UNITED STATES PATENT OFFICE.

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METHOD OF ORNAMENTING KNITTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 454,854, dated June 30, 1891.

Application filed October 14, 1890. Serial No. 368,108. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN COCHRANE, Jr., of Malden, county of Middlesex, State of Massachusetts, have invented an Improvement in Methods of Ornamenting Knitted Fabrics, of which the following description is a specification.

The greater majority of knitted goods manufactured for the production of articles of personal wear are of one color rather than party-colored, the fabric being commonly knitted from unbleached or white yarn, and then colored if the garment is to show a color. Numerous articles are, however, knitted from colored yarn, and in some articles the yarns are of different colors; but the figure or color effects produced by the introduction of yarns of different colors add materially to the cost of the fabric, and the latitude for design is limited.

In my experiments to render knitted goods available for a greater range of garments in which color effects are desired, I have discovered a method or process by which elastic-knitted goods may be printed as are ordinary woven goods, and thus I am able to give to knitted goods as great diversity of coloring and design as can be given to woven goods by printing processes.

Attempts have been made to print knitted goods, and such printing has been confined, so far as I am aware, to the use of blocks and on small articles; but such printing has not been satisfactory owing to the soft elastic nature of the material. I have discovered that this difficulty may, however, be overcome chiefly by subjecting the knitted goods to a powerful calendering operation before entering the printing-machine, and the effectiveness of my method is greatly enhanced by subjecting the goods to the action of a "padding solution," through which it is led before being calendered, the padding being so compounded and applied as to remain pliable rather than friable during the printing operation. The greater portion of knitted fabric produced is knitted in tubular form, and the tubular fabric is cut to shape and the cut edges are united together.

From my experiments I am fully satisfied that knitted goods laid out flat and of single thickness as woven goods are laid when being printed is commercially impracticable, as up to the present time I have been unable to control the side edges of the web formed by slitting the tubular fabric. I have, however, discovered that a tubular web, when stretched and calendered, and preferably also padded, may be printed on both sides while yet under the influence of the calendering and preferably the padding, as a tube when once stretched and calendered presents straight edges at its sides, and the adhesion of one ply of the tube against the other, due to the calendering, materially aids in keeping the fabric smooth and prevents it returning into its normal condition. The pressure to which the knitted fabric is subjected is such in calendering as to condense and solidify the same, so as to leave the edges of the flattened tube so thin that the design or color applied to the outer side of the tube at bottom and top will practically join at the said edges, thus avoiding defects in design which otherwise would be liable to objection.

In practicing my invention, therefore, I take a knitted tube and pass it through, preferably first a padding solution composed of about five pounds of starch and two and one-half pounds of neutral olive-oil soap mixed with about forty gallons of water, these ingredients having given excellent satisfaction. This solution will be boiled, and while boiling the knitted goods is drawn through it and the goods thereafter dried by usual processes. The goods is then subjected to a powerful calendering process or subjected to the action of rolls, which, as the material is wound upon a roller, acts to compress the material solidly and make a solid roll. While the material is being wound in roll form and subjected to pressure it is stretched, and as a result of this stretching and calendering the material in tube form is impacted one ply against the other and is reduced in thickness, leaving the edges thin, the padding, if used, also serving to maintain the fabric in its compressed and attenuated condition; or, in other words, the knitted fabric is by the stretching and calendering practically deprived of its elasticity, so that it may be led through a printing-machine of usual construction and may be printed by a roll upon one or both sides, the roll being engraved to the desired design and for a depth suitable to the particular fabric. Any de-

sired colors may be obtained by usual printing compound. I have found in practice that this stretched and calendered web when printed on both sides permits the color to practically pass about the thin edges of the tube, thus avoiding defects in design. After the printing operation has been completed, the color having been set by steaming or in other well-known manner, the fabric will be washed, thereby relieving it from the surplus color and padding solution, after which the fabric is dried, leaving the same in condition to be utilized, the fabric then possessing substantially its original elasticity.

I have described as I prefer the padding of the knitted fabric before calendering the same; but very good effects may be obtained upon some goods without the padding, for the powerful calendering, while one ply rests in contact with the other, materially destroys the natural elasticity of the fabric, sufficiently so that it may be printed in some but not all designs.

This invention is not limited to the employment of the exact padding solution named, as other flexible padding solutions might be employed.

I claim—

1. The herein-described method of ornamenting knitted tubular fabric, which consists in stretching and calendering and thus condensing a knitted tube, and while under the influence of the calendering and stretching printing the fabric upon one or both of its outer sides, substantially as described.

2. The herein-described method of ornamenting knitted tubular fabric, which consists in padding a knitted tube with an elastic padding, stretching, calendering and thus compressing the said padded tube, and thereafter printing the fabric on one or both of its outer sides, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN COCHRANE, JR.

Witnesses:
GEO. W. GREGORY,
ANNIE S. WIEGAND.