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METHOD FOR PRODUCING A WOVEN ELASTIC BANDAGE OR LIKE FABRIC

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This invention relates in general to woven rubberless elastic fabrics and, in particular, to a woven elastic fabric structure containing elastic threads as warp or filling, or as both warp and filling, of highly stretchable crimped synthetic textile yarns which are of the superpolyamide class.

The present invention contemplates in one of its forms a one-way stretch woven elastic fabric or bandage employing therein as warp or filling highly stretchable elastic threads of superpolyamide yarn having permanently crimped properties and interwoven with relatively inelastic threads of either cotton, or regular multi-filament superpolyamide yarn such as regular Du Pont multi-filament nylon yarn, or of other plain ordinary commercial yarns, to form a unitary fabric. In its preferred structure, such a woven elastic fabric or bandage has its high stretch or elastic properties imparted thereto in the direction that the fabric is to stretch by employing as the entire warp or as the entire filling thereof, as the case may be, elastic threads of highly stretchable resilient permanently-crimped nylon yarn which have been processed mechanically in accordance with the so-called "Helanca" process to give it elasticity, which yarn is depicted, described and claimed in the L. A. Billion Patent No. 2,564,245, dated August 14, 1951, and produced by highly twisting a multi-filament nylon yarn up to between 3000 to 4000 turns per meter, shrinking the twisted yarn to impart crimping and kinking effects thereto and setting the yarn by treatments under conditions of controlled heat and moisture, drying and untwisting this twist from the set yarn to leave the resultant yarn at substantially zero twist, and then subjecting this yarn to treatment in a heated aqueous medium whereby the tension of the filaments of said yarn is released. This resulting thread may be used as a single yarn or it can be made into two-ply with no twist by plying it with a thread similarly treated but back twisted to substantially no twist after having initially been highly twisted in an opposite direction. Such crimped nylon yarn has a stretchability of at least 100%. Permanently crimped nylon yarn having a long stretch range as thus-indicated and good contracting or return properties made by other known crimping processes may be employed, if desired, in lieu of that produced by the aforementioned Billion patent. The crimped elastic yarns used in the woven fabric as herein contemplated, however, need not be restricted to nylon since other crimped superpolyamide yarns may be substituted therefor to provide high stretch or elastic properties to such woven elastic fabrics.

If a more absorbent bandage fabric is desired, cotton or other textile fiber of an inelastic and absorbent character can be used as the weft or filling threads woven with the elastic crimped nylon warp yarn above-described, and in such case, the stretch obviously will be warpwise since the crimped nylon yarns extend in that direction only in the woven product thus made.

If a two-way stretch fabric is desired as is herein contemplated as another form of the present invention, crimp-

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ed nylon yarn made by the method of the aforesaid Billion patent is employed for the entire warp and the entire filling of the fabric.

In weaving one-way stretch woven fabrics and two-way stretch woven fabrics the crimped elastic nylon yarns when used either as warp or filling threads as in the case of the former, and when used as both warp and filling threads as in the case of the latter, are stretched under tension to substantially their fully extended linear or straight condition and warp and filling groups of threads are interwoven into an open weave fabric structure such as in an open plain leno weave doubling every pick, or in a two and two lisle weave, or in a straight marquisette weave as desired. The fabric thus woven as it comes off the loom will have little or no stretch in either direction, i. e., warpwise and fillingwise, but the desired elastic properties are imparted thereto by wetting out the thus-woven fabric at a temperature of 170° F. or higher with or without use of a wetting-out agent, then shrinking such fabric in cold water, and subsequently drying and setting the moist shrunk fabric without tension at a temperature of 212° F. or higher.

As a specific example of a one-way stretch all-nylon elastic limb or body bandage made in accordance with my invention, warp threads of 70 denier, two-ply, crimped nylon, as produced by the method of the above-mentioned Billion patent, and filling threads of 40's, two-ply cotton are woven together into a fabric structure in a manner characteristic of a two and two lisle weave. That is to say, the elastic warp threads are woven in a two up and two down weave with relation to all the filling threads. This woven bandage fabric after it comes off the loom then is subjected as it is unwound from its roll to a wetting-out treatment at a temperature of 170° F. or higher with or without use of a wetting-out agent, followed by shrinking of the resulting fabric in cold water, after which it is dried and set without tension at a temperature of 212° F. or above. The resulting bandage fabric is found to have a range of stretch after the shrinking, drying and setting treatments just-described from about 60% to 100% of the finished fabric length.

Among the advantages of my invention is that a light, extremely thin and strong elastic bandage can be made which is comfortable to wear and has a soft velvety feel when contracted. It has a soft stretch, pulls out with ease and will lightly conform to any shape which it surrounds to give support to the area encompassed without holding it too tightly as to restrict movement of the bound area or to impede circulation. The extremely high strength of the nylon elastic warp threads makes the bandage high suitable for binding bone fractures, use as a tourniquet to stop the flow of blood, and if bound with a relatively soft tension will allow freedom of movement in joints. Because of its thinness and lightness such a bandage is particularly adaptable for binding sprained ankles, knees or elbows, or varicose veins, and when stretched its openness will readily allow light and air to get to the bound part where inflammation exists besides being capable of staying in place without bulk. The bandage will wash easily and it will retain its high stretchable properties indefinitely.

Such limb or body bandages, as just-described, may be made in different widths varying in range from 2 inches to 6 inches wide and when stretched their length is about 5½ yards.

An elastic fabric as herein contemplated also may be made in wide goods wherein crimped nylon yarn may be used in the filling in leno-weave with regular nylon or superpolyamide warp yarn in comparatively coarse sley construction thereby allowing the fabric to contract fillingwise. After shrinking and drying the resultant fabric could be slit warpwise into any desired widths. This fabric

either before or after slitting may be treated with an adhesive and made into stretchable "band-aids." The stretch would be width-wise in such fabric strips. The usual gauze pad for covering a wound would be attached to the adhesive side of this bandage fabric.

Another field of use in which such a leno-weave fabric composed of all-nylon yarns with crimped nylon yarn as the filling is for brassieres, foundation garments, girdles, linings for bathing suits, etc.

By the term "wetting-out" is meant the process of wetting or saturating the fibers of the woven fabric or bandage with water. By the term "wetting-out agent" is meant a substance that is capable of lowering the surface tension of the water when added thereto so that the fibers will wet more rapidly.

What is claimed is:

1. The method of making an elastic rubberless woven fabric which comprises in interweaving warp and filling groups of threads into an open-weave fabric structure, the threads of one of said groups disposed in the direction in which the final fabric is to stretch being of a permanently crimped superpolyamide yarn set in said condition and being woven in their stretched straight condition with relatively inelastic threads forming the other group, then wetting-out the thus-woven fabric at a temperature of 170° F. or higher with or without use of a wetting-out agent, shrinking the resulting fabric in cold water, and thereafter drying and setting the moist shrunk fabric without tension at a temperature of 212° F. or higher to permit the crimped superpolyamide yarns to contract and become kinky and elastic.

2. The method of making a thin, light, all-nylon elastic bandage having substantial stretch and a soft velvety feel when contracted, which consists in interweaving warp and filling groups of threads of nylon yarns in an open-weave fabric structure, the threads of one of said groups

disposed in the direction in which the final fabric is to stretch being of crimped set nylon yarns woven in their stretched straight condition with the threads of the other group, then wetting-out the thus-woven fabric at a temperature of 170° F. or higher with or without use of a wetting-out agent, shrinking the resulting fabric in cold water, and subsequently drying and setting the moist shrunk fabric without tension at a temperature of 212° F. or higher to permit the crimped nylon yarns to contract and become kinky and elastic.

3. The method of making a rubberless woven elastic bandage which comprises in interweaving warp and filling groups of threads into an open-weave fabric structure, the threads of one of said groups disposed in the direction in which the final fabric is to stretch being of a permanently crimped nylon yarn set in said condition and being woven in their stretched straight condition with cotton threads forming the other group, then wetting-out the thus-woven fabric at a temperature of 170° F. or higher with or without use of a wetting-out agent, shrinking the resulting fabric in cold water, and thereafter drying and setting the shrunk fabric without tension at a temperature of 212° F. or higher to permit the crimped nylon yarns to contract and become kinky and elastic.

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