PROCESS FOR FABRICATING CARD CLOTHING DRUMS

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References Cited
UNITED STATES PATENTS
665,015 1/1901 Kennedy............................. 29/282
957,440 5/1910 O'Brien.................................. 29/23
958,144 5/1910 Lockwood.............................. 72/142


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ABSTRACT
An improvement in a process for constructing a carding or garnetting drum wherein an extension piece is added to extend the length of a smooth surfaced drum and a number of metallic card clothing wires are wound on the drum and extension piece under tension in a multistart helical configuration to form coils, a space being left between each coil. The wires are clamped to prevent them unwinding, and the coils are compressed together and simultaneously moved onto the drum surface only. The extension piece is removed and the wires are permanently attached to the drum. The application is useful in preparing drums suitable for fibrillation.

5 Claims, 5 Drawing Figures
PROCESS FOR FABRICATING CARD CLOTHING DRUMS

BACKGROUND OF THE INVENTION

This invention relates to the clothing of a drum and more particularly, to a novel method for constructing a carding or garnetting drum.

The clothing of a drum for carding and garnetting machines has been known and practiced for many years. Metallic card clothing wire or garnett wire as it is sometimes called, is a narrow strip of metal, usually high strength steel, having serrated flutes, usually sawtooth in shape. The wire, as it is called herein, is spirally arranged to cover the surface of a roller or drum. In earlier times the wire was generally set in leather or wood. Nowadays it is quite common to have a helical groove cut in the cylindrical surface of a drum, with the wire fitting into the groove.

The use of carding machines for the preparation of regular fibrous webs from uniaxially-oriented polymer films such as polyethylene or polypropylene is well known in the art. This process is referred to as fibration, and the drums are referred to as fibrillator drums. However, in fibrillator drums it is important that the configuration of the pins, or teeth as they are referred to, in the wire be accurately located for suitable fibration of a nylon, polyester, polyethylene, or polypropylene moving web. In carding or garnetting drums available today, the angle and location of the teeth can be closely controlled, but the pattern sometimes changes because of tension and width differences occurring in the wire during use.

Carding, and garnetting drums are generally wound with a single start wire. This results in patterns which are not ideally suited to fibrillator drums. To obtain the required configuration of the teeth for use as a fibrillator, it is necessary to wind multistart helical coils of wire on the drum. For fine fibration the wires must be close together so that the teeth are in close contact with each other. Conventional methods of covering the surface of a drum with wires to produce multistart wound drums are restricted by small width variations in the wire material. This makes the covering process slow and often times produces an uneven surface on the finished drum.

It is an object of the present invention to provide a novel process for the clothing of a drum. It is a further object to provide a novel method of winding a plurality of metallic wires in multistart helical coils around a drum. There is also provided a novel method for constructing a carding or garnetting drum suitable for fibrillating a plastic film.

SUMMARY OF THE INVENTION

With these and other objects in view, there is provided in a process for constructing a carding or garnetting drum wherein metallic card clothing wires are wound around a drum having a smooth surface, the improvement comprising the steps of extending the drum length by the addition of a temporary extension piece, winding a plurality of wires under tension in a multistart helical configuration to form coils around the drum and extension piece, leaving a space between each coil, clamping the wires to prevent unwinding, compressing the coils together while at the same time locating the coils along the length of the drum only, removing the temporary extension piece and permanently attaching the wires to the drum.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing which illustrates the embodiments of the invention,

FIG. 1 is a schematic diagram showing a metallic card clothing wire winding onto a drum according to one method of the present invention.

FIG. 2 is a schematic diagram of a completed carding or garnetting drum with the temporary extension piece removed.

FIG. 3 shows a detailed partial view of a suitable metallic card clothing wire.

FIG. 4 shows a cross section through the metallic card clothing wire shown in FIG. 3.

FIG. 5 shows a partial longitudinal cross section through a drum showing the arrangement of wires before compression.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring now to the drawing, a carding or garnetting drum 10 shown in FIG. 1, has a temporary extension piece 11 connected to the drum 10 by a threaded plug 12. Both the drum 10 and the extension piece 11 have a smooth surface. This plug 12 is part of the extension piece 11 and fits into a threaded socket 13 in the drum 10. A collar 14 slides over the drum 10 and the extension piece 11. The collar 14 comprises a finish shoulder 15 having a number of grooves 16 cut on an angle across face of the finish shoulder 15 to support and hold metallic card clothing wires. At the other end of the collar 14 is a compression shoulder 17 separated from the finish shoulder 15 by a land 18. The compression shoulder 17 supports a compression tube 19 required for pushing the collar 14 along the extension piece 11 to the drum 10. A handle 20 projects radially from the compression shoulder 17 at one location, and is used for stopping the collar 14 from rotating on the extension piece 11 or the drum 10. There is also a setscrew 21 which fits into a tapped hole 22 on the compression shoulder 17. This setscrew 21 locates the collar 14 on the extension piece 11. At the end of the extension piece 11 there is a short stub shaft 23 used for supporting the drum 10 and extension piece 11 in a lathe or winding machine. At the opposite end of the fibrillator drum 10 is a start shoulder 24 having angle grooves 25 to support and hold the metallic card clothing wires.

A roll or coil 26 of metallic card clothing wire is mounted at one side of a lathe or winding machine (not illustrated) supporting the drum 10 and extension piece 11. A wire 27 leaves the roll, passes through a tensioning device 28 or brake and is wound around the drum 10.

In FIG. 2, the drum 10 is shown with a wire 27 in place and the coils pressed together between the starting shoulder 24 and the finish shoulder 15 which forms part of the collar 14. The collar 14 is attached to the drum 10 by means of the setscrew 21 inserted through the tapped hole 22 in the compression shoulder 17 and pressed against the surface of the drum 10. The extension piece 11 has been unscrewed from the drum 10, and is shown separately from the drum 10.

One example of metallic card clothing wire is shown in FIG. 3 and 4. The teeth 30 are sawtooth in shape,
and have one side at 90°. The wire is generally made from high strength steel, and may be made from stainless steel. The wire has an L-shape across section, with the base 31 forming the horizontal leg of the L. Regular garnett or lickerin wire may be used. A special 90° lickerin wire with hardened points is preferable for use in fibrillator drums.

A section of the drum 50 is shown in FIG. 5 with wires 51 combined into a multitart bundle 52. The winding pitch is greater than the length of the bundle 52, so there is always a space 53 remaining between the bundles. The individual wires 51 are generally wound in contact with each other.

In operation the drum 10 is assembled to the extension piece 11 and the collar 14 is located on the end of the extension piece 11 by means of the setscrew 21. This assembly is then mounted in a lathe or winding machine. The first wire 27 is silver-soldered into one of the grooves 25 on the start shoulder 24. In some cases two or more wires 27 may fit into one groove 25, and in this case, it is preferable to silver-solder the first wire 27 to one side of the groove 25. Alternatively a large collar may be added to the start shoulder 24, and the first wire 27 held by means of a C-clamp or some other suitable clamp. The drum 10 is then rotated and the wire 27 fed through a brake 28 attached to a tool post (not shown) on the lathe or winding machine. As the drum 10 rotates this tool post feeds along the machine at a certain rate to give a pitch greater than the length of the wire bundle, and a space remains between the bundles after the last wire is wound. The tension in this strip 27 is maintained so that the wire 27 does not move once it has been wound onto the drum, neither must the tension be too great otherwise the wire 27 deforms or is wound on sideways. The wire 27 is wound in helical coils across the drum 10 and the extension piece 11 and fits into a groove 16 on the finish shoulder 15. The wire 27 extends onto the land 18 of the collar 14 and is securely clamped by a C-clamp or some other suitable clamp. The second wire 27 is fitted into the same groove 25 in the start collar 24 or it has a separate groove 25. If the same groove is used, the second wire 27 is silver-soldered in place, and if a clamp was used to support the first wire 27 it is removed. The wall thickness in the start shoulder 24 between the grooves 25 is approximately the same thickness as the wire 27.

Therefore, when the silver-soldering occurs, the wall between the grooves 25 heats up to the same temperature as the wire 27 being silver-soldered thus forming a good soldered connection. In lining up the second wire 27 it is preferable to have the teeth 30 on the wire 27 aligned with the teeth 30 on the first wire 27. This is achieved by using a steel rule or straight edge held parallel to the axis of the drum 10 and fitted between the base of the teeth 30. The teeth 30 are held in this aligned position while the wires 27 are being connected to the start shoulder 24. The second wire 27 is wound on the same pitch as the first wire 27 leaving no space between the first and second wires. The wires 27 are wound with the base 31 of the L shaped leg, as shown in FIG. 4, pointing in the direction the wire moves along the drum, as illustrated in FIG. 1. Thus, no change occurs to the wire 27 winding onto the drum 10, fouling the teeth 30 of the preceding wire 27 on the drum. The second wire 27 fits into the same groove 16 on the finish collar 15 and is silver-soldered together with the first wire 27. Alternatively, the second wire 27 fits into a groove of its own and is silver-soldered in place.

The total number of starts used in winding a fibrillator drum is calculated so that when the coils are compressed, the required tooth pattern and drum diameter are obtained. It has been found that a number of starts varying from one to thirty is preferable. However, as many as fifty starts are feasible. After the number of wires 27 required to form the bundle have been wound onto the drum 10 and anchored, the compression tube 19 is brought up against the compression shoulder 17 of the collar 14. The setscrew 21 in the shoulder 17 is removed and the collar 14 is held from rotating by the handle 20. The compression tube 19 is pressed against the shoulder 17 of the collar 14, and the collar 14 is pushed along the extension piece 11 compressing the coils of wires together until the collar 14 rests entirely on the end of the drum 10. At the same time, it is sometimes necessary to rotate the drum 10 relative to the collar 14 so that the teeth 30 of the wires 27 are all in the required alignment pattern and the required tension is maintained in the wire. The collar 14 is stopped from rotating by the handle 20 which is held rigid by the tool post on the machine. A locating hole is drilled into the surface of the drum 10 through the tapped hole 22, and the setscrew 21 is then screwed into the tapped hole 22, holding the collar 14 firmly in place on the main drum 10. This attachment becomes a permanent attachment. The compression tube 19 and the extension piece 11 are then removed as shown in FIG. 2.

In another embodiment of this concept the collar 14 is pushed along the extension piece 11 until the finish shoulder 15 just overlaps the end of the drum 10. The coils of wires 27 are then clamped to the drum 10 by means of one or more band clamps, the compression tube 19 and the extension piece 11 are removed and the collar 14 is cut on a lathe leaving the finish shoulder 15 on the drum 10. This finish shoulder is then silver-soldered, rivetted, dovetailed or attached by some other means to the drum 10, and the clamps removed.

**EXAMPLE**

A drum suitable for fibrillating was prepared using a special 90° lickerin wire having 13.33 teeth per inch. The wire height from the base of the L to the top of the teeth was 0.159 ins. and the width of the wire at the base was 0.037 ins. The drum had a diameter of 2.375 ins. and the distance between the start shoulder and the finish shoulder with the extension piece in place was 16.07 ins. Twenty starts were wound on the drum at a pitch of 1 turn per inch.

The grooves in the start shoulder and the finish shoulder were 0.087 ins. wide, with a wall thickness between the grooves of 0.013 ins. Two wires were placed in each groove, the first wire being silver-soldered to the start shoulder, and clamped on the land after the finish shoulder. The second wire silver-soldered into the groove in the start shoulder, and silver-soldered together with the first wire in the groove in the finish shoulder. After all the wires were wound onto the drum, the coils of wires were compressed. It was necessary to turn the drum about one quarter turn within the collar to keep the teeth in approximate alignment. Some slight deviations occurred in alignment, however, due to inaccuracies in the distances between the teeth on the wire.
After compression, the drum length from start shoulder to finish shoulder was 12.00 ins. The collar was clamped to the drum by the setscrew, and the extension piece removed.

What is claimed is:

1. In a process for constructing a carding or garnetting drum wherein metallic card clothing wires are wound around a drum, having a smooth surface, the improvement comprising the steps of:
   - extending the drum length by the addition of a temporary extension piece having a collar thereon, said collar being slidable over said extension piece and said drum;
   - winding a plurality of wires in a multistart bundle configuration under tension to form helical coils around the drum and extension piece leaving a space between each coil, said wires being attached at one end to said drum;
   - clamping the wires at the other end to said collar to prevent unwinding;
   - compressing the coils together by sliding said collar on said drum while at the same time rotating said drum with respect to said collar to maintain said tension;
   - removing the temporary extension piece; and
   - permanently attaching the wire to the drum.

2. The improvement according to claim 1 wherein the wires have teeth along the length of the wire and each wire is wound so that the teeth in the coils are aligned in rows parallel to the drum axis.

3. In a process for constructing a carding or garnetting drum wherein metallic card clothing wires are wound around the smooth surface of a drum, the improvement comprising the steps of:
   - extending the drum length by the addition of a temporary extension piece having a collar thereon, said collar being slidable over said extension piece and said drum;
   - winding a first wire under tension at a predetermined pitch to form helical coils around the surface of the drum and extension piece;
   - winding a predetermined number of wires in sequence under tension at the pitch predetermined to form helical coils around the surface of the drum and extension piece, each wire starting from the same relative location on the drum and being in contact with the previously wound wire and the width of the predetermined number of wires being less than the predetermined pitch said wires being attached at one end to said drum;
   - clamping the wires at the other end to said collar to prevent unwinding;
   - compressing the coils together by sliding said collar on said drum while at the same time rotating said drum with respect to said collar;
   - removing the temporary extension piece; and
   - permanently attaching the wires to the drum.

4. The improvement according to claim 3 wherein the predetermined number of wires including the first wire is in the range of 2 to 30.

5. The improvement according to claim 3 wherein the wires have teeth along the length of the wire and each wire is wound so that the teeth in the coils are aligned in rows parallel to the drum axis.
UNIVERSAL STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,740,809 Dated June 26, 1973

Inventor(s) Michael John Wolstencroft

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the front page, the Convention Priority data should be added as follows:

[30] Foreign Application Priority Data

December 22, 1970 Canada ......... S.N. 101,334

Signed and sealed this 29th day of October 1974.

(SEAL)
Attest:

MCCOY M. GIBSON JR. C. MARSHALL DANN
Attesting Officer Commissioner of Patents