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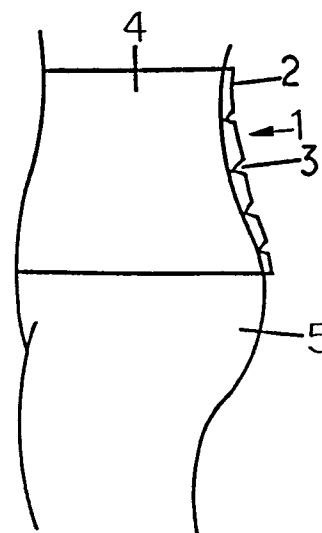
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**W-8000 München 5(DE)**(54) **Clothing and method of manufacturing the same.**

(57) The invention relates to a clothing having a bone or a stretch suppressing member for shaping up the body line fixed to the surface of a fabric for composing the clothing. The bone or the stretch suppressing member comprises a crosslinked polyurethane resin, which is provided as a crosslinkable polyurethane prepolymer to the fabric surface and the prepolymer is polymerized with accompanying crosslinking to be fixed on the fabric surface. This provides the clothing with bones or stretch suppressing members of cloth which are excellent in touch, superior in washability so that the bones or stretch suppressing members will not be peeled off by washing, reduced in manufacturing labor required, and excellent in productivity.



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## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to clothing which has a bone or stretch suppressing member for shaping up the form of the body affixed to the surface of a fabric composing the clothing and a method of manufacturing the same.

### Description of the Prior Art

Hitherto, a bone has been used in wire form, bar form or plate form and made of metal or synthetic resin possessing appropriate elasticity or stiffness in the foundation garments or the clothing in order to shape up a specific portion of the human body from the aesthetic point of view, or to prevent undesired movement (such as sliding up or down) of the clothes, or to protect a part of the body as in the corset or the like.

For example, in the clothing for emphasizing the aesthetic effect by shaping up the body line, such as the foundation garments, it is proposed to use clothing provided with a stretch suppressing member manufactured by applying a photosetting resin composition in a desired area, and irradiating with ultraviolet radiation or the like to harden the photosetting resin composition. This suppresses the stretchability of the fabric of the clothing so as to shape up the wearer by constraining superfluous flesh from swelling outward.

More specifically, for example in a brassiere, a wire-form bone made of stiff metal wire or synthetic resin in nearly arcuate form typically is inserted into a French seam space, which is sewn in the peripheral edge of the cup cloth by means of bias tape or other fabric, along the lower semiperipheral edge of the cup for receiving the breast. Especially in the brassiere, the bone is often used for the purpose of keeping the breast shapely or shaping it up from the aesthetic point of view.

In the girdle, for example, a bone in the shape of a metal plate or bar is used in the waist portion by insertion into a French seam space sewn in plural positions nearly in the longitudinal direction or in the direction oblique to the longitudinal direction similarly by means of bias tape or fabric. In such a girdle, the bone is often used mainly for the purpose of preventing it from sliding down, aside from the aesthetic purpose for shaping up the waist line.

In the tight slip or other body-fitting foundations, when the wearer of such pieces walks or moves, the portion of the tight slip corresponding to the lower half of the body often slides up, and in order to prevent such sliding up, wires or similar bones are sewn in similarly in the longitudinal

direction along both side lines of the tight slip or the like.

Besides, in the girdle or swimming suit, in order to constrain the abdomen from swelling outward, a stretch suppressing member such as the photosetting resin composition as mentioned above is applied to the abdomen area and hardened by photosetting. It is also known to use such stretch suppressing member in the hip area to lift the hips.

However, the bones used in the prior art are only inserted into the French seam space sewn in the fabric, and the bones are not directly affixed to the fabric. Therefore the bones move freely in the French seam space by the motion while wearing or by washing, and the bones may tear the fabric composing the clothing to get out. Besides, it takes much labor in sewing the French seam space, and it is difficult to reduce the cost.

To eliminate such shortcomings, it may be considered to compose the bone of synthetic resin and adhere it to the fabric with an adhesive, or compose the bone of thermoplastic resin and affix it to the fabric by thermal fusion. In these cases, however, the adhesive permeates through the fabric and is exuded and solidified at the opposite side of the fabric, or the thermoplastic resin is melted by heating for thermal fusion to lower the viscosity and partly exudes to the opposite side of the cloth to solidify. Therefore the touch is completely spoiled and uncomfortable.

Furthermore, when using a stretch suppressing member of the fabric, a synthetic resin solution or a photosetting resin composition is applied to the fabric and dried or hardened by photosetting, but at the moment of application these solutions exude to the opposite side of the fabric, and the same problems occur.

## SUMMARY OF THE INVENTION

An object of the invention is to present clothing provided with a bone or stretch suppressing member of fabric, which is excellent in touch, superior in washability so as not to be peeled off by washing, has decreased manufacturing labor requirements, and can be produced with high productivity.

To achieve the above object, the invention relates to clothing having a bone or a stretch suppressing member for shaping up the body line which is fixed to the surface of a fabric for composing the clothing, wherein the bone or the stretch suppressing member comprises a crosslinked polyurethane resin, which is provided to the fabric surface as a crosslinkable polyurethane prepolymer. The prepolymer is polymerized and crosslinked to be fixed on the fabric surface.

According to the invention, it is preferable that the clothing be foundation garments or swimming

suits.

Also according to the invention, it is preferable that a part of the crosslinked polyurethane resin for composing the bone or the stretch suppressing member gets into the space of weaving and knitting of the fabric, but does not exude to the opposite side of the fabric.

The invention further relates to a method of manufacturing clothing having a bone or a stretch suppressing member for shaping up the body line composed of a crosslinked polyurethane resin, fixed to a predetermined area of the surface of a fabric composing the closing, wherein a polyurethane resin prepolymer synthesized from an isocyanate compound and polyol is applied to the predetermined area of the surface of the fabric, and heated to achieve crosslinking polymerization.

In the above mentioned method of the invention, it is preferable that the clothing is foundation garments or swimming suits.

Also in the method of the invention, it is preferable that the viscosity of the polyurethane resin prepolymer is in a range of 200 poise to 700 poise.

Further in the method of the invention, the isocyanate compound is at least one diisocyanate compound selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, and their derivatives, and the polyol is at least one polyol selected from the group consisting of polymethylene glycol polymer; and a copolymer of polymethylene glycol and dicarboxylic acid having polymethylene glycol at both ends.

The clothing of the invention has a bone or a stretch suppressing member for shaping up the body line fixed to the surface of a fabric composing the clothing. The bone or the stretch suppressing member is composed of a crosslinked polyurethane resin, and moreover the bone or the stretch suppressing member is made from a crosslinkable polyurethane prepolymer. The crosslinkable polyurethane prepolymer is applied on the surface of the fabric and fixed by crosslinking polymerization. Therefore, the prepolymer of the crosslinkable polyurethane resin possesses a relatively convenient viscosity or property for processing. For example when applying a polyurethane resin on the surface of a fabric, it is usually injected from the nozzle, and it can be easily injected from the nozzle. When laminated or layered on the fabric, a part of it somewhat impregnates the space of weaving or knitting of the fabric to enhance the adhesion, but does not exude to the opposite side of the fabric. Moreover, when heated in this state to achieve crosslinking polymerization, the viscosity is further raised to be finally solidified, and therefore unlike the case of using thermoplastic resin, it is not melted by heating to lower the viscosity, and

exudation to the opposite side of the fabric is prevented more securely, so that the touch will be excellent. Still more, it is solidified on the fabric by crosslinking polymerization, and it is firmly adhered and solidified on the fabric, so that it also excels in washability. Still more, no adhesive is particularly used for fixing the bone or the stretch suppressing member for shaping up the body line to the fabric surface, nor is it affixed by sewing, but only a prepolymer is injected from, for example, a nozzle onto the fabric, applied in a proper shape, and heated to achieve crosslinking polymerization, so that it does not require much labor and is excellent in productivity.

Besides, the polyurethane resin may be finished easily from a stiff material to a relatively pliable property by properly adjusting the material composition or hardener or the like, and it may be easily used differently depending on the type of the clothing to be applied, or location or purpose.

In the invention, it is particularly preferred that the clothing be foundation garments or swimming suits. They particularly have the function for shaping up the body line and are likely to slide up or down on the wearer, and therefore the merits of the invention maybe effectively utilized.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a perspective view of an example of the shape of a bone comprising polyurethane resin of the invention.

Fig. 2 shows a partially cut-away perspective view of an example of shape of a bone in a plate bar form of the invention.

Fig. 3 shows a partial side view of a corset being worn for protecting the waists in one of embodiment of the invention.

Fig. 4 shows a plan view of an example of the shape of a bone comprising polyurethane resin of the invention.

Fig. 5 shows a sectional view of an example of the shape of a bone comprising polyurethane resin of the invention.

Fig. 6 shows a schematic view of the main parts of a brassiere in one embodiment of the invention.

Fig. 7 shows a schematic view of the main parts of a brassiere in another embodiment of the invention.

Fig. 8 shows a schematic view of the main parts of a long line brassiere in one embodiment of the invention.

Fig. 9 shows a schematic view of the main parts of a long line brassiere in another embodiment of the invention.

Fig. 10 shows a schematic view of the main parts of a tight slip in one embodiment of the

invention.

Fig. 11 shows a schematic view of the main parts of a three-in-one in one embodiment of the invention.

Fig. 12 shows a schematic view of the main parts of a girdle in one embodiment of the invention.

Fig. 13 shows a schematic view of the main parts of a waist nipper in one embodiment of the invention.

Fig. 14 shows a perspective view of a swimming suit in one embodiment of the invention.

Fig. 15 shows a perspective view of an example of a girdle in one embodiment of the invention.

Fig. 16 shows a schematic perspective view of the girdle in Fig. 15 from behind.

#### DETAILED DESCRIPTION OF THE INVENTION

Practical examples of clothing of the invention include brassiere, long line brassiere, tight slip, girdle, waist nipper, three-in-one, body suit, braslip, leotard, dress with breast cups, corset, swimming suit, evening dress, and suit etc., but the invention is not limited to these examples only. The invention may be applied preferably in any clothes desired to have a body shaping-up effect, clothing deformation preventive effect, clothing wrinkle preventive effect, and the like, or in clothes which are likely to move while wearing, such as sliding up or down.

Fig. 1 is a perspective view showing an example of the shape of a bone comprising polyurethane resin used in the invention. Numeral 1 denotes a bone and 2 represents polyurethane resin. This bone is shaped in an arc, and is preferably applied in the brassiere or the clothing having cups for accepting breasts. Of course, depending on the type of clothing or the location applied, the shape of the bone may be freely formed as desired, including wire form, plate form, and bar form, or the shape in the longitudinal direction may not be always an arc, but may be nearly a straight form depending on the purpose. Moreover, the sectional shape and the shape in the lengthwise direction may be properly formed depending on the purpose, application and location, and the shown shape is not limitative. For example, Fig. 2 shows a partial perspective view of a bone in a plate bar form, and as in Fig. 2 the flexibility may be further enhanced by disposing a nearly V-shaped groove 3 in the direction substantially perpendicular to the longitudinal direction of the bone 1. In Fig. 2, numeral 2 also denotes polyurethane resin.

For example, when such a bone is used in the corset for protecting the waist as shown in Fig. 3 (a partial sectional view showing the state of wearing the corset for protecting the waist), the wearer can

move the body somewhat to the back, but when bent backward, the groove 3 is closed, and the corset prevents further bending backward. This is preferably used in the corset for lumbago, for example. In Fig. 3, numeral 1 is bone, 2 is polyurethane resin, 3 is nearly V-section groove, and 4 is a corset main body.

Fig. 4 shows a plan view of a bone of nearly arcuate form, and as shown herein the flexibility may be offered by disposing a groove 3 at a proper position. In Fig. 4, numeral 1 denotes a bone, 2 represents polyurethane resin, and 3 is a V-shaped notch.

Fig. 5 is a sectional view, taken in a direction perpendicular to the longitudinal direction, of another example of a bone. Numeral 1 is a bone, 2 is polyurethane resin, and 3 is a groove provided along the lengthwise direction of the bone 1.

As shown in the few examples above, the shape of the bone is not limited to a simple plate form, bar form or wire form, but may be any other form depending on the need (this holds true also in other embodiments explained below).

Fig. 6 is a schematic view of the main parts of a brassiere of the invention having a bone 61 made of polyurethane resin fitted in the cup peripheral edge part. In this example, the bone 61 is fixed in the peripheral edge part approximately at the lower side of the brassiere cups, and when the bone is located at such position, the breasts are kept shapely from the aesthetic point of view, or the bone is used for shaping up the body line. As required, moreover, in order to prevent the breasts from moving or swelling to the sides, the bone also may be disposed along the upper side part as indicated by a bone 62. A bone 63 also may be located at the indicated position in order to prevent back cloth 64 from shrinking in the widthwise direction, prevent rounding by washing to deform or impair the appearance, or prevent the garment from becoming hard to wear.

These bones may be formed and fixed to a predetermined position on the fabric of the clothing by discharging prepolymer of two-component polyurethane resin from a proper nozzle, and heating to achieve crosslinking polymerization. As the apparatus for discharging polyurethane resin prepolymer or the like from nozzle while heating, the hand gun is used generally, but other apparatus or methods may be employed as far as the object of the invention is achieved.

Fig. 7 is schematic view of main parts showing a strapless type brassiere of one embodiment of the invention having a bone 71 fitted in the side parts approximately in the vertical direction. It is preferred to locate the bone in this position in order to prevent back cloth 72 from shrinking in the widthwise direction by washing, prevent rounding

to impair the appearance, or prevent the garment from becoming hard to wear.

As desired, moreover, by disposing a bone 73 along the upper edge portion of the cups, the brassiere is prevented from sliding down, or if necessary, by disposing a bone 74 along the upper and lower edges of the back cloth 72, prevention of shrinkage or rounding of the back cloth may be further reinforced.

Fig. 8 is a schematic view of the main parts showing a long line brassiere having a bone of the invention. A bone 81 is adhered to the peripheral edge portion nearly at the lower side of the cups of the long line brassiere. This is the bone intended to keep the breasts shapely from an aesthetic point of view, whereas the bone 82 is an example of one intended for preventing a back cloth 84 from shrinking in the widthwise direction, rounding to impair the appearance, or making it hard to wear, and for preventing the body part cloth 83 from sliding upward while being worn to form wrinkles.

Fig. 9 is a schematic view of the main parts showing a long line brassiere of a different type having bones of the invention. Bones 91, 92, 93, 94 are provided for the purpose of preventing the long line brassiere from shrinking in the vertical direction to impair the appearance or make it hard to wear, and also preventing the upper part from sliding down or the lower part from sliding up while being worn to form wrinkles. The bones 91, 92 also play the role of keeping the breasts shapely.

Fig. 10 is a schematic view of main parts showing a tight slip having a bone of the invention. In this embodiment, a bone 101 is disposed at both sides for the purpose of preventing the lower part of the tight slip from sliding up gradually while being worn to form wrinkles. Furthermore, as required, a bone 102 may be provided along the lower edge portion of the breast receiving part to keep the breasts shapely.

Fig. 11 is a schematic view of the main part showing a three-in-one having bones of the invention. Bones 111, 112 are provided to the lower side from beneath the breast receiving part, and a bone 113 is provided at the side. These bones are intended to preventing the upper part from sliding down and the lower part from sliding up while being worn.

Fig. 12 is a schematic view of essential parts showing a girdle having bones of the invention. Bones 122, 123 are located obliquely on the waist line or at its upper position, and a bone 121 is provided at the side above and below across the waist line. These bones are intended to prevent wrinkling due to sliding-down of the upper part while being worn.

Fig. 13 is a schematic view of the main parts showing a waist nipper having bones of the inven-

tion. Bones 131, 132 are disposed in the vertical direction in a form of squeezing the waist line at the abdomen part, and a bone 133 is disposed in the vertical direction similarly to squeeze the waist line at the side. These bones are intended to prevent the upper part from sliding down and the lower part from sliding up while being worn so as not to form wrinkles, and to shape up the waist line.

Several examples of the clothing having the bones of the invention are demonstrated herein, but the invention is not limited to these embodiments alone.

In the another feature of the invention, the stretch suppressing member is applied in corresponding portions of the clothing for confining the elongation of predetermined specific portions of the clothing, controlling the stretchability or elasticity for constraining the superfluous flesh from swelling outward, or shaping up the body line aesthetically.

Usually, a thin coating of polyurethane is fixed on the fabric of clothing in a film form. The stretch suppressing member is not required to have such a high stiffness as compared with the bone, and the film form means a relatively thin thickness, and it is not always necessary to be a continuous flat sheet, but it may also contain various patterns in consideration of the design of the clothing.

As in the examples shown in Fig. 14 to Fig. 16, the stretch suppressing force may be partially intensified or weakened by varying the density of the pattern of the polyurethane resin.

Fig. 14 is a perspective view of a swimming suit provided with a stretch suppressing member in an embodiment of the invention, and the portion indicated by numeral 141 is the area with stretch suppressing member composed of polyurethane in a pattern form. The resin portion in the lower abdomen part is wider in area and the resin is provided densely, and as going upward, the resin area becomes smaller in pattern, that is, the resin is sparser.

Accordingly, swelling of the lower abdomen part is sufficiently constrained, and the upper abdomen part is constrained from swelling with a certain force, but it is not necessary to constrain as firmly as in the lower abdomen part, and its constraining force is weakened, so that an unnecessarily strong constraining force may not act near the pit of the stomach to prevent reduction of comfort of wearing. If such delicate changes of the constraining force are not necessary, instead of such pattern, the stretch suppressing member may be applied continuously and solidly.

Fig. 15 is a perspective view showing an example of girdle having a stretch suppressing member in one of the embodiment of the invention. Numeral 151 denotes a girdle main body, and 152 is a portion provided with stretch suppressing member

composed of polyurethane for controlling the elongation of fabric of the girdle main body 151 provided in a pattern for suppressing the swelling of the abdomen part.

The stretch suppressing member applied part 152 is given in a pattern in a wider area in the lower part and a narrower area in the upper part, and in this pattern, the lower abdomen part is particularly constrained with force, while the middle abdomen part and the upper abdomen part are constrained with a smaller force gradually to prevent reduction of the comfort of wearing. The resin applied portion from the side of abdomen to the hip part indicated by numeral 153 has a floral resin pattern, and the constraining force is slightly weakened.

Fig. 16 is a conceptual perspective view of seeing the girdle in Fig. 15 obliquely from behind.

The resin is dense in the part corresponding to the lower hip part of the portion indicated by numeral 153, and this dense part is effective to lift the hips.

In this way, in the invention, by varying the density of pattern area between the portion for constraining particularly strong and the portion for constraining with less force, the constraining force may be delicately varied partly by applying the stretch suppressing member, or the stretch suppressing member may be applied continuously and solidly where constraining force may be uniform, or depending on the design, the polyurethane resin may be sparingly extruded in thin lines on the fabric to draw proper patterns.

The application thickness of the stretch suppressing member may be determined in consideration of the type of resin and the desired constraining force, and is not particularly defined, but it is generally desired to apply about 500 to 100  $\mu\text{m}$  in thickness.

As explained in the few examples above, the shape and coating thickness of the stretch suppressing member may be freely selected as required, and should not be limited to these examples alone.

As the crosslinking polyurethane resin used in the invention, an ordinary crosslinking polyurethane resin may be employed, which is generally known as two-component type polyurethane resin.

It comprises an isocyanate compound generally having two or more isocyanate groups, and a compound having two or more hydroxy groups known as polyol, and usually it mainly comprises diisocyanate compound and dihydroxy compound, and if necessary, an isocyanate compound with three or more functional groups or a polyol with three or more functional groups may be combined.

Examples of polyol include a polyol of polyether type and a polyol of polyester type, and

when the polyol of polyester type is used, the hardness is relatively higher than when the polyol of polyether type is used. As the polyol, by using those shorter in the interval between functional groups, or isocyanate with three or more functional groups, the crosslinking density of the produced resin becomes larger, and the material of higher hardness may be obtained. Or, as the hardener or chain extender, amines having two or more amino groups (usually, diamines and triamines are mainly used) may be employed, and by using such amines, as compared with the case of hardening by polyols, harder materials are generally obtained easily.

Isocyanate compounds are known in various types used as isocyanate components of polyurethane resin of this kind, and may be selected from those used ordinarily, for example, tolylene diisocyanate, 4,4'-diphenylmethane diisocyanate, 3,3'-bitolyene-4,4'-diisocyanate, 3,3'-dimethyldiphenylmethane-4,4'-diisocyanate, 1,5-naphthalene diisocyanate, tolidine diisocyanate, hexamethylene diisocyanate, isophorone diisocyanate, m-phenylene diisocyanate, p-phenylene diisocyanate, xylylene diisocyanate, lysine diisocyanate, trimethylhexamethylene diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, triphenylmethane triisocyanate, lysine ester triisocyanate, 1,6,11-undecane triisocyanate, 1,3,6-hexamethylene triisocyanate, bicycloheptatriisocyanate, and their derivatives. Above all, aromatic or alicyclic polyisocyanate may be preferably used. Particularly preferred isocyanate compounds of them are 4,4'-diphenylmethane diisocyanate, 4,4'-dicyclohexylmethane diisocyanate and their derivatives.

Among the polyols, the polyether type polyol is known in various types used as polyol components of this type of polyurethane resin, and may be properly selected from those used ordinarily, for example, such polymethylene glycol polymers as polypropylene glycol, polyethylene glycol, polytetramethylene glycol, propylene oxide-ethylene oxide copolymer etc., poly (oxypropylene) triol, poly (oxypropylene)-poly (oxyethylene) triol, glycerin propylene oxide addition compound, and trimethylol propane propylene oxide addition compound. Among them, polymethylene glycol polymers such as polyethylene glycol are preferred.

Of the polyols, the polyester type polyol is known in various types used as the polyol components in polyurethane resin of this kind, and usually esters having an OH group at both ends thereof synthesized by dehydrated condensation reaction of a dicarboxylic acid with glycol or triol is used. Practical examples include, among others, polyethylene adipate, polyethylene propylene adipate, polybutylene adipate, polyhexamethylene adipate,

etc. synthesized from adipic acid and glycol such as ethylene glycol, propylene glycol, diethylene glycol, butylene glycol, 1,6-hexane glycol, neopentyl glycol, etc. Particularly preferred is a polymer of polymethylene glycols and dicarboxylic acid having polymethylene glycols at both ends.

A chain extender, crosslinking agent or catalyst used as the materials of this type of polyurethane also may be used. The chain extender may be properly selected mainly from diamines or diols with two functional groups, and the crosslinking agent, from polyfunctional amines or polyfunctional alcohols with three or more functional groups, or polyfunctional isocyanate compounds.

These amines may be properly selected from, for example, hydrazine, hexamethylene diamine, m-phenylene diamine, triethylene diamine, 4,4'-diaminodiphenyl methane, and other amines used for this purpose. Examples of diols and polyhydric alcohols may include, aside from those listed above, ethylene glycol, propylene glycol, diethylene glycol, tetramethylene glycol, 1,4-butadiene glycol, hydroquinone diethylol ether, glycerin, sorbitol, etc., and also other diols and polyhydric alcohols used for this purpose may be properly selected and used. As the catalyst, amines and others used in polymerization of polyurethane resin of this kind may be used as required.

In the invention, as described herein, using the prepolymer of the polyurethane resin synthesized from these materials, the prepolymer is discharged, for example, from a nozzle to be applied on a desired area of the surface of a fabric of clothing, and is heated to complete crosslinking polymerization. Examples of prepolymer may include a prepolymer having hydroxy groups at both ends, which is prepared by allowing an isocyanate compound and an excess molar quantity of polyol to react, moreover being added a proper crosslinking agent (hardener), and a prepolymer having isocyanate groups at both ends, which is prepared by allowing polyol and an excess molar quantity of isocyanate compound to react, moreover being added a proper crosslinking agent. It is one of the merits of using the polyurethane resin that the desired hardness, elasticity and other properties may be controlled in a considerably wide range by selecting the components, type or quantity of these monomers, or type or quantity of hardener.

For example, the bone in the lower side of the brassiere cups and the bone for the protective corset for lumbago are often required to have a relatively high stiffness, while in the portion corresponding to the lower part of the skirt such as the tight slip, the bones are used for preventing sliding of the garment, and are desired to be pliable. These adjustments may be relatively easily controlled by selecting the composition of polyure-

thane resin.

These prepolymers can be easily discharged from the nozzle, and when laminated on the fabric they moderately permeate into the space of weaving or knitting of the fabric to enhance the adhesion, but do not exude to the opposite side of the fabric. When heated in this stage to achieve crosslinking polymerization, the viscosity is further enhanced until finally solidified, and therefore, unlike the thermoplastic resin, the viscosity is not lowered by heating and melting, and exudation to the opposite side of the fabric is further effectively prevented, so that the touch will be excellent. Still more, by crosslinking polymerization and solidification on the fabric, adhesion and fixation to the fabric are strong, so that the washability may be excellent.

The viscosity of prepolymer may be selected, for example, in a range of 4 to 1000 poise properly depending on the purpose, preferably in a range of, for example, 200 to 700 poise.

As required, moreover, the bones and stretch suppressing members may be disposed at the back side of the fabric, and in such cases it is desired to process the areas of bones and stretch suppressing members by raising or giging. The raising process may be realized by known techniques, including the electrostatic hair planting, buffing, adhesion of raised woven fabric or knit, adhesion of pile fabric or nonwoven fabric and cutting or buffing the surface to raise, and other methods. By such raising process, in the case of the clothing directly in contact with the skin, the polyurethane resin and skin do not contact directly with each other, but there is a space of raising to allow sweat to escape, so that the touch is improved, which is very preferable.

#### Example 1

Using 4,4'-diphenyl methane diisocyanate and polyethylene glycol at molar ratio of 1:1.3, and using 0.3 mole of ethylene diamine as crosslinking agent, a polyurethane resin prepolymer with viscosity of 200 poise at 30 °C was prepared.

This polyurethane resin prepolymer was injected by using a hand gun from a nozzle at 120 °C in a thickness of 2 mm and width of 7 mm, and applied on the surface of fabric of brassiere at the positions of the bones 61, 62, 63 shown in Fig. 6.

In succession, the polyurethane resin prepolymer was heated for 2 minutes at 150 °C to achieve crosslinking polymerization, and was completely fixed on the surface of fabric of brassiere to form bones. The applied polyurethane resin did not exude to the reverse side of the fabric of the brassiere.

The obtained brassiere was not reduced in the

comfort of wearing, and had the function of keeping the bust shapely. In addition, because of the bone 63, the back cloth 64 did not shrink in the width-wise direction.

#### Example 2

The polyurethane resin prepolymer in the same composition as in Example 1 was injected by the same method as in Example 1, and plate form bones 121, 122, 123 in a thickness of 2 mm and width of 7 mm were formed near the waist line of the girdle as shown in Fig. 12.

The bones 121, 122, 123 had the function of preventing the girdle from sliding down. The fixed polyurethane resin did not exude to the reverse side of the fabric of the girdle, and the comfort of wearing was not reduced.

#### Example 3

Using 4,4'-diphenylmethane diisocyanate and polytetramethylene glycol at a molar ratio of 1:1.3, and using 0.4 mol of hexamethylene diamine as crosslinking agent, a polyurethane resin prepolymer with viscosity of 300 poise at 30 °C was prepared.

This polyurethane resin prepolymer was injected by a hand gun, and applied on the fabric near the abdomen part of a swimming suit composed of nylon fiber and polyurethane fiber at 120 °C in a thin coating of about 200 μm in thickness in a pattern indicated by 141 in Fig. 14. The applied polyurethane resin prepolymer was heated for 2 minutes at 150 °C to achieve crosslinking polymerization, and was completely fixed to the fabric of swimming suit, thereby forming a stretch suppressing member.

This swimming suit had a shaping function for constraining the superfluous flesh from swelling outward.

The applied polyurethane resin did not exude to the reverse side of the fabric of the swimming suit, and the comfort of wearing was not reduced.

#### Example 4

Using the polyurethane resin prepolymer in the same composition as in Example 3, the stretch suppressing member was formed on a girdle in the same condition as in Example 3. The shape of the stretch suppressing member was patterned as shown by 152, 153 in Fig. 15, Fig. 16, and the other conditions were the same as in Example 3.

The obtained girdle had the function of strongly constraining the superfluous flesh of the lower abdomen part from swelling outward, and also had the function of lifting the hips. The stretch sup-

pressing member composed of the applied polyurethane resin did not exude to the reverse side of the fabric of the girdle, and the comfort of wearing was not reduced.

The clothing having the bones or stretch suppressing members for shaping up the body line fixed to the surface of a fabric for composing the clothing of the invention has the bones or the stretch suppressing members formed by using prepolymers of crosslinkable polyurethane resin, and is therefore excellent in touch without the urethane resin exuding to the reverse side of the fabric for composing the clothing, and is excellent in washability so as not to be peeled off by washing, and has reduced in the manufacturing labor requirements and is excellent in productivity, thereby presenting an excellent clothing with bones or stretch suppressing members of fabric.

In the preferred embodiments of the invention wherein the clothing is foundation garments or swimming suits etc., they offer the functions of shaping up the body line and preventing from sliding up or down, so that the effects of the invention may be very preferably exhibited.

#### Claims

1. An article clothing having a bone or a stretch suppressing member for shaping up the body line, fixed to the surface of a fabric forming the clothing, wherein the bone or the stretch suppressing member comprises a crosslinked polyurethane resin, which is provided as a crosslinkable polyurethane prepolymer to the fabric surface and which is polymerized with accompanying crosslinking to provide a crosslinked polyurethane resin fixed on the fabric surface.
2. An article clothing according to claim 1, wherein the clothing is foundation garments or swimming suits.
3. An article clothing according to claim 1, wherein a part of the crosslinked polyurethane resin for forming the bone or the stretch suppressing member impregnates the space of weaving or knitting of the fabric, but is not exuded to the opposite side of the fabric.
4. A method of manufacturing clothing having a bone or a stretch suppressing member for shaping up the body line comprised a crosslinked polyurethane resin, fixed to a predetermined area of the surface of a fabric forming the clothing, wherein a polyurethane resin prepolymer synthesized from an isocyanate compound and polyol is applied to the pre-



determined area of the surface of the fabric, and heated to achieve crosslinking polymerization.

5. A method of manufacturing clothing according to claim 4, wherein the clothing is foundation garments or swimming suits. 5
6. A method of manufacturing clothing according to claim 4, wherein the viscosity of the polyurethane resin prepolymer is in a range of 200 poise to 700 poise. 10
7. A method of manufacturing clothing according to claim 4, wherein the isocyanate compound is at least one diisocyanate compound selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, and their derivatives, and the polyol is at least one polyol selected from the group consisting of polymethylene glycol polymer; and a copolymer of polymethylene glycol and dicarboxylic acid having polymethylene glycol at both ends. 15  
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8. A method of manufacturing clothing according to claim 7, wherein said polymethylene glycol polymer is a polyethylene glycol, and said polymethylene glycol is an ethylene glycol. 30

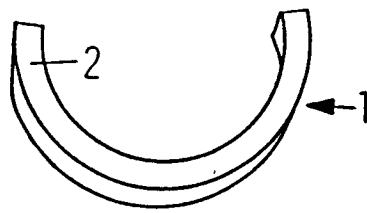
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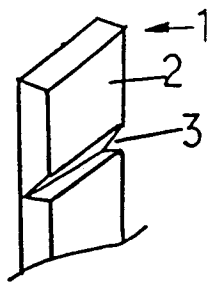
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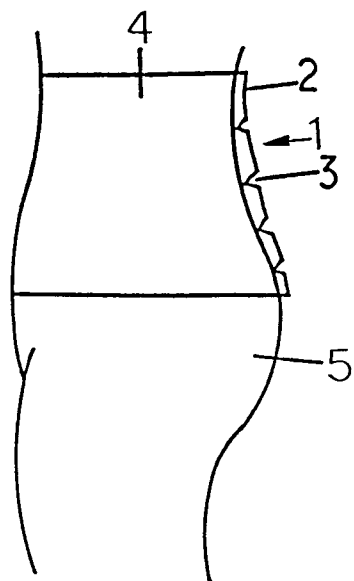
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F i g. 1



F i g. 2



F i g. 3

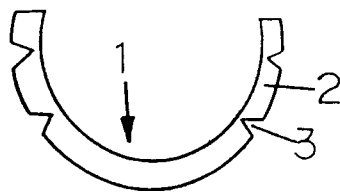


Fig. 4

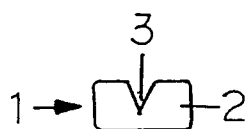


Fig. 5

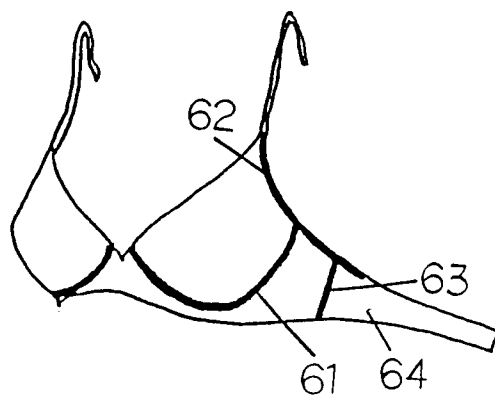


Fig. 6

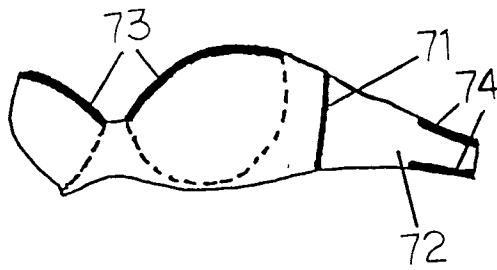


Fig. 7

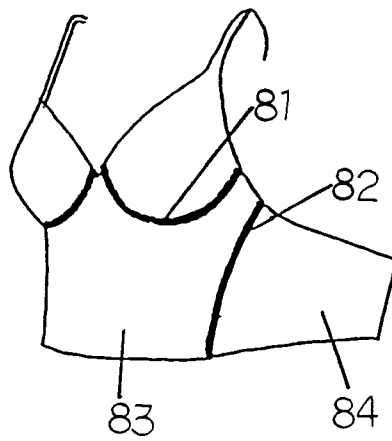


Fig. 8

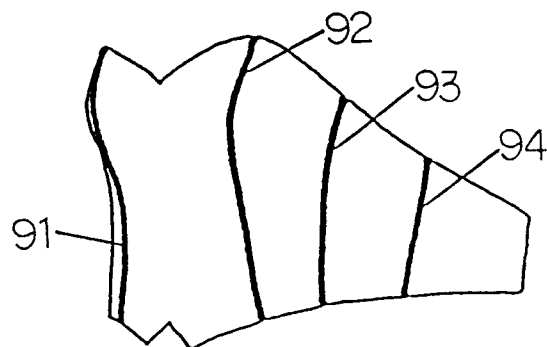


Fig. 9

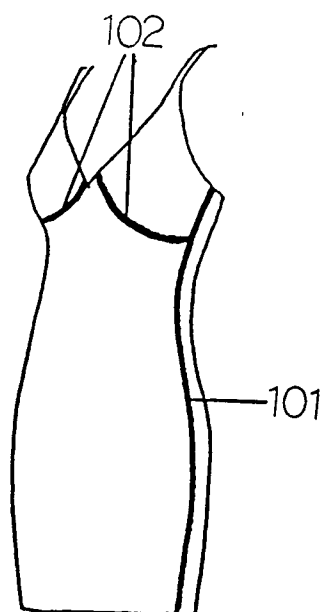


Fig. 10

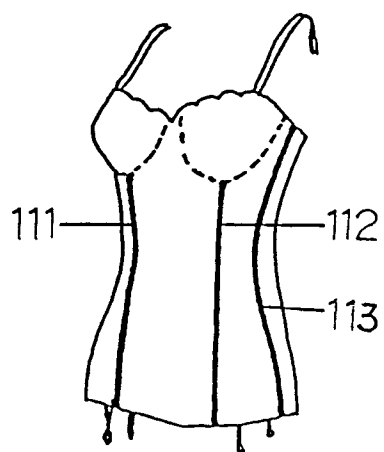
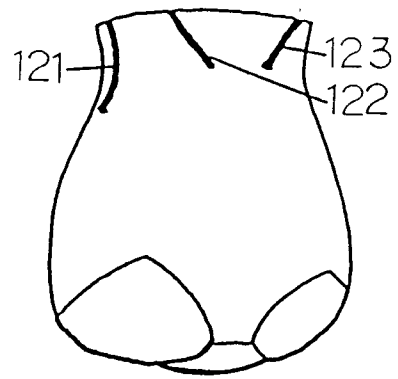
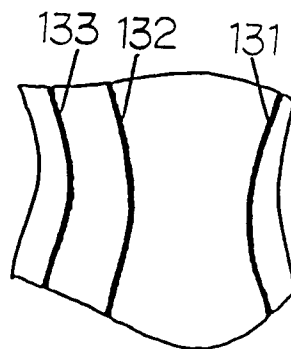


Fig. 11



F i g. 1 2



F i g. 1 3

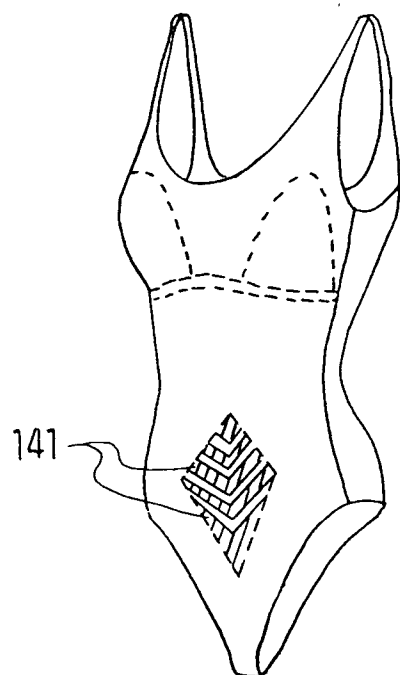


Fig. 14

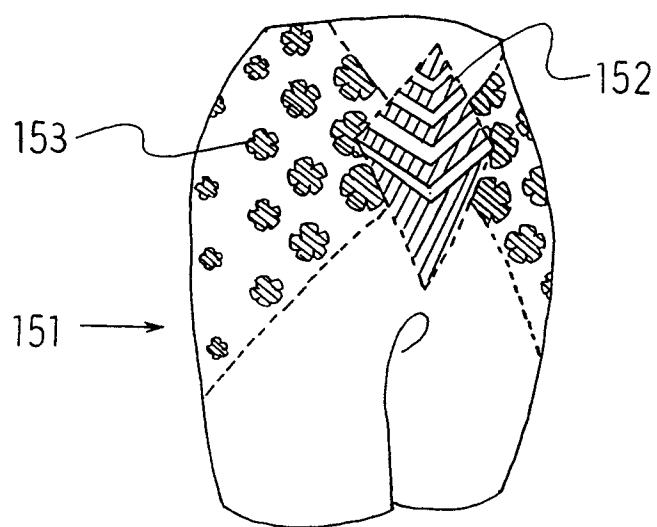
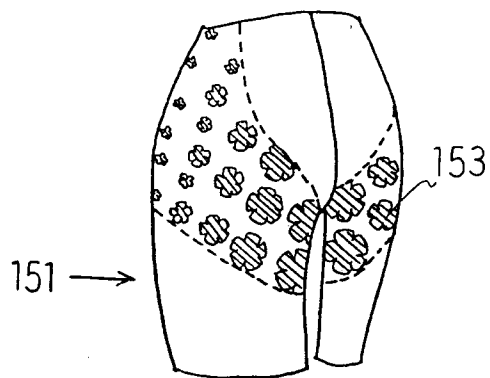


Fig. 15



F i g . 1 6





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## EUROPEAN SEARCH REPORT

Application Number

EP 92 10 7740

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                     |                                                       |                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Citation of document with indication, where appropriate, of relevant passages                                                                                       | Relevant to claim                                     | CLASSIFICATION OF THE APPLICATION (Int. Cl.5)                        |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | GB-A-933 398 (JUAN DUARRY SERRA)<br>* page 2, line 1 - line 12; claim 1; figures 1-15 *<br>* page 3, line 46 - line 74 *<br>* page 6, line 37 - line 48 *<br>---    | 1,2                                                   | D06N3/14<br>A41C5/00<br>A41D7/00<br>A41C1/00                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DATABASE WIPL; accession nr.:85-219549 (36);<br>Derwnet Publications, Ltd.; London,GB;<br>& JP-A-60139801 (SENKO NYLON KK) 24 July 1985<br>* whole abstract*<br>--- | 1,2                                                   |                                                                      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | US-A-4 916 755 (JAY FEIGENBAUM ET AL.)<br>* column 2, line 64 - column 3, line 22; claims 1,4; figures *<br>---                                                     | 1,2                                                   |                                                                      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | US-A-3 320 346 (BERNARD I. GALITZKI ET AL.)<br>* column 3, line 28 - line 55; claim 1; figures 1,2 *<br>---                                                         | 1,2                                                   |                                                                      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EP-A-0 238 664 (YOSHIHARA)<br>*abstract*<br>* page 1, line 4 - line 10; figures *<br>* page 12, line 25 - page 13, line 10 *<br>-----                               | 1,2                                                   | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)<br><br>D06N<br>A41C<br>A41D |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                     |                                                       |                                                                      |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                     | Date of completion of the search<br>16 SEPTEMBER 1992 | Examiner<br>PAMIES OLLE S.                                           |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br><br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                                                                                                                                     |                                                       |                                                                      |