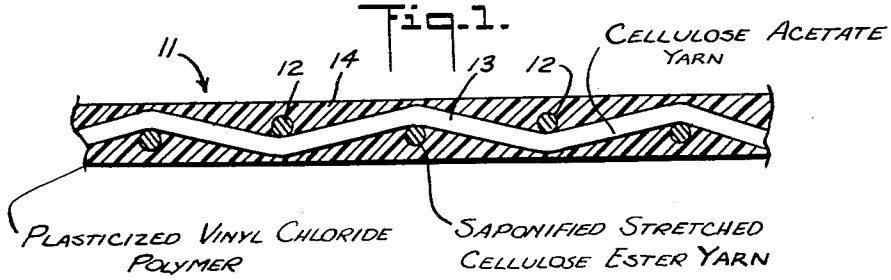
Oct. 18, 1960 W. WHITEHEAD 2,956,331

NARROW FABRICS

Filed Oct. 24, 1955

Fig. 1.



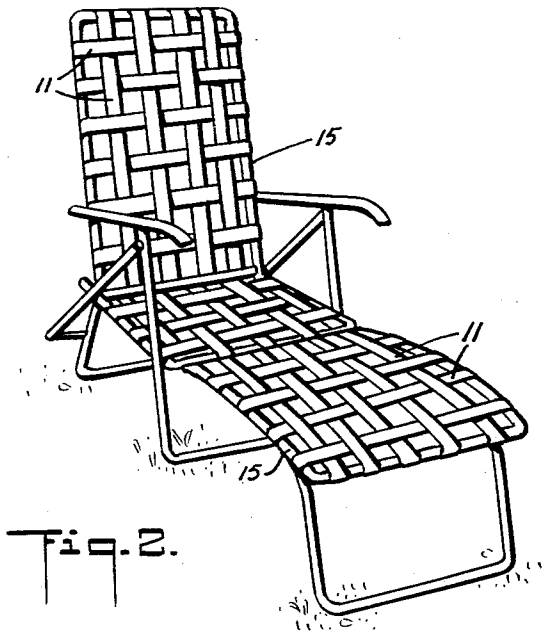


Fig. 2.

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NARROW FABRICS

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2 Claims. (Cl. 28—80)

This invention relates to narrow fabrics and relates more particularly to the production of fabric bands or tapes of high strength.

It is an object of this invention to produce fabric bands or tapes which are very strong, light in weight and highly resistant to deterioration by sun, rain and other atmospheric influences.

Other objects of this invention will be apparent from the following detailed description and claims.

In accordance with one aspect of this invention a band or tape is produced by weaving a fabric web in which the warp is made up of high-tenacity continuous filament cellulose ester yarns which have been stretched and saponified, while the weft of the fabric consists of yarns of a cellulose ester such as cellulose acetate. This fabric is then coated on both sides with a plasticized vinyl chloride polymer and thereafter slit into strips with a hot knife in a direction parallel to the warp yarns. The action of the hot knife cuts and fuses the vinyl resin coating as well as the cellulose ester weft and forms a smooth non-ravelling edge on the resulting band or tape.

The saponified stretched cellulosic yarn used in the practice of this invention has a tenacity of at least 5.5 grams per denier. Such yarns may be produced in known manner from yarns of cellulose esters, preferably esters of carboxylic acids having 2 to 4 carbon atoms, best results being obtained from yarns of cellulose acetate. Stretching of the cellulose ester yarn may be accomplished by drawing the yarn to at least about 4 times, preferably 6 to 10 or even 20 times, its original length, in the presence of a stretch-assisting agent such as hot water or steam, which may be under superatmospheric pressure. Alternatively, the stretched cellulose ester yarn may be produced in known manner by a combined spinning and stretching operation in which a solution of the cellulose ester is extruded in filamentary form into a bath which is a coagulant for said solution and contains a swelling agent for the cellulose ester, the resultant filaments being stretched, to the degree indicated above, while in said bath. These stretching processes cause the molecules of the cellulose ester to become highly oriented along the fiber axis. On saponification of the stretched cellulose ester filaments, for example with an aqueous sodium hydroxide solution, there is produced a high-tenacity regenerated cellulose material which does not greatly decrease in tenacity when wet. Regenerated cellulose yarn produced in this manner may have for example, a wet tenacity of 80 to 90%, e.g. 86%, of its dry tenacity.

The cellulose acetate of the weft yarns preferably has a combined acetic acid content of 53 to 62.5%, e.g. 54.5%. Yarns of this material are considerably weaker than the warp yarns, generally having tenacities of about 1.1 to 1.8 grams per denier, and they are thermoplastic whereas the warp yarns are non-thermoplastic. The weft yarns may be of the spun type or of the continuous filament type.

The deniers of the warp and weft yarns may be varied widely. A suitable range of deniers for the warp yarn is

about 30 to 1600 denier, while for the weft it is about 75 to 600 denier or more.

Either the warp or the weft, or both, may be colored. Thus the yarns may be dyed, in well known manner, before weaving or the woven fabric may be union-dyed or cross-dyed. Also, pigmented yarns, produced by incorporating coloring matter into the spinning solutions used for making said yarns, may be employed.

The vinyl chloride polymer used in coating the fabric may be polyvinyl chloride or a copolymer of vinyl chloride with a minor amount of another monomer such as vinyl acetate. A dope containing the vinyl chloride polymer, together with one or more plasticizers therefor and a volatile solvent may be spread onto the fabric and the coated fabric heated to evaporate the solvent. Alternatively, a plastisol or plastigel containing fine particles of an acetone-insoluble vinyl chloride polymer dispersed in the plasticizer may be applied to the fabric and the coated fabric heated to cause the plasticizer and polymer to blend homogeneously and form a tough layer firmly anchored to the fabric. Also, films of the plasticized vinyl chloride polymer may be applied on both sides of the fabric and the resulting assembly may be heated and pressed, as by means of hot rolls, to bond the films to the fabric. Other methods of coating the fabric may be employed, as is well known in the art.

The plasticizers which may be employed in admixture with the vinyl chloride polymer are well known in the art, suitable plasticizers being, for example, dicyclohexyl phthalate, di(methylcyclohexyl)phthalate, tricresyl phosphate, dibutyl phthalate or dioctyl phthalate, polyglycol sebacate or other polyesters. The use of esters of cyclic alcohols, e.g. of cyclohexanol or methylcyclohexanol, results in coatings which adhere exceptionally well to the fabrics containing fibers of cellulose acetate. The proportion of plasticizer may vary within wide limits. For example, 60 to 175% of plasticizer based on the weight of the vinyl chloride polymer is suitable.

The amount of coating material applied to the fabric should be sufficient to cover all of the fibers completely, and preferably also to fill all of the interstices between the interlaced yarns.

The knife used for the cutting of the fabric into strips is desirably maintained at a temperature of about 500 to 550° C. Generally, it is most practical to pass the coated fabric, which may be, for example, 30 to 120 inches in width, past a plurality of heated knives spaced across the width of said fabric, so that there are produced a plurality of coated bands, each about ¼ to 4 inches in width. The knives may have stationary or rotating blades and may be arranged either to apply substantial transverse pressure or little or no transverse pressure to the fabric during the cutting thereof.

The bands or tapes produced in accordance with this invention are eminently suitable for use as webbing material in the production of outdoor furniture. Other uses are as Venetian blind tapes, as webbing for spring seats of upholstered furniture, for cargo tie downs and for miscellaneous belts, edges and pipings. In the making of Venetian blind tapes, the necessary cross-ladders, which may also be of the slit, coated fabric of this invention, may be attached to the main tapes by a hot-sealing operation.

In the accompanying drawing, which illustrates one aspect of this invention,

Fig. 1 is a cross-sectional view of a coated tape, and

Fig. 2 is a view, in perspective, of a lawn chair made with the coated tape.

Referring now to the drawing, reference numeral 11 designates a coated tape, comprising warp yarns 12 of a cellulose ester which has been stretched and saponified and weft yarns 13 of cellulose acetate coated with a plasticized

vinyl chloride polymer **14**. In Fig. 2, reference numeral **15** designates the framework of a chair, which may be, for example, of tubular aluminum or steel. Tapes **11** are stretched cross this framework **15** in interlaced fashion so as to form surfaces for supporting the body of the user.

The following example is given to illustrate this invention further.

Example

A woven fabric 42 inches wide and comprising a warp of 18 ends per inch of 270 denier cellulose acetate yarn which has been stretched and saponified and 20 picks per inch of 300 denier cellulose acetate yarn is coated, equally on both sides, with a plastisol comprising 100 parts of acetone-insoluble polyvinyl chloride resin powder, 65 parts of dioctyl phthalate and 0.5 part of an organic color pigment so that a total of 4 ounces of coating is deposited per square yard of fabric. The fabric is then heated to about 160° C. to set the coating and the coated fabric is thereafter slit with hot knives, at a temperature of 550° C., to form bands 1½ inches in width, having smooth sealed non-absorbent edges.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. A woven fabric having a warp consisting essentially of cellulose ester continuous filament yarns which have been stretched and saponified and a weft consisting essentially of cellulose acetate yarns, said fabric being coated with a plasticized vinyl chloride polymer, said fabric being capable of being slit into strips by a hot knife in a direction parallel the warp yarns, so that the action of said hot knife cuts and fuses said polymer and said weft and forms smooth non-ravelling edges on said strips.

2. A tape comprising a woven fabric having a warp consisting essentially of cellulose ester continuous filament yarns which have been stretched and saponified and a weft consisting essentially of cellulose acetate yarns, said fabric being coated with a plasticized vinyl chloride polymer, the edges of said tape containing fused cellulose acetate and plasticized vinyl chloride polymer.

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