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T. L. SHEPHERD
MANUFACTURE OF FABRICS CONSISTING WHOLLY OR
PARTLY OF RUBBER ELASTIC THREADS
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T. L. Shepherd
INVENTOR

By *Glascow Downings & Peck*
Attys.

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MANUFACTURE OF FABRICS CONSISTING
WHOLLY OR PARTLY OF RUBBER ELASTIC
THREADS

Thomas Lewis Shepherd, London, England

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This invention relates to the manufacture of fabric or lacework consisting wholly or partly of rubber elastic threads, and to improved elastic threads and methods of preparing same for such purposes. This application comprises a division of my copending application Serial No. 724,814 filed the 9th day of May, 1934.

In the weaving or knitting of a fabric from such threads, whether they are bare or whether they are covered with one or more fibrous windings of cotton, silk, wool or the like, there is difficulty in controlling the tension of the threads, this being increased when they are very fine. Various suggestions have been made to overcome this drawback, but they usually entail a modification of, or an adaptation in, the construction of the shuttles or in the selvage. In spite of these suggestions, however, for overcoming the difficulty, the weave or knit still continues to be unsatisfactory, because there is a tendency for local irregularities to be set up in the fabric or an imperfect selvage is formed which spoils the material, and moreover the variation in tension tends to create shirring, cockling and other imperfections.

Again when the pirn is empty or about to become exhausted, the last pick needs to be withdrawn before continuing to weave. Moreover a defect is sometimes caused by a slight difference in the length of the weft threads.

The objects of the invention include the provision of novel and improved elastic threads adapted to eliminate the above mentioned difficulties, and also the provision of improved methods, to so control the thread before and during weaving that it exerts no tension, that is to say, it is in a static condition, so as to thereby eliminate all irregular patches, lines or zones in the fabric.

Another object of the invention is to temporarily deprive the rubber thread in effect of its elasticity to enable it to be conveniently worked, the elasticity being finally restored to it again, by and during the subsequent dressing, finishing and other operations necessary to completely finish the fabric.

Various further and more specific objects, features and advantages will clearly appear from the following specification, describing by way of example various preferred embodiments of the invention. The invention consists in such novel features, methods and combinations of method steps as are disclosed and described herein.

The invention will now be described with reference to the accompanying drawing which il-

lustrates by way of example, a thread of rubber, the stretch of which is controlled as will hereafter be described.

In carrying the invention into effect the rubber thread *a* is prepared in any suitable way, such as by extrusion from a solution of rubber or from an aqueous dispersion of latex or being cut out from a sheet or otherwise.

A thread thus prepared may then be extended for weaving, knitting, lacemaking or any other purpose to an extent which is preferably somewhat or slightly below its full degree of extensibility or elastic limit and the thread *a* is then coated under the desired degree of stretch as above described, with a suitable kind of soluble adhesive as shown at 11 in the drawing. Alternatively, according to the invention in certain of its phases, the thread may thus be coated when in its natural relaxed condition.

Such an adhesive coating which should be of a quick drying character may consist of or comprise glue, gelatine, a solution of cellulose, starch, wax, resin or the like or a suitable varnish. It may be applied by coating, spraying, painting or otherwise and the coating is then allowed to dry to such a degree as will impart to the thread a rigid or semi-rigid set so that the resulting thread will not possess the characteristic of extensibility but is substantially deprived of its elasticity.

The "Chemical Formulary", Vol. I, pages 474-477, copyright 1933, published by The Chemical Formulary Co., Brooklyn, N. Y., and the textbook by Wheeler, entitled "The Manufacture of Artificial Silk", page 94, published by Chapman & Hall Ltd., London, England, 1928, disclose various sizing materials and mixtures suitable or readily adaptable for the above indicated purposes. Suitable and effective sizing materials or mixtures having the necessary tenacity and flexibility for the purpose may be selected by trial and will of course depend somewhat on the dimension and character of the particular thread used, and the extent to which the thread is to be stretched when the coating is applied.

It will be understood that the rubber thread either before or after having been stretched may be vulcanized. After the thread has thus been coated with the above described coating, it may then be passed into a loom or into a knitting machine so that it may be woven or knitted into a fabric and when such fabric is completed the latter may be finished by being boiled or heat treated in any suitable way so as to remove the glue,

gelatine or other coating and so that the fabric will be shrunk to its limit. As brought out in my above mentioned parent application, the treatment may be such as to remove or otherwise eliminate the coating from the elastic threads, by a washing, dissolving or other action, suitable for restoring the elasticity or resilience of the threads; but in some cases the coating may be only incompletely removed where any particular characteristic of stiffness is desired in the fabric. After the removal of the coating, the fabric may be calendered on a steam calender, being boiled again if necessary, and again steam calendered and finally put through a finishing calender. It will also be understood that the finishing process is preferably carried out without any stretching of the fabric.

From the foregoing it will be understood that stretch control over the thread, yarn or fabric is obtained, so that the loom has to deal with a material possessing a substantially constant "non-stretch" character, after which the control is removed, leaving a flexible fabric which is uniform in character, surface and appearance. The desired elasticity of the finished fabric is determined by the amount of stretch applied to the yarn during the operations of sizing or coating or the like.

As also brought out in my above mentioned parent application, to prevent any tendency for the threads to stick together, French chalk or similar dusting or lubricating medium may be applied thereto. And also while the adhesive or coating material used is preferably of such a character that it will quickly dry, yet if necessary the drying may be accelerated by artificial drying means of any suitable kind. It is to be further understood that the elastic threads which are to be coated may comprise uncovered rubber or rubber composition, or may comprise those with a winding or windings or covering already thereon, of silk, cotton, wool or other fibrous or protective material, of types which are per se well known in the art.

The fabric described in the foregoing may be made wholly from warps and/or wefts which are of the coated elastic rubber, or partly from ordinary non-extensible textile warps and/or wefts, and those of the coated elastic rubber. For the ordinary textile warps and wefts, the stretch control will not be required.

In the appended claims, references to rendering the elastic yarn approximately or substantially inelastic, and to suppressing the inherent elasticity of the elastic yarn, are of course intended in a practical and not a theoretically absolute sense, that is, absolute inelasticity is not required or necessarily desirable, the object being rather to avoid an objectionable elongation under actual operating conditions.

While the invention has been described in detail with respect to particular preferred examples, it will be understood by those skilled in the art after understanding the invention that various changes and further modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of manufacturing a fabric consisting in coating elastic rubber thread with a suitable soluble material, and allowing or causing it to dry, whereby the thread can no longer be substantially stretched, leading the thread thus treated into a machine for manufacturing the fabric, after which the coating is removed from the thread of the fabric so as to restore again to the threads their capacity of stretching.

2. A method of manufacturing a fabric consisting in coating elastic rubber thread with soluble material such as gelatine and allowing or causing it to dry so that the thread can no longer be substantially stretched, leading the thread thus treated into a machine for manufacturing the fabric after which the coating is removed from the thread of the fabric so as to restore the capacity of stretching to such thread.

3. As a new article of manufacture, a vulcanized rubber thread coated with soluble material which is allowed to dry and thereby prevent the thread from being stretched.

4. As a new article of manufacture an elastic vulcanized rubber thread coated with soluble material whilst it is under a predetermined amount of stretch so as to thereby deprive the thread of its elasticity.

5. Process of making fabric including elastic rubber or rubber-composition yarn, comprising stretching the elastic yarn, applying size thereto to restrain it against contraction from this stretched condition, manufacturing the fabric, and removing the size from the elastic yarn of the fabric.

6. Process of making fabric including elastic rubber or rubber-composition yarn, comprising as a preliminary operation, applying size to the yarn to render the yarn approximately inelastic during manufacture of the fabric, manufacturing the fabric, and removing the size from the thus treated yarn thereof.

7. An inherently elastic thread comprising a body of rubber or rubber composition having a soluble size deposited thereupon to hold said body in a stretched and substantially inelastic condition so that it may be woven or knitted without elongating or contracting from this condition to an appreciably greater degree than inelastic yarn.

8. An inherently elastic yarn comprising a body of rubber or rubber composition provided with a fibrous cover thereupon and having a soluble size deposited upon said cover and adapted to hold the yarn in a stretched but substantially inelastic condition so that the yarn may be woven or knitted without elongating or contracting from this condition to an appreciably greater degree than inelastic yarn.

9. Process of making fabric including elastic yarn having an elastic core and a fibrous cover wound thereupon, comprising as a preliminary operation applying size to the fibrous cover of the elastic yarn to render the yarn approximately inelastic during manufacture of the fabric, manufacturing the fabric, and removing the size from the elastic yarn of the fabric.

10. Process of making fabric including elastic rubber or rubber-composition yarn, comprising stretching the elastic yarn, applying a soluble gelatinous size thereto to restrain it against contraction from this stretched condition, manufacturing the fabric, and removing the size from the elastic yarn of the fabric.

11. An inherently elastic thread comprising a body of rubber or rubber composition having a soluble size comprising gelatine deposited thereupon to hold said body in a stretched and substantially inelastic condition so that it may be woven or knitted without elongating or contracting from this condition to an appreciably greater degree than inelastic yarn.

stantially inelastic condition so that it may be woven or knitted without elongating or contracting from this condition to an appreciably greater degree than inelastic yarn.

12. The method of manufacturing fabric or lace work consisting wholly or partly of elastic rubber threads, in which method vulcanized or unvulcanized rubber threads are first coated with a suitable adhesive or varnish and dried to render them non-elastic, after which the non-elastic threads obtained are woven or otherwise made into fabric, and the fabric thus obtained subsequently treated to remove the coating.

13. Process of making fabric including both elastic rubber or rubber-composition yarn and textile yarn, comprising initially causing the elastic yarn to assume a condition of linear extension sufficiently beyond its normal unstretched condition to permit the elastic yarn to be at or near its unstretched condition after finishing of the fabric, temporarily fixing the yarn in said condition of extension by applying and hardening soluble substance thereon, manufacturing the fabric, and dissolving the said soluble substance from the elastic yarn.

14. Process of making shrunk woven fabric having both elastic rubber or rubber-composition yarns and textile yarns extending in one direction therein, characterized in that, before weaving, the elastic yarns are temporarily fixed by soluble adhesive in an extended condition in which the ratio of the extended length of yarn to the normal unstretched length thereof is such that the finished fabric after shrinking will present a substantially uniform surface free of irregular patches or zones.

15. Process of making woven woolen fabric of which a portion of the filling yarns are elastic rubber or rubber-composition, characterized in that before weaving, the elastic filling yarns are temporarily fixed by soluble adhesive in an extended condition less than the full degree of extensibility thereof.

16. A method of making elastic fabrics composed of elastic and inelastic strands which comprises weaving in at least one direction of the fabric inelastic strands, associating with said inelastic strands in the same direction of the fabric covered elastic strands held to a substantially predetermined weaving elongation by sizing, and desizing the fabric to permit the elastic strands to contract.

17. A yarn comprising a body of rubber or rubber-composition, and a fibrous winding covering the same, and including a soluble size acting to suppress the inherent elasticity of the yarn during manufacture of fabric therefrom and adapted to be removed thereafter, the length of said yarn being substantially greater than the length it would assume in the absence of said size.

18. Process of making fabric having therein both textile yarn and elastic rubber or rubber-composition yarn, including initially suppressing the inherent capability of the elastic yarn to expand and contract in length upon applying or releasing tension, such suppressing being effected by associating with the elastic yarn a relatively inelastic accompaniment, utilizing the two yarns for the manufacture of the fabric in the usual way, and thereafter restoring the inherent elasticity of the elastic yarns.

19. Process of making knitted fabric having therein both textile yarn and elastic rubber or rubber-composition yarn, including initially suppressing the inherent capability of the elastic yarn to expand and contract in length upon applying or releasing tension, such suppressing being effected by associating with the elastic yarn a relatively inelastic accompaniment, utilizing the two yarns for the knitting of fabric in the usual way, and thereafter restoring the inherent elasticity of the elastic yarns in the knitted piece.

20. Process of making fabric including elastic rubber or rubber-composition yarn, comprising stretching the elastic yarn, applying a soluble size thereto to restrain it against contraction from this stretched condition, manufacturing the fabric, and removing at least a substantial part of the size from the elastic yarn of the fabric.

21. An unfinished fabric having incorporated therein strands of textile material and strands comprising elastic rubber, the latter strands each carrying soluble sizing and being maintained in a stretched condition by said sizing.

22. In the manufacture of fabric embodying elastic thread, the steps which include treating elastic thread comprising vulcanized rubber while substantially stretched with a substance imparting a semi-rigid set thereto for effectively maintaining the same in its stretched condition during manufacture of the fabric, then manufacturing the fabric, and treating the fabric to restore the inherent elasticity of the elastic thread.

THOMAS LEWIS SHEPHERD.