

UNITED STATES PATENT OFFICE.

DANIEL EDGAR COE, OF DARBY, PENNSYLVANIA.

ART OF MANUFACTURING YARN FROM WASTE.

SPECIFICATION forming part of Letters Patent No. 466,457, dated January 5, 1892.

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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, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in the Art of Manufacturing Yarn from Waste, of which the following is a specification.

In the manufacture of yarn from wool, silk, and other fibers, as is well known, a large proportion of the fiber employed therein is during the various steps of the process necessary to its transformation converted into waste, the percentage of which varies within wide limits, depending upon the skill of the operatives, the condition of the machinery through which the fiber is passed, and various other circumstances not necessary to enumerate herein. The loss that would result from casting this waste aside as a by-product would be so great that efforts are made to reclaim it and utilize the same in the manufacture of yarn by returning it to its original condition as fiber, and after mixing it with fresh material transforming it therewith into yarn by the usual process or that through which it was passing when extruded.

The return of the waste to its original condition, when no twist has been imparted to it or when in the condition of what is known as "soft waste," is easily accomplished by simply pulling or picking it apart, which may be effected either by hand or by the usual picking machinery. When, however, the waste has passed that point in the manufacture before being thrown off and twist has been imparted to it, forming what is known as "hard waste," its return to its original condition is a more difficult operation, the difficulty increasing in proportion to the amount of twist which the waste possesses, and it is more especially in connection with this character of waste that my present invention is concerned. In this last-mentioned condition the reversion of the waste into fiber can only be practically effected by picking or carding machinery, which acting upon the strands of fiber as they are passed through it tends to comb out the twists from the strands and brings the separate fibers or filaments thereof into parallelism, or approximately so, ready for incorporation with other fiber and trans-

formation with it into yarn by the process through which it was originally passing. This mode of treatment, however, while serving to remove the twists from the strands and straighten the individual fibers thereof, is found objectionable in practice principally because of the deleterious effects upon the fibers, due to the breaking thereof by the action of the picking or carding mechanism thereon, and because of the cost incident thereto. The object of my invention is to obviate these objections and provide not only a method whereby the transformation of waste of the character last mentioned into yarn may be more cheaply and efficiently effected than has been possible heretofore, but also a greatly superior yarn as a result thereof.

To these ends the invention consists, first, in the peculiar method of procedure whereby the results specified are accomplished, and, second, in the yarn produced thereby, all as will hereinafter more fully appear.

In carrying out my invention the hard waste as it comes from the various machines is first fed to and passed through an ordinary preparing gill-box, which, without removing the twist therefrom, breaks the strands thereof into lengths and brings them into parallelism with respect to one another or into an approximation thereto. From this machine the waste, as thus treated, is delivered in the form of a lap, which is afterward cut up into sections of, say, sixteen inches in length, or thereabout, by shears or otherwise, and the sections so formed are then continuously fed to a second lap-preparing gill-box, through which they are passed, whereby to further straighten the strands of the waste and more thoroughly intermix them, while yet in no substantial degree removing the twist therefrom. After having passed through this last-mentioned gill-box and received treatment the product is again discharged in the form of a lap, which is next fed to and passed through an ordinary can-preparing gill in a continuous manner, and is delivered into a can in the form of a continuous sliver. The slivers thus produced are then combined and a number of them together in a mass passed through a finishing-preparing gill-box, forming a single resulting sliver, which is delivered by such machine into a can or other

suitable receptacle. The number of slivers combined in this machine will depend, as will be understood, upon the size of the composite slivers to be produced, and in making up
 5 such combination slivers composed wholly of hard waste may be selected, or slivers composed of hard waste may be united with slivers formed from soft waste, or with slivers made up from new material or with both, as
 10 may be desired, the operation of the machine upon the slivers as they pass therethrough serving to intermix them and bring the strands or yarns composing each into more perfect parallelism with respect to those composing
 15 the others without in any great degree disturbing the twist therein. As thus formed, the resulting sliver is fed to and passed through an ordinary wool-combing machine, by which operation all knots and imperfect
 20 threads are removed, and a sliver made up in whole or in part of substantially perfect threads, depending of course upon the character of the individual slivers combined in the last preceding operation is produced. After
 25 leaving this combing-machine the sliver is passed through the appropriate drawing-machines, and by a series of combinations and drawings therein evened and attenuated to the proper degree to form the yarn required.
 30 When the coarser kinds of yarns are to be produced, these drawing-machines will consist of a can gill-box, a spindle gill-box, an open-drawing finishing-box, an open-drawing reducing-box, and a roving-frame, through
 35 which several machines the slivers, combined and united to the desired number, will be successively passed, the roving-frame in this case effecting not only a portion of the drawing of the mass passing therethrough, but also the
 40 spinning thereof. When, however, on the other hand, the finer grades of yarns are to be produced, the several drawing-machines above mentioned will be supplemented by a flier-spinning machine, by means of which,
 45 after the slivers have been combined and drawn in the preceding machines, the resulting product may be spun, or, if desired, still further drawn and then spun.

Although in the preceding method I have
 50 described the combining and uniting of the slivers as effected in each of the drawing-machines constituting the series, it is obvious that in some cases this arrangement may be modified and the combining and uniting effected in only certain of such machines, while
 55 through the remainder of these machines such slivers will be passed singly.

Again, while the treatment above set forth is the one which I prefer to adopt in most
 60 cases, yet with some characters of hard waste—as, for instance, warp ends and other like kinds where the threads or ends are arranged parallel to each other, or substantially so, at the outset—such waste may be cut or divided
 65 into sections of the appropriate lengths and its conversion into yarn effected without subjecting it to the action of the combing-ma-

chine, in which event that machine may be dispensed with.

From the foregoing it will be seen that I
 70 provide a simple and inexpensive mode of procedure, whereby the conversion of hard waste into yarn may be effected without returning it to its original condition as fiber, the severing of the yarns or strands compos-
 75 ing the waste into sections of comparatively short lengths, permitting of its being readily drawn and attenuated in the usual drawing machinery without removing the twist there-
 80 from.

By following the method of procedure as thus described a yarn is produced which, instead of being formed from a number of independent filaments of fiber twisted together,
 85 is made up either in whole or in part from a number of short sections of twisted composite threads or strands combined, and likewise spun or twisted together.

In carrying my improved method into effect any of the well-known forms of prepar-
 90 ing gill-box, lap-preparing gill-box, can-preparing gill, finishing-preparing gill-box, wool-combing machine, can gill-box, spindle gill-box, open-drawing finishing-box, open-drawing reducing-box, roving-frame, and flier
 95 spinning-machine may be employed; but as such machines form no part of my present invention and possess no novelty in themselves they have not been illustrated and need no further description herein.
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Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The improvement in the art of converting fibrous hard waste into yarn, which consists in severing the threads or strands composing the waste into sections of the appropriate length, then drawing the waste until the proper degree of attenuation is reached, and then twisting the same into yarn, substantially as described.
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2. The improvement in the art of converting fibrous hard waste into yarn, which consists, first, in dividing the threads or strands composing the waste into sections of the appropriate length, then drawing the mass to bring such threads or strands into parallelism and the waste into the form of a sliver, then combining and drawing the slivers thus formed until the proper degree of evenness
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 120 and attenuation is attained, and then twisting the product so formed into yarn, substantially as described.

3. The improvement in the art of utilizing fibrous hard waste in the manufacture of yarn,
 125 which consists, first, in forming the waste into laps, next in cutting or dividing these laps into sections of the appropriate length, next in forming these sections again into laps, next in drawing such laps and converting them
 130 into slivers, next in combining a number of slivers and drawing them until another sliver is formed, next in combing these last-mentioned slivers without changing their form,

next in combining and drawing a number of the slivers thus combed until the proper degree of evenness and attenuation have been attained, and then twisting the product so
5 formed into yarn, substantially as described.

4. A yarn having a number of short sections of twisted threads or strands incorporated therein, substantially as described.

5. A yarn composed of a number of short sections of twisted threads or strands spun or 10 twisted together, substantially as described.

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Witnesses:

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