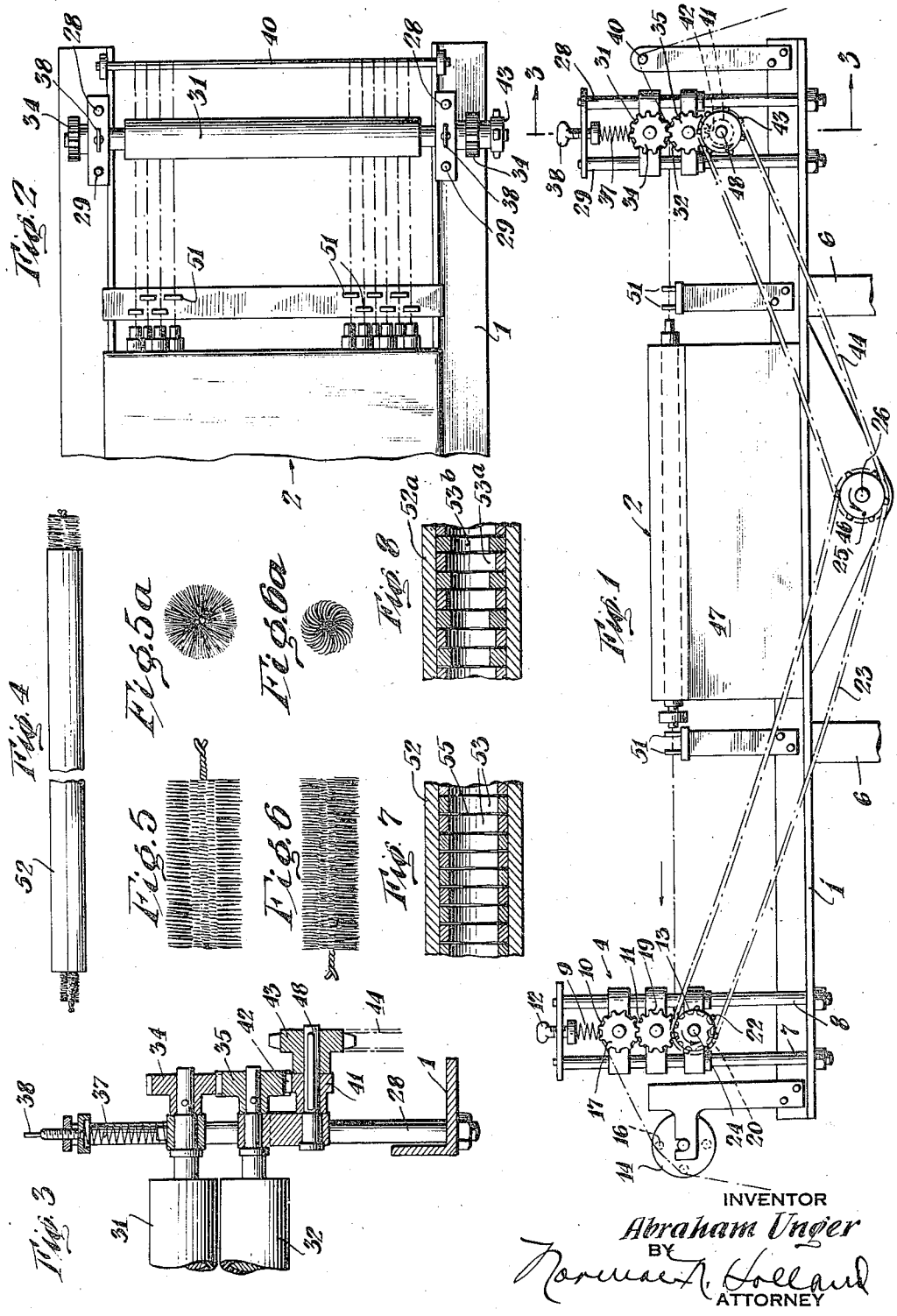
March 10, 1942. A. UNGER 2,276,124

DEVICE FOR CURLING CHENILLE

Filed Nov. 12, 1938



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Patented Mar. 10, 1942

2,276,124

UNITED STATES PATENT OFFICE

2,276,124

DEVICE FOR CURLING CHENILLE

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Application November 12, 1938, Serial No. 240,137

17 Claims. (Cl. 28—62)

The present invention relates to devices for making chenille and the like and more particularly to an improvement upon the device and method shown in my copending application Serial No. 210,958, filed May 31, 1938.

The fibres of chenille as it is originally made project radially outward. The purpose of my prior invention and of my present invention is to curl or swirl the radial fibres to give the outer surface a smooth appearance. Chenille yarn of the type referred to herein is utilized extensively in connection with the manufacture of artificial lamb's wool, commonly referred to as astrakhan. To produce this artificial or synthetic fur, a curled chenille yarn is arranged in irregular swirly patterns on a backing material and attached thereto in some suitable manner. Some of the difficulties experienced with artificial astrakhan as previously manufactured are that the chenille did not possess a sufficiently dense appearance, nor did it look the same when viewed from different directions. The fibres of the yarn were not curled or bent sufficiently tight and close to the axial threads, nor were the curls in a plane perpendicular to the axial threads. If the respective planes of the curled fibres are inclined to the axial threads, the chenille possesses a "rat-tail" appearance which detracts from its beauty. Failure to obtain proper curling of the fibres causes certain areas of the artificial fur to appear relatively sparse or bare and the rich wooly effect is not present.

The present invention aims to overcome or minimize the above and other difficulties by providing a machine adapted to produce at a more rapid rate a higher grade of chenille yarn or braid in which the fibres of the finished product swirl in planes substantially perpendicular to the axis of the yarn, and are curled and compacted close to the axis of the braid. In addition, the chenille will retain its original appearance under more severe wear. The present invention also contemplates providing a machine for efficiently and economically producing the improved curled braid in large quantities.

An object of the present invention is to provide an improved machine for producing more perfectly curled chenille yarn or the like.

Another object of the present invention is to provide a curled chenille yarn which will not readily uncurl or lose its shape.

Another object of the present invention is to provide a curled chenille yarn in which the curled fibres project outwardly in planes substantially perpendicular to the longitudinal axis of the yarn.

Another object of the present invention is to provide a chenille curling machine adapted to be operated at higher speeds than heretofore and adapted to curl grades of chenille which could not be curled in previous devices.

Still another object of the present invention is to provide a machine for producing chenille yarn and the like, having a minimum number of parts.

A further object of the present invention is to provide an improved type of curling tube for use in curling chenille.

A still further object of the present invention is to provide a curling tube which may be readily and inexpensively manufactured.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein

Fig. 1 is a side elevational view of a preferred embodiment of the invention;

Fig. 2 is a top plan view of one end of the device shown in Fig. 1;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1;

Fig. 4 is a view showing a strand of chenille yarn passing through the improved curling member;

Figs. 5 and 5*a* illustrate side and end views, respectively, of the chenille yarn prior to being curled;

Figs. 6 and 6*a* illustrate side and end views, respectively, of the chenille yarn after being curled;

Fig. 7 is a fragmentary sectional view of the improved curling tube; and

Fig. 8 is a fragmentary sectional view of a modified form of curling tube also embodying the invention.

Described generally, the invention embodies two principal features which are about to be described. The first is the mechanism for advancing the chenille through a curling device, which is generally a heated tube, combined with an improved mechanism for giving the chenille a back and forth movement necessary for curling the chenille. This mechanism is shown more particularly in Figs. 1 to 3. The second principal

feature is the improved heated tube or curler, shown more particularly in Figs. 7 and 8, for curling the chenille. While both features are shown in a single embodiment, it will be understood that the tube or curler can be used with other feeding mechanisms and the feeding mechanism can be used or combined with other curlers.

It should be noted at this point that the terms forwardly and rearwardly are used herein for convenience in describing the structure and operation of the machine, the former referring to those features and structures at the discharge end of the device for causing the chenille to progress through the curling means and the latter referring to those features and structures adjacent the opposite or entering end of the device.

The base or table 1 and the supporting legs 6 are preferably made from suitable angle irons or other stock shapes of structural members and support the feeding device, curling means and retarding device. Adjacent one end of the base 1 and the curling means 2 is mounted the feeding or advancing device 4 which preferably comprises a pair of spaced upright members 7 and 8 bolted, riveted, welded or otherwise secured at each side of the base 1. Adjustably mounted upon the upright members are a plurality of rollers 10, 11 and 13 adapted to be operated to pull a chenille yarn or the like through the machine. The rollers are spaced sufficiently close together so that a strand of chenille yarn may be received between them and fed therethrough by friction upon rotation of the rollers. A spring 9 and adjustable thumb screw 12 may be utilized for resiliently urging the rollers toward each other. In the preferred embodiment, three rollers are illustrated, the yarn being led between a lower and an intermediate roller, around the outside of the intermediate roller, then between the intermediate and top roller and finally over the top roller. From the top roller 10 the yarn is preferably led over a guiding drum 14 having rods 16 thereon to increase the pull on the yarn and thence into any suitable receptacle (not shown). Although three rollers are illustrated in the feeding or advancing device, it will be clear that a greater or smaller number may be utilized if desired.

The chenille advancing rollers 10, 11 and 13 are positively driven by the drive shaft 26 through sprocket 25 thereon, sprocket chain 23, sprocket 22 on shaft 24 and intermeshing gears 17, 19 and 20 on the shafts of rollers 10, 11 and 13, respectively. The drive shaft may be rotated by an electric motor or other source of power to drive the feeding means continuously, causing it to exert a steady forward pull on the chenille.

The retarding device (Figs. 1, 2 and 3) preferably comprises a pair of spaced upright members 28 and 29 secured in any suitable manner to opposite sides of the base 1 carrying a pair of adjustably mounted rollers 31 and 32 having gears 34 and 35 adjacent their ends for rotating the rollers. The rollers may be resiliently urged toward each other by a spring 37 and adjustable thumb screw 38 and are adapted to receive between them strands of chenille yarn or the like. A bar 40 is preferably utilized to assist in guiding the yarn to the rollers 31 and 32, to remove any kinks therefrom, and to remove slack therefrom.

As stated above, a back and forth movement of the chenille in the heated curling tube is desirable to properly finish or curl the chenille. The mechanism about to be described achieves this without stopping or reversing the movement of the feeding mechanism. The mechanism saves time and produces a better curl or finish. For this purpose the chenille retarding rollers 31 and 32 are intermittently driven by the main drive shaft 26 through sprocket 46 thereon, sprocket chain 44, sprocket 43 on shaft 48, a gear 41 with a single tooth 42 also on the shaft 48, and intermeshing gears 34 and 35 on the shafts of the respective rollers 31 and 32.

The single tooth gear 41 operates to periodically effect rotation of the retarding rollers 31 and 32 in opposition to the movement of the chenille yarn caused by the feeding device 4. When the single tooth 42 of the gear 41 is out of the mesh with the retarding roller gear 35, the retarding rollers are free to be rotated by the movement of the yarn therethrough caused by the rollers of the feeding device 4. However, when the single tooth 42 is in meshing relation with the retarding roller gear 35, the retarding rollers are rotated in a direction to oppose the forward movement of the yarn therethrough. This opposing effect causes the yarn to stretch slightly and also to be moved backward a short distance through the curling means 2 and the rollers of the feeding device 4. The gripping action of the various rollers on strands of chenille yarn can be regulated by suitably adjusting the thumb screws 12 and 38 which regulate the tensions of the springs 9 and 37 and control the force with which the rollers are urged together. In actual practice, it has been found that good results are obtained with the curling means by proportioning the operating parts of the retarding device so as to cause approximately a one-half inch backward movement of the yarn for approximately every three inches that the yarn moves forward. This backward movement of the chenille can be achieved without stopping the feeding rollers at the front end of the machine. Most of the backward movement, which is about one-half inch in each instance, is made possible by stretching the chenille. Such stretching causes the strand of chenille to turn because of the twisted thread at the center. The stretching and turning of the chenille in the heated curling tube gives a tighter and better curling action. In addition, the continuous forward feed simplifies the mechanism and increases the rate of curling. If the stretching operation in the backward movement tends to create undue tension, there is sufficient slack in the feed drive to relieve it. If desired, the spring 9 may be adjusted to regulate the maximum tension.

The improved curling tube for transforming the straight chenille yarn fibres to curled or spiralled fibres substantially perpendicular to the longitudinal axis of the yarn is illustrated in Fig. 7. This curling tube comprises an outer casing or tubular member 52 having therein a plurality of adjacent annular rings or apertured members 53 of the same inside diameter. Ordinary brass pipe of suitable diameter may be utilized for the outer casing member 52 and a second brass pipe with an outside diameter permitting it to fit within the outer casing may be cut into rings to form the inner annular members 53. Annular rings approximately one-eighth of an inch in length have been found to work well in practice. Turning or burring inwardly the ends of the outer casing is sufficient to hold the inner members in position. In the preferred

form the curling tube has the annular rings arranged contiguously within the outer member for its entire length.

While not certain of the theory of operation of the tube, it is believed that ordinary untreated chenille yarn (Figs. 5 and 5*a*) moves forwardly through the curling tube and that its straight fibres are pulled rearwardly in a "rat-tail" effect. During the relatively short backward movement of the yarn in the tube, the ends of the rearwardly extending straight fibres strike against the comparatively rough edges at the joints **55** between the rings and, taking the direction of least resistance, curl themselves outwardly in spiral form into contact with the heated walls of the tube. In this latter position the fibres are in contact with the heated tube walls for a substantial portion of their lengths and are effectively ironed or pressed into a shape (Figs. 6 and 6*a*) which is not destroyed during the next succeeding forward movement of the yarn. The curling action is greatly assisted by the turning or untwisting of the strand of chenille when subjected to the tension and stretching incident to the backward movement. The present tube will curl grades of chenille which cannot be curled on the knurled or threaded tubes used heretofore in the art.

In Fig. 8, there is illustrated a modified form of curling tube wherein an outer casing member **52***a* is provided with a plurality of inner rings **53***a* and **53***b* having different internal diameters. The rings **53***a* having the greater internal diameter act as spacers for the members **53***b* having the smaller internal diameter. This modification also produces results far superior to previous types of curling tubes.

The heating means for the curling tubes preferably comprises an electrically heated oven **41** through which the curling tubes extend. The tubes may be maintained at a substantially constant and uniform temperature by means of a thermostat and by packing them in a bed of sand or the like to prevent rapid changes in temperature. Suitable guides or doctors **51** may be used to assist in guiding the yarn into and out of the curling tubes.

A further description of the operation of the machine at this point is not believed necessary, in view of the foregoing detailed description of the construction and operation thereof. As shown in the drawing any desired number of strands of chenille may be treated simultaneously.

It will be seen that the present invention provides an improved, simple and inexpensive machine and method for curling chenille yarn and the like. The fibres of the finished product possess a uniform appearance when viewed from any direction. The advancing and retarding devices may be driven from a single power source and the machine is adapted to economically produce curled chenille yarn in large quantities. In addition, the machine is adapted to curl certain grades of chenille yarn that could not be satisfactorily curled with previously known curling devices. The machine is rugged in construction and well able to withstand any rough usage which may be encountered under actual operating conditions.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A machine for curling chenille yarn including, in combination, a heated tube adapted to curl chenille yarn, a plurality of members adapted to cooperate to move the yarn substantially continuously through said heated tube, means for actuating said moving members, means to intermittently jerk the chenille in opposition to said yarn moving members to stretch and curl the chenille in the tube, means for intermittently actuating said jerking means, and means for operating said latter means.

2. In a machine of the class described, the combination of means for curling chenille yarn and the like and means for alternately subjecting the yarn to forward and backward movement in said curling means, the means for causing backward movement of the chenille being intermittently actuated to intermittently, in effect, grip and hold the chenille while the means for causing forward movement is effective and also to give a backward jerk to the chenille, whereby said chenille is stretched while in said curling means to curl the chenille.

3. A machine for curling chenille yarn and the like including, in combination, a heated curling means, a plurality of roller members adjacent one end of said curling means adapted to cooperate to move yarn continuously through said curling means in one direction, means for effecting rotation of said rollers, a plurality of roller members adjacent the opposite end of said curling means adapted to cooperate to periodically and independently reverse the movement of yarn through the curling means, and means for actuating said latter rollers at desired intervals.

4. A machine for curling chenille yarn and the like including, in combination, a heated curling member, a plurality of rollers adjacent one end of said curling member adapted to effect movement of yarn through said curling member, means for rotating said rollers, a plurality of rollers adjacent the opposite end of said curling member adapted to cooperate to effect periodic movement of said yarn in a direction opposite to that caused by said first rollers, and means including a fragment of a gear for actuating said latter rollers.

5. A device for curling chenille yarn and the like when heated comprising a hollow member having a plurality of inwardly extending projections therein, certain of said projections extending farther inwardly than the others of said projections, and means mounted adjacent the respective ends of said hollow member for controlling the passage of chenille yarn through said device.

6. A device for curling chenille yarn and the like when heated comprising a hollow member having a plurality of inwardly extending projections therein with alternate projections extending farther inwardly than the other projections.

7. A device adapted to be utilized for imparting a curl to chenille yarn and the like when heated comprising a tubular member and a plurality of annular members in said tubular member extending inwardly from the interior surface thereof, certain of said annular members having a greater inside diameter than others of said annular members for spacing said other annular members at desired intervals, means for pulling a strand of chenille substantially

continuously through said device and means for imparting a backward movement to the strand of chenille at intervals.

8. A device adapted to be utilized for imparting a curl to chenille yarn and the like when heated comprising a hollow outer member having therein a plurality of apertured members, alternate of said apertured members extending farther inwardly than the remainder of said apertured members.

9. A device adapted to be utilized for imparting a curl to chenille yarn and the like when heated comprising a hollow member having a plurality of rings therein with their sides substantially perpendicular to the axis of said hollow member.

10. A device adapted to be utilized for curling chenille yarn and the like, comprising a member having a substantially cylindrical bore and a plurality of substantially contiguous heated rings in said bore having jagged inner edges.

11. A device adapted to be utilized for curling chenille yarn and the like comprising a hollow tube with a series of smooth interior surfaces terminating in abrupt edges and separated by gaps, and means adjacent one end of said device for moving a strand of chenille in one direction through the device, and means adjacent the opposite end of said device for moving said strand of chenille in an opposite direction through the device.

12. A device for curling the normally radially outwardly extending fibres of a strand of chenille yarn closely about the axis of the yarn, comprising, a hollow outer casing for containing removable fibre curling means, and removable fibre curling means inside said outer casing having substantially peripherally extending inwardly projecting portions and with at least some of said inwardly projecting portions being spaced from each other at their adjacent inner faces to provide fibre receiving gaps.

13. A device for curling the normally radially outwardly extending fibres of a strand of chenille yarn closely about the axis of the yarn, comprising, a holding means, a series of individual members adjacently mounted in said holding means and with their inner surfaces forming a substantially tubular bore adapted to permit a strand of uncurled chenille yarn to pass therethrough, the junctions of said bore-forming surfaces of the members providing irregularities in the surfaces of the bore effective when the bore is heated to curl said strand of uncurled chenille closely about the axis of the yarn when relative movement occurs between a strand of chenille and said bore-forming surfaces.

14. A device for curling the normally radially outwardly extending fibres of a strand of chenille closely about the axis of the yarn, comprising, a holding means, a plurality of individual narrow members adjacently mounted in said holding means having internal surfaces adapted to coperate with each other to form a substantially tubular bore adapted to permit a strand of uncurled chenille yarn to pass therethrough, the adjoining edges of said narrow members providing irregular surfaces in the bore and being spaced from each other at portions to provide fibre receiving gaps, said irregular surfaces and gaps being effective when the bore is heated to curl said strand of uncurled chenille closely about its axis when relative back and forth movement occurs between a strand of chenille and said narrow members.

15. In a machine of the class described, the combination of means including a stationary heated tube adapted to receive and curl chenille yarn, rotary means at one end of the tube for causing substantially continuous movement of chenille yarn through said tube, a stationary support for said rollers, and means at the other end of the tube intermittently subjecting the chenille yarn to a force acting intermittently and in opposition to the direction of said substantially continuous movement at a point in advance of the entry into the tube whereby the chenille yarn tends to stretch in said tube and the axial threads of the yarn tend to turn while in said heated tube thereby to curl the chenille.

16. A machine for curling chenille yarn including, in combination, a hollow member adapted to receive and curl the yarn, means adjacent one end of said hollow member and carried by a support stationary with respect thereto for effecting passage of the yarn through said hollow member and out of the machine, means adjacent the opposite end of said hollow member and carried by a support stationary with respect thereto for opposing said movement of the yarn at equally spaced intervals by subjecting it to a relatively sudden short and quick pulls which stretch the yarn by opposing the forward movement thereof and a common means for actuating said moving and opposing means.

17. A device for curling chenille yarn and the like comprising an outer casing member and a plurality of individual substantially contiguously arranged rings therein, the substantially contiguously arranged rings being effective when heated to curl the chenille yarn upon relative forward and backward movement of the chenille yarn and said rings, and means for effecting relative back and forth movement between said rings and said chenille yarn.

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