Sept. 20, 1949. R. R. CONE 2,482,655

METHOD AND APPARATUS FOR MAKING RUGS

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Fig. 1.

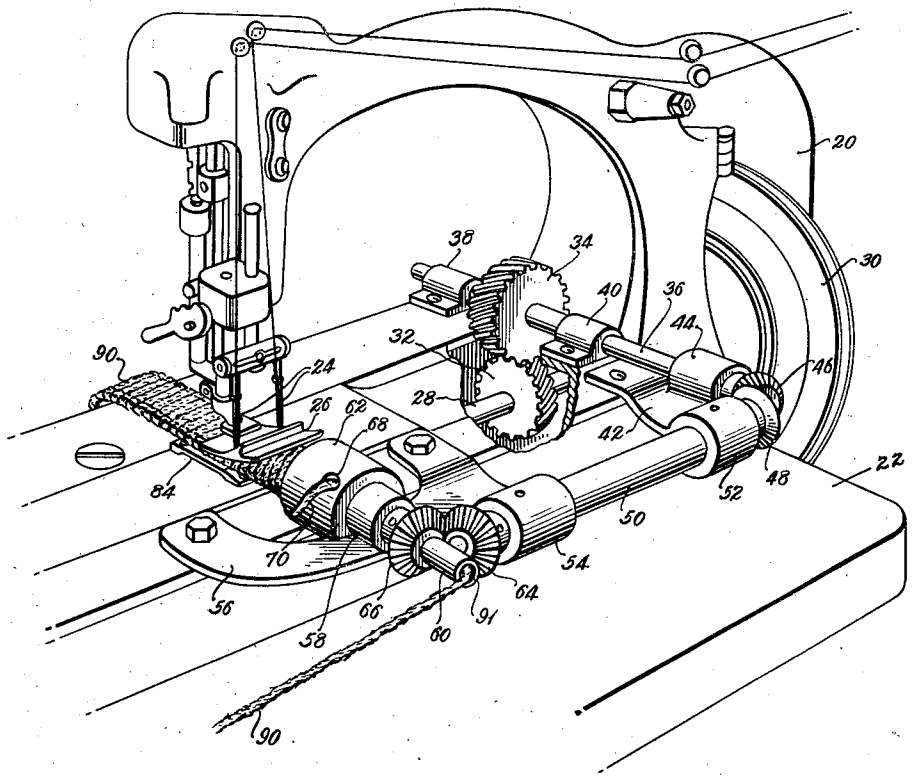
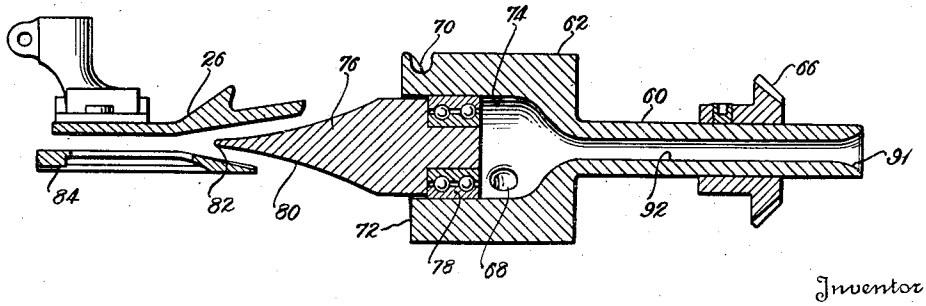


Fig. 2.



Inventor

Ralph R. Cone

By Townshend & Colton

Attorneys

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Fig. 3.

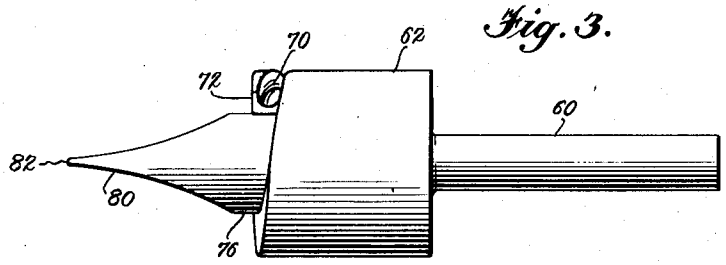


Fig. 4.

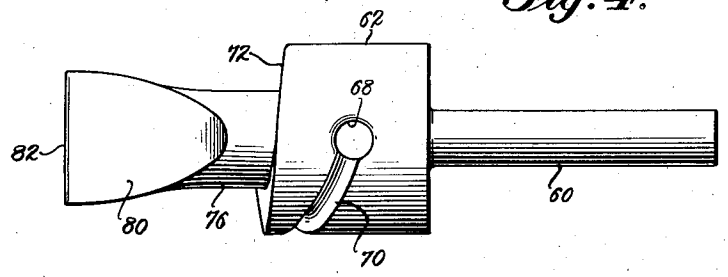


Fig. 5.

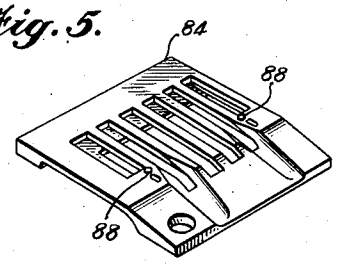


Fig. 6.

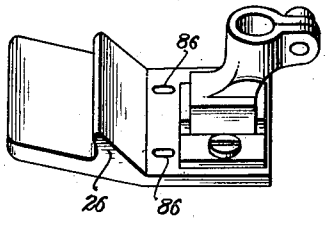


Fig. 7.

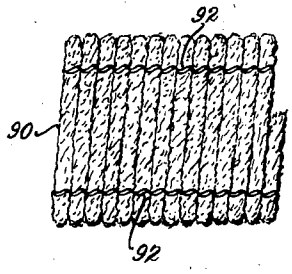
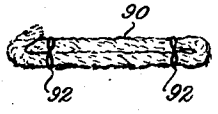


Fig. 8.



Inventor

Ralph R. Cone

By Townshend & Colton

Attorneys

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METHOD AND APPARATUS FOR MAKING RUGS

Ralph R. Cone, Augusta, Ga., assignor to Riverside Mills, Augusta, Ga.

Application January 30, 1945, Serial No. 575,232

13 Claims. (Cl. 112—9)

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This invention relates to pile fabrics, methods of producing such fabrics and machines for effecting their production.

A prior patent issued to the present applicant on March 21, 1944, No. 2,344,537, describes an article of manufacture comprising a textile filament wound and stitched to form a web suitable for varied uses in the textile arts. The present invention represents an advance in the art, in that the filament or filaments are wound only temporarily on a mandrel. The winding mechanism may assume the form of an attachment for commercially known sewing machines, which may then stitch the web intermediate its edges without the necessity for any backing or sheet material to maintain the textile material in desired form.

As in the earlier patent referred to, one of the uses contemplated for the fabric produced by this invention is in the manufacture of rugs of the type wherein the pile is adhesively secured to a backing, or two backings, as the case may be. Various other applications of the products are contemplated, however, including their use for tape, braid, tapestries, portières, bedcovers and trimmings, to mention a few.

In accordance with the present invention, a winding device, which may be constructed conveniently as a sewing machine attachment, comprises a support having a head rotatably mounted thereon and means for rotating the head at a predetermined speed; the head may be provided with a peripheral groove to serve as a guide for one or more filaments to be wound; the filament or filaments may be introduced to the interior of the head and led into the peripheral groove through a radial opening in the head; the delivery end of the head may terminate in a single helical thread having a pitch approximating or slightly greater than the diameter of the material to be wound; adjacent the delivery end of the head, and in some cases supported therein by suitable bearings, a mandrel may be positioned to receive the wound filament from the head; the mandrel is preferably circular in section at its receiving end and provided with a gradual taper terminating in a relatively thin rectangular section at its delivery end; in order to maintain the convolutions in sufficiently tightly wound condition, the perimeter of the mandrel is substantially constant throughout its circular and tapered portions; from the reduced end of the mandrel, the wound or looped filamentary material may be fed between the throat plate and presser foot of a sewing machine, where a suitable number of

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stitches may be applied to maintain the fabric in its assigned form.

Due to the helical formation on the delivery end of the head, it will be understood that the convolutions will be forced along the mandrel, and ultimately to the stitching mechanism. By a proper selection of gearing, the feed of the wound filament may be so related to the speed of the machine needle or needles, that the stitches are of the proper length and frequency to assure proper sewing of the adjacent loops of the material and satisfactorily unite them to form a self-supporting tape-like body.

The article produced may be defined as a textile filament wound to form a substantially flat tube having contacting inner walls. Adjacent turns of the filament are preferably in contact, although the use of a plurality of filaments is contemplated, in which case the contacting adjacent turns may not be formed from the same filament. As already indicated, the flat tube so formed may be provided with one or more rows of stitching extending longitudinally thereof.

A more complete understanding of the invention will follow from a detailed description of some of its aspects with respect to the attached drawings wherein:

Fig. 1 is a fragmentary perspective view showing the winding device applied to an existing type of sewing machine;

Fig. 2 is a sectional elevation view of the winding device showing its relationship to certain cooperating parts of a sewing machine;

Figs. 3 and 4 are elevational views of a suitable winding device;

Fig. 5 is a perspective view of a sewing machine throat plate;

Fig. 6 is a perspective view of a sewing machine presser foot;

Fig. 7 is a plan view of a length of an article produced by the present invention; and

Fig. 8 is an end elevation view of the article of Fig. 7.

The sewing machine 20 shown in Fig. 1 is of an existing commercial type having a base 22, a pair of needles 24, a presser foot 26, a main shaft 28 and a balance wheel 30. A helical gear 32 is mounted on the main shaft for cooperation with a helical gear 34 fixed to a jack shaft 36 journalled in suitable bearings 38 and 40 mounted on the frame of the machine. A bracket 42 is fastened to the frame to provide a bearing 44 for an extension of the shaft 36 to the end of which is fitted a bevel gear 46 which meshes with a complementary bevel gear 48 fitted to a shaft 50,

supported by bearings 52 and 54 provided by the bracket 42 and a bracket 56, respectively, for rotation parallel to the main shaft 28. The bracket 56 is likewise secured to the machine frame and provides a second bearing 58 for the hollow shaft 60 extending from the rotary head 62. On the end of the shaft 50 and spaced from the end of shaft 60, bevel gears 64 and 66, respectively, are provided to complete the train.

The head 62 contains a radial port 68 which intersects a peripheral groove 70 which in turn terminates in a helical end 72 formed on the head. The head is provided with a counterbore 74 in which a mandrel 76 is supported for relative rotation by a suitable bearing assembly 78. The mandrel has a substantially circular section adjacent the head, for a length sufficient to wind a helical coil of thread, yarn or filament, which terms are used synonomously throughout the present specification and claims. The major portion of the mandrel projecting beyond the head is provided with a taper 80 however, which terminates in a relatively thin substantially rectangular end 82, care being observed to assure substantial constancy of the perimeter or circumference throughout the circular portion and taper to assuer uniform tension in the filament wound thereon.

The reduced end of the mandrel is received between the presser foot 26 and a throat plate 84 which converge at a rate corresponding to the taper on the mandrel to receive the flat tube of material formed by winding the filament and then flattening it. The presser foot 26 is provided with suitable openings 86 and the throat plate with similar openings 88 for passage of the needles 24 employed to sew the adjacent loops of the wound material together.

The filament 90 is supplied from a reel or other suitable source, not shown, and is threaded into a rounded end 91 through a passage 92 in the hollow shaft 60, whence it is led through the radial opening 68 to the peripheral groove 70, from which it is fed to the mandrel 76 by the helical end 72 of the head, and between the presser foot 26 and throat plate 84 where the stitches 92 are formed to produce an article of the type depicted in Figs. 7 and 8.

Where other suitable means are provided to retain the wound filament in the desired flat form, the sewing may be omitted. In other cases it may be desired to omit one of the rows of stitching shown in Fig. 7, and in still other cases, more lines of stitching may be provided. For the manufacture of rugs, where the strips thus formed are set-up in an apparatus similar to a type chase and two backings adhesively applied, it is advantageous to provide stitching closely adjacent to both edges of the body so that the stitching itself will be embedded in the binder and serve as a key to avoid separation.

Whereas the description of the invention has relied upon a single illustration of its application, various modifications have already suggested themselves, and will suggest themselves to those skilled in the art. It is not, therefore, intended that the invention be restricted to this illustration except as specified in the appended claims.

I claim:

1. A winding device comprising a support, a head rotatably mounted on said support, said head having a grooved periphery and a helical end, a tapered mandrel adjacent said helical end, and a passage formed in said head and communicating with said groove for introducing a filament to the interior of said head and to said groove for cooperation with said helical end and said mandrel.

2. A winding device comprising a support, a head rotatably mounted on said support, means for rotating said head at a substantially constant rate, means for introducing a filament to said head, a relatively stationary mandrel adjacent said head, and means carried by said head for feeding said filament from said head to said mandrel at a substantially uniform rate.

3. A winding device comprising a support, a head rotatably mounted on said support, means for rotating said head, means for introducing a filament to said head, a mandrel adjacent said head, means for feeding said filament from said head to said mandrel at a substantially uniform rate, said mandrel having a varying cross-sectional peripheral shape of substantially constant perimeter.

4. A winding device comprising a support, a head rotatably mounted on said support, means for rotating said head, means for introducing a filament to said head, a relatively stationary mandrel adjacent said head, means for feeding said filament from said head about said mandrel at a substantially uniform rate, said mandrel having a cross-section varying from substantially circular to substantially flat and having a substantially uniform perimeter throughout.

5. A winding device comprising a support, a head rotatably mounted on said support, means for rotating said head, means for introducing a filament to said head, a peripheral groove provided on said head serving as a guide for said filament, said groove terminating at the end of said head in a helical face having a pitch exceeding the diameter of said filament, and a relatively stationary mandrel extending beyond said face to receive filament convolutions delivered from said head.

6. A sewing machine attachment comprising a rotary head actuated by the machine drive mechanism, means for feeding a filament to said head, means carried by said head and rotatable therewith for feeding said filament helically from said head, a tapered mandrel adjacent said head for receiving the filament from said head, said mandrel delivering said filament to a stitching mechanism operative in timed relationship with respect to said head.

7. Apparatus for producing flattened helical bodies from filamentary material comprising a rotary head adapted to receive filamentary material, means provided on said head for winding said filamentary material helically and positively advancing the same, a mandrel arranged in the path of said helically wound material, said mandrel having a varying peripheral cross section of substantially constant perimeter for imparting to said helically wound material a substantially flat form, and means arranged in the path of said helically wound material to fasten it in substantially flat form.

8. Apparatus for producing flattened helical bodies from filamentary material comprising a rotary head adapted to receive filamentary material, helical means provided on said head for winding said filamentary material helically and positively advancing the same, a mandrel arranged in the path of said helically wound material, said mandrel having a varying peripheral cross section for imparting to said helically wound material a substantially flat form, and

means for fastening said body along its edges to retain it in substantially flat form.

9. A method for producing flattened helical bodies from filamentary material comprising winding filamentary material to form a helix of substantially circular cross section, gradually modifying said cross section by feeding the helix along a varying path of substantially constant perimeter until the cross section of said helix is substantially flat and retaining the body thus formed in its substantially flat condition.

10. A method for producing flattened helical bodies from filamentary material comprising winding filamentary material to form a helix of substantially circular cross section, gradually modifying said cross section by feeding the helix along a varying path of substantially constant perimeter until the cross section of said helix is substantially flat and fastening the body thus formed to retain the substantially flat condition.

11. A method for producing flattened helical bodies from filamentary material comprising winding filamentary material to form a helix of substantially circular cross section, gradually modifying said cross section by feeding the helix along a varying path of substantially constant perimeter until the cross section of said helix is substantially flat and stitching the body thus formed to retain the substantially flat condition.

12. A method for producing flattened helical bodies from filamentary material comprising winding filamentary material to form a helix of

substantially circular cross section, gradually modifying said cross section by feeding the helix along a varying path of substantially constant perimeter until the cross section of said helix is substantially flat and fastening the convolutions of the body thus formed adjacent the edges thereof.

13. A sewing machine attachment comprising a rotary head adapted to be driven in timed relationship with the machine stitching mechanism, means for introducing a filament to said head, helical means carried by said head for positively feeding said filament from said head towards said stitching mechanism in helical form, means receiving said helically formed filament and transferring it in flattened form between a throat plate and presser foot provided by said machine for stitching the filament in its flattened tape-like condition.

RALPH R. CONE.

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