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W. R. KEEN  
CURLED YARNS, CURLED YARN FABRICS AND  
METHOD FOR MAKING SAME

2,857,651

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2 Sheets-Sheet 1

FIG. 1

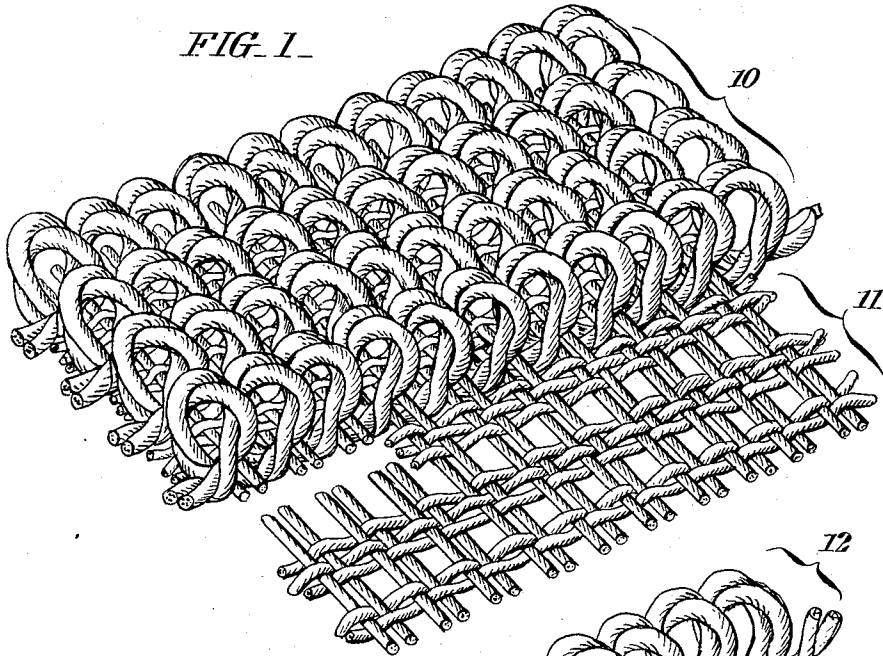


FIG. 2

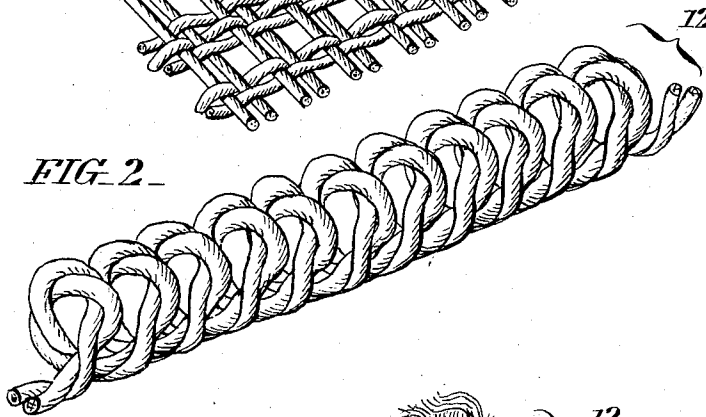
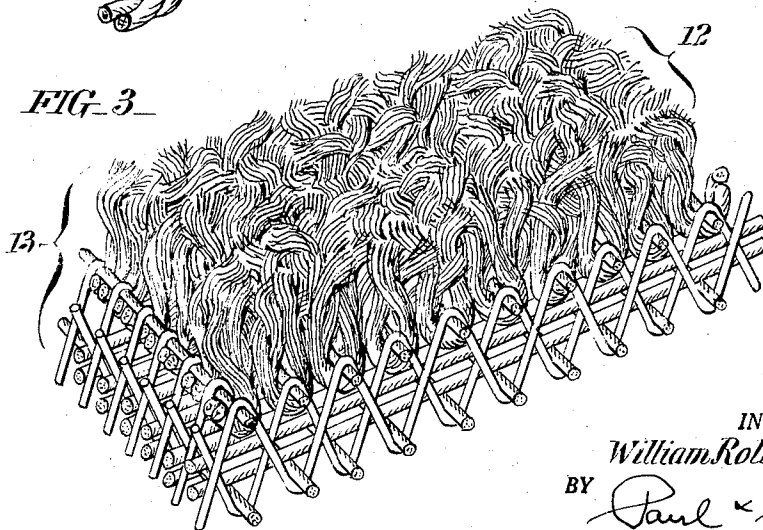


FIG. 3



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FIG. 4

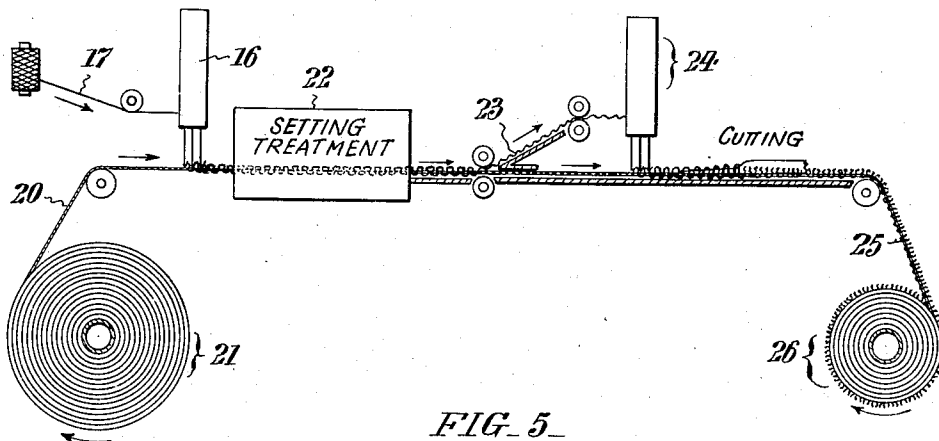


FIG. 5

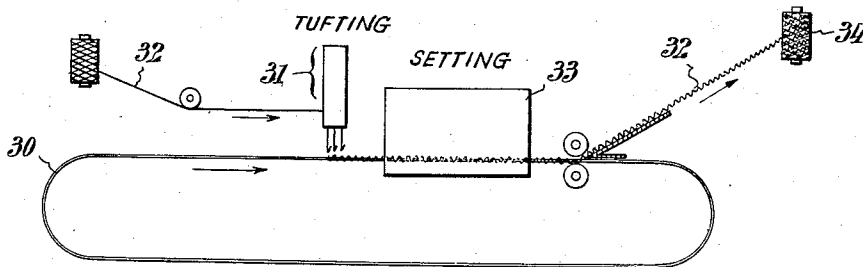
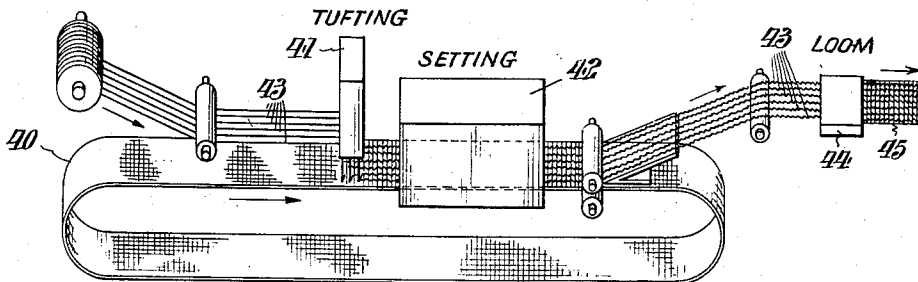


FIG. 6



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## CURLED YARNS, CURLED YARN FABRICS AND METHOD FOR MAKING SAME

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17 Claims. (Cl. 28—72)

This invention relates to a method of manufacturing curled or crimped textile yarns, curled yarn fabrics, to the apparatus for making them, and to the curled yarns produced thereby. The curled yarns of the present invention may be made from fibers or filaments of materials which will take a substantially permanent set such as mohair, wool, nylon, dacron and the like or mixtures thereof with viscose or the like.

It has been known to produce curled or crimped yarns for use in textile materials. However, the known methods are both tedious and costly and often produce serious deterioration in the strength and elasticity of the yarns produced so that they are difficult and costly to use in weaving or other fabric forming processes.

It is an object of this invention to provide a method of crimping or curling textile yarns without injuring the yarn material.

It is also an object of this invention to provide a rapid and inexpensive method for continuously producing curled textile yarns.

It is a further object of the present invention to provide a continuous process for crimping or curling yarns without exerting undue strain on the yarn material.

It is also an object of this invention to provide a process and apparatus for producing fabrics having curled or crimped yarns.

It is a further object of the present invention to provide a process and apparatus for continuously producing a number of curled yarn ends and simultaneously weaving or tufting a fabric using said ends.

It is a still further object of this invention to provide a novel crimped or curled textile yarn.

One embodiment of the invention is illustrated in the attached drawings of which:

Fig. 1 is a perspective view of a backing material tufted with a yarn which it is desired to curl or crimp in accordance with the invention;

Fig. 2 is a perspective view of the tufted yarn of Fig. 1 removed from the backing material;

Fig. 3 is a perspective view of the crimped yarn of Fig. 2 employed as a pile yarn in a woven cut pile fabric; and

Fig. 4 is a diagrammatic drawing showing another embodiment of the invention wherein a pile yarn is tufted in a backing material, set in the backing, removed and then retufted in the backing material and showing the apparatus employed;

Fig. 5 is a diagrammatic drawing showing another embodiment of the invention wherein an endless loop of backing material is continuously tufted and the tufted yarn is set and spooled; and

Fig. 6 is a diagrammatic perspective view showing another embodiment of the invention wherein an endless loop of backing material is continuously tufted, and the tufted yarn is set and beamed to a loom.

The yarn 10 which it is desired to curl or crimp is tufted in the usual manner in a backing material 11 as

shown in Fig. 1. The backing material may be of any of the usual open weave materials such as burlap. The yarns 10 may be of any normal construction as to count or twist in the single or ply and may be spun entirely of wool, mohair, nylon, dacron or any settable fiber or filaments of nylon or any settable filament or combinations thereof. The yarn 10 is tufted in the backing 11 and, as thus deformed, is subjected to the treatment necessary to provide a set in the yarn 10. The type of crimp or curl produced in the yarn may be varied by modifying types of loops and stretch used during the tufting. The setting is performed on the tufted fabric in accordance with known methods required to produce a set in the yarn material such as by the application of hot water or steam. If preferred, the tufted yarn may be dyed while in this condition and thereby obtain both setting and dyeing at the same time. The yarn is then pulled from the backing as may be easily done with a tufted yarn, and is fully prepared to be used as a pile yarn in a tufted or woven fabric. A fully crimped and set yarn 12 is shown in Fig. 2 and Fig. 3 shows the crimped yarn 12 woven as the pile yarn in a pile fabric 13. As shown in Fig. 3, the pile is cut allowing the yarns 12 to twist or turn in accordance with their set conformations to form a dense, tight, pile surface.

A continuous process for making crimped yarn is shown in Fig. 5. Backing material 30, which may be in the form of a continuous loop, is continuously fed into a tufting machine 31 where it is tufted with yarn 32. The tufted backing material 30 is then continuously fed into a setting chamber 33 where the tufted yarn 32 is set in the looped or crimped condition. As the backing material 30 leaves the setting chamber 33, the crimped yarn 32 is continuously raveled from the backing and is wound about the cone 34.

Where the yarn is to be used to produce a tufted fabric, the yarn may be tufted back into the very backing material in which it was set as illustrated in Fig. 4. The backing material 20 is fed from the roll 21 to the tufting machine 16. The pile forming yarn 17 is fed to the tufting machine 16 and there tufted into the backing material 20. The tufted backing material is then fed continuously to the setting chamber 22. There the tufted configurations in the tufted fabric 20 are set by any usual treatment. The pile yarn 23 is then pulled from the fabric 20 and fed to the needles of tufting machine 24, while at the same time the backing material of the fabric 20 is fed beneath the tufting machine 24, so that the crimped yarn 23 is tufted back into the fabric 20. The retufted fabric 25 is then taken up on roll 26.

The present invention also includes the process shown in Fig. 6 in which a woven fabric is continuously produced from crimped yarn. A continuous loop of backing material 40 is fed to tufting machine 41 and setting chamber 42. The yarn 43 is tufted into the backing material 40 and then set in the tufted condition in setting chamber 42 and is unraveled and beamed directly to the loom 44 where it becomes the warp yarns in the woven fabric 45.

An important advantage of the invention is that it accomplishes the crimping and curling of yarns in a form where they can be set or dyed and set evenly on conventional dyeing equipment and in a minimum time. Thus, as shown in Fig. 4, all of the equipment is that normally used in handling and producing piece goods. The handling of individual yarns is limited to the tufting machine which is, of course, a standard goods making machine.

Having thus described my invention, I claim:

1. A method of producing crimped yarns comprising the steps of needle-tufting textile yarns in a backing

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material to form a tufted pile fabric, subjecting the resulting pile fabric to setting treatment to set the loops in the tufted yarns and removing the set yarns from the backing material.

2. The textile yarn made according to the process of claim 1.

3. A method of producing crimped yarns comprising the steps of needle-tufting textile yarns of a settable material in a woven backing material, continuously subjecting the tufted pile fabric so formed to heat treatment to set the loops in the pile yarns and then pulling out the tufted yarns as permanently crimped individual yarns.

4. The textile yarn made according to the process of claim 3.

5. A method of forming crimped yarns comprising the steps of tufting textile yarns in a woven backing material to form a tufted pile fabric, subjecting said tufted pile fabric to moist heat treatment, drying the fabric and then raveling the pile yarns and collecting them as individually crimped yarns.

6. The textile yarn made according to the process of claim 5.

7. A method of producing a tufted pile fabric comprising the steps of tufting pile yarns in a backing material, setting the pile yarns in situ in said backing material, removing the set pile yarns and retufting them into the backing material.

8. The fabric made according to the process of claim 7.

9. A method of making a tufted pile fabric comprising the steps of needle-tufting a textile yarn warp-wise in a woven backing material, continuously subjecting the tufted pile fabric so formed to a pile yarn setting treatment in a warp-wise direction, removing the set pile yarns from the backing material and continuously needle-tufting said yarns into a backing material.

10. The fabric made according to the process of claim 9.

11. A method of continuously producing crimped yarns from a closed loop of backing material comprising continuously needle tufting a textile yarn in the backing material and then continuously setting the tufted back-

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ing material to form a permanent crimp in the tufted yarn and then raveling the set crimped yarns and collecting them by winding about a cone.

12. A method of continuously making a fabric with crimped yarns comprising continuously tufting pile yarns in a backing material, setting the yarns so tufted in the backing material and then continuously delivering the tufted and set yarns to a loom as warp yarns.

13. The fabric made according to the process of claim 12.

14. A method of forming a tufted pile fabric comprising tufting pile-forming yarns in a backing material, setting the tufted yarns, removing the tufted and set yarns from the backing material and tufting said pile forming yarns in a backing material.

15. The fabric made in accordance with the method of claim 14.

16. A method of making pile fabrics comprising tufting pile-forming yarns in a backing material, setting the tufted yarns, removing the tufted and set yarns from the backing material and weaving said yarns as the pile yarns in a woven pile fabric.

17. The fabric made in accordance with the method of claim 16.

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