Nov. 16, 1965 F. J. CLENDENING, JR 3,217,386

YARN TRANSFER DRUM

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FIG. 1

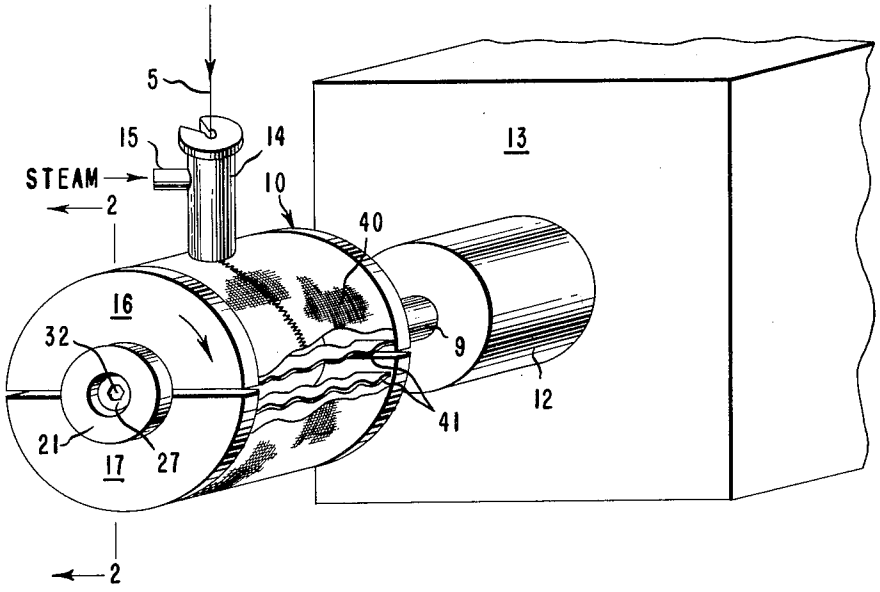

FIG. 2

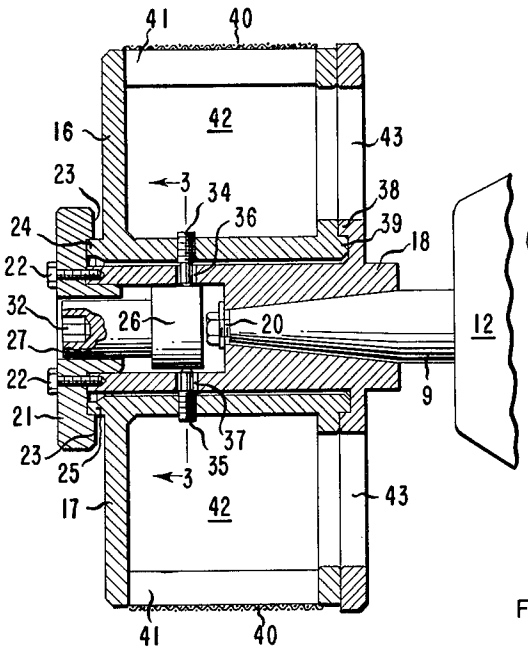

FIG. 3

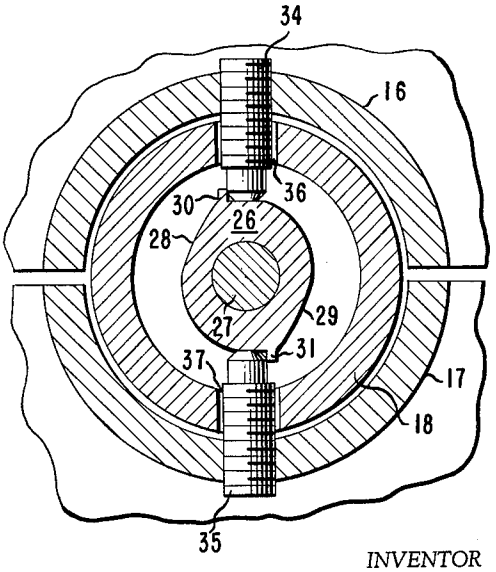

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FIG. 4

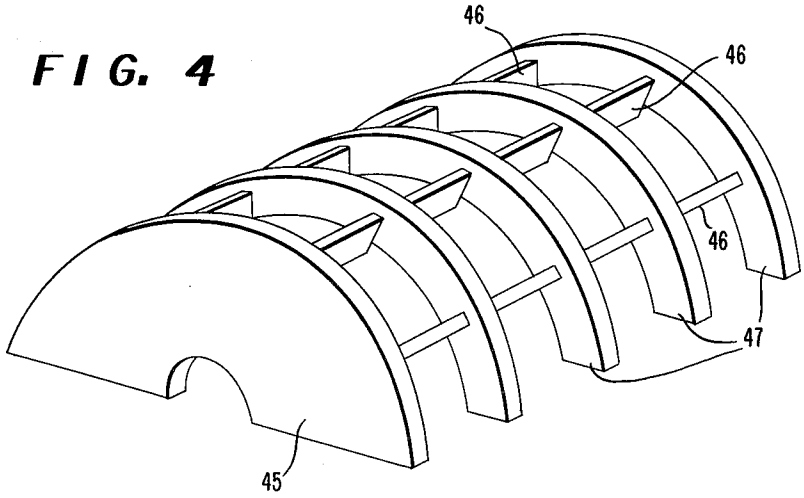
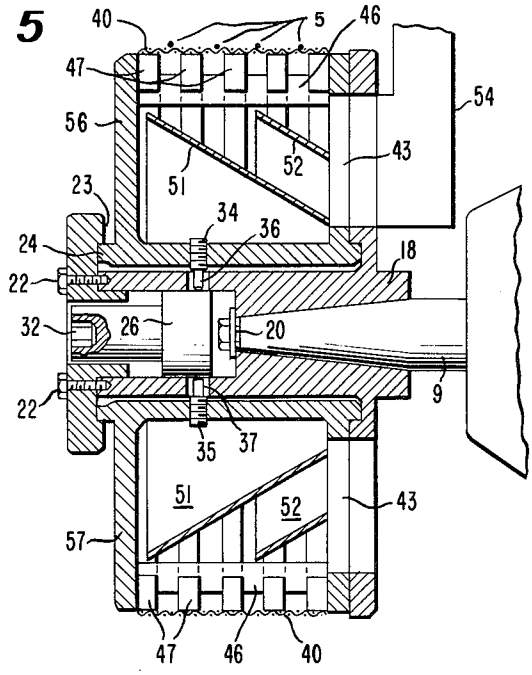


FIG. 5



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3,217,386
YARN TRANSFER DRUM

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3 Claims. (Cl. 29—117)

This is a continuation-in-part of my application Serial No. 239,111, filed November 21, 1962 (now abandoned).

This invention relates to an improved compact yarn transferring apparatus for conveying a plurality of textured threadlines simultaneously.

In processing yarn of synthetic filaments to produce a fluffy, bulked texture by heating a running threadline and impinging the heated threadline with a fluid stream againt a moving textured surface, it is essential to separate the fibers from the fluid medium, allow sufficient time for relaxation to take place and permit cooling in a tensionless state before transferring the running strand to downstream processing stages continuously and in a uniform manner.

A rotating circular wheel having a suitably textured surface to handle the yarn in the above manner on a low productivity basis, that is, when handling a single running threadline, is disclosed by Weiss and Prokesch in U.S. Patent No. 3,156,028 issued Nov. 10, 1964, and assigned to my assignee. However, serious problems arise where high productivity is desired, particularly in side-by-side treatment of a plurality of threadlines, since filament-to-filament uniformity is achieved by subjecting each threadline to identical process conditions. Also, in attempting to construct a wheel device sufficiently large to handle a great number of threadlines, cumbersome proportions and excessive maintenance have made previous wheel concepts economically unsuited for large scale commercial production.

It is therefore an object of this invention to provide an improved, compact yarn transferring device capable of conveying a great plurality of running strands continuously and in a uniform manner. Another object of this invention is to provide an improved, compact yarn transferring apparatus which affords relatively rapid and simple maintenance. Other objects will become apparent from the disclosure and claims.

The objects are achieved, in an apparatus for treating yarn, by a yarn transfer drum having an endless textured screen forming a cylindrical surface on the drum, a plurality of circumferentially-spaced rib-members for supporting the screen, a pair of semicylindrical frame supports for the ends of the rib-members defining therewith a hollow drum split lengthwise into two portions for tensioning the screen, a hollow rotatable hub for supporting the semicylindrical frames in spaced relationship, adjustable pins in said frames for setting the spacing of the frames, cam-locking pin-engaging means mounted in the hub for moving said frames into spaced relationship, and abutting hub and frame surfaces for holding the frames on the hub.

The apparatus is described in detail with reference to the accompanying drawings in which:

FIGURE 1 shows an isometric view of the apparatus;

FIGURE 2 shows an enlarged cross-sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged section of the cam-locking assembly, taken on line 3—3 of FIGURE 2;

FIGURE 4 is an isometric view to show, on an enlarged scale, details of a rib structure different from that of FIGURE 1; and

FIGURE 5 is an enlarged cross-sectional view corresponding to FIGURE 2 but including baffles to improve the fluid flow within the apparatus.

Referring to FIGURE 1, the screen-faced drum **10** is shown mounted on the shaft **9** of a motor **12** rigidly attached by means not shown to a stationary machine frame **13**. The cylindrical screen surface of the drum is being used to receive and forward a running thread-line **5** of yarn after passage through a yarn treating jet **14** shown schematically above the screen drum. The running threadline is processed with steam or other treating fluid, fed to the jet through pipe **15**, and is impinged with a fluid stream against the textured surface of the drum **10**, in the manner disclosed by Weiss and Prokesch. The drum rotates and conveys the processed yarn **5** in a tensionless state to downstream processing stations (not shown).

As shown in FIGURE 2, the assembly comprises generally two semicylindrical frame supports **16** and **17** that are attached to a hub **18** which is fixedly mounted on the shaft **9** by the fastener assembly designated by the numeral **20**. An annular cap **21**, shown attached to the hub **18** by means of bolts **22** is provided with a protruding flange **23** which cooperates with annular shoulders **24** and **25** on the semicylindrical supports **16** and **17** to hold these supports around the hub. Similar abutting surfaces **38** and **39** are provided for holding the inner sides of these supports in position on the hub.

Shown in FIGURE 3, the cam-locking assembly **26** comprises a cam shaft **27** modified on one end with dual cam surfaces **28** and **29** provided with stops **30** and **31**. The exposed end of the assembly shaft **27** is journaled in the aperture of annular cap **21** and contains a hexagonal-shaped cavity **32** for accommodating a suitable wrench (not shown). The cam surfaces **28** and **29** operatively engage two diametrically opposed adjustable pins **34** and **35** which protrude through clearance holes **36** and **37** in the hub **18** and threadedly fasten to the supports **16** and **17** respectively.

Referring again to FIGURES 1 and 2, the endless textured wire screen **40** is of predetermined length and is maintained in a tensioned condition around the outside periphery of the supports **16** and **17**. A series of rib-members **41** are arranged circumferentially in spaced relationship with the ends welded to the supports **16** and **17** near the circumference of the supports to form a supporting cylinder and to maintain the supports in spaced relationship. The rib-members **41** structurally support the screen **40** and deflect the fluid stream away from the fibers. The wavy configuration of the rib-members **41** shown in FIGURE 1 may be preferred to deflect the fluid stream away from the yarn without imparting an undesirable repetitive pattern of crimp to the deposited yarn, but straight rib-members are generally satisfactory, e.g., they may be of flat metal stock having a thickness approximating the size of the screen openings. In addition, the rib-members **41** tend to dissipate the fluid stream in the drum chamber **42** before it exits through openings **43** in the inner screen-supporting sides of the semicylindrical frame supports and on into a central duct system (not shown).

To install a new screen **40**, an operator inserts a suitable wrench into the cavity **32** and manually rotates the cam-lock assembly **26** counterclockwise from the expanded position shown in the FIGURE 3. This causes the pins **34** and **35** to shift inward while riding the cam surfaces **28** and **29** to the low points and thereby cause the supports **16** and **17** to collapse slightly inward. Tension on the endless screen **40** is released and the loosened screen is thus readily replaced. The cam-lock assembly **26** is then rotated clockwise until the pins **34** and **35** abut against the stops **30** and **31** on high portions of the cam surfaces **28** and **29**, whereupon the supports **16** and **17** are shifted radially outward. The pins **34** and **35**

are threadedly attached to the supports **16** and **17** and provide fine adjustment which enables shoulders **24** and **25** to abut against the flange **23**, and similarly as to surfaces **38** and **39**. These abutting surfaces are machined to a predetermined diameter to re-establish accurately the drum surface relative to the exhaust opening of jet **14**. In addition, the abutting surfaces **23**, **24** and **38**, **39** prevent over-tensioning of the screen **40**.

In operation, the threadline **5** of yarn impinges and deposits on the screen **40** and is conveyed away from the jet **14** by the rotation of the drum **10**. At the point of deposit, the fluid stream is separated from the yarn and continues through the interstices of the screen **40** and the rib-members **41** into the chamber **42**, whereupon it is exhausted through the openings **43** and into a central duct system (not shown) maintained under reduced pressure. The yarn deposited on the drum surface is conveyed in a tensionless state to take-up rolls (not shown) for down-stream processing.

Although one threadline is shown for simplicity of illustration, the drum device can be fabricated to any desired width for accommodating a plurality of running threadlines arranged in a parallel array as shown in FIGURE 5. Furthermore, instead of two semicylindrical frame supports **16** and **17**, the frame support can obviously be divided into three, four or more sectors forming a cylinder in combination and held in spaced relationship in similar manner.

Under certain conditions of fluid treatment, yarn filaments may become caught between the wire screen belt **40** and the supporting rib-members **41** discussed above, Such entrapment leads to breaking or pulling of filaments from the treated yarn bundle as it is withdrawn from the surface and, in turn, to quality defects and filament loops protruding from the yarn.

For drums conveying a plurality of moving yarn, particularly, this problem can be circumvented by an alternate embodiment which provides support for the screen in the region between the threadlines on the drum. Apparatus to accomplish this is shown schematically in FIGURE 4, which illustrates a type of frame support that may be substituted for those of FIGURE 1. This framework comprises an end plate and hub portion **45**, a plurality of recessed longitudinal stays **46** which in turn support spaced circumferential ribs **47** on which the screen belt, not shown, is carried. The number and spacing of the ribs depend upon a number of factors such as the resistance of the foraminous surface to impact, the size and number of yarn bundles to be conveyed and other process conditions. The details of installation and operation of this frame support are identical with the apparatus shown in FIGURES 1, 2 and 3. The stays **46** are spaced slightly from the screen and do not support it, but serve the other functions described for rib-members **41**.

The relatively open cage-like structure of the screen drum discussed permits the bulking fluid to discharge freely from the yarn-treating jet and blow in all directions through the interior of the drum. The dispersing fluid may thus disturb the yarn being conveyed on the surface of the drum. FIGURE 5 illustrates a deflecting baffle arrangement within the screen drum, which not only absorbs the impact of the jet and muffles the disturbances of the treating fluid but also provides means for exhausting the fluid uniformly beneath the individually treated lines on the drum surface. Frame supports **56** and **57**, which may be similar to supports **16** and **17** of FIGURE 1 or of the type as shown in FIGURE 4, are mounted in operating position on shaft **9**. In this illustration four yarns **5** are shown in processing position on the screen surface **40** of the drum. Internal baffles **51** and **52** in the form of partial conical partitions are fixed within the frame support and extended rearwardly to opening **43**.

A suitable entrance to a stationary ductwork **54** in the supporting processing machinery is aligned to communicate with the baffles **51** and **52** of the rotatable drum. As the drum rotates in operation, an exhaust apparatus, not shown, continuously withdraws the bulking fluid from within the drum and discharges it at a point remote from the process. The space between the baffles is adjusted so as to equalize the flow of bulking fluid across the width of the foraminous surface and thereby provide uniform treatment. Not only has more uniform fluid flow been obtained with such a baffle arrangement but it has also been found possible to use greater pressure for the bulking fluid and, in turn, more vigorous treatment of the yarn by the bulking fluid without disturbance of the yarn being conveyed on the drum surface.

The apparatus of this invention provides a compact means for conveying a plurality of threadlines simultaneously and in a uniform manner. In addition, the adjustable core feature simplifies maintenance and adjustment problems, particularly during replacement of old screens.

Since many different embodiments of the invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited by the specific illustrations except to the extent defined in the following claims.

I claim:

1. In an apparatus for treating yarn wherein a running threadline of yarn is impinged on a screen with a fluid stream, a yarn transfer drum comprising an endless textured screen forming a cylindrical surface on the drum for receiving the yarn from the stream, a plurality of circumferentially-spaced rib-members for supporting the screen, segmented cylindric frame supports for the ends of the rib-members defining therewith a hollow cylindrical drum split lengthwise into a plurality of cylindric-sectors for tensioning the screen, a hollow rotatable hub for maintaining the cylindric-sectors of the drum in spaced relationship, adjustable pins in said frame supports for setting the spacing of the cylindric-sectors, cam-locking pin-engaging means mounted in the hub for moving said cylindric-sectors into spaced relationship, and abutting hub and frame surfaces for holding the frame supports on the hub.

2. Apparatus as defined in claim **1** in which said rib-members deflect fluid away from the yarn into said hollow cylindrical drum, and said drum includes means for deflecting the fluid out of one end of the drum.

3. In an apparatus for treating yarn wherein a running threadline of yarn is impinged on a screen with a fluid stream, a yarn transfer drum comprising an endless textured screen forming a cylindrical surface on the drum for receiving the yarn from the stream, a plurality of circumferentially-spaced rib-members for supporting the screen, a pair of semicylindrical frame supports for the ends of the rib-members defining therewith a hollow cylindrical drum split lengthwise into two portions for tensioning the screen, a hollow rotatable hub for maintaining the semicylindrical frame supports in spaced relationship, adjustable pins in said frame supports for setting the spacing of the frame supports, cam-locking pin-engaging means mounted in the hub for moving said frame supports into spaced relationship, and abutting hub and frame surfaces for holding the frame supports on the hub.

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