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DOUBLE CRIMPING APPARATUS

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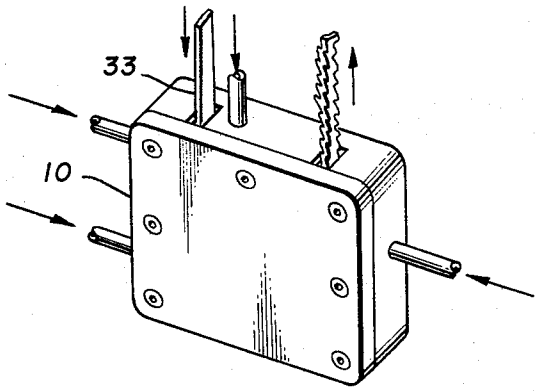


FIG. 1.

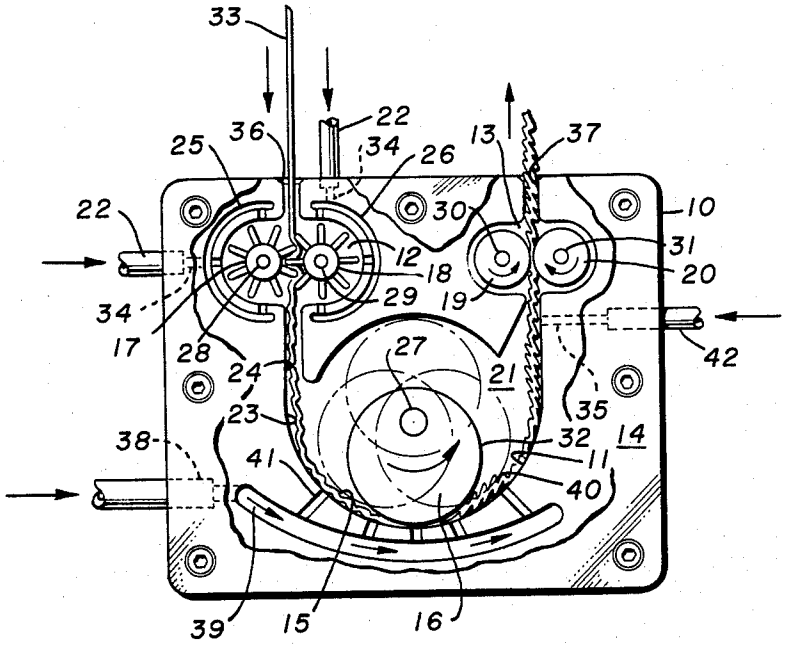


FIG. 2.



FIG. 3.

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DOUBLE CRIMPING APPARATUS

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This invention relates to a tow crimping apparatus and more specifically to an apparatus for crimping or texturing a continuous tow.

One of the steps in preparing a continuous tow for use by the textile industry is the crimping or texturing process. The crimping operation occurs generally after the tow has been dried. Crimping devices currently in use have a conventional stuffing box in working association with nip rolls, wear discs, clapper bars and the like. These arrangements produce a tow which is uniformly crimped during its entire length. The tow is heated as it enters the apparatus so that it will remain crimped after it passes through the crimping means. After the tow is heated, it is forced into a stuffing chamber and then out of the apparatus. Accordingly, a primary object of this invention is to provide a novel and improved tow crimping apparatus which will eliminate the nip rolls, wear discs, clapper bars and the like.

Another object of this invention is to provide a tow crimping apparatus with an eccentric disc for engaging and crimping a tow.

A further object of this invention is to provide a crimping apparatus which varies the wavy amplitude of the tow.

Other objects and advantages of the invention will become apparent when the following detailed description is read in conjunction with the appended drawings, in which

FIGURE 1 is a pictorial view of the apparatus showing the spatial relationship of the ports and openings employed by the device,

FIGURE 2 is a front, sectional view of the apparatus illustrating the principles of the invention and showing a pair of gears advancing a tow into a chamber where an eccentric disc is mounted,

FIGURE 3 diagramatically illustrates the wavy effect which the eccentric disc has imparted to the tow.

One embodiment of the present invention contemplates using an eccentric disc to impart extra crimping to a portion of a continuously moving tow. This extra crimping is desirous in that it increases interfilament resistance to slipping.

The apparatus is fed a continuous tow or yarn by a pair of crimping gears which are located in an inlet to a chamber in a housing. The crimping gears impart a crimp to the tow by meshing with the tow being sandwiched therein. The crimping gears then deposit the crimped tow on an inner housing wall which is smooth in texture and arcuated in design. A rotating disc, which is eccentrically mounted in the apparatus and is provided with a friction-surfaced periphery, frictionally engages the tow and advances it along the arcuate wall at a speed greater than the speed at which the tow is being deposited on the wall, thereby bunching the tow ahead of the rotating disc. The bunched tow is then pushed by the rotating disc to a position where a pair of withdrawing rollers which are located in an outlet pull the tow from the apparatus.

Where a thermoplastic yarn comprises the tow, it must be heated so that it will receive and hold the shape of the crimping device. Jets of hot air are supplied to the tow immediately before and during the crimping imparted by the crimping gears. Jets of hot, wet air are also supplied to the tow where the eccentric disc comes in close association with the arcuate inner wall. A jet of cool air is then supplied to the crimped tow immediately before the tow comes in contact with the withdrawing rollers.

The cool air sets the tow in its crimped form thereby preventing the withdrawing rollers from removing the imparted crimp.

Referring specifically to the drawings, a housing **10** having a housing chamber **21** therein receives a tow **33**. The tow **33** is drawn through an inlet **36** by a pair of meshing crimping gears **17** and **18**. The crimping gears **17** and **18**, being journaled in gear housing **12** are rotatably mounted on shafts **28** and **29**, respectively, and are turned by any well-known means. As the crimping gears **17** and **18** turn, the uncrimped tow **33** is fed thereto and is crimped by the meshing of the gear teeth.

Fluid conducting chambers **25** and **26** immediately surround the gear housing **12**. Passageways **34** link fluid conducting chambers **25** and **26** with gear housing **12**. A hot fluid is introduced to the fluid conducting chambers **25** and **26** by tubular pipes **22** which are connected to a fluid supplying source (not shown). The hot fluid then travels through passageways **34** to the fluid conducting chambers **25** and **26** and into the gear housing **12**. The fluid which is generally gaseous in nature, like steam or air, softens the uncrimped thermoplastic tow **33** so that when the tow **33** is fed between the crimping gears **17** and **18**, the tow **33** will set in the pattern of the imparted crimp.

After crimping the uncrimped tow **33**, the crimping gears **17** and **18** deposit the crimped tow **15** in housing chamber **21** on chamber wall **23**. The crimping gears **17** and **18** push the crimped tow along a passageway **24** and into housing chamber **21**. As the crimped tow **15** slides along the arcuated portion **11** of the chamber wall **23**, a rotating disc **16**, which is eccentrically mounted in the apparatus on a shaft **27** and turned by any well-known means and which is provided with a frictioned-surfaced periphery **32**, frictionally engages the crimped tow **15**. The rotating disc **16**, having a portion of its periphery which moves in a path contiguous with the arcuated chamber wall **11**, advances the crimped tow **15** at a speed greater than the speed at which the crimped tow **15** is being led to the arcuated wall **11**. As the rotating disc **16** swings through its path, the crimped tow **15** is bunched on the advancing portion of the disc **16** thereby forming a wad **40**. The wad **40** imparts a second crimp to the crimped tow **15** but since not all of the tow **15** is wadded, the crimped tow develops a waviness therein which varies in amplitude (as shown in FIGURE 3). This alternating wavy effect increases interfilament resistance to slipping among the filaments comprising the tow.

A hot fluid, such as steam, similar to the hot fluid which has been previously described is piped to the crimped tow **15** at the position where it is being crimped for the second time through apertures **41** in arcuated wall **11** which are connected to a fluid conveying chamber **39**. The hot fluid is supplied to the fluid conducting chamber **39** by a tubular pipe **38** which is connected to a source (not shown). The hot fluid anneals or softens the crimped tow **15** so that it will receive the second crimp which is provided by the rotating, eccentric disc **16**.

The eccentric disc **16** pushes the wad **40** to a position where a pair of withdrawing rollers **19** and **20** may pull the crimped tow **15** out of the housing chamber **21** and push it through outlet **37** and out of housing **11**. The withdrawing rollers **19** and **20** are journaled in a roller housing **13** and are rotatably mounted on roller shafts **30** and **31** and are turned by any well-known means. A tubular orifice **35** is located in housing wall **14** and is in close communication with withdrawing rollers **19** and **20**. The tubular orifice **35** opens into outlet **37** and is connected to a cool air supplying source (not shown) by means of pipe **42**. The cool air hits the crimped tow before coming into contact with withdrawing rollers **19** and **20** and sets it; therefore, when the crimped tow passes be-

tween the withdrawing rollers **19** and **20**, none of the crimp is removed therefrom by the withdrawing rollers **19** and **20** which impinge thereagainst.

While the preferred embodiment of this invention has been disclosed, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. Apparatus for crimping yarn comprising:

(a) a housing having inlet and outlet apertures opening into a chamber therein including an arcuate wall surface;

(b) crimping means mounted in said inlet aperture for controllably deforming said yarn and advancing said yarn onto and along said arcuate wall surface at a predetermined speed;

(c) withdrawing means mounted in said outlet aperture for removing said yarn at substantially said predetermined speed; and

(d) a member mounted proximate said arcuate wall surface intermediate said crimping and withdrawing means and including a portion alternately movable from a position away from said arcuate wall surface to a position in moving engagement with and in the direction of said yarn, said portion being movable at a speed greater than said predetermined yarn speed whereby said yarn is spacedly wadded to impart a second crimp thereto.

2. Apparatus for crimping yarn comprising:

(a) a housing having inlet and outlet apertures opening into a chamber therein and including an arcuate wall surface;

(b) crimping means mounted in said inlet aperture for controllably deforming said yarn and advancing said yarn onto and along said wall surface at a predetermined speed;

(c) withdrawing means mounted in said outlet aperture for removing said yarn at substantially said predetermined speed;

(d) an eccentric disc mounted proximate said arcuate wall surface intermediate said crimping and withdrawing means and including a portion alternately movable from a position away from said arcuate wall surface to a position in moving engagement with and in the direction of said yarn, said portion being movable at a speed greater than said predetermined yarn speed whereby said yarn is spacedly wadded to impart a second crimp thereto;

(e) means in said housing for supplying a hot fluid to said crimping means and said eccentric disc to soften said yarn and thereby enhance its deformability; and

(f) means in said housing intermediate said disc and said withdrawing means for providing said yarn with a cool fluid bath to set the crimp therein.

3. Apparatus for crimping a yarn comprising:

(a) a housing having inlet and outlet apertures opening into a chamber including an arcuate wall surface;

(b) crimping gears mounted in said inlet aperture for controllably deforming said yarn and advancing said yarn onto and along said wall surface at a predetermined speed;

(c) withdrawing rollers mounted in said outlet aperture for removing said yarn at substantially said predetermined speed;

(d) a disc eccentrically and rotatably mounted proximate said arcuate wall surface intermediate said crimping gears and withdrawing rollers and including a friction surfaced periphery engaging said yarn as said periphery moves in a path contiguous with said arcuate wall in the direction of movement of said yarn, said periphery being movable at a speed greater than said predetermined yarn speed whereby said yarn is spacedly wadded to impart a second crimp thereto;

(e) conduits in said inlet and said arcuate wall for supplying a hot fluid to said crimping gears and said disc, respectively, to soften said yarn and thereby enhance its deformability; and

(f) a tubular orifice in said housing intermediate said disc and said withdrawing rollers for providing said yarn with a cool fluid bath to set the crimp therein.

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