

# UNITED STATES PATENT OFFICE.

DANIEL EDGAR COE, OF DARBY, PENNSYLVANIA.

ART OF MANUFACTURING YARN AND FABRICS FROM SILK-WASTE.

SPECIFICATION forming part of Letters Patent No. 672,055, dated April 16, 1901.

Application filed June 6, 1900. Serial No. 19,218. (No specimens.)

*To all whom it may concern:*

Be it known that I, DANIEL EDGAR COE, a citizen of the United States, and a resident of Darby, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in the Art of Manufacturing Yarn and Fabrics from Silk-Waste, of which the following is a specification.

In the reeling of the filaments of silk from the cocoon and their transformation into what is known as "thrown-silk yarn" more or less waste results from floss and broken and defective ends, and this, with the cocoons that are partially unreeled and those that are pierced by the escape of the chrysalides or otherwise defective, constitutes the material to the transformation of which my invention relates. Heretofore in the transformation of materials of this class into yarn it has been the custom to either remove the gum from the filaments at the outset by boiling them in a liquid solvent or otherwise and then after cleansing and drying them to pass them through suitable mechanism, whereby their transformation was effected, or else to subject them to the action of appropriate mechanism and then remove the gum therefrom at some subsequent stage of the treatment prior to the spinning operation. When the first of these methods of procedure has been followed, the materials have been so matted and felted together by the boiling action that the separation of the filaments was accomplished only at the expense of breaking them into such short lengths that a great proportion of them, amounting in some instances to fifty per centum and over, has been extruded as noil and has had little value, owing to the fact that the yarn produced from them has had but little luster and strength, and hence could be used only for the cheapest products. On the other hand, when the boiling and degumming operation took place at a later stage in the proceedings the treatment of the material by the mechanism was of such a character that only loose and partially-opened up material could be treated, and even with this the yarn produced thereby has lacked the requisite luster, in consequence of the fact that the constituent strands which composed the filaments were separated from each other by the degumming operation before they were bound

together in the spinning operation, and as a result thereof they could not be properly incorporated into the yarn, but projected therefrom in the form of fuzz, which thereby detracted greatly from its value. The object of my invention is therefore to reduce the amount of this noil to the minimum and at the same time to produce a yarn therefrom which shall be greatly enhanced in value. To this end I first subject the waste to the action of a garnett or other equivalent machine without boiling or removal of gum, with a view to the opening up and separation of both the material composing the cocoons and the remainder of the waste and the breaking of the longer filaments into shorter lengths, which in practice it is preferred should not exceed twelve or fourteen inches. The material as thus treated I next pass through a series of ordinary preparing gill-boxes for the purpose of arranging the filaments in parallel relationship and forming them into a continuous, even, and uniform sliver. From this series of gill-boxes I next pass the sliver to and through an ordinary wool-combing machine and separate out the shorter filaments or noil from the longer filaments, which latter I then convert into yarn by drawing and spinning in the same manner and by the same machines as is ordinarily employed in the drawing and spinning of long-fiber wool and other similar material. The shorter filaments or noil, on the other hand, I subject to the action of an ordinary short-fiber woolen-card, and after converting it into a roving spin it into yarn on an ordinary mule or other spinning machine. The different yarns thus produced I then boil off or degum and then cleanse, after which they are ready for subsequent use in the manufacture of fabrics or other articles. Instead, however, of thus degumming and cleansing the material in the yarn, where the latter is to be manufactured into fabrics or other articles, these steps I sometimes defer until after that operation has been effected and then perform them upon the fabric or articles produced, it only being essential that this degumming and cleansing of the waste be deferred until after the spinning operation has been effected.

By the mode of procedure thus described I obviate the felting of the filaments of the



silk together incident to the boiling and degumming of the same when in an entangled condition, as well as the separation of the ends of the constituent parts of the filaments  
5 and consequent projecting fuzz when broken or otherwise until after they have been bound into the yarn, and not only produce a noil-yarn which is stronger than any of the yarns of this character as heretofore produced, but  
10 also both a long-filament spun-yarn and a short or noil yarn that are severally more lustrous as well. Moreover, by this mode of procedure I am enabled to utilize a greater portion of the entangled material that was  
15 before felted together in the boiling and degumming operation, and thereby rendered unavailable, since when acted upon in its raw state it more readily yields to the action of the various opening and straightening machines, and in that condition its filaments are  
20 more easily arranged in a parallel relationship.

Having now described my invention and specified the best means contemplated by me  
25 for carrying it into effect, I claim and desire to secure by Letters Patent of the United States—

1. The improvement in the art of manufacturing silk-waste into yarn which consists in  
30 opening up and separating the filaments

thereof and breaking the longer of such filaments into shorter lengths, then disposing these filaments in parallel relationship and forming them in an even and uniform sliver, then combing and separating the shorter from  
35 the longer filaments, then converting the masses of these filaments into yarns by drawings and spinning, and then degumming such material, substantially as described.

2. The improvement in the art of manufacturing silk-waste into yarn which consists, in opening up and separating the filaments thereof and breaking the longer of such filaments into shorter lengths, then gilling and  
40 arranging its filaments in parallel relationship and forming them into an even and uniform sliver, then combing the sliver thus formed to separate the longer filaments thereof from the shorter filaments or noil, then  
45 converting the longer and shorter filaments into yarn by drawing and spinning the one, and carding, drawing and spinning the other, and then degumming the material, substantially as described.

In witness whereof I have hereunto set my  
55 hand this 5th day of June, 1900.

DANIEL EDGAR COE.

Witnesses:

C. L. SERRILL,  
R. F. SWEENEY.