United States Patent [19]

Crocker

[11] **3,807,615**

[45] **Apr. 30, 1974**

[54] **TOOTHED PIDDLER BELTS**

[75] Inventor: **Tallie Joseph Crocker,** Waynesboro, Va.

[73] Assignee: **E. I. duPont de Nemours and Company,** Wilmington, Del.

[22] Filed: **Oct. 6, 1972**

[21] Appl. No.: **295,663**

[52] **U.S. Cl.** **226/172**

[51] **Int. Cl.** **B65h 17/34**

[58] **Field of Search** ..... 19/153, 244, 115, 129, 19/66 R; 198/165; 226/172; 28/1 CF

[56] **References Cited**

UNITED STATES PATENTS

463,110	11/1891	Dryden	198/165 X
2,805,765	9/1957	Saum	226/172
3,341,899	9/1967	Marriner	19/66 R

FOREIGN PATENTS OR APPLICATIONS

634,929	3/1950	Great Britain	19/70

Primary Examiner—Richard A. Schacher

[57] **ABSTRACT**

A belt piddler having two vertically mounted endless belts having contiguous vertical sections to form a means for gripping a continuous advancing length of material is modified to improve operability by grooving the surfaces of the belts which contact each other. The grooves are across the entire width of each belt and preferably are continuous.

3 Claims, 3 Drawing Figures

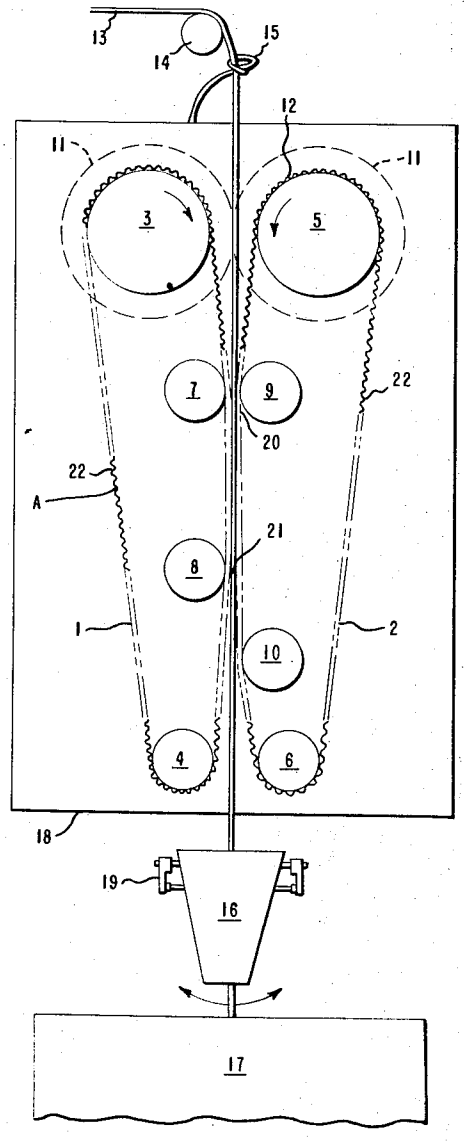

FIG. 1

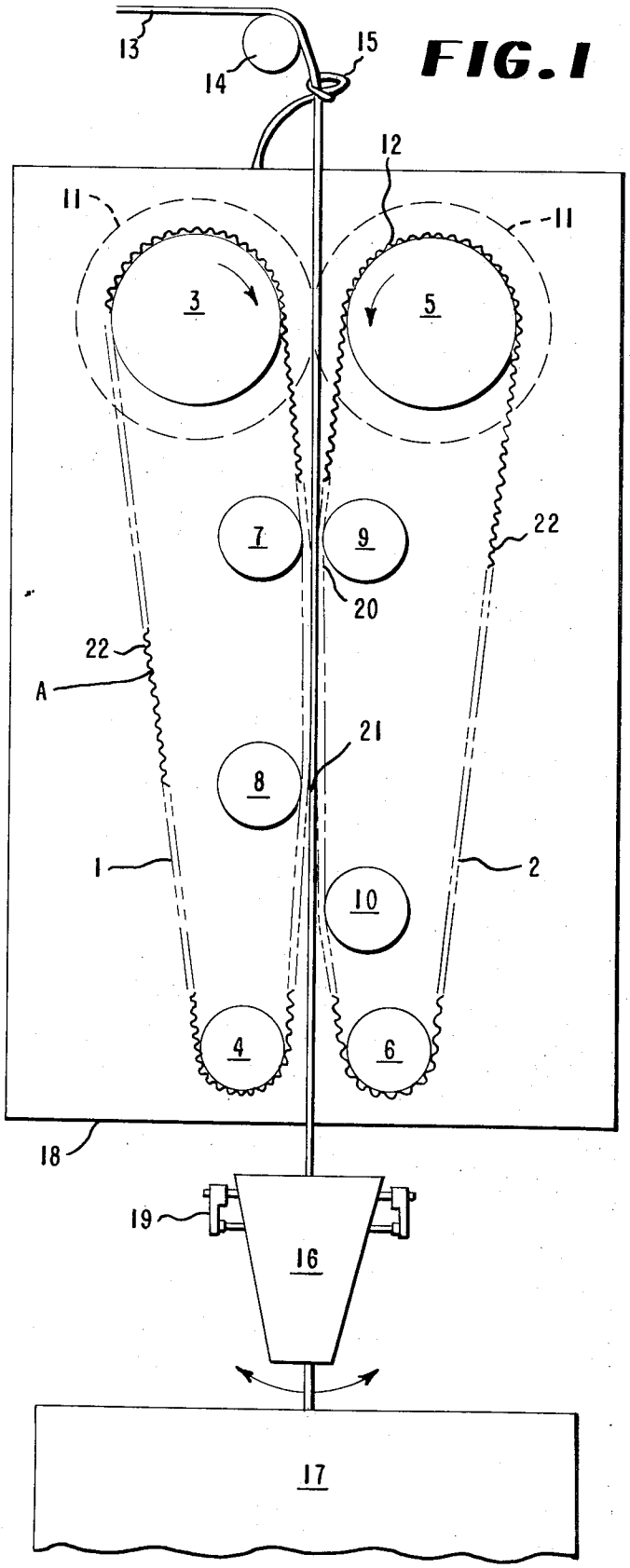

FIG. 2

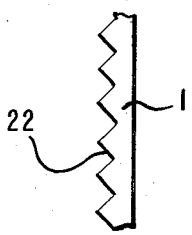

FIG. 3

TOOTHED PIDDLER BELTS

BACKGROUND OF THE INVENTION

This invention relates to apparatus for receiving and distributing a moving, wet filamentary tow or other continuous length of fibrous material. More particularly, it relates to an apparatus for receiving running lengths of wet tow at high speed and delivering the wet tow smoothly to a can or other stationary container positioned beneath the apparatus.

In the manufacture of acrylic tows or other tows of synthetic filaments, it is frequently desired to subject the tow to treatment with water or an aqueous bath during or just after spinning and then to deliver the running wet tow at high speed into a large can or other suitable container for intermediate storage. In delivering the tow into a collection container, it is desired to use a simple belt piddler such as the one disclosed by Saum et al., in U. S. Pat. No. 2,805,765, consisting of two endless belts running vertically in close proximity.

Although a belt piddler is fairly satisfactory for handling a moving tow when the tow is merely moist, difficulties arise when the tow is quite wet. When the tow is wet, it tends to cling to one of the belts and follow the belt around to a point at which it wraps around the belt. Because of the high rate of product throughput at each piddler and because it is not customary to man each piddler continuously, the resulting process discontinuity is very wasteful even if it occurs only once each day. Accordingly, to avoid this problem, it is usually found necessary either to remove most of the water from the tow or to employ a piddler other than a belt piddler.

SUMMARY OF THE INVENTION

The present invention provides an improved apparatus for piddling moving continuous lengths of wet fibrous material. The apparatus comprises a belt piddler having two endless belts mounted in vertical spatial proximity on driving and tension rolls and adapted for receiving a continuous length of fibrous material from above and delivering said material to a designated point beneath the piddler. The improvement in the apparatus consists in the belts in the piddler being provided with a multiplicity of grooves transverse to the direction of the travel of the belts and on the surface of the belts which contacts the fibrous material.

By employing the apparatus of the invention in which the surfaces are provided with grooves transverse to the direction of the travel of the belt on the surfaces which contact the fibrous material, it is found that very wet tows and other continuous lengths of textile fiber material may be handled with only an extremely low incidence of wrapping of the tow around the belt.

The endless belts should be somewhat wider than the width of the moving continuous lengths of fibrous material. The two belts preferably have the same width. In each grooved belt, the grooves in the belt should cross most of the area of the surface of the belt which is contacted by moving continuous length of fibrous material. Preferably, the grooves are continuous across the entire width of the belt.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevation view of a belt piddler in accordance with the present invention.

FIG. 2 is an enlarged view of the profile of the belt at point A of FIG. 1, and

FIG. 3 is an enlarged view of an alternative profile of the belt at point A of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, the belt piddler is generally designated by reference numeral 12 and comprises two belts designated by reference numerals 1 and 2, which are mounted to be in close proximity and form a nip of some length during a part of their respective travel. Belt 1 is mounted on rolls 3 and 4, being driven by drive roll 3. Belt 2 is similarly mounted on rolls 5 and 6, being driven by drive roll 5. Rolls 4 and 6 are air loaded tension rolls. The belts are made to contact or almost contact each other by the placement of these rolls and by the use of idler rolls 7 and 8 over which belt 1 runs and idler rolls 9 and 10 over which belt 2 runs. Idler roll 9 is an air loaded compression roll. All of the rolls are mounted on plate 18, drive rolls 3 and 5 being driven at the same surface speed bp means of gears 11 mounted behind the plate.

The moving tow 13 is fed from a source (not shown) over roll 14 to and through guide 15 and thence to belt piddler 12. It first passes into the upper nip 20 of the belts and is carried between belts 1 and 2 to the lower nip 21, at which point it is discharged from the belts into a traverse guide 16 which is an oscillating funnel or boot. Under this guide 16 is a can or container 17 in which the tow 13 is deposited. The traverse guide is mounted in gimbals 19 below the belt. The container 17 may be rotated or traversed as desired, and when filled, is removed and replaced by an empty container in accordance with conventional practice.

In accordance with the invention, the belts have grooves transverse to the direction of travel of the belt provided in their outer surface 22, which is the surface which contacts the moving continuous length of fibrous material. An enlarged view of the profile of one embodiment of the grooved belt is shown in FIG. 2. In this embodiment, the belts have a saw-toothed profile at their outer face and the grooves are V-shaped, meeting each other at the surface so that the surface has no flat portion.

An enlarged view of the profile of another embodiment of the grooved belt is shown in FIG. 3. In this embodiment, the belts have a profile in which the grooves have sloping sides and flat portions at the bottoms of the grooves, being spaced to provide flat portions on the surface of the belt equal in length to the flat portions at the bottoms of the grooves.

The outer surfaces of the belts may also have other profiles providing a multiplicity of grooves transverse to the direction of travel of the belt. For instance, the grooves may have vertical walls separated by flat portions on the surface of the belt and flat portions at the bottoms of the grooves. The profile of the outer surface of the belts may also be a sinuous curve. Other configurations of the profile of the outer surface of the belt will be readily apparent.

The belts employed in the apparatus of this invention may be made of rubber or a tough, resilient, synthetic polymer such as polyvinyl chloride. Other equivalent materials may be used to form the main composition of the belt, with or without a surface coating as desired. For additional strength and durability, the belts may be

reinforced with a fabric of polyester fibers, cotton, rayon, or other suitable fibers. Other suitable reinforcing structures within the belt may be used.

In FIG. 1, the direction of belt 2 has a greater deviation from vertical as it approaches tension roll 6 than the direction of belt 1 as it approaches tension roll 4. The more nearly vertical direction of belt 1 is helpful under some circumstances in assisting a vertical discharge of the continuous length of fibrous material from the belts. However, if preferred, tension rolls 4 and 6 may be mounted in such positions that the belt directions have the same deviation from vertical as they approach the bottom.

As employed herein, the term "continuous length of fibrous material" is meant to include not only tows of continuous filaments but also ropes or yarns of continuous filaments as well as slivers of staple fibers and other equivalent fibrous structures. The advantages of employing the grooved belts of the invention are most readily observed in handling continuous lengths of fibrous materials which are quite wet, i.e., containing an amount of water equal to at least half of the dry weight of the continuous length of fibrous material. However, the piddlers employing the grooved belts may also be used for handling dry moving continuous lengths of fibrous material, or continuous lengths of such material which are only somewhat moist.

In operation, a piddler having the design shown in FIG. 1 is equipped with two grooved belts comprised of 70 percent polyvinyl chloride by weight reinforced with 30 percent by weight of a fabric of polyester fiber. Each belt has an outside surface, or fiber-contacting surface, having a saw-toothed profile such as that depicted in FIG. 2. Each belt is 0.15 inch thick, measured between the inside surface of the belt and the furthermost points of the outside surface of the belt; and the distance between peaks of the saw-toothed profile is 0.15 inch. The depth of the grooves (vertical distance between peaks and valleys) is 0.05 inch. The belts are 70 inches long and 6.5 inches wide. The piddler is employed to receive tows of spun acrylonitrile polymer filaments containing about 115,000 filaments per tow and having a moisture content of 70 percent water, based on the weight of the dry tow. The individual filaments have a denier per filament of about 10. The moving tow is taken up by the piddler at the rate of about 400 yards per minute and is discharged vertically at the same rate through an oscillating funnel into a container positioned below the piddler. During a prolonged test of the piddler, it is observed that the incidence of wraps around one of the belts of the piddler attributable to malfunction of the piddler is fewer than one wrap per month.

In a similar run made for comparison purposes, a piddler having conventional, ungrooved belts is employed to handle tows of acrylonitrile polymer filaments of the same size and same moisture content at the same rate of delivery and discharge. The conventional belts are made of polyvinyl chloride reinforced by fabric and have a somewhat roughened surface comprising an embossed pattern of diamond-shaped indentations having a depth of 0.010 inch and having each side of the diamond measuring approximately 5/64 of an inch. In employing these belts, it is observed that the incidence of wraps attributable to malfunction of the piddler is at the rate of more than one wrap per day.

What is claimed is:

1. In an apparatus for piddling continuous moving lengths of wet fibrous tow including a belt piddler having two vertically mounted endless belts having vertical sections with smooth surfaces in contiguous relation to form a means for gripping said material and advancing it to a designated point beneath the piddler, said wet tow having a tendency to wrap around one of the belts, the improvement comprising: the surfaces of said belts in contiguous relation having a plurality of transverse grooves therein, whereby the incidence of wraps of said wet tow around one of said belts is reduced.

2. The apparatus of claim 1, said grooves being across the entire width of said belts.

3. The apparatus of claim 2, said grooves being continuous.

* * * * *