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ARTIFICIAL YARN AND PROCESS OF PRODUCING SAME

William Liebig, Huntingdon, Pa.

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This invention relates to improvements in artificial yarns and methods of producing artificial yarns and more particularly refers to the production of artificial yarns from continuous synthetic filaments and the products of such processes which are particularly suitable for use in knitted ladies' hosiery.

Prior to the instant invention both natural and synthetic yarns have been twisted while spinning same for various reasons. For example, yarns made of relatively short fibers or short filaments have been given more or less substantial twists in order that the relatively short fibers composing them may be properly interlaced and the yarns thereby given their required strength. In practice a finished No. 20 cotton yarn may be given a twist of seventeen turns to the inch. In connection with rayon yarns, the original luster or sheen is destroyed by twisting and this luster or sheen may be restored if the yarn is given a considerable reverse twist under slight tension. It is found that this luster of the rayon yarn can be substantially improved if the yarn is moistened and the reverse twisting is done while the yarn is in moistened condition. Such prior treatments of rayon have shown that the reverse twisting process is desirable and commercially usable only when the finished product is to be a lustrous yarn and it is not required that the yarn be possessed of great tensile strength.

In addition to the reverse twisting of rayon filaments or fibers as described above, synthetic yarn such as cuprammonium yarns have been twisted and then subjected to a substantial heat and wetting treatment at a temperature at or above the boiling point of water, then completely drying the same, then reverse twisting the synthetic yarn to the zero point or beyond the zero point in order to effect a finished product which will resemble wool but may be distinguished from real wool by a special luster.

It is an object of the instant invention to produce an artificial yarn which will have the appearance and characteristics of silk rather than of the relatively lustrous synthetic yarns and will be relatively smooth and "silky" to the feel rather than "wooly."

A further object of the instant invention is to produce a relatively dull artificial yarn which will be smooth and silky to the touch and will have relatively great tensile strength and elasticity.

Another object of the invention is to produce an artificial yarn which will have the characteristics of raw silk yarn with regard to tensile strength, elasticity, dullness and feel.

Other objects and the nature and advantages of the invention will be apparent from the following description.

In accordance with the invention synthetic yarn, such as cuprammonium yarn, in the form of skeins containing no twist, are first soaked in a solution composed of water, sulphonated mineral oil and fine ground glue for four minutes while the solution is maintained at a temperature of approximately 120° F. This yarn may be in the form of continuous filaments and may be in various sizes of from 50 to 100 denier. The size 75 denier may comprise sixty filaments and the higher the denier the more filaments and the lower the denier the less filaments in proportion. Care should be taken that the skeins are not soaked at too high a temperature. The purpose of soaking the yarn initially is to make it more pliable and to protect the filaments in the succeeding operations. The yarn is then dried and wound on spinner spools.

The spinner spools are then associated with a high speed twisting machine, such as is known in the throwing industry and an initial twist of fifty or more turns per inch in one direction is put into the yarn.

After the yarn has had its initial twist, the yarn is "set" in a specially controlled vacuum steam chest. In this chest the yarn is treated for fifteen minutes at a temperature of 180° F. while the steam within the chest is maintained under vacuum so that the boiling point of water is not reached. It is important and critical that the temperature in the steam chest not reach the boiling point of water as otherwise the yarn will be ruined for the purpose desired and will not obtain the characteristics such as will make it suitable for use in knitted hosiery, for example, which hosiery is to resemble silk rather than wool.

After the vacuum steam treatment, the yarn is allowed to approach room temperature in a relative humidity of approximately 60%. The yarn remains under these humidity conditions for approximately two or three hours and is then again wound on spinner spools.

The spinner spools are now associated with a high speed twisting machine and the yarn is given a back twist of approximately 20% of the original number of turns.

After the reverse twisting operation, the yarn is again "set" in the vacuum steam chest under the conditions already described.

After the second "setting" step, the yarn is wetted and wound onto cones, the wetting agent

being sulphonated mineral oil which is applied to the thread by a rotating roller as it is wound onto the cones. The finished yarn is oiled so that it will hold its moisture and be sufficiently lubricated for succeeding operations on the knitting machine such as, for example, a hosiery knitting machine.

Other synthetic yarn may be produced as described above including viscose yarns which are usually received on cones and in such case it is necessary to reel this material into skeins so that it may properly go through the initial soaking operation already referred to.

It has been found that yarns produced in accordance with the above examples, when knitted into hosiery, have produced artificial silk hosiery which are unusually sheer, strong, elastic, dull and snag-proof. The yarn being smooth and compact makes for sheerness and resistance to snagging. The special treatment of the yarn imparts to the hose the dullness of silk as compared with the relative lustrous appearance of ordinary synthetic yarns. The wet treatments of the yarn and the process of heating which are controlled as to temperature prevent injury to the surface of the yarn so that it is smooth and silky to the touch.

It is to be understood that the initial soaking solution may comprise other materials besides sulphonated mineral oil and finely ground glue either in addition to these materials or in place of them. For example, other wetting agents may be substituted for the mineral oil and other sizing agents may be substituted for the finely ground glue. It is important, however, that at no time in the process of producing artificial yarn is the temperature raised above the boiling point of water, and in fact the temperature must be maintained below the boiling point of water. It is also to be understood that other wetting agents may be employed after the final setting of the yarn in place of the sulphonated mineral oil.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to the specific conditions set forth in the specification except where they are indicated as being critical and as set forth in the appended claims.

I claim:

1. The method for producing a synthetic yarn suitable for use in the knitting of ladies' hosiery, comprising soaking a skein of synthetic yarn composed of a plurality of substantially untwisted continuous filaments in a solution of water, sulphonated mineral oil and finely ground glue at a temperature of approximately 120° F. for approximately four minutes in order to make the yarn more pliable and to protect same during the succeeding operations, drying the yarn, twisting the yarn in one direction approximately 50 turns, then setting this twist in the yarn by treating it with steam controlled as to temperature such as by the utilization of steam of approximately 180° F. maintained under a vacuum, holding the yarn under these wet hot conditions for approximately 15 minutes, then permitting the yarn to cool in a room maintained at room temperature and at approximately 60% relative humidity for a period of approximately two or three hours, then twisting the yarn in reverse in an amount approximating 20% of the original twist, then setting the yarn under the same heat and moisture conditions as before, and finally wetting the yarn with sulphonated mineral oil while winding same to produce the finished yarn.

2. The method set forth in claim 1, said synthetic yarn being a viscose yarn.

3. The method set forth in claim 1, said synthetic yarn being a cuprammonium yarn.

4. The method for producing a synthetic yarn comprising soaking unprepared synthetic yarn in a warm sizing bath, drying the yarn, twisting the yarn in one direction, setting this twist by controlled heat and moisture treatment at a temperature of less than 212° F., permitting the set yarn to cool somewhat and then twisting the yarn in a reverse direction in an amount less than one half of the original twist and again setting the yarn under similar setting conditions as before.

5. The method recited in claim 4, said synthetic yarn being a viscose yarn.

6. The method recited in claim 4, said synthetic yarn being a cuprammonium yarn.

7. The yarn resulting from the process of claim 1.

8. The yarn resulting from the process of claim 4.

WILLIAM LIEBIG.