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Lusk et al.

[11] **3,729,916**

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[54] METHOD FOR TREATING YARN

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[52] **U.S. Cl.** .....**57/34 HS**, 57/83

[51] **Int. Cl.** **D02g 1/02**, D01h 1/28

[58] **Field of Search** .....57/1, 34 R, 34 HS, 57/36, 37, 51, 51.4, 51.5, 54, 55.5, 61, 78, 83, 84, 90, 157 TS, 157 MS, 157 R

[56] **References Cited**

UNITED STATES PATENTS

2,790,298	4/1957	Kunzle	57/28 X
2,623,346	12/1952	Lohfert et al.	57/83 X
3,354,631	11/1967	Elias et al.	57/83 X

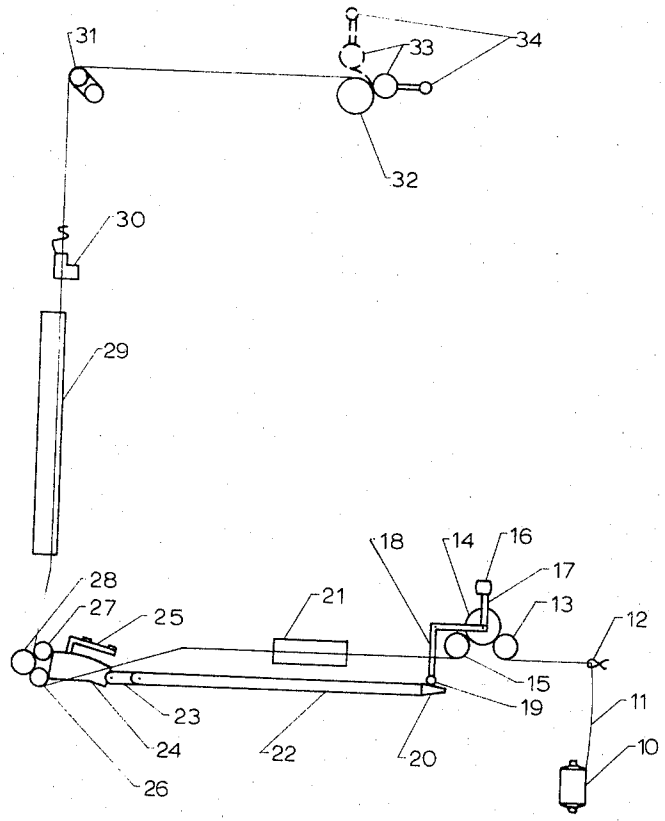
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[57] **ABSTRACT**

A method and apparatus for drawing and texturizing yarn in a continuous operation is described. Useful in a conventional drawing and texturizing operation wherein the yarn is passed through a drawing zone, a heating zone, and a false twisting zone to obtain drawn yarn having stretch characteristics. The improvement of this invention provides feeding and drawing means in the drawing zone which are synchronized to be engaged or disengaged simultaneously. This may be accomplished through the use of a connecting shaft and cam system which causes draw rolls and feed rolls to be simultaneously engaged and disengaged. This unique system allows an operator to "thread up" the entire apparatus prior to simultaneously initiating the operation.

2 Claims, 3 Drawing Figures



2 Sheets-Sheet 1

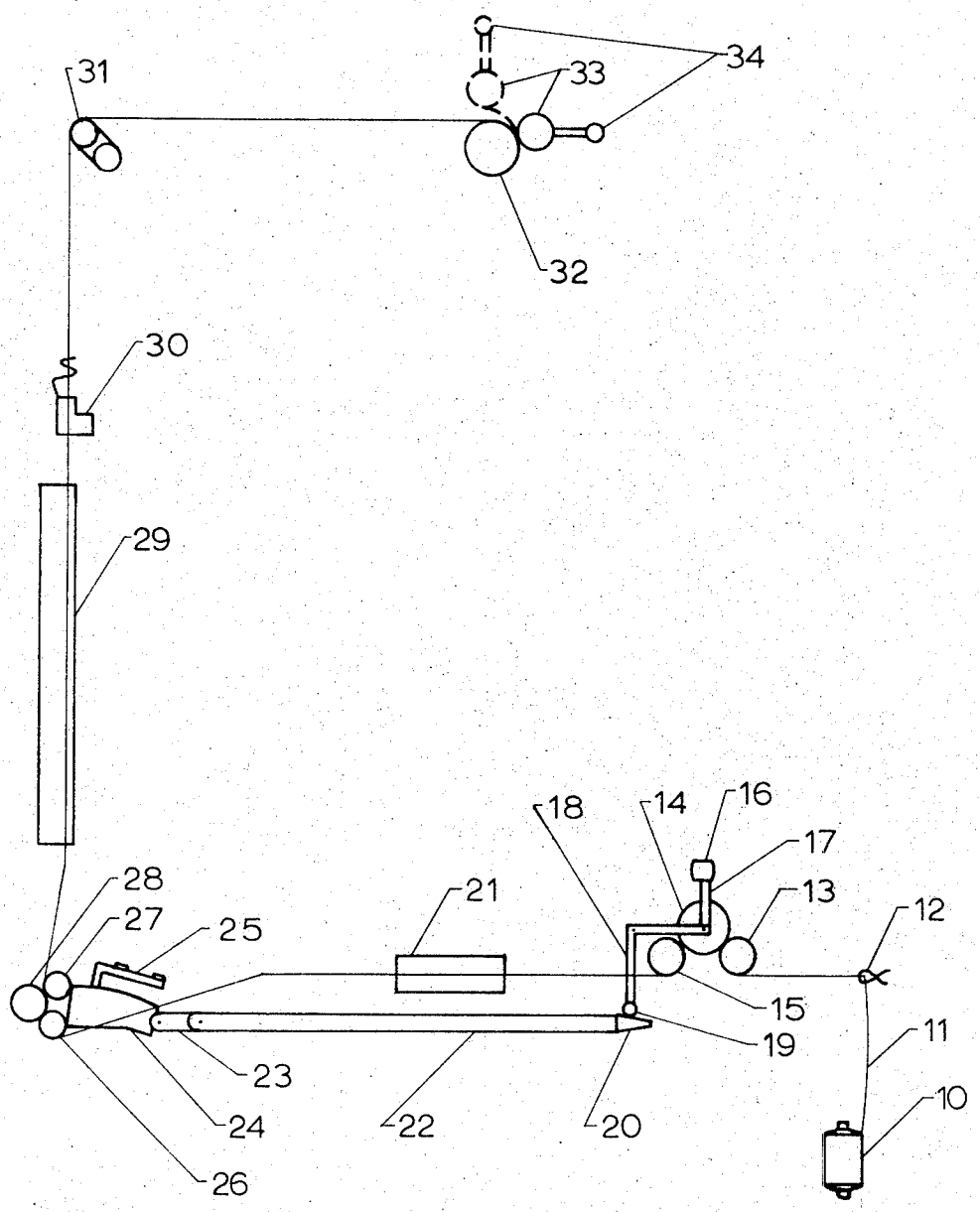


FIG 1

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FIG. 2

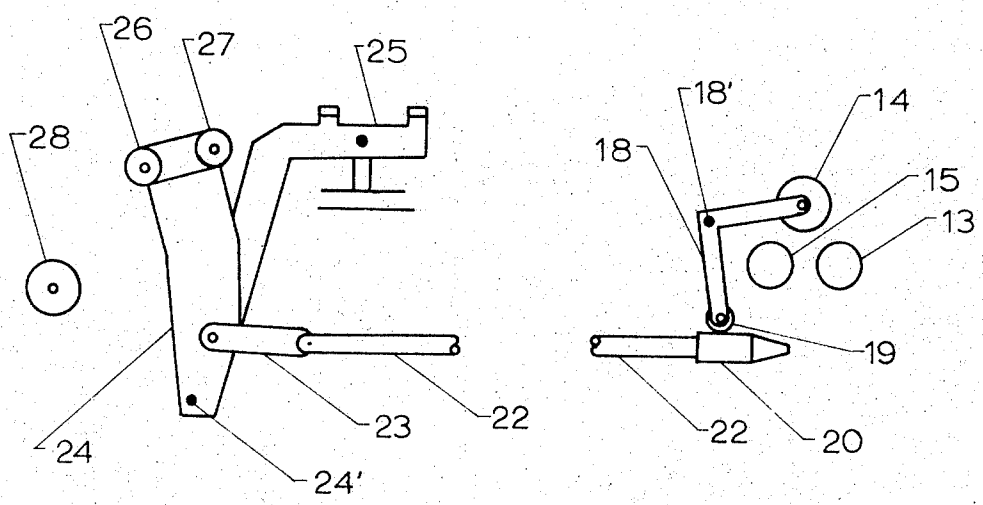
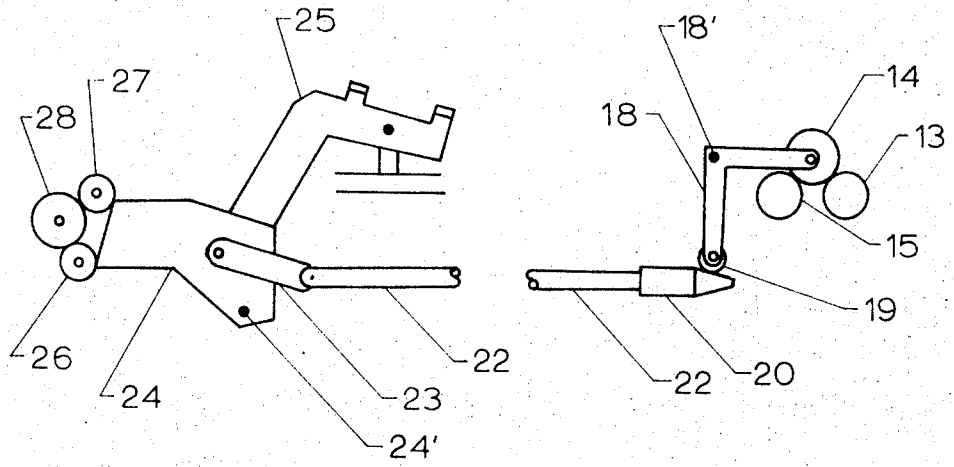


FIG. 3



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METHOD FOR TREATING YARN

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is directed to the treatment of yarn. More particularly, the invention is directed to a method of, and apparatus for, drawing and texturizing yarn in a continuous operation.

2. Description of the Prior Art

Various processes and machines are known for treating yarn to impart stretch characteristics thereto including U.S. Pat. Nos. 2,803,105; 2,803,108; 2,803,109; and 2,831,376 to Stoddard et al.; U.S. Pat. No. 3,152,436 to Dudzik et al.; and U.S. Pat. No. 3,541,775 to Fisher. The techniques employed in the mentioned patents provide for heating drawn yarn and thereafter feeding the heated yarn through a false twist spindle where twist characteristics are applied to the heated yarn, resulting in stretch yarn characterized by crimped or coil-like configurations. Such procedures are well known.

In these prior techniques, it is necessary to subject the yarn to a prior drawing operation before treating the yarn to impart stretch characteristics thereto. This additional separate processing step is undesirable in that it is time consuming and less economical. Certain processes have been proposed in which drawing and texturizing have been carried out in a continuous operation including U.S. Pat. No. 2,890,568 to Willens in which a draw zone consisting of feed rolls and draw rolls operating in the normal manner is simply placed between the yarn supply and the heating zone. However, this type of operation has been found to be unsatisfactory. The yarn tends to be overfed into the draw zone and can easily become entangled before the draw rolls can take up the slack. It is also desirable with equipment of this type to "thread up" the equipment prior to beginning operation thereof. In order to proceed in this manner, it is necessary that the feed rolls and draw rolls be synchronized and engaged or disengaged simultaneously in order to obtain proper drawing of the yarn.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for drawing and texturizing yarn.

It is another object of this invention to provide a method for drawing and texturizing yarn in a continuous operation.

It is another object of this invention to provide a method and apparatus for drawing and texturizing yarn in a continuous operation wherein the feeding means and drawing means are synchronized so that drawing of the yarn may be initiated or discontinued simultaneously.

These and other objects of this invention will be apparent from the detailed description thereof which follows.

According to the present invention, the aforesaid objects are accomplished and yarn may be drawn and texturized in a continuous operation. In a conventional drawing and texturizing operation wherein the yarn is passed through a drawing zone, a heating zone, and a false twisting zone to obtain drawn yarn having stretch characteristics, the improvement which comprises providing in the drawing zone feeding means and drawing means which are synchronized to be engaged or disengaged simultaneously to provide proper drawing of the yarn and proper feeding of the drawn yarn into the heating zone. This is accomplished through the use of a connecting shaft and cam system which causes draw rolls and feed rolls to be simultaneously engaged and disengaged. The unique system of this invention allows the operator to "thread up" the drawing and texturizing apparatus prior to simultaneously initiating the drawing and feeding means used in the drawing operation.

The nature of the invention will be more fully apparent from the following detailed description of preferred embodiments exemplified in the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic side elevation showing the layout of one form of apparatus suitable for carrying out the invention;

FIG. 2 is a diagrammatic side elevation showing the drawing operation of FIG. 1 in detail wherein the feed and draw mechanism is disengaged.

FIG. 3 is a diagrammatic side elevation showing the drawing operation of FIG. 1 in detail wherein the feed and draw mechanism is engaged.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A detailed description of the present invention follows with reference to FIG. 1 in general and to FIGS. 2 and 3 in detail. It is to be understood that the type and arrangement of apparatus and the like may be varied for the purpose of carrying out this invention. The particular arrangement as shown in FIGS. 1, 2 and 3 are preferred.

In FIG. 1, a continuous filament yarn 11 is fed from a supply package 10 through a guide 12 to feed rolls 14, 13 and 15. Rolls 13 and 15 are driven and floating roll 14 may be positioned to engage or disengage rolls 13 and 15. Although two rolls 13 and 15 are shown and preferred, the operation of this invention could proceed using only a single roll instead of two rolls as shown. The yarn 11 passes from roll 15 through a drawing zone which may optionally contain a draw pin, plate or the like shown generally at 21, which may be heated. The yarn then passes to draw rolls 26, 27 and 28. Roll 28 is driven and Casablanca rolls 26 and 27 may be positioned to engage or disengage roll 28. Yarn 11 rides against rolls 26 and 27 when disengaged as shown in FIG. 2. When rolls 26 and 27 engage roll 28, the yarn passes through heating zone 29. This heating zone preferably consists of a heater equipped with heater grooves as is well known in the art. The yarn is positioned in alignment with the heater grooves so that the yarn may be threaded up out of contact with the heater and placed into contact with the heater grooves by the movement of rolls 26 and 27 into contact with driven roll 28. The yarn 11 is passed from the heated zone through false twist spindle 30 to forwarding rolls 31 to a conventional takeup shown at 32 and 33. Driven roll 33 is independently moved into position to drive takeup 32 by means such as arm 34 or the like. Simultaneously therewith or thereafter rolls 13 and 15 engage roll 14 and rolls 26 and 27 engage roll 28.

As pointed out above, feed roll **14** and draw rolls **26** and **27** may be simultaneously engaged or disengaged with driven rolls **13** and **15** and draw roll **28** respectively in order that the entire operation may be threaded up prior to initiating the draw texturizing operation. Rolls **26** and **27** are activated by means of peddle **25**. When these rolls are activated and moved into contact with roll **28**, roll **14** automatically engages rolls **13** and **15** due to the action of shaft **22** and cam **20**. Shaft **22** and cam **20** are connected to peddle **25** through rocker arm **24** and bracket **23**. When rolls **26** and **27** are engaged with roll **28**, shaft **22** is displaced to the left by connection through rocker arm **24**, which pivots about pin **24'**, and linkage **23** causing roller **19** to ride down on the face of cam **20**. The weight of roll **14** causes L-shaped bracket **18** to pivot about pin **18'**, thus lowering roll **14** into contact with driven rolls **13** and **15**. When such contact is made, yarn feed will commence. A weight **16** of up to 10 or more pounds may optionally be connected to roll **14** through bracket **17** to increase the pressure of roll **14** against rolls **13** and **15** and thus prevent possible slippage of the yarn at this point of contact.

When rolls **26** and **27** are disengaged from contact with roll **28**, shaft **22** moves to the right through the action of peddle **25** and rocker arm **24**. As shaft **22** moves to the right, roller **19** rides up on cam **20** causing roll **14** to be raised through the pivotal action of L-bracket **18**. This simultaneous engaging and disengaging of roll **14** and Casablanca rolls **26** and **27** is shown in detail in FIGS. **2** and **3**.

FIG. **2** shows the position of roll **14** and rolls **26** and **27** when disengaged and FIG. **3** shows the position of roll **14** and rolls **26** and **27** when engaged.

With reference to FIGS. **2** and **3** it is seen that when peddle **25** is activated, rocker arm **24** moves in an arc to cause Casablanca rolls **26** and **27** to engage drive roll **28**. The mechanism involved is known in the art and does not form part of this invention. Such peddle and rocker arm action may be found on any Leesona No. 553 stretch yarn machine or Leesona No. 555 stretch yarn machine, available commercially from Leesona Corporation of Warwick, Rhode Island. Leesona Corp. publications Catalog No. 555–S–2–5246 and Catalog No. 555–P–2–5254, pages 20 and 22 show the mechanism of this arrangement. When rocker arm **24** moves to cause engagement of rolls **26** and **27** with drive roll **28**, shaft **22**, connected to rocker arm **24** through bracket **23**, moves with the rocker arm and causes feed roll **14** to engage rolls **13** and **15** due to the action of cam **20** on roll **19** which is connected to floating roll **14** through L-bracket **18**. Shaft **22** is, of course slidably supported by any well known bearing means (not shown).

When peddle **25** is released, its lower end moves down forcing rocker arm **24** up, disengaging Casablanca rolls **26** and **27** and causing shaft **22** and cam **20** to move to the right as shown in FIG. **2**. Cam **20** moves under roller **19** causing floating roll **14** to move upward so as to disengage from contact with driven rolls **13** and **15** through the pivotal movement of L-bracket **18**.

The use of the method and apparatus of this invention provides a convenient and economical method for drawing and texturizing yarn in a continuous operation. Using the method of this invention allows the apparatus to be threaded up and then the drawing, heating and twisting of the yarn may be initiated after thread up by the engagement of roll **14** with rolls **13** and **15**, rolls **26** and **27** with roll **28**, and roll **33** with take-up **32**. In the drawing operation, which is unique to this invention, it is critical that drawing pressure be applied by Casablanca rolls **26** and **27** and floating roll **14** simultaneously. The method and apparatus of this invention provides a unique and novel way of applying the necessary drawing pressure.

The invention is applicable to yarns generally, including staple fiber yarns, but is particularly applicable to continuous filament yarns, e.g. of wholly synthetic materials such as polyamides, polyesters, polyolefins, and the like; of regenerated cellulose as in viscose rayon and cuprammonium rayon; and of cellulose acetate or other organic derivatives of cellulose. The invention is particularly applicable to continuous filament yarns of polyamides, such as polyhexamethylene adipamide, polycaprolactam, and the like and of polyesters, such as polyethylene terephthalate and the like.

The drawing of the yarn may be either a cold-draw or hot-draw as is well known in the art. The yarn may be given a degree of drawing of the order of 3 to 5 or more times depending upon the nature of the material. It has been found that a draw ratio of about 3:1 is preferred for polyhexamethylene adipamide yarns and a draw ratio of about 5:1 is preferred for polyethylene terephthalate yarns.

From the drawing zone, the drawn yarn is fed into a heating zone as is well known in the art. As shown in FIG. **1**, the drawn yarn passes from the drawing zone to the heating zone **29**. The yarn rides on rolls **26** and **27** which provide tension to the yarn and allow the yarn to be threaded up in alignment with a groove in the heater so that, upon operation, the yarn may be moved into contact with the heater groove. The temperature of the heater or heating zone is regulated to the temperature at which the yarn is desired to be processed with the length of the heater or heating zone enabling the yarn to reach equilibrium temperature with the heater or heating zone as it travels thereover or therethrough. The temperature of the heater is maintained uniformly at a point below the temperature at which the yarn melts. Contact heaters are preferred for the purposes of this invention although other types of heaters and/or heating methods may be used if desired. As is well known in the art, the heated zone is correlated to the linear travel of the yarn to supply sufficient heat thereto to effect the proper yarn setting which reorients the molecules of the yarn in the twisted formulation obtained in the twisting zone to produce the crimped or coil-like configuration characteristic of textured or stretch yarn. If necessary to impart the desired characteristics to the yarn, additional heaters or heating zones may be used.

The drawn, heated yarn is then passed to the false twist spindle, shown at **30** in FIG. **1**, where twist characteristics are applied to the yarn. False twist spindles useful for the purposes of this invention are well known in the art and are of the type in which the yarn passes through a hollow and rapidly rotating spindle provided with means for guiding the yarn through several sharp changes of direction. False twist spindles

of the type convenient for use herein are fully described in the art as shown in U.S. Pat. No. 3,044,226 to Hilbert and U.S. Pat. No. 3,074,226 to Hilbert.

The yarn passes from the false twist zone to forwarding rolls **31** and to a conventional take-up device shown at **32** and **33**. During operation, the take-up speed is equal to or greater than the speed of driven roll **28**. After thread-up, driven roll **33** is moved into contact with take-up **32** to start the operation.

It is to be understood that changes and variations may be made in the present invention by one skilled in the art without departing from the spirit and scope thereof as defined in the appended claims.

What is claimed is:

1. In a machine for treating yarn including disengageable feed rolls, draw rolls and take-up rolls, and a heating device and a false twisting device the improvement comprising

disengageable feed roll means for accepting filament yarn from a source of supply;

means for driving said draw rolls at a speed substantially faster than said feed rolls means, and

means for substantially simultaneously engaging said feed roll means and said driving means comprising

a pedal for engaging said draw rolls;

a pivoted bracket member for engaging said feed roll means, and

a mechanical coupling between said pedal and said bracket member.

2. The machine of claim **1** wherein said mechanical coupling between said pedal and said bracket member comprises

a rocker arm connected to and activated by the movement of said pedal to engage or disengage said draw rolls;

a bracket connected to and activated by the movement of said rocker arm;

a shaft connected to and activated by the movement of said bracket;

a cam attached to and activated by the movement of said shaft, and

a roller riding on said cam and connected to said bracket member and activating said bracket member to engage or disengage said feed roll means in response to the movement of said pedal.

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