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UNITED STATES PATENT OFFICE

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HOSIERY

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This invention relates to a new and improved construction of stockings, socks, etc. all of which are hereinafter in the description and claims included in the term hose. It relates particularly to hose made from yarns consisting of continuous filaments whether the same be natural or artificial fibres or mixtures of natural and artificial fibres. More particularly this invention is directed to the production of hose from simple highly twisted yarn, that is of a single yarn or thread unmixed or untwisted with any other yarn whether of the same or different nature.

An object of this invention is to produce hose which will be superior in appearance and wearing quality to the hose now manufactured. Another object of this invention is to produce hose which will conform to the shape of the leg of the wearer. Another object of this invention is to provide hose which will have its tendency to ladder or run very greatly minimized. Another object of this invention is to provide hose manufactured in whole or in part from yarns consisting of continuous filaments of cellulose acetate, cellulose propionate, cellulose butyrate, ethyl cellulose, benzyl cellulose or other organic esters and ethers of cellulose (all included in the term, organic derivatives of cellulose) or from yarns comprising artificial filaments of the reconstituted cellulose types such as viscose, cuprammonium cellulose and nitrocellulose. Other objects and advantages of our invention will appear from the detailed description of the same.

It is well known to manufacture hose from yarns of continuous filaments of organic derivatives of cellulose and from filaments of the reconstituted cellulose types as well as from yarns or filaments of natural silk or from mixtures of these various filaments. Hose manufactured from such yarns, however, are objectionable in that they have the pronounced tendency to ladder or run. This laddering is due to the drawing or slipping out of a line or series of loops in the fabric, from the adjacent loops through which they are threaded, on the breaking of a loop or thread. This slipping or drawing out of the threads or loops is due to the lack of adhesion between the various threads at the interlooping points because of the low coefficient of friction of the yarn employed. This defect is so serious that it has greatly limited the use of certain classes of yarns for hosiery and certain classes of knitting machinery. It has also resulted in the employment of complicated processes of knitting with the object of locking the loops so that the breaking of an individual loop will not result in a run. Numerous attempts have also been made to prevent laddering or running in knitted goods by subjecting the yarns employed or the finished articles to chemical treatments with the object of so altering the physical characteristics of the surface of the yarn that their coefficient of friction would be raised, thereby minimizing the tendency of the yarns to slide or slip over one another. Our invention dispenses with the need of employing such chemical treatments.

We have now discovered a simple and efficient process for producing hose which will have a markedly reduced tendency to run. We have found that if yarns of continuous artificial textile filaments or/and natural silk of high twist are used for hosiery (knitting purposes) a stocking (fabric) will be obtained which is practically ladder proof. In addition the hose obtained by utilizing such highly twisted yarn possesses much greater mechanical strength than hose manufactured from similar untwisted or slightly twisted yarn.

The use of highly twisted yarn gives unusual beneficial effects. The high twist imparted to the yarn gives a much better fitting hose due to the twisted yarn exerting its contractile properties. The hose consequently fits the wearer's leg snugly and precludes the formation of wrinkles or bags in the leg or ankle portion of the stocking. When yarns made from artificial filaments of organic derivatives of cellulose or of reconstituted cellulose are employed in highly twisted form, they have a subdued, soft and even lustre resulting in hose which will have a lustre very much like that of natural silk.

This is a very desirable result since some artificial filaments as usually employed have a very high metallic lustre and are undesirable because of that fact.

We have found that yarns of continuous artificial textile filaments or/and silk having 10, 15, 20 or 30 turns or more to the inch give very excellent hose, not only with regards to decreased tendency to ladder but also as to increased mechanical strength and improved lustre. Very good results were obtained in using cellulose acetate yarn of 150 denier with about 17 turns to the inch. The coarser the yarn, that is the higher the denier, the less twist required to decrease the lustre of the filaments.

Certain classes of artificial filaments such as, for example, the viscose and reconstituted cellulose types, are unsatisfactory for use in hosiery manufacture because of their lack of strength. To overcome this weakness it is customary to mix natural silk filaments with such artificial filaments to obtain hose which have the requisite strength. Our invention removes the necessity of mixing natural silk filaments with artificial filaments as the high twist imparted to the artificial filaments in accordance with our discovery gives to the latter the strength necessary for it to be utilizable in hosiery manufacture unmixed with other filaments or yarns. This results in an appreciable saving in the cost of manufacture of such hosiery.

In making hose in accordance with this invention the same may be knitted throughout with highly twisted yarn or where desired only the leg or panel portion may be knitted with the highly twisted yarn and the remainder of the hose formed from ordinary untwisted or slightly twisted yarn. Yarns which have been found to give especially good results are those constituted of filaments of organic derivatives of cellulose, particularly cellulose acetate. Cellulose acetate yarns of 75, 100 and 150 denier with about 10 to 25 twists to the inch have given the best results. The denier of the yarn and the number of turns per inch are varied depending on the nature of the hosiery and the effect desired as well as upon the denier of the yarn.

Very good hose were made on a Wildman 240 needle machine using 150 denier cellulose acetate silk having 30 turns to the inch plaited with one end of 13/15 jap silk. These stockings had the appearance of natural silk hose and were not very susceptible to runners, the latter being due, no doubt, to the great binding property of the highly twisted yarn. In addition these stockings gave a very much better fit than stockings prepared from untwisted yarns or yarns with a normal twist. This specific example, is of course, merely illustrative since yarns of other deniers could be used and the number of turns per inch will vary somewhat with the denier of the yarn employed.

The use of highly twisted yarns in accordance with our discovery has the advantage that the improved hose can be obtained by utilizing the usual knitting machines now employed in the manufacture of hosiery. It also does away with the need of chemical treatments to reduce the tendency to ladder.

This invention has been described particularly with reference to hose made of cellulose acetate yarn mixed with natural silk yarn. It is, however, also applicable to yarns consisting of or containing continuous artificial textile filaments of whatever nature such as of the organic derivatives of cellulose type or of the reconstituted cellulose type as well as to yarns of natural silk. These various classes of yarns can be employed alone or mixtures of the same can be employed. Where desired instead of using highly twisted yarns through, predetermined portions only of the hose can be produced by using highly twisted yarn while normally twisted yarn can be utilized for the remaining portions. It is also possible to use twisted yarns of different degrees in different portions of the same stocking.

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

1. Knitted hose containing in at least part of its length simple highly twisted yarn of continuous textile filaments of organic derivatives of cellulose having 15 to 17 turns per inch.

2. Knitted hose containing in at least part of its length simple highly twisted yarn of continuous textile filaments of cellulose acetate having 15 to 17 turns per inch.

In testimony whereof, we have hereunto subscribed our names.

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