% to 250% may be employed. In addition, as the stretchable material **3**, one with a stretch rate of approximately 120% to 170% may be employed or one with a stretch rate of approximately 110% to 130% may be employed.

[0050] Note that the stretch rate is expressed by the following equation. (Stretch rate=a maximum length of the stretchable material **3** when force is applied/a length of the stretchable material **3** when force is not applied×100%)

[0051] Here, the maximum length of the stretchable material **3** when force is applied means a length of the stretchable material **3** when maximum tensile force is applied to the stretchable material **3**. If the tensile force to be applied to the stretchable material **3** gradually increases from "0," the length of the stretchable material **3** is also gradually increased. However, when the stretchable material **3** is pulled with force equal to or larger than the maximum tensile force, the stretchable material **3** hardly extends and is rather broken. Also, as long as the stretchable material **3** is pulled with force equal to or smaller than the maximum tensile force, it is designed that the stretchable material **3** is restored. However, when the stretchable material **3** is pulled with force larger than the maximum tensile force (the maximum tensile force in the limit of elasticity), permanent distortion remains in the stretchable material **3**.

[0052] Here, the specific description of a case when the stretch rate is 170% is given. It is assumed that the stretchable material **3** with a predetermined thickness, a predetermined width, and a predetermined length LA (a length of the stretchable material when tensile force is not applied is LA; for example, 100 mm) is pulled from the both ends thereof in the longitudinal direction with tensile force. When the maximum tensile force is applied, the length of the stretchable material **3** becomes 1.7 times longer (1.7LA; for example, 170 mm).

[0053] Also, regions other than the region using the stretchable material **3** are formed of woven fabric (fabric) with little stretchability. The stretch rate of the woven fabric is approximately 100% to 102%, which is smaller than the extension rate of the stretchable material.

[0054] Note that a fabric with stretchability may be employed as the stretchable material **3** in place of knitted fabric. It is assumed that the fabric with stretchability is formed by being woven with stretchable strings.

[0055] The stretchable material **3** is provided in a portion substantially in a single-roll helical shape vertically extending to a near-knee inner side region **15** from a lumbar region (a lower lumbar region) **7** through an upper hip region **9**, a hip joint outer side region **11**, and a front-side middle thigh region **13** in this order. Also, the stretchable material **3** has a predetermined width.

[0056] Here, the lumbar region **7** is a region for a part immediately behind the lumbar (a lower part of the lumbar) of the wearer (a region immediately behind a part between the crotch and the back waist and immediately below the waist band portion **17**; the lower lumbar region). The upper hip region **9** is a region for the upper part of the left or right side of the hips of the wearer. The hip joint outer side region **11** is a region for an outer side of the hip joint of the wearer (a region for skin parts of the wearer located on the left of the left hip joint of the wearer, or a region for skin parts of the wearer located on the right of the right hip joint of the wearer).

[0057] The front-side middle thigh region **13** is a region for a part located in a middle position in the vertical direction of the thigh area of the wearer and on the front side of the thigh area. The near-knee inner side region **15** is a region for a part near the knee of the wearer and on an inner side of the thigh area (the right side of the left thigh area of the wearer and the left side of the right thigh area of the wearer). Note that the lumbar region **7** and the like are regions facing the skin parts of the lumbar and the like of the wearer wearing the trousers.

[0058] The trousers **1** is formed symmetrically and the helical stretchable material **3** are provided symmetrically. Accordingly, on the left side of the trousers **1**, the portion from the left lumbar region **7**L to the left near-knee inner side region **15**L via the left upper hip region **9**L, the left hip joint outer side region **11**L, and the left front-side middle thigh region **13**L is formed of the helical stretchable material **3**L with a predetermined width (in a helical state in a clockwise direction when the trousers **1** is seen from the top thereof).

[0059] On the right side of the trousers **1**, the portion from the right lumbar region **7**R to the right near-knee inner side region **15**R via the right upper hip region **9**R, the right hip joint outer side region **11**R, and the right front-side middle thigh region **13**R is formed of the helical stretchable material **3**R with a predetermined width (in a helical state in an anticlockwise direction when the trousers **1** is seen from the top thereof).

[0060] Note that the stretchable material **3**L on the left side and the stretchable material **3**R on the right side are connected with each other at the lumbar of the wearer (see, FIG. **3**).

[0061] Hereinafter, further details are described by using the left or right side of the trousers **1** as an example.

[0062] The near-knee inner side region **15**L of the stretchable material **3**L on the left side reaches slightly behind the region of an inseam **19** of the trousers **1**.

[0063] Here, FIG. **7** is used to more specifically describe the state where the near-knee inner side region **15**L of the stretchable material **3**L on the left side reaches slightly behind the region of the inseam **19** of the trousers **1**. Note that FIG. **7** shows a cross-sectional view of a tube portion on the left side of the trousers **1** (a tube portion into which the left leg enters). However, since the trousers **1** is formed symmetrically as described above, a tube portion of the trousers **1** on the right side is also formed similarly to the tube portion on the left.

[0064] FIG. **7** (*a*) is a drawing showing a cross-section taken along the IXA-IXA line in FIG. **3** and is a cross-sectional view of the trousers **1** in the lowermost end of the stretchable material **3**L (a lower end of a linear joint portion between the stretchable material **3**L and a left back pants cloth **27**L). FIG. **7**(*b*) is a drawing showing a cross-section taken along the IXB-IXB in FIG. **3** and is a cross-sectional view of the trousers **1** slightly upper than the lowermost end of the stretchable material **3**L.

[0065] The reference sign LG shown in FIG. **7** shows the thigh area of the wearer wearing the trousers **1**. The reference signs PA**1**, PB**1** show a side seam **33** of the trousers **1**. The reference signs OA, OB show the center of the thigh area LG and the center of the tube portion of the trousers **1**. The reference signs LA**1**, LB**2** show a straight line connecting the side seam **33** and the inseam **19** of the trousers **1**. Note that it is assumed that the center OA of the thigh area LG shown in FIG. **7**(*a*) is present on the straight line LA**1**, for example, and the center OB of the thigh area LG shown in FIG. **7**(*b*) is present on the straight line LB**1**, for example.

[0066] In FIG. **7**(*a*), the reference sign PA**2** shows the lowermost end of the stretchable material **3**L (see FIG. **3** together) and the reference sign LA**2** shows the straight line connecting between the center OA of the thigh area LG and the lowermost end PA**1** of the stretchable material **3**L. Here, an angleθA**1** of intersection between the straight line LA**1** and the straight line LA**2** is approximately 15°.

[0067] In FIG. **7**(*b*), the reference sign PB**2** shows the portion slightly upper than the lowermost end of the stretchable material **3**L (see FIG. **3** together) and the reference sign LB**2** shows the straight line connecting between the center OB of the thigh area LG and the portion PB**2** slightly upper than the lowermost end of the stretchable material **3**L. Here, an angle θB**1** of intersection between the straight line LB**1** and the straight line LB**2** is approximately 15°. Note that the reference sign PB**3** is a boundary between the stretchable material **3**L and the left anterior trousers cloth **25**L.

[0068] As above, the near-knee inner side region **15**L of the stretchable material **3**L reaches slightly behind the region of the inseam **19** of the trousers **1**. Note that the intersection angle θA**1** or the intersection angle θB**1** may be set as needed in a range from 10° to 20°, which is wider than 15°, or may be set in a range which is further wider than 5° to 30°, or may be set as needed in a range which is further wider than 5° to 60°.

[0069] The width of the stretchable material **3**R (**3**L) on the right becomes downwardly wider gradually. Here, the width direction of the stretchable material **3**R (**3**L) is a direction perpendicular to a helical extending direction (the longitudinal direction) of the stretchable material **3**R (**3**L). However, the width direction of the stretchable material **3**R (**3**L) may be set in the vertical direction of the trousers **1**.

[0070] FIG. **4** shows shapes of the stretchable material **3**R and the like on the right side before being sewed together. The stretchable material **3**R and the like shown in FIG. **4** are formed in a planar shape. Also, a direction perpendicular to the paper plane of FIG. **4** is a thick direction of the stretchable material **3**R and the like. Note that seam allowances of the stretchable material **3**R and the like are not illustrated in FIG. **4** for sake of simplicity.

[0071] The trousers **1** is formed by, for example, sewing together the stretchable material **3**R, a right front body cloth **21**R (in the case of a left front body cloth, **21**L), a right back side joint cloth **23**R (in the case of a left back side joint cloth, **23**L), a right front pants cloth **25**R (in the case of a light front pants cloth, **25**L), and a right back pants cloth **27**R (in the case of a left back pants cloth, **27**L) as needed.

[0072] Here, it is designed that one side portion **29**R of the right front pants cloth **25**R and one side portion **31**R of the right back pants cloth **27**R are jointed with each other to form the side seam **33** of the trousers **1**.

[0073] Also, one portions of another side portion (one side portion facing the one side portion **29**R) of the right front pants cloth **25**R and another one side portion (one side portion facing the one side portion **31**R) **37**R of the right back pants cloth **27**R are joined together to form a joint portion (a sewing portion) **39** near the inseam **19** (see, FIG. **3**). Note that the two-dot chain line L**1** shown in the right front pants cloth **25**R is a portion to be the inseam **19** of the trousers **1**.

[0074] Also, other portions of another side portion (one end portion in the longitudinal direction) **52**R of the stretchable material **3** and one portion of another side portion **37**R of the right back pants cloth **27**R are joined together to form the joint portion **39** near the inseam **19**.

[0075] Accordingly, the near-knee inner side region **15**R of the stretchable material **3**L reaches a portion slightly behind the region of the inseam **19** of the trousers **1**.

[0076] In addition, it is designed in the trousers **1** that another one side portion **41**R of the right front pants cloth **25**R and another one side portion **43**R of the right back pants cloth **27**R are joined together with the one side portion (one side portion in the width direction) of the stretchable material **3**, and one side portion **47**R of the right front open cloth **21**R and one side portion **49**R of the right back side joint cloth **23**R are joined together with one side portion (the other side portion in the width direction) **51**R of the stretchable material **3**. Note that the both side portions **45**R, **51**R, (**45**L, **51**L) in the width direction of the stretchable material **3** is substantially straight for facilitating the joint.

[0077] Although portions other than the joints are also joined in the trousers **1**, the description thereof is omitted.

[0078] As described above, in the trousers **1** that is formed by joining together the stretchable material **3**, the right front open cloth **21**R, the right back side joint cloth **23**R, the right front pants cloth **25**R, and the right back pants cloth **27**R, compression force is, of course, not applied to the stretchable material **3** and tensile force is also not applied. In other words, no force is applied.

[0079] Also, in the trousers **1**, the ring-shaped waist band portion **17** is joined by sewing or the like with the upper portion of the front open cloths **21**R, **21**L and the back side joint cloths **23**R, **23**L, and side pockets **55** and back pockets **57** are provided.

[0080] Furthermore, in the trousers **1**, when seen from the front side thereof, a crotch seam **6** and the stretchable material **3** have a predetermined distance between them (a distance in the inseam **19**) L2 (for example, approximately 100 mm) (see, FIG. **1**). Accordingly, the strength of the trousers **1** (tensile strength in the crotch seam **6** and the like) can be increased, and also the looking of the trousers **1** can be improved when

seen from the front thereof. In other words, if the distance L2 is set "0," the stretchable material **3**L and the stretchable material **3**R are joined together in the crotch seam **6** of the trousers **1**, which results in decreasing the strength in the crotch seam **6**. In addition, when the wearer of the trousers **1** is seen from the front thereof, the wearer looks as if he/she put underwear on the trousers. Thus, the looking is bad.

[0081] However, the crotch seam **6** and the stretchable material **3** are spaced apart from each other by the predetermined distance L2, so that the strength insufficiency and bad looking can be avoided.

[0082] In addition, in the trousers **1**, as shown in FIG. **1**, in the vertical direction, a value of the distance (dimension) L2, a value of the distance (dimension) L3, and a value of the distance (dimension) L4 are substantially equal to one another, or the value of the distance L4 is slightly larger than the value of the distance L3, and the value of the distance L3 is slightly larger than the value of the distance L2.

[0083] Accordingly, even in a case where the wearer of the trousers **1** takes a squat-down position with the skin of the legs extended, the trousers **1** stretches as needed and thus the wearer does not feel any sense of discomfort. In other words, in the squat-down position, the skin on the thigh area of the wearer is extended utmost at the knee portions. The extended amount of the trousers **1** becomes gradually smaller from the knee portion toward the crotch portion. The dimensions L2, L3, and L4 are set as described above, so that the stretchable material **3** is provided near the portions in which the skin stretches. Accordingly, the stretchable material **3** stretches following the stretch of the skin. Thus, there is almost no sense of discomfort. Note that, even when the dimension L4 is set smaller than the dimension L2 or the dimension L3, the stretchable material **3** follows the stretch of the skin on the front side of the thigh portion. On the other hand, however, the stretchable material **3** is placed in a friction portion (near-knee portion), which is not preferable. Also, if the dimension L2 is set "0" or smaller, the stretching region of the skin on the thigh front side and the position of the stretchable material **3** do not meet each other. Thus, the wearer may feel a sense of discomfort.

[0084] Note that the dimension L3 is a dimension in the vertical direction of the stretchable material **3** (the width of the stretchable material **3** in the inseam **19**) and the dimension L4 is a dimension between a region for the center of the knee and the lower end of the stretchable material **3** (the dimension of the right front pants cloth **25**R or the left front pants cloth **25**L in the inseam **19**).

[0085] The trousers **1** provides an effect of making a wearer feel comfortable (without losing a sense of comfort) in any position, such as the squat-down position, knee-raised position, tiptoe squat position, open legs position or the like when the wearer wears the trousers **1**. In other words, even though a wearer (a worker) works on the roof or the like in a position such as the squat down position or open leg position, the trousers **1** ensure the comfort of the wearer following the position of the wearer.

[0086] More specifically, among joints of a human body, main joints related to the trousers **1** are hip joints and knee joints. For example, the shape of the trousers **1** is decided along with a state (a standing state; a stand-upright state) where the wearer does not bend the hip joints and the knee joints.

[0087] Here, for example, as shown in FIG. **5**, in contrast with the standing state, when the wearer is in the knee-raised position, the legs of the wearer is most deformed and the deformation force is most received by the wearing trousers **1** of the wearer from the legs of the wearer. In other words, the hip joint is bent and the knee joint is bent so that the crotch portion opens, and the other knee (the right knee in FIG. **5**) kneels on the ground or the floor. Accordingly, in the knee-raised position, the tensile force as shown by an arrow in FIG. **5** acts on the trousers **1**. Even when such tensile force acts, the stretchable material **3** stretches as needed. Thus, the wearer wearing the trousers **1** easily takes the knee-raised position.

[0088] When the wearer is in the knee-raised position as shown in FIG. **5**, the stretchable material **3** stretches most in the width direction of the stretchable material **3** in the portion shown by the arrow (the near-knee inner side region). Also, it is designed that the stretchable material **3** stretches in other portions. Then, the stretchable material **3** is formed in one helical state, so that the stretchable material **3** extends substantially 360° around the axis of the leg as the center thereof. Thus, when the wearer is in the knee-raised position as shown in FIG. **5**, the stretchable material **3** elastically deforms as needed, which makes the wearer to easily take the knee-raised position.

[0089] The case where the wearer is in the knee-raised position as shown in FIG. **5** is further specifically described by using FIG. **6**. FIG. **6**(*a*) is a drawing showing a state where the wearer is in the standing position (the stand upright position). FIG. **6**(*b*) is a drawing showing the wearer is in the knee-raise position, which corresponds to FIG. **5**.

[0090] A curve L**11** shown by the broken line in FIG. **6**(*a*) extends from the inner part of the right knee of the wearer to the inner part of the left knee of the wearer via the crotch of the wearer (passes through the inner thigh of the wearer). Also, a curve L**12** shown by the broken line in FIG. **6**(*b*) is a curve passing through the same portions as the curve L**11** (parts of the skin of the same wearer as the wearer shown in FIG. **6** (*a*)).

[0091] In the state shown in FIG. **6** (*a*), the curve L**11** has a length of 70.5 cm, for example, whereas in the state shown in FIG. **6** (*b*), the curve L**12** has a length of 83.5 cm, for example. Accordingly, the length of the skin in the inner thigh area of the wearer increases by approximately 18%.

[0092] In this manner, even when the length of the skin in the inner thigh area of the wearer increases by approximately 18%, since the stretchable material **3** is provided, the wearer can easily take the knee-raised position.

[0093] On the other hand, since a stretchable material is not provided in trousers including a front body **201** and a back body **203** as shown in FIG. **20**, the trousers cannot sufficiently accommodate the 18% increase. Thus, the wearer can hardly take the knee-raised position.

[0094] Note that the trousers **1** can provide a sense of comfort not only when the wearer is in the knee-raised position but also when the wearer is in the tiptoe squat position, the crossed leg position, and the like, and the wearer can easily take the tiptoe squat position or crossed leg position as similar to the case where the wearer is in the knee-raised position.

[0095] Also, the stretchable material **3** is weaker to friction or stretching as compared with the other regions of the trousers **1** (the region formed of woven fabric) and the knitted string thereof tends to cause snagging or pilling by the friction or scratching. However, since the stretchable material **3** is provided in the above-described portion in the trousers **1**, even when the wearer sits down on the floor or the ground with the trousers **1** being put on during working, the stretchable material **3** is unlikely to come in touch with the floor or

the ground or the wall. For example, the stretchable material **3** is positioned at an upper region of the hips while avoiding a lower region of the hips. Thus, even when the wearer sits down with the hips placed on the roof, the stretchable material **3** does not come into contact with the roof. Accordingly, the friction or the like does not occur (the snagging or the pilling does not occur) in the stretchable material **3**, so that the stretchable material **3** is prevented from being damaged as much as possible.

[0096] On the other hand, in case of conventional sportswear or dancewear, an entire wear is formed of a stretchable material such as knit. Thus, snagging or pilling is easily occurred when a wearer is working on the roof or the like.

[0097] Also, the stretchable material **3** is provided as described above. Accordingly, the stretchable material **3** and the side pockets **55** do not interfere with each other. Thus, the side pockets **55** become easy to place.

[0098] Furthermore, the region formed of the stretchable material **3** does not exist under the knee in the trousers **1**, so that the amount of the stretchable material **3** used is reduced and such a damage that entanglement is caused by contact between the stretchable material **3** and the wall or the like in the region under the knee can be prevented.

[0099] Also, in the trousers **1**, the near-knee inner side region **15** of the stretchable material **3** reaches slightly behind the region of the inseam **19** of the trousers **1**. Accordingly, the wearer becomes easier to take the knee-raised position when wearing the trousers **1**.

[0100] In other words, as described above, it is preferable that the stretchable material **3** greatly stretch at the inseam **19** of the trousers **1** when the wearer is in the knee-raised position. However, if the near-knee inner side region **15** stops at the region of the inseam **19** of the trousers **1**, the stretchable material **3** joined with the woven fabric cannot sufficiently stretch due to the interruption of the woven fabric. In contrast, in the trousers **1**, the near-knee inner side region **15** of the stretchable material **3** reaches slightly behind the region of the inseam **19** of the trousers **1**. Accordingly, the effect of the woven fabric becomes smaller and the stretchable material **3** sufficiently stretches at the region of the inseam **19** of the trousers **1**. Thus, the wearer can further easily take the knee-raised position.

[0101] Also, since the width of the stretchable material **3** gradually downwardly increases in the trousers **1**, the wearer can further easily take the knee-raised position.

[0102] In other words, when the wearer takes the knee-raised position as shown in FIG. **5**, the stretchable material **3** stretches most in the width direction at the inseam **19** in the near-knee inner side region **15**. The amount of stretch becomes upwardly smaller. In this manner, since the width of the stretchable material **3** gradually downwardly increases, the wearer can further easily take the knee-raised position.

[0103] Also, since the width of the stretchable material **3** is smaller on the upper side (the lumbar side), the stretchable material **3** and the back pockets **57** do not interfere with each other even when the back pockets **57** are provided on the hip region of the trousers **1**, the stretchable material **3**. Thus, the back pockets become easier to be placed.

[0104] Furthermore, the stretchable material **3** obliquely extends in a direction close to the horizon on the upper side of the trousers **1** (the lumbar, particularly the sacral region and vicinity thereof). Thus, the interference with the back pockets **57** can be further securely avoided.

[0105] Also, since the trousers **1** is provided with the stretchable material **3**, the wearer can easily bend the knees or the waist to open legs even when the trousers **1** stick to the skin of the legs of the wearer with sweat. In other words, in the case of conventional trousers, if a wearer tries to make a movement such as to open legs with the trousers sticking to the legs of the wearer, slippage hardly occurs between the trousers and the skin of the legs. Thus, the trousers disturb the movement of opening the legs of the wearer. However, in the case of the trousers **1**, if the wearer tries to make a movement such as to open legs with the trousers **1** sticking to the legs of the wearer, slippage hardly occurs between the trousers **1** and the skin of the legs, but the stretchable material **3** stretches as needed, so that the trousers do not disturbs the movement of opening the legs of the wearer.

[0106] Also, in the case of the trousers **1**, even when the wearer squats down with the knees or the like bent from the standing state, the stretchable material **3** stretches as needed. Accordingly, there is no need to lift up the trousers (the conventional trousers) as shown in FIG. **16**. And, even when the both hands of the wearer are blocked with a luggage or the like, the wearer can easily take in the squat-down position.

[0107] Here, the stretch or the like of the skin of the wearer (the worker) of the wearer **1** is described.

[0108] When the worker takes the squat-down position such as tiptoe squat or knee raising (takes the squat-down position from the standing position), the change in the body dimensions occurs. This change in the dimensions occurs due to extension and contraction of the skin by bending and stretching of mainly the hip joint and the knee joint, the contraction of muscle, and movement of bones. Main positions of the squat-down position are "bending and stretching," "tiptoe squat," and "leg-crossed sit." The worker works on the roof while keeping the squat-down position for a long period of time.

[0109] In the squat-down position, the bending movement of the joints of the legs is at least performed. In the tiptoe squat position, the legs perform outward turn and abduction movement in addition to the bending movement of the legs.

[0110] The bones particularly related to the squat-down position include the pelvis, the femur, the patella, and the tibia. Portions which connect these bones related to the squat-down position and which are movable are joints. The joints particularly related to the squat-down position are the hip joint which is a connected portion of the pelvis and the femur, and the knee joint which is a connected portion of the femur and knee cap.

[0111] The movement of the joints in the squat-down motion (the motion changing from the standing position to the squat-down position) is described. As for the legs, when squatting down, the hip joint and the knee joint are bent. Also, in the squat-down movement along with the opening-leg movement such as the tiptoe squat, the hip joint outwardly turns and abducts.

[0112] The bending of the hip joint is a movement to bend the leg thrusting forward. When the worker is standing (when in the standing position), if the knees are not bent, the leg (the thigh area) can be bent at an angle up to approximately 90° to the body (the belly part and the chest part). Also, when the worker is standing (when in the standing position), if the knees are bent, the leg (the thigh area) can be bent at an angle up to approximately 125° to the body (the belly part and the chest part).

[0113] The bending in the hip joint is a movement in which the lower leg part (a part of the leg below the shin) is bent backwardly putting out to the thigh area and can be bent at an angle up to approximately 130°.

[0114] The abduction in the hip joint is a movement in which the thigh area is opened so that the thigh area moves apart from the body axis. The thigh area can be bent by an angle up to approximately 45° toward the side with respect to the body axis (the trunk of the body).

[0115] The outward turn in the hip joint is a movement in which the thigh area is turned (rotated) about the axis of the thigh area and the thigh area can be bent by an angle up to approximately 20°.

[0116] The squat-down movement of the worker is made in combination of the bending movements of the hip joint and the knee joint, the abduction movement of the hip joint, and the outward turn of the hip joint.

[0117] The movement of the muscles in the squat-down motion (the motion changing from the standing position to the squat-down position) is described. The muscles acting in the squat-down movement are muscles of the legs.

[0118] More specifically, when the hip joint is bent, the psoas major muscle, the iliac muscle, the rectus femoris muscle, and the sartorius muscle are contracted. When the hip joint is bent, the gracilis muscle, the sartorius muscle, the biceps femoris muscle, the semimembraneous muscle, the semitendinosus muscle, the gastrocnemius muscle, and the popliteus muscle are contracted. When the hip joint is abducted, the gluteus medius muscle, the gluteus minimus muscle, and the sartorius muscle act, while when the hip joint is outwardly turned, the gluteus maximus muscle, the piriformis muscle, the sartorius muscle, and the biceps femoris muscle act.

[0119] As described above, the kinds of motions, bones, joints, and muscles in the squat-down movement are described. However, the dimensions of the body surface changes according to the motions in the squat-down movement. This is because the body surface U (the skin of the worker) is extended and the position is changed by the movement of the bones, the contraction of the muscles, and bending of the joints in the squat-down movement.

[0120] Here, the change in the body surface is described.

[0121] Due to the bending movement, the abduction, and outward turn movement of the hip joint and the bending movement of the knee joint, the muscles of the thigh area (the psoas major muscle, the iliac muscle, the rectus femoris muscle, and the sartorius muscle) are contract. As a result, protrusion of the muscles occurs and the circumference of the thigh area (the outer circumferential length; the diameter of the thigh area) becomes larger. Furthermore, the tendon protrudes on the back portion of the knee. Accordingly, the dimension of the knee portion also becomes larger.

[0122] When the hip joint is bent, the pelvis and the femur are moved (turned). When the knee joint is bent, movements (positional changes) in the pelvis, the femur, the patella, and the tibia in the knee joint occur. When the hip joint is abducted, the femur moves in a direction away from the body axis. When the hip joint is outwardly turned, the patella moves to the side of the body.

[0123] The skin of the hips extends due to the bending of the hip joint. The surface of the knee portion protrudes and the skin of the front portion of the knee extends due to the bending of the knee joint. The skin from the crotch portion to the inner side of the knee extends due to the abduction of the hip joint. The skin from the front portion of the knee to the crotch portion extends due to the outward turn of the hip joint.

[0124] The change in the above-described extension of the skin in the knee-raised position (the change occurred when moving from the standing position to the knee-raised). Note that, the knee-raised position is shown in FIG. **5**, FIG. **6**, FIG. **9**(*a*), FIG. **12**(*a*), FIG. **14**, and FIG. **15**. In the knee-raised position, one hip joint is opened and the other knee touches the roof. In FIG. **9**, FIG. **12**, FIG. **14**, and FIG. **15**, the worker bends the left knee on the roof.

[0125] FIG. **8** (*a*) is a drawing in which the thigh areas and the belly are seen from the front side when the wearer is standing. Also, FIG. **8**(*a*) shows A to D and A' to D' of skin parts (the parts on the front and inner sides in the thigh areas including the femur triangles). FIG. **8**(*b*) is an exploded drawing of the parts A to D and A' to D' of the skin.

[0126] FIG. **9**(*a*) is a drawing in which the thigh areas and the belly are seen from the front side when the wearer takes the knee-raised position. Also, FIG. **9**(*a*) shows A to D and A' to D' of skin parts (the parts on the front and inner sides in the thigh areas including the femur triangles). FIG. **9**(*b*) is an exploded drawing of the parts A to D and A' to D' of the skin.

[0127] FIG. **11**(*a*) is a drawing in which the legs and the belly are seen from the front side when the wearer is standing. Also, FIG. **11**(*a*) shows E to G and E' to G' of skin parts (the lumbar and the hip part). FIG. **11**(*b*) is an exploded drawing of the skin parts E to G and E' to G'.

[0128] FIG. **12**(*a*) is a drawing in which the legs and the belly are seen from the front side when the wearer is in the knee-raised position. Also, FIG. **12**(*a*) shows E to G and E' to G' of skin parts (the lumbar and the hip part). FIG. **12**(*b*) is an exploded drawing of the skin parts E to G and E' to G'.

[0129] The stretch of the skin parts on the front side of the wearer is described.

[0130] As shown in FIG. **10**, when the part A shown in FIG. **8**(*the* right side part in the standing position) and the part A shown in FIG. **9** (the right side part in the knee-raised position) are compared with each other, the area becomes approximately 200% (precisely, 196.7%) with the movement from the standing position to the knee-raised position. Also, with the movement from the standing position to the knee-raised position, the length of the part A (the dimension in the lateral direction in FIG. **9**(*b*)) becomes approximately doubled.

[0131] When the part B shown in FIG. **8** (the right side part in the standing position) and the part B shown in FIG. **9**(*the* right side part in the knee-raised position) are compared with each other, the area becomes approximately 80% (precisely, 80.1%) with the movement from the standing position to the knee-raised position.

[0132] When the part C shown in FIG. **8** (the right side part in the standing position) and the part C shown in FIG. **9**(*the* right side part in the knee-raised position) are compared with each other, the area shows almost no change (precisely, it becomes 104.3%) even with the movement from the standing position to the knee-raised position.

[0133] When the part D shown in FIG. **8** (the right side part in the standing position) and the part D shown in FIG. **9**(*the* right side part in the knee-raised position) are compared with each other, the area becomes approximately 140% (precisely, 136.7%) with the movement from the standing position to the knee-raised position.

[0134] When the part A' shown in FIG. **8** (the left side part in the standing position) and the part A' shown in FIG. **9**(*the*

left side part in the knee-raised position) are compared with each other, the area becomes approximately 160% (precisely, 162.7%) with the movement from the standing position to the knee-raised position. Also, with the movement from the standing position to the knee-raised position, the length (the dimension in the lateral direction in FIG. **9**(*b*)) becomes approximately 1.7 to 1.8 times.

[0135] When the region B' shown in FIG. **8**(*the* left side part in the standing position) and the part B' shown in FIG. **9** (the left side part in the knee-raised position) are compared with each other, the area becomes approximately 90% (precisely, 85.9%) with the movement from the standing position to the knee-raised position.

[0136] When the part C' shown in FIG. (the left side part in the standing position) and the part C' shown in FIG. **9**(*the* left side part in the knee-raised position) are compared with each other, the area becomes approximately 110% (precisely, 114. 8%) with the movement from the standing position to the knee-raised position.

[0137] When the part D' shown in FIG. **8** (the left side part in the standing position) and the part D' shown in FIG. **9**(*the* left side part in the knee-raised position) are compared with each other, the area becomes approximately 140% (precisely, 142.9%) with the movement from the standing position to the knee-raised position.

[0138] The stretch of the skin parts on the back side of the wearer is described.

[0139] As shown in FIG. **13**, when the part E shown in FIG. **11**(*the* left side part in the standing position) and the part E shown in FIG. **12**(*the* left side part in the knee-raised position) are compared with each other, the area becomes approximately 130% (precisely, 134.5%) with the movement from the standing position to the knee-raised position.

[0140] When the part F shown in FIG. **11** (the left side part in the standing position) and the part F shown in FIG. **12** (the left side part in the knee-raised position) are compared with each other, the area becomes approximately 120% (precisely, 120.3%) with the movement from the standing position to the knee-raised position.

[0141] When the part G shown in FIG. **11** (the left side part in the standing position) and the part G shown in FIG. **12**(*the* left side part in the knee-raised position) are compared with each other, the area becomes approximately 220% (precisely, 222.5%) with the movement from the standing position to the knee-raised position. Also, with the movement from the standing position to the knee-raised position, the length (the dimension in the vertical direction in FIG. **12**(*b*)) becomes approximately 2.2 times. Furthermore, as it can be seen from the diamond shaped slit in the part G shown in FIG. **11**(*b*) from the "V"-letter shaped cutout in the part G shown in FIG. **12**(*b*), the form of the part G (the three-dimensional form) is also changed.

[0142] As can be seen from FIG. **11**(*b*) and FIG. **12**(*b*), the stretches of the skin are substantially equal to each other on the left and right sides on the back side of the wearer.

[0143] When the worker is in the squat-down position, particularly in the position with open legs, the skin of the wearer is stretched (contracted) as described above. Accordingly, to obtain a sense of comfort when the wearer of the trousers **1** takes the squat-down position, the stretchable material (the stretchable member) has to be provided according to the aforementioned stretch and contraction of the skin.

[0144] Since the trousers **1** is provided with the stretchable material **3** in the thigh region (thing area) of the front body, the stretchable material **3** stretches following the stretch of the skin parts A, A' sown in FIG. **8** and FIG. **9**. Thus, the sense of tightness or tight fit in the thigh portion can be prevented and the sense of comfort can be secured.

[0145] In the trousers **1**, the stretchable material **3** provided on the back side of the lumbar also stretches in the back body, and the stretchable material **3** stretches following the stretch of the skin parts G, G' shown in FIG. **11** and FIG. **12**. Thus, the sense of tightness or tight fit on the backside of the lumbar can be prevented and the sense of comfort can be secured.

[0146] And now, in FIG. **14** and FIG. **15**, the skin parts A, A' and the skin part G, G' are not overlapped with the stretchable material **3**. However, since the stretchable material **3** stretches along with the stretch of the parts A, A' and G, G', the sense of tightness or tight fit can be prevented.

[0147] For example, the wearer of the trousers **1** wears underwear. Accordingly, the skin of the wearer does not come into direct contact with the parts A, A' and the parts G, G' of the trousers **1**. In addition, even when the wearer sweats, the trousers **1** does not stick to the skin of the wearer (the parts A, A' or the parts G, G'). Accordingly, even though the parts A, A' and the parts G, G' are not overlapped with the stretchable material **3**, the stretchable material **3** stretches in place of the regions of the trousers **1** for the parts A, A' or the parts G, G' (the regions formed of the cloth of the trousers **1** which overlap with the parts A, A' and the parts G, G'), when the wearer is in the squat-down position. Thus, the sense of tightness or tight fit can be prevented.

[0148] Furthermore, even though the wearer of the trousers **1** keeps the squat-down position for a long period of time, the stretchable material **3** stretches as needed and accordingly the blood vessel of the legs are hardly compressed. Thus, there is no possibility of losing balance when standing up. Also, when the wearer of the trousers **1** is in the squat-down position, the stretchable material **3** stretches as needed, which does not cause the sense of tightness. Accordingly, the wearer can smoothly take the squat-down position and there is no possibility of losing the balance when moving to take the squat-down position. As a result, the occurrence of accidents of falling from the roof can be suppressed.

[0149] In addition, with the trousers **1**, when the wearer of the trousers **1** climbs a ladder with the legs being bent and lifted, the stretchable material **3** stretches as needed. Thus, the sense of tightness due to the bending of the legs can be prevented. As a result, the accidents of falling from the roof can be suppressed.

[0150] Furthermore, with the trousers **1**, the stretchable material **3** stretches as needed when the wearer of the trousers **1** takes the squat-down position. Accordingly, there is not such a case that the belly portion is not compressed by a belt and the backbone is compressed with the compression. Thus, the occurrence of the strained back due to the compression of the belly portion or the backbone can be avoided.

[0151] And now, the above description is about the trousers (lower wear), but the stretchable material **3** may be provided in an overall **61**. In other words, in the overall **61** including an upper wear portion (a jacket portion) **65** and trousers portion **63** (see, FIG. **17** and FIG. **18**), any change may be made in such a manner, for example, the trousers portion **63** is formed as similar to the trousers **1** or a body of the overall (the overall shown in FIG. **17** and FIG. **19**) is provided with cargo pockets **59**. FIG. **18** is an exploded drawing of the overall **61**. The reference signs same as those of the trousers **1** shown in FIG. **4** are given to denote portions of the trousers portion **63**.

[0152] The overall **61** in which the trousers portion **63** is formed similarly to the trousers **1** is symmetrically formed similarly to the trousers **1**.

[0153] Also, the overall **61** (the upper wear portion **65**) is provided with a belt-like stretchable material (an upper wear shoulder front stretchable material) **67**. The upper wear shoulder front stretchable material **67** is a portion from a neck base diagonally-front region **69** to an armpit front region **73** via an arm base front region **71** of a wearer and constitutes a part of the upper wear portion **65**.

[0154] The neck base diagonally-front region **69** is a region for a part that is at the neck base of the wearer (a boundary between the neck and a trunk or a portion slightly below the boundary) and is located diagonally in front. The arm base front region **71** is a region for a part that is at an arm base of the wearer (a boundary between the arm and the trunk) and is located on the front side. The armpit front region **73** is a region for a part that is at the armpit of the wearer and is located on the front side.

[0155] More specifically, the overall **61** is symmetrically formed. Accordingly, the upper wear shoulder front stretchable material **67** includes the upper wear shoulder right front stretchable material **67**R and the upper wear shoulder left front stretchable material **67**L. Then, the upper wear shoulder right front stretchable material **67**R is provided extending from the neck base diagonally-right-front region **69**R to the armpit right front region **73**R via the arm base right front region **71**R.

[0156] The neck base right front region **69**R is a region for a part that is at the neck base of the wearer and is located diagonally in right front of the wearer. The arm base right front region **71**R is a region for a part that is at the right arm base of the wearer and located on the front side of the wearer (substantially the center of the right arm base in the vertical direction). The armpit right front region **73**R is a region for the front side part of the right armpit of the wearer.

[0157] The longitudinal direction of the upper wear shoulder right front stretchable material **67**R is a direction in which the upper wear shoulder right front stretchable material **67**R is extended (the direction passing from the neck base diagonally-right-front region **69**R to the armpit right front region **73**R via the arm base right front region **71**R). The width direction of the upper wear shoulder right front stretchable material **67**R is a direction substantially perpendicular to the longitudinal direction of the upper wear shoulder right front stretchable material **67**R.

[0158] The width of the upper wear shoulder right front stretchable material **67**R is not constant, for example, but decreases at the neck base diagonally-right-front region **69**R and gradually increases toward the arm base right front region **71**R, and then gradually decreases toward the armpit right front region **73**R. In other words, a value of the width of the upper wear shoulder right front stretchable material **67**R smoothly changes, and is small on the both ends of the longitudinal direction and is large on the center portion of the longitudinal direction.

[0159] The upper wear shoulder left front stretchable material **67**L is provided to be symmetrical with the upper wear shoulder right front stretchable material **67**R.

[0160] Also, the overall **61** (the upper wear portion **65**) is provided with a belt-like stretchable material (the upper wear shoulder back stretchable material) **75**. The upper wear shoulder back stretchable material **75** is a portion passing from a neck base diagonally-back region **77** to an armpit back portion **81** via an arm base back region **79** of a wearer and constitutes a part of the upper wear portion **65**.

[0161] The neck base diagonally-back region **77** is a region for a part that is at the neck base (a boundary between the neck and a trunk or a portion slightly below the boundary) and is located diagonally in back.

[0162] The arm base back side region **79** is a region for a part that is at an arm base and is located on the back side.

[0163] The armpit back region **81** is a region for a part that is at the armpit and is located on the back side.

[0164] More specifically, the overall **61** is symmetrically formed. Accordingly, as similar to the upper wear shoulder front stretchable material **67**, the upper wear shoulder back stretchable material **75** also includes the upper wear shoulder right back stretchable material **75**R and the upper wear shoulder left back stretchable material **75**L. Then, the upper wear shoulder right back stretchable material **75**R is provided extending from the neck base diagonal right back region **77**R to the armpit right back region **81**R via the arm base right back region **79**R.

[0165] The neck base right back region **77**R is a region for a part that is at the neck base of the wearer and is located diagonally in right back of the wearer. The arm base right back region **79**R is a region for a part that is at the right arm base of the wearer and is located on the back side of the wearer (substantially the center of the right arm base in the vertical direction). The armpit right back region **81**R is a region for the back side part of the right armpit of the wearer.

[0166] The longitudinal direction of the upper wear shoulder right back stretchable material **75**R is a direction in which the upper wear shoulder right back stretchable material **75**R is extended (the direction passing from the neck base diagonal right back region **77**R to the armpit right back region **81**R via the arm base right back region **71**R). The width direction of the upper wear shoulder right back stretchable material **75**R is a direction substantially perpendicular to the longitudinal direction of the upper wear shoulder right back stretchable material **75**R.

[0167] The width of the upper wear shoulder right back stretchable material **75**R is not constant, for example, but as similar to the upper wear shoulder right front stretchable material **67**R, and increases at the center of the longitudinal direction and decreases on the both ends.

[0168] The upper wear shoulder left back stretchable material **75**L is provided so as to be symmetrical with the upper wear shoulder right back stretchable material **75**R.

[0169] Note that in the overall **61**, the upper wear shoulder right front stretchable material **67**R (the upper wear shoulder left front stretchable material **67**L) and the upper wear shoulder right back stretchable material **75**R (the upper wear shoulder left back stretchable material **75**L) are not connected with each other (are separated at the armpit portion of the wearer), but the upper wear shoulder right front stretchable material **67**R (the upper wear shoulder left front stretchable material **67**L) and the upper wear shoulder right back stretchable material **75**R (the upper wear shoulder left back stretchable material **75**L) may be connected with each other (may be connected at the armpit portion of the wearer).

[0170] Also, one or both of the upper wear shoulder front stretchable material **67** and the upper wear shoulder back stretchable material **75** may be excluded. FIG. **19** is a drawing showing the overall **61** whose upper wear shoulder front stretchable material **67** is omitted, which corresponds to FIG. **17**.

[0171] Also, the overall **61** (the upper wear portion **65**) is provided with a belt-like stretchable material (the upper wear trunk stretchable material) **83**. The upper wear trunk stretchable material **83** is a portion passing from an upper lumbar region **85** to a diagonally-front belly region **89** via a side belly region **87** and constitutes a part of the upper wear **65**.

[0172] The upper lumbar region **85** is a region for the lumbar of the wearer (an upper part of the lumbar). The side belly region **87** is a region for a side belly part of the wearer. The diagonally-front belly region **89** is a region for a diagonally-front belly part of the wearer.

[0173] More specifically, since the overall **61** is formed symmetrically, the upper wear trunk stretchable material **83** is provided extending from the diagonally-right-front belly region **89**R, the right side belly region **87**R, the upper lumbar region **85**, the left side belly region **87**R, and the diagonally-left-front belly region **89**L in this order.

[0174] The diagonally-right-front belly region **89**R is a region for apart away from the navel of the wearer to the right by a predetermined distance (for example, approximately 10 cm). The right side belly region **87**R is a right region for the right belly of the wearer (a part located in substantially the same height direction the naval and in the boundary between the belly and the back). The upper lumbar region **85** is a region for a part right behind the wearer on the upper side of the lumbar of the wearer.

[0175] The left side belly region **87**L is a left region for the left belly of the wearer (a part located in substantially the same height direction the naval and in the boundary between the belly and the back). The diagonally-left-front belly region **89**L is a region for a part away from the navel of the wearer to the left by a predetermined distance (for example, approximately 10 cm).

[0176] The longitudinal direction of the upper wear trunk stretchable material **83** is a direction provided by extending the upper wear trunk stretchable material **83** (the direction from the diagonally-right-front belly region **89**R, to the right side belly region **87**R, the upper lumbar region **85**, the left side belly region **87**L, and the diagonally-left-front belly region **89**L, in this order). The width direction of the upper wear trunk stretchable material **83** is a direction substantially perpendicular to the longitudinal direction of the upper wear trunk stretchable material **83**.

[0177] The width of the upper wear trunk stretchable material **83** is not constant, for example, but as similar to the upper wear shoulder right front stretchable material **67**R, and increases at the center of the longitudinal direction and decreases on the both ends.

[0178] If the wearer and the overall **61** are seen in the planar view when the wearer wears the overall **61**, the upper wear trunk stretchable material **83** is in a "C"-letter shape with the front side of the wearer being open.

[0179] Note that the upper wear trunk stretchable material **83** and the stretchable material **3** (**3**R, **3**L) of the trousers portion **63** are spaced apart from each other with the waist band cloth **91** being therebetween, but the upper wear trunk stretchable material **83** and the stretchable material **3** of the trousers portion **63** may be connected with each other. In other words, the pants-side stretchable material **3** and the upper wear trunk stretchable material **83** may be connected with each other at the region **93** shown in FIG. **17**(*b*) (the region with a predetermined width narrower than the width of the lumbar). Furthermore, the pants-side stretchable material **3** and the upper wear trunk stretchable material **83** may be formed of an integral stretchable material.

[0180] The overall **61** is further described by referring to FIG. **18**. Note that only right side portion of the overall **61** is exploded in FIG. **18**. Also, the cloth shown in FIG. **18** in which double semi-circle **95** is drawn (including the stretchable material) is formed symmetrical with respect to a line segment **97** in which the double semi-circle **95** is drawn.

[0181] In other words, in the overall **61**, the trousers side stretchable material **3**, the waist band cloth **91**, an upper trunk portion stretchable material **83**, a back center body cloth **99**, and a collar cloth **101** are actually symmetrical with respect to the line segment **97**.

[0182] Also, the overall **61** is formed of cloths forming the right front body **103** (**103**R), the right upper sleeve cloth **105**(**105**R), the right lower sleeve cloth **107** (**107**R), and the trousers portion **63**, and each cloth shown in FIG. **18** and each cloth in symmetry thereof (each cloth on the left side) are sewed up together as needed to create the overall **61**.

[0183] And now, in the trousers **1** shown in FIG. **1** and the like, the left and right stretchable materials **3**R, **3**L are divided, and the left and right stretchable materials **3**R, **3**L are sewed up together to create the trousers **1**. However, in the trousers **1** shown in FIG. **1** and the like, the left and right stretchable materials **3**R, **3**L may be integrally formed without being divided.

[0184] Also, the upper wear trunk stretchable material **83** shown in FIG. **18** is integrally formed. However, the upper wear trunk stretchable material **83** shown in FIG. **18** may be divided into left and right parts, and the divided left and right upper wear trunk stretchable materials may be sewed up together to form the upper wear trunk stretchable material.

[0185] The overall **61** is provided with the upper wear shoulder front stretchable material **67** and the upper wear shoulder back stretchable material **75**, so that the upper wear shoulder front stretchable material **67** and the upper wear shoulder back stretchable material **75** stretch when the wearer moves the arms of the wearer. Thus, the arms can be easily moved.

[0186] Also, the overall **61** is provided with the upper wear trunk stretchable material **83**, so that the upper wear trunk stretchable material **83** stretches when the wearer bends the waist of the overall **61**. Thus, the waist can be easily moved.

[0187] Note that the overall **61** shown in FIG. **17** and the like are a long sleeve type, but the overall may be a short sleeve type or a sling type (a running type).

[0188] Also, in the overall **61**, the trousers portion **63** may be deleted and only the upper wear **65** is left, which may be used as an upper wear.

1. Trousers, comprising a stretchable material in a helical form with a predetermined width is provided in a portion of each of the trousers extending from a region corresponding to a lumbar of a wearer to a near-knee inner side region being a region corresponding to an inner side of a thigh area near the corresponding knee, via a region corresponding to an outside of the corresponding hip joint.

2. The trousers according to claim **1**, wherein the near-knee inner side region of the stretchable material reaches slightly behind an inseam region of each of the trousers.

3. The trousers according to claim **1**, wherein the width of the stretchable material gradually increases downwardly.

4-**9**. (canceled)

10. An overall comprising a stretchable material in a helical form with a predetermined width provide in a portion extend-

ing from a region corresponding to a lumbar of a wearer to each near-knee inner side region being a region corresponding to an inner side of a thigh area near the corresponding knee, via a region corresponding to an outside of the corresponding hip joint.

11. The overall according to claim **10**, wherein the near-knee inner side region of the stretchable material reaches slightly behind an inseam region of each trouser portion of the overall.

12. The overall according to claim **10**, wherein the width of the stretchable material gradually increases downwardly.

13. The overall according to claim **10**, further comprising a stretchable material in a belt form is provided in a portion extending from a region corresponding to a part located at a neck base of the wearer and diagonally in front, to a region corresponding to a part located at an armpit of the wearer and on a front side, via a region corresponding to a part located at an arm base of the wearer and on the front side.

14. The overall according to claim **10**, further comprising a stretchable material in a belt form is provided in a portion extending from a region corresponding to a part located at a neck base of the wearer and diagonally in back to a region corresponding to a part located at an armpit of the wearer and on a back side, via a region corresponding to a part located at an arm base of the wearer and on the back side.

15. The overall according to claim **10**, further comprising a stretchable material in a belt form is provided in a portion extending from the region corresponding to the lumbar of the wearer to a region corresponding to a diagonally-front belly part of the wearer via a region corresponding to a side belly part of the wearer.

16-21. (canceled)

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