United States Patent [19]

Wolstencroft

[11] **3,740,809**

[45] **June 26, 1973**

[54] **PROCESS FOR FABRICATING CARD CLOTHING DRUMS**

[75] Inventor: **Michael John Wolstencroft,** Collins Bay, Ontario, Canada

[73] Assignee: **Du Pont of Canada Limited,** Montreal, Quebec, Canada

[22] Filed: **June 30, 1971**

[21] Appl. No.: **158,427**

[52] **U.S. Cl.**..... **29/148.4 D,** 29/423, 140/97

[51] **Int. Cl.**..... **B21d 53/12,** B21h 1/12, B21h 1/14, B21k 1/02, B21k 1/04

[58] **Field of Search**..... 29/148.4 D, 148.4 R, 29/423; 140/97; 72/134, 142

[56] **References Cited**

UNITED STATES PATENTS

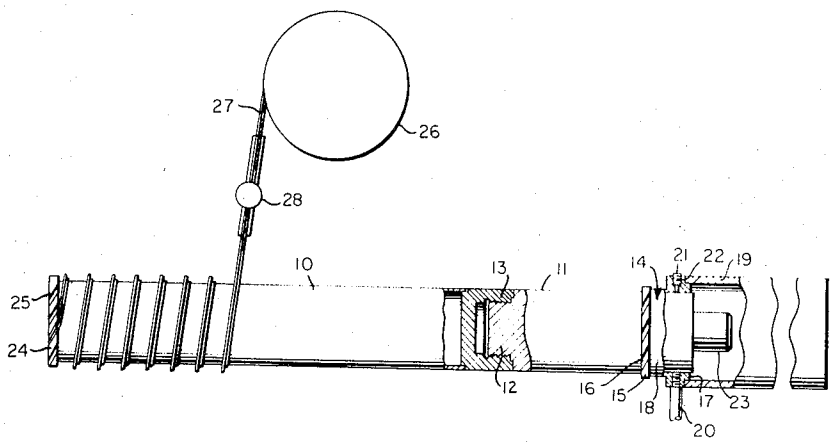
665,015	1/1901	Kennedy	144/282
957,440	5/1910	O'Brien	29/23
958,144	5/1910	Lockwood	72/142
3,651,560	3/1972	Phillips	29/423

Primary Examiner—Charles W. Lanham
Assistant Examiner—V. A. Dipalma
Attorney—Howard P. West, Jr.

[57] **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 the preparation of drums suitable for fibrillation.

5 Claims, 5 Drawing Figures



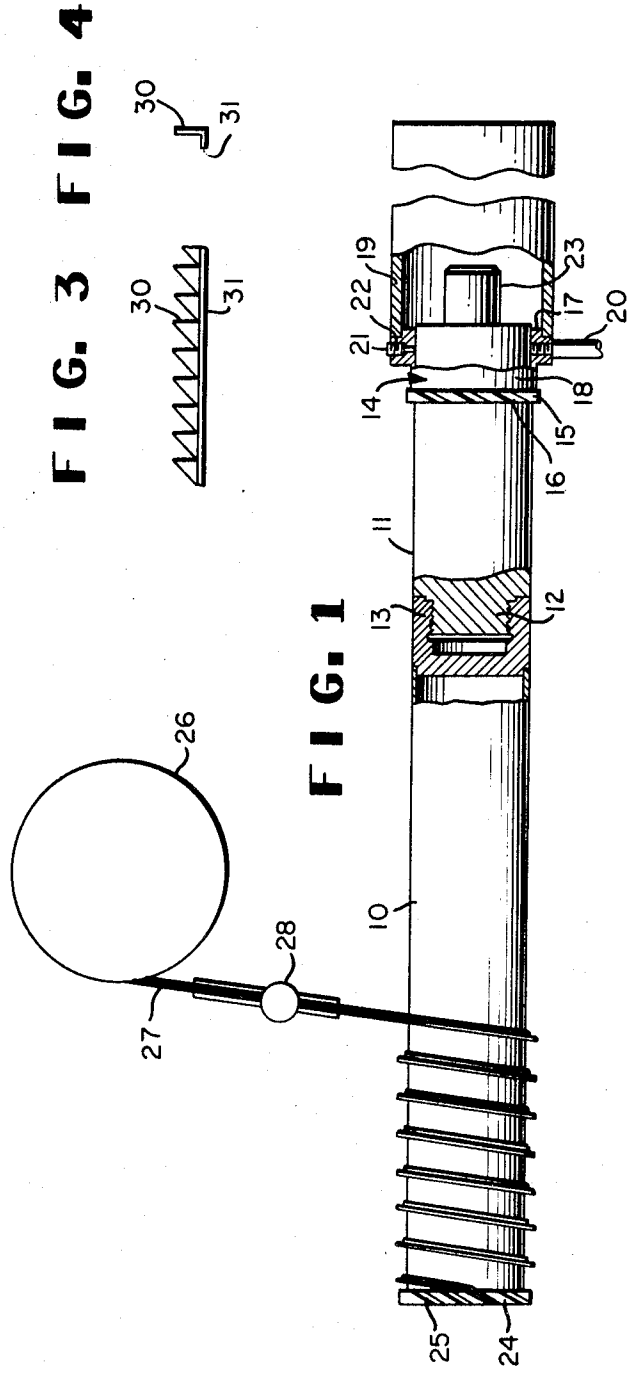


FIG. 1

FIG. 3 FIG. 4

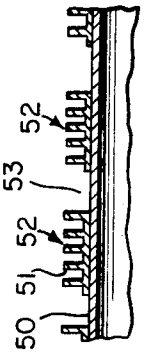


FIG. 5

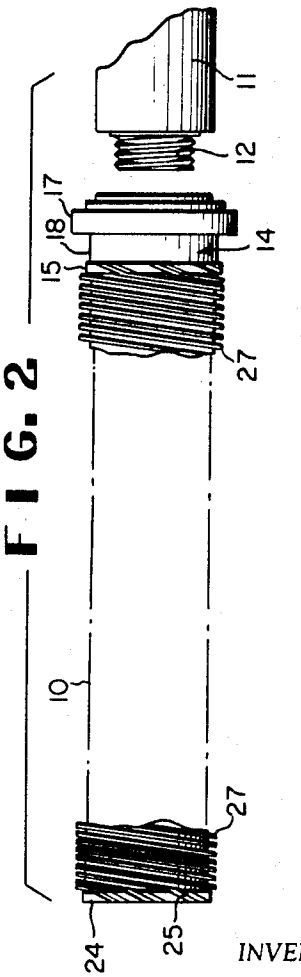


FIG. 2

INVENTOR
MICHAEL JOHN WOLSTENCROFT

BY Howard P. West Jr.
ATTORNEY

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 saw-tooth 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 fibrillation, 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 fibrillation 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 fibrillation 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 cross 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 multistart 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 chance occurs of 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, dowelled 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.

* * * * *

PO-1050
(5/69)

UNITED 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.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents