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Whitaker

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[54] **APPARATUS FOR TEXTURING YARN**

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[52] **U.S. Cl.** **28/1.3**; 28/1.4; 28/1.6

[51] **Int. Cl.** **D02g 1/20**

[58] **Field of Search** 28/1.3, 1.4, 1.6

[56] **References Cited**

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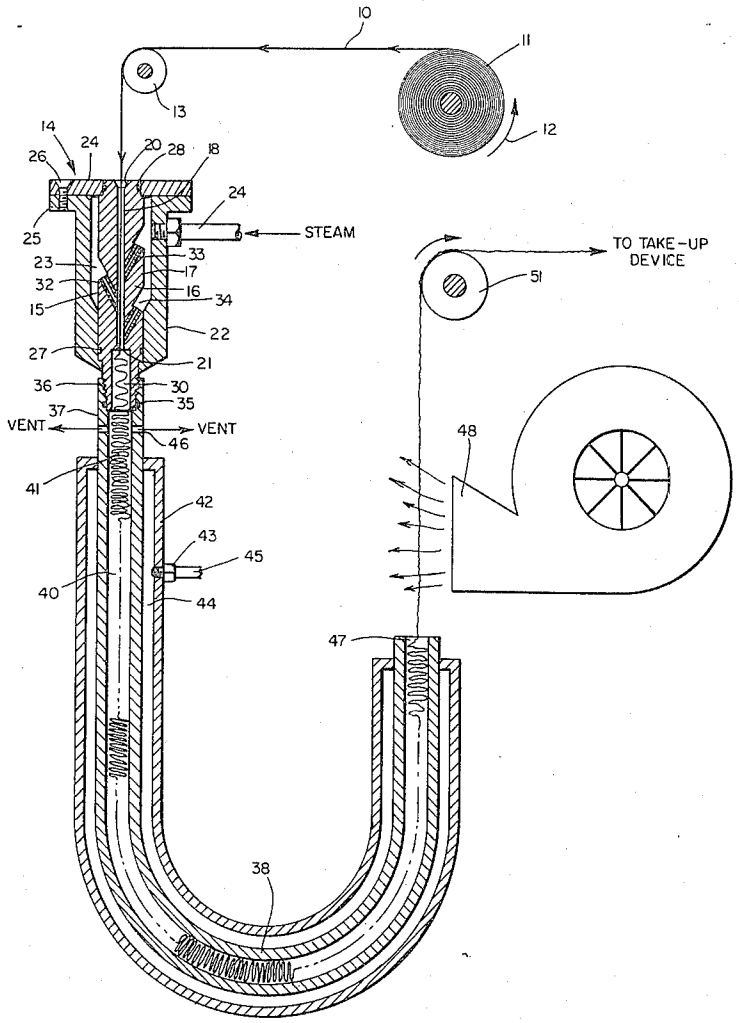
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Primary Examiner—Louis K. Rimrodt

[57] **ABSTRACT**

Apparatus is provided, for facilitating the texturing of yarn, whereby a yarn strand is delivered through a needle, and impelled therethrough, to form a wad, in the presence of steam, with the yarn being crimped by compacting during the formation of the yarn, and heat set in a crimped condition by steam, and the wad of thus crimped yarn then is de-compacted and may, if desired, be subjected to further heat treatment, to relax stresses or the like, followed by cooling if desired.

22 Claims, 5 Drawing Figures



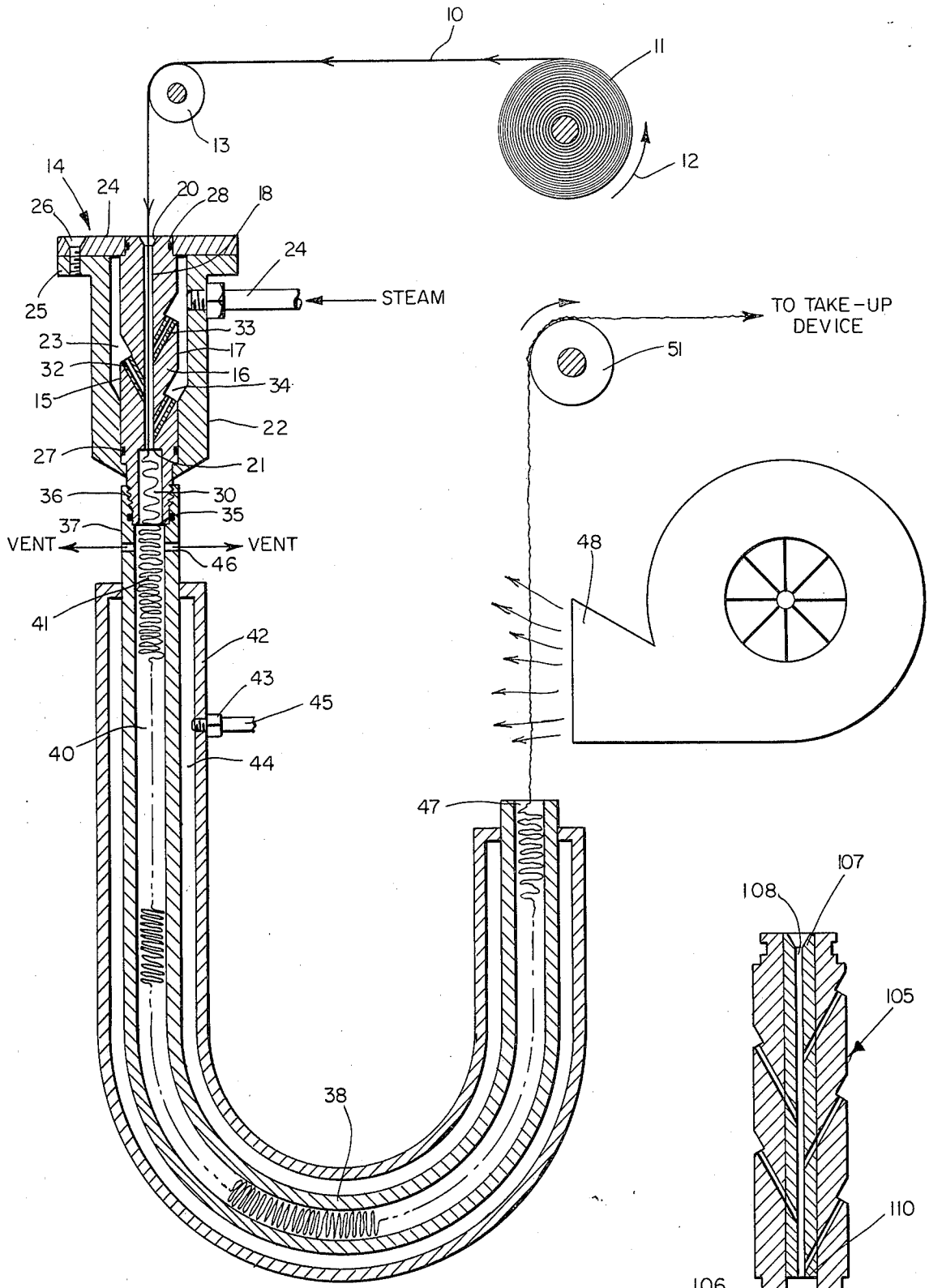

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VENT
VENT
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38
TO TAKE-UP DEVICE
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48

Fig. 1

107
108
105
110
106

Fig. 5

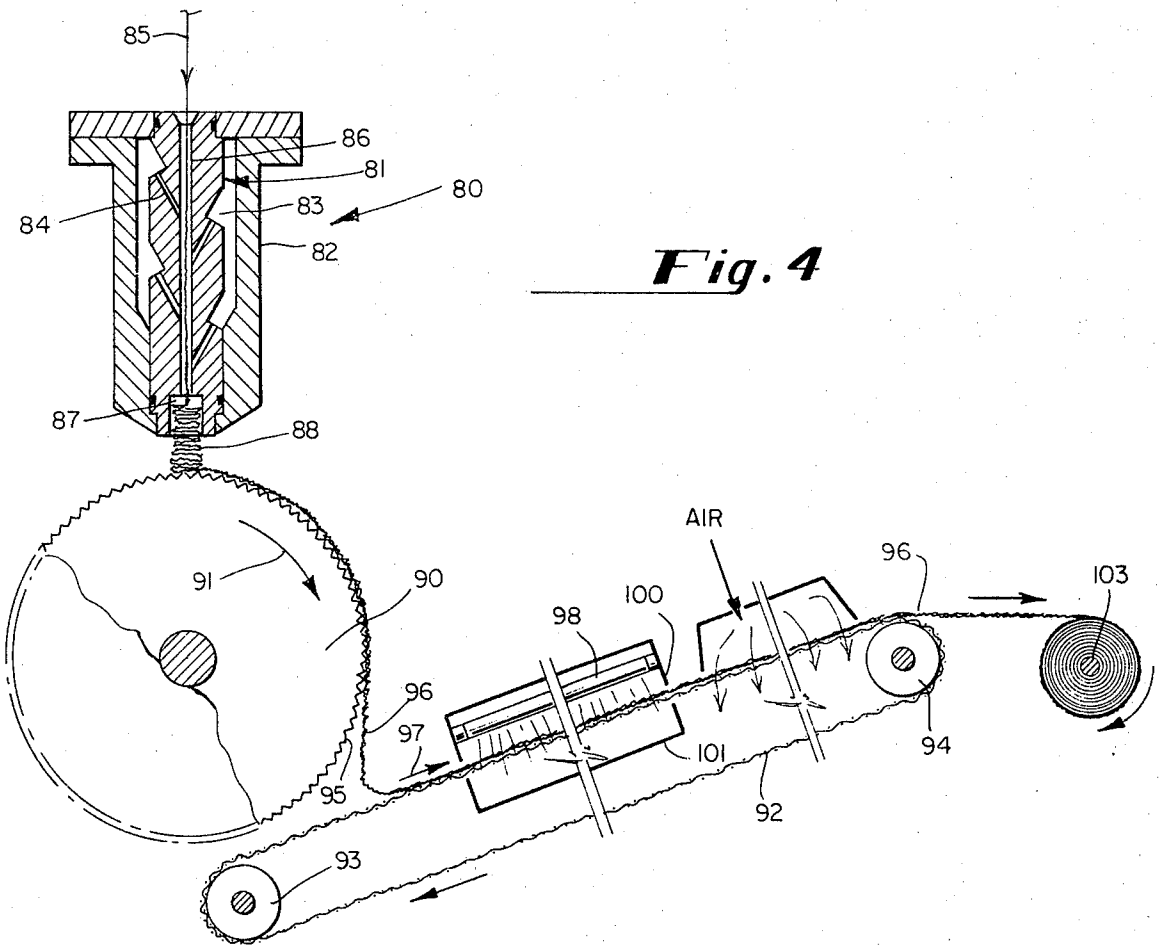


Fig. 4

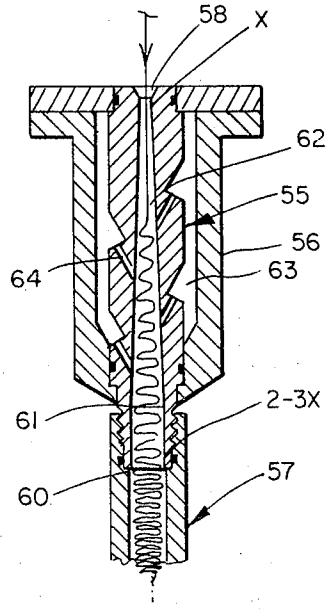


Fig. 2

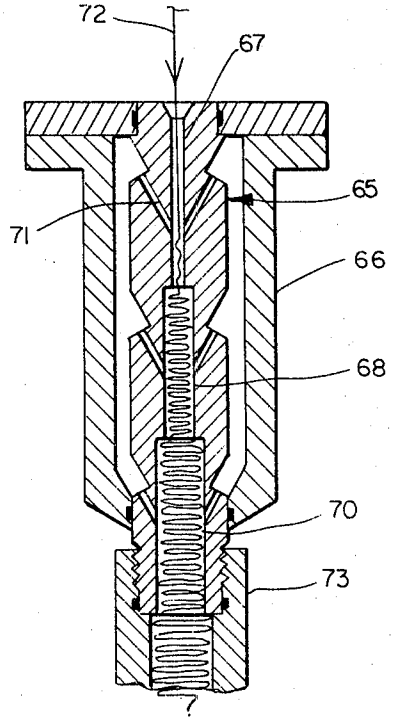


Fig. 3

APPARATUS FOR TEXTURING YARN

BACKGROUND OF THE INVENTION

In prior art types of texturing apparatus, for texturing yarn or the like, steam has been used for the purpose of assisting the delivery of yarn, as well as for providing the heat necessary for heat-setting the yarn in a crimped condition. The U.S. Pat. to Faidley 3,611,520 constitutes such a development. The Faidley development, and also the development of the present invention, are particularly useful in texturing synthetic yarns, of the monofilament type, or even of the double or otherwise multiple filament type, most particularly with respect to the present invention. Because of the nature of synthetic yarns, they are susceptible to relaxation upon elevation in temperature. Yarns normally delivered to crimping apparatus have previously been extruded and drawn, and may have a pre-determined orientation or alignment of molecules. When subjected to heat, as for example, by steam contact, any prestressing may result in a shrinkage, or reduction in length of a given length of yarn, if such prestressing had been effected by a drawing or by the lengthening operation. Also, the crimping of yarns in the presence of steam, whereby the yarns are in a randomly bent, tangled or the like condition while subjected to steam at a sufficiently high temperature to relax stresses therein, in order that the yarns take on a permanent set in the crimped condition is known. The above-mentioned Faidley patent is so operative, and also teaches the use of delivering a wad against a moving surface disposed therebeneath as a frictional resistance to such movement of the wad outside its crimping chamber, and with the delivery of the wad from its crimping chamber effecting a decompacting or de-wadding, whereby the yarn may again be wound for use, with a memory of its crimped condition. Such crimping effects a bulking of the yarn.

THE PRESENT INVENTION

The present invention is directed toward an improvement over the above-mentioned Faidley disclosure, whereby refinements in the crimping itself, and in the manner of effecting such crimping are provided, and also whereby the steam is utilized additionally for the purpose of providing early contact with the yarns, and further for the purpose of effecting the movement of the yarn through the needle, in its path, at a plurality of locations. Accordingly, jets of steam enter the yarn path of the needle at various locations spaced longitudinally of the needle, and are angled for engaging the yarn and impelling it in the desired direction, from several locations, not only for the purpose of providing increased handling capabilities of the yarn through the needle, and perhaps faster speed of travel of yarn through the needle, but also to provide early contact of steam with the yarn, either for shrinkage or stress relaxation purposes, as well as for raising the temperature of the yarn at an early time, just prior to crimping. Additionally, the present invention provides novel techniques for resisting the delivery of a wad of crimped yarn from the crimping chamber, and for controlling the decompacting thereafter, as well as further refinements of the process.

SUMMARY OF THE INVENTION

The present invention is directed toward providing

improvements in yarn texturing apparatus; specifically yarn crimping chambers, steam delivery and temperature-raising apparatus for delivering yarn to the crimping chamber, and for providing friction-type resistance to discharge of yarn from the crimping chamber by novel combinations of yarn handling apparatus.

Accordingly, it is a primary object of this invention to provide novel apparatus for texturing yarn.

It is a further object of this invention to provide a novel system for compacting and decompacting yarn.

It is a further object of this invention to provide a novel apparatus for using steam, not only for providing the heat of relaxation of molecules of synthetic yarn during a crimping process, but also for physically impelling the yarn during its delivery to the crimping chamber.

It is another object of this invention to provide novel apparatus for taking-off and de-wadding yarn from the crimping chamber.

It is a further object of this invention to provide crimping chamber refinements and apparatus for preparing yarn prior to its entering the crimping chamber.

It is a further object of this invention to provide novel yarn delivery means to a crimping chamber, as well as, and in combination with novel apparatus for providing paths of travel of wads of crimped yarn, during its delivery.

Other objects and advantages of the present invention will become readily apparent to those skilled in the art by a reading of the following brief description of the drawing figures, detailed descriptions of the preferred embodiments, and the appended claims.

THE DRAWINGS

FIG. **1** is a vertical sectional view, partially schematic, of one form of the apparatus of this invention, wherein the yarn delivery, early treatment, crimping, and subsequent treatment are illustrated.

FIG. **2** is a vertical sectional view, wherein an alternative form of a portion of the apparatus of FIG. **1** is illustrated, specifically a yarn delivery path that is tapered in cross-sectional configuration.

FIG. **3** is a view generally similar to that of FIG. **2**, although slightly larger, but wherein the yarn delivery path is of progressively stepped configuration.

FIG. **4** is a generally vertical sectional view, partially schematic, of an alternative system in accordance with this invention.

FIG. **5** is a vertical sectional view through a modified form of a yarn delivery needle in accordance with this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, reference is first made to FIG. **1**, wherein yarn **10** is illustrated, as being delivered from a suitable delivery roll **11** or the like, rotating in a counterclockwise direction illustrated by the arrow **12** of FIG. **1**. The yarn **10** is illustrated as being a single filament synthetic yarn, such as nylon **6**, nylon **66** or the like, although it will be understood, within the purview of the present invention, the yarn **10** can be a double ply yarn, or triple ply, or other multiple ply yarn, either completely synthetic, or comprising a mixture of synthetic and natural fiber filaments, if desired. In some instances, the yarn **10** will be prestressed prior to delivery around the roll **13**, to the yarn

treatment and crimping station **14.** In other instances, the yarn will not be pre-stressed, it being understood that the apparatus of this invention is intended to accommodate all such types of yarn. When monofilament yarn is used, a typical yarn will be of 2,500 denier, but of course a wide range of denier is utilized. Also, it will be understood, that because the yarn **10** is synthetic, it will generally be of the continuous filament type, but any types of yarn or yarn mixtures that lend themselves toward heat treatment and increased bulking or crimping may be so used.

At station **14,** a needle **15** is provided, that will generally be circular in plan view or horizontal cross-section, but will have an elongated configuration such as that illustrated in FIG. **1,** with wall portions that aggregately define a generally cylindrical configuration **16** between outer surface portions **17,** and an elongated longitudinally extensive interior bore **18,** that defines the longitudinal path of travel of the yarn **10** therethrough, from the chamfered inlet **20** to the path outlet **21,** generally straight therebetween as illustrated.

A housing **22,** generally of stainless steel construction or the like, capable of withstanding perhaps **150** pounds per square inch gauge of steam therein is provided, defining about the outer surface **17** of the needle **15,** a chamber **23.** A suitable nipple or other inlet means **24** is provided, threadingly connected into the housing **22,** as illustrated, for delivering steam supplied thereto, into the chamber **23.** The steam will thus be supplied at perhaps 125 psig, or somewhat higher or lower, as desired. The upper end of the housing **22** is closed by an end plate **24** or the like secured to a flange **25** of the housing **22** by a suitable threaded fastener **26** or the likes, as desired.

A suitable circular ring or the like **27** will facilitate the provision of a seal between the lower end of the needle **15** and the housing **22,** as will a similar circular ring **28** effect comparable sealing at the upper end.

The outlet of the path **18** enters into a crimping chamber **30,** that, in the embodiment illustrated in FIG. **1** comprises a cylindrical bore.

A plurality of connecting ducts **33** comprise angled jets, and are constructed as angled bores, extending from the chamber **23,** and from outside surfaces such as **17** that communicate with the chamber **23,** inwardly through the wall portions **16** of the needle member **15,** into communication with the bore or path **18** of yarn **10** through the needle member **15.** The ducts **31, 32** and **33** thus extended downwardly and inwardly, being angled through the wall portions of the needle member to intersect the path of uncrimped yarn extending therethrough at locations more closely adjacent the outlet of the needle member than the locations of communication of the connecting ducts with the chamber **23.** It will thus be seen, that steam under pressure within the chamber **23** will enter the ducts **31, 32** and **33,** and will have a downward component of motion as such steam communicates with the path or bore **18,** that, with the steam thus contacting and engaging the then already downwardly moving yarn **10,** will further impel the yarn downwardly, with such ducts **32, 33** and **31** acting as jets, for delivery of the yarn **10** into the crimping chamber **30.** Also, it will be noted that the steam thus directly engages the yarn **10** at locations that are longitudinally spaced upstream from the entry of the yarn into the crimping chamber **30.** It will be understood that a plurality of such connecting ducts **31, 32** and **33** may be utilized, but that only three are specifically illustrated in FIG. **1,** for the sake of clarity. Also, it will be understood that the ducts **31, 32** and **33** illustrated are provided with cylindrical sleeves therein, that may for example be of stainless steel construction, if desired, and that are generally inserts, although if desired, the use of such sleeves could be avoided and small openings be used instead thereof, that may be bored or drilled directly through the walls **16** of the needle member **15,** if desired. However, the use of sleeves as indicated, make it impossible to maintain closer control over the diameter of such ducts (interior diameter). It will also be noted that notches **34** are provided where the ducts communicate with the chamber **23,** for facilitating machining and inlet of the inserts, as well as for providing increased volume for steam within the housing **22,** in the chamber **23.**

Yarn thus entering the chamber **30** is being delivered thereto faster than it is being removed therefrom at the lower end **35** thereof, and thus tends to fold and bend upon itself. At about this time in the operation, the yarn will preferably be at a temperature such that it is amenable to taking on the configuration of the crimps, as a relaxed configuration therefor.

It will be noted that the lower end of the needle member **15** as illustrated in FIG. **1** is threadingly connected at **36,** into a tube **37.** The tube **37** may comprise a J-box, of the configuration illustrated in FIG. **1,** or may merely be a tube having an arcuately bent portion, or rounded portion **38** capable of providing sufficient friction to retard the movement of a wad of crimped yarn therethrough, and thus to provide a resistance effect to yarn being delivered from the crimped chamber **30.** Depending upon the interior size or diameter **40** of the J-box or other tube **37,** such may also function in part as a crimping chamber, although, in many instances, the chamber **30** will provide sufficient crimping, with the tube **37** providing only a path for the already crimped yarn to pass therethrough. This resistance will provide a long plug or wad such as **41** of crimped yarn that the apparatus of this invention may be used to continue the treatment thereof. For example, the tubular member **37** may be provided with a jacket **42** as indicated, that in turn may be provided with an inlet **43** for delivering steam or other treatment fluid into a chamber **44** disposed about the tube **37.** Thus, if it is desired to continue to heat treat the continuous wad **41,** or to even further relax stresses that may still be present in the yarn or yarns that form the wad **41,** heat may be delivered to the inlet **45** of the chamber **44.** In lieu of the provision of a chamber **44,** it may be desired simply to wrap the tube **37** with a high temperature type tape, as insulation, in order that the tube **37** will retain heat in the presence of the wad **41.**

Furthermore, it will be apparent that other types of treatment fluid other than steam or heating fluid may be utilized, within the chamaber **44,** to have the desired effect upon the continuous wad **41.** For example, due to the particular yarn constructions and heat applied during its passage through the needle member **15,** it may be that the yarn at the time that it begins to enter the J-box or tube **37** (at about the location of the vents **46**) may already be heatset, or molecularly free of memory of their previous condition, in which instance it may be desired to cool the wad during its passage through the J-box **37.** In such an instance, cooling fluid could be supplied to the chamber **44.** However, gener-

ally, it will be desired to continue to heat the wad **41** during its passage through the tube **37**, as illustrated in FIG. **1**, and in which instance, steam will be supplied to the inlet **45**.

It will be noted that the wad, upon its discharge through the outlet end **47** of the J-box or curved tubular member **37**, will generally be cooled, either by ambient air from the environment, or by a suitable blower **48** or the like, in order to assure setting of the yarn prior to substantial tensioning thereof. The then dewadded yarn **50** is delivered around a roller **51** or the like, to a take-up device.

With reference to FIG. **2**, it will be seen that an alternative embodiment of a needle member **55** is provided, with a suitable housing **56**. The housing **56** is constructed generally along the lines of that **22** illustrated in FIG. **1**, and accordingly will not be described in detail. Similarly, the curved tubular member **57** is constructed similar to that **37** of FIG. **1**, and also will not be described in detail, it being understood that the member **57** will be used to accommodate a wad passing therethrough, and may or may not be provided with a housing similar to that **42** of FIG. **1**, as desired.

The needle member **55**, between its inlet end **58** and its discharge end **60** is frusto-conically configured, for at least a substantial portion of its length, and in the embodiment illustrated in FIG. **2**, from its inlet **58** (below the chamfer thereof), to about the point **61**. This is to provide a path **62** of yarn travel through the member **55** that progressively, continuously expands, as illustrated, such that, as steam entering into the interior **63**, or chamber of the housing **56** (provided with steam in a conventional manner), passes through connecting ducts or jet ports such as that **64**, and impels the yarn downwardly, facilitating the commencement of the formation of crimps further upstream than in the embodiment of the needle member **15** of FIG. **1**. This has been found to be advantageous, in that, the greater the length of contact with the steam, the more expanded is the then-forming wad laterally, inasmuch as the slope or taper provided for the path **62** facilitates a larger storage area as the yarn bulks and expands as measured width-wise, although the yarn is compacting length-wise.

With reference to FIG. **3**, there is illustrated another arrangement also similar to that of each of FIGS. **1** and **2**, but wherein the needle member **65**, disposed within the housing **66**, is provided with progressively stepped bore or passage portions such as **67**, **68** and **70**, throughout its length, as indicated, whereby the formation of a bulking chamber occurs in stages, commencing for the embodiment of FIG. **3** at about the stage of the bore size indicated by the numeral **68**, and terminating at the stage **70**, insofar as the chamber increases in width while within the needle member **65**. The yarn **72** is impelled through the path portions **67**, **68** and **70**, as aforesaid for each of the needle members **15** and **55**, through the ducts **71**, with the yarn being bulked in stages (although rapidly), rather than with progressive regularity as would be the case in FIG. **2**. In any event, the yarn at the outlet end, or wadforming chamber **70** will be substantially compacted for crimping and bulking purposes as it leaves the chamber **70**, just as will the yarn be upon its leaving the chamber between points **61** and **60** in the embodiment illustrated in FIG. **2**.

The yarn at its discharge from the chamber portion **70** of the needle member **65** can compact somewhat as indicated in FIG. **3**, because the size of the chamber **70** may be perhaps two or more times the size of the inlet of the path portion **67**, as measured width-wise. For example, the sizes of the path or chamber portions **67**, **68** and **70** may respectively be 50/1000 inches, 75/1000 and 100/1000, if the yarn **72** is, for example, of 2500 denier. Similarly, the plug-forming chamber portion at the lower end of the needle member **55**, between the points **61** and **60** may also be 2 to 3 times the transverse or width-wise size of the upper end of the path **62**, as desired. It will be understood, of course, that various dimensional changes may be utilized, as desired.

With respect to all of the embodiments of FIGS. **1**, **2** and **3**, it will be understood that, particularly when it is desired that the wad of yarn within the curved tubular member **37**, **57**, **73** or the like is desired to be set a substantial amount, while remaining in compacted form, some provision should be made for exit of the steam that impels the yarn into the wad-formation chamber **30**, **60**, **70** or the like, and accordingly, the steam discharge vents **46** are provided. However, the continued downward movement and formation of wads or plugs within the chambers such as that of **30** will continue to physically urge the wad portions within the J-box or curved tubular member **37**, continually downwardly and outwardly through the discharge outlets **47** thereof, but that the steam will preferably have been released through the vents **46**, such that continued heating by the steam will not take place, unless desired. It may be desired to continue to apply heat by having a fluid within the chamber **44** as discussed above, but such will generally not be at the high temperature of steam directly in contact with the wad **41**, in order to allow setting of the yarns at temperatures below their melting temperatures.

With reference to FIG. **4** in detail, an apparatus generally designated by the numeral **80** is illustrated, as comprising a needle member **81**, a housing **82**, with some means (not shown) for providing steam into a chamber **83**, for passage through connection ducts or jet means **84**, for engaging yarn **85** being delivered to a bore-like path **86**, and impelling the yarn vertically downwardly, as indicated, due to the component of downward direction of the angled ducts, for compacting of the yarn **85** in the laterally expanded crimping chamber **87**. Thus, the jet orifices **84** are operative as discussed above for those of the embodiment of FIG. **1**.

In the embodiment of FIG. **4**, the wad or plug **88** is delivered onto the surface of a wheel or roller **90**, that is rotating in a direction of the arrow **91** illustrated in FIG. **4**, seing delivered by any suitable drive means, with the surface of the roller **90** providing] resistance to the uownward movement of the plug **88** from the chamber **87**, in a manner similar to that in which the tubular member **37** provides a resistance to the discharge of the wad from the chamber **30** discussed above. As the wheel **90** rotates, the wad **88** becomes somewhat decompacted, as indicated, and is delivered onto a woven metal apron or the like as provided by a continuous conveyor belt **92** on suitable drive and idler rollers **93** and **94**, respectively, with the conveyor **92** being of generally mesh construction or the like. It will be noted that the steam is operative upon the yarn **85** and wad **88**, in a manner similar to that discussed in the embodiment of FIG. **1**, in order to convey the yarn filaments, to provide a heat of thorough relaxation of the

yarn molecularly, when the yarn is in the crimped condition indicated by the wad or plug within the chamber **87,** and with the steam also serving to convey the plug downwardly against the surface of the roll **90.** It will be noted that the surface of the roll **90** may either be fluted as at **95,** or roughened in any other desired way, or even smooth, as desired, depending upon the particular yarn, speed of rotation of the roll **90,** etc.

It will be noted that the conveyor **92** is run in a direction such that it will move the decompacted yarn **96** therealong, in the direction of the arrow **97** illustrated, preferably beneath some heating means, such as an infrared light arrangement **98** having suitable upper and lower enclosure means **100** and **101** respectively. It will be noted that other heating means than the infrared light **98** may be provided, or even no such heating means, as desired, but that, in many instances, it will be desirable to relax some of the residual stresses of the yarn in its crimped condition, and to achieve full shrinkage of the yarn, inasmuch as the yarns originally delivered at **85** into the member **81** may have been prestressed longitudinally, or stretched. The yarn **96** leaving the enclosure **100** may then pass beneath a suitable cooling chamber or hood **102** as indicated, provided with suitable cooling air or the like from a blower or any other satisfactory arrangement. The decompacted yarn **96** will then be substantially completely set and will be delivered to a take-up roll **103.**

It will also be apparent, that if desired, the entire conveyor **92,** and even the roll **90** if desired may be enclosed, for heat-retention purposes, or partially enclosed, as desired.

With reference to FIG. **5,** in particular, it will be seen that an alternative needle member **105** is provided, that it is constructed generally similar to that **81** of FIG. **4,** but wherein the crimped condition **106** at the bottom thereof is formed because of the presence of an insert **107** for providing the path **108** of yarn travel through the needle member **105,** and at the lower end of the insert **110,** at which the insert **110** terminates, such leaves a chamber **106.** It will be clear that, from a machining or manufacturing standpoint, it may be desirable to utilize an insert **107,** whereby a bore the size of the chamber **106** may originally be machined into the element **105,** and with the reduced path **108** being provided by machining an insert **107** accordingly and inserting it into the bore **106,** and with the lower end of the bore that does not accommodate a portion of the insert **107** providing the crimping chamber. Such a feature could also be utilized for the needle member **15,** or even the needle members of FIGS. **2** and **3,** as desired.

It will be clear from all of the foregoing that various modifications may be made in the details of construction, as well as in the use and operation of the individual components of the apparatus of this invention, and in the apparatus itself. Furthermore, various substitutions and modifications that are standard in the trade may also be utilized. Sizes and materials may also be changed and substituted, within the spirit and scope of the invention, as well as other modifications obvious to those skilled in this art.

What is claimed is:

1. Apparatus for facilitating the texturing of yarn delivered thereto, comprising an elongated, enclosed yarn guide member having a yarn passageway extending therethrough between an inlet and an outlet thereof, said passageway extending to a yarn crimping chamber arranged to receive yarn from said passageway, for accommodating and crimping a wad of yarn therein, said crimping chamber having a yarn wad outlet end opening in a downstream direction relative to the travel of yarn, resistance means offering resistance to the movement of crimped yarn from said crimping chamber, and impelling means comprising a plurality of opposed and substantially parallel spaced passages angled to provide a force component in the direction of movement of the yarn and arranged at a plurality of longitudinally spaced locations along said passageway.

2. The apparatus of claim **1,** wherein said impelling means comprises a housing disposed about said passageway defining a chamber, inlet means for expandable fluid into said chamber, and a plurality of connecting ducts extending from said chamber into said passageway, said ducts being angled to intersect the passageway at an angle extending toward the direction of yarn movement.

3. The apparatus of claim **2,** wherein said yarn passageway is of substantially constant transverse size throughout its length.

4. The apparatus of claim **2,** wherein said yarn passageway is tapered from a smaller inlet toward a larger outlet.

5. The apparatus of claim **2,** wherein said yarn passageway is of progressively stepped configuration from a smaller inlet toward a larger outlet.

6. The apparatus of claim **2,** wherein said yarn passageway includes a sleeve insert.

7. The apparatus of claim **2,** wherein said connecting ducts include sleeve inserts extending angularly into said passageway.

8. The apparatus of claim **2,** wherein said resistance means comprises a tubular member, at least partially curved to define an arcuate path portion of wad passage therethrough, with the interior of said tubular member comprising surface means offering resistance to but permitting the passage of a wad of crimped yarn therethrough, including steam vent means at an inlet end of said tubular member.

9. The apparatus of claim **2,** wherein said resistance means comprises a tubular member, at least partially curved to define an arcuate path portion of wad passage therethrough, with the interior of said tubular member comprising surface means offering resistance to but permitting the passage of a wad of crimped yarn therethrough, including means for delivering steam at sufficient temperature and pressure to both heat set the yarn crimps and move the yarn through the needle member and move the crimped yarn wad through the tubular member, with yarn supply means for delivering yarn to the inlet of the needle member, and including crimped yarn takeup means for taking up yarn in de-wadded form upon discharge thereof from said tubular member.

10. The apparatus of claim **9,** including means for cooling de-wadded yarn upon discharge from said tubular member, but upstream of said yarn takeup means.

11. The apparatus of claim **2,** wherein said resistance means comprises a rotatable roll member and means for rotating the same, with the surface of said roll member being adapted to receive said wad and deliver yarn therefore in de-wadded form along an arcuate path, including means for delivering steam at sufficient tem-

perature and pressure to both heat set the yarn crimps and to move the yarn through the needle member.

12. The apparatus of claim **11,** including means for applying heat of relaxation of de-wadded yarn downstream of the path of movement of yarn delivered from said roll member and means defining a path of movement of yarn delivered from said roll member, with yarn supply means for delivering yarn to the inlet of the needle member, and including crimped yarn takeup means for taking up yarn in de-wadded form upon discharge thereof from past said means for applying heat of relaxation.

13. The apparatus of claim **12,** including means for cooling de-wadded yarn during its movement along its path, downstream of said means for applying said heat of relaxation, but upstream of said takeup means.

14. The apparatus of claim **1,** wherein said resistance means comprises a tubular member, at least partially curved to define an arcuate path portion of wad passage therethrough, with the interior of said tubular member comprising surface means offering resistance to, but permitting the passage of, a wad of crimped yarn therethrough.

15. The apparatus of claim **14,** wherein said tubular member is of J-box construction.

16. The apparatus of claim **14,** including external means for heating said tubular member.

17. The apparatus of claim **16,** wherein said heating means comprises a steam jacket.

18. The apparatus of claim **1,** wherein said resistance means comprises a rotatable roll member and means for rotating the same, with the surface of said roll member being adapted to receive said wad and deliver yarn therefrom in de-wadded form along an arcuate path.

19. The apparatus of claim **18,** wherein said roll member is of fluted surface construction.

20. The apparatus of claim **18,** including means for applying heat of relaxation of de-wadded yarn downstream of the path of movement of yarn delivered from said roll member and means defining path of movement of yarn delivered from said roll member.

21. The apparatus of claim **20,** wherein said means defining a path of movement comprises an endless conveyor belt of metal mesh construction, disposed for receiving yarn from said roll member.

22. Apparatus for facilitating the texturing of yarn delivered thereto, comprising a needle member having a longitudinal yarn path extending therethrough between an inlet and an oulet thereof, said yarn path terminating at its outlet end in a yarn crimping chamber means, said crimping chamber means being of a greater transverse size than the inlet end of said yarn path for accommodating a wad of crimped yarn therein, said crimping chamber means having yarn wad outlet end opening in a downstream direction relative to the travel of yarn, and combination means for facilitating both heating yarn being delivered through the path in the needle and impelling yarn therethrough from a plurality of longitudinally spaced locations along the path through the needle, wherein said combination means comprises a housing disposed about said needle member defining a chamber about a substantial longitudinal portion of the outer wall portions thereof, inlet means to said chamber for facilitating the delivery of steam thereto, and a plurality of connecting ducts extending through the wall portions of said needle member between said chamber and said yarn path, with said ducts being angled through the wall portions of said needle member to intersect the path of uncrimped yarn extending therethrough at locations more closely adjacent to the outlet of the needle member than the locations of communication of said connecting ducts with said chamber.

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