Nov. 21, 1967 J. R. HODGES ETAL 3,353,240

METHOD AND APPARATUS FOR FEEDING YARN INTO A STUFFER CRIMPER

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Fig. 2.

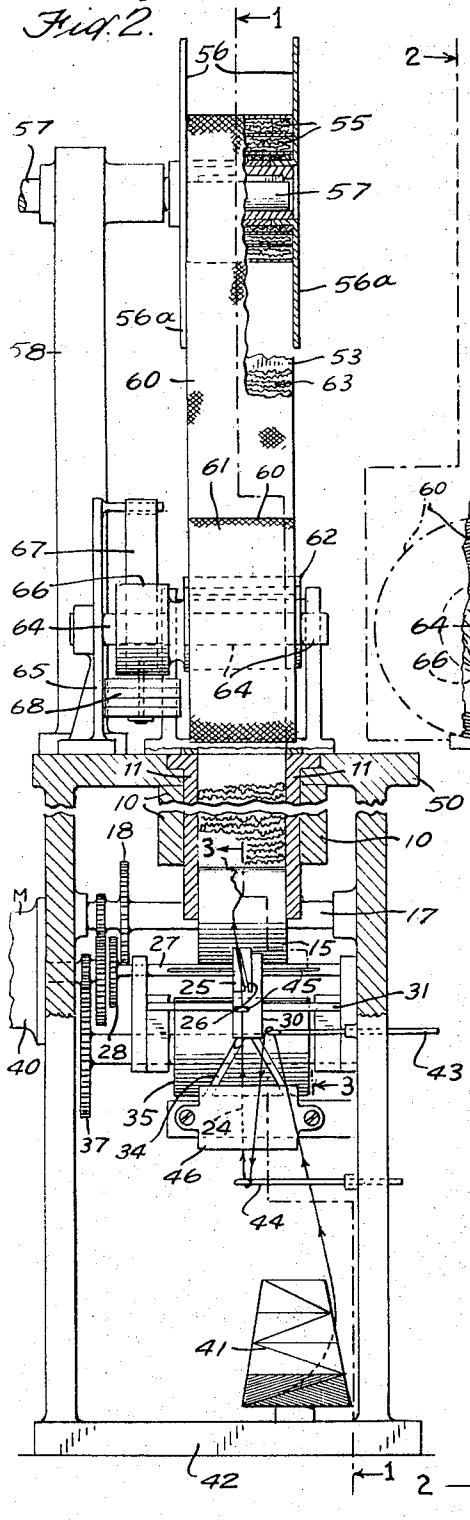
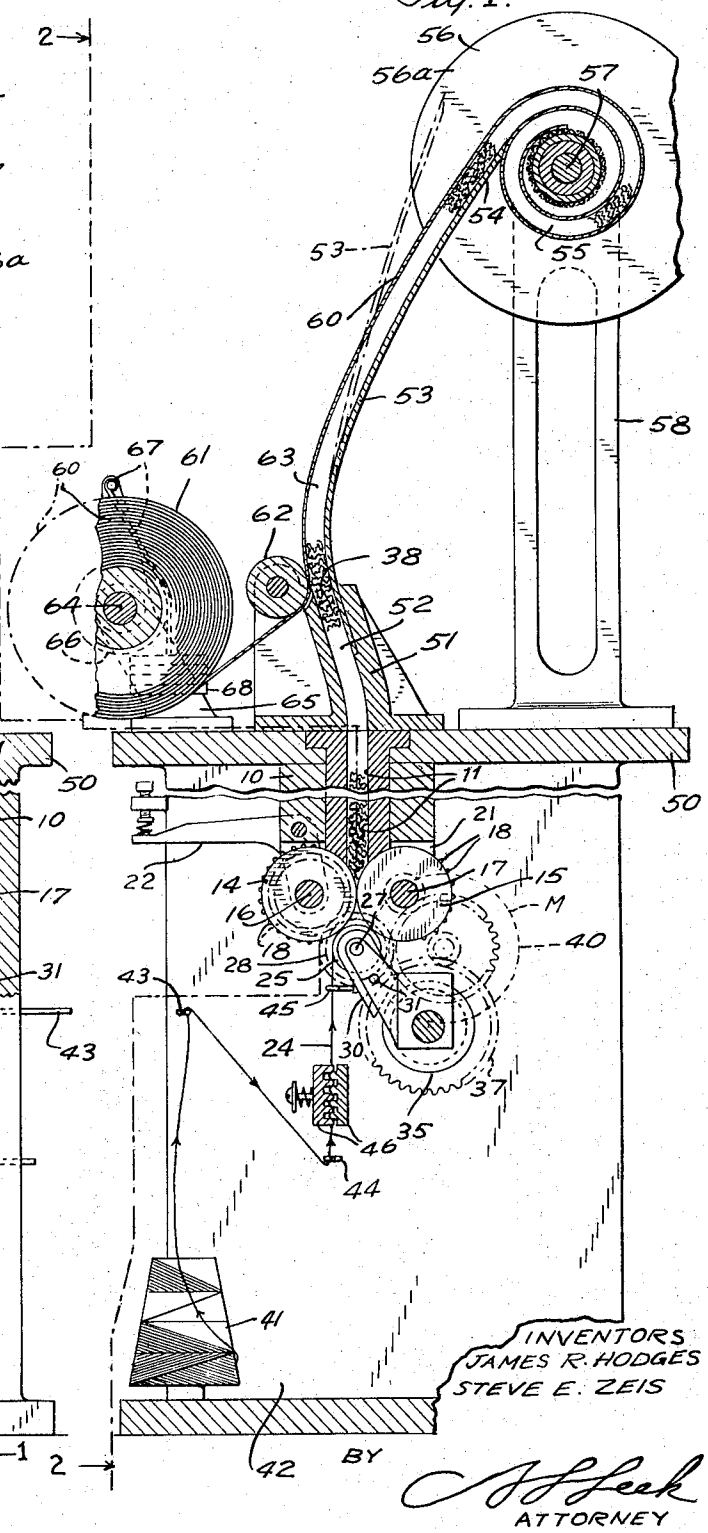


Fig. 1.



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Fig. 6.

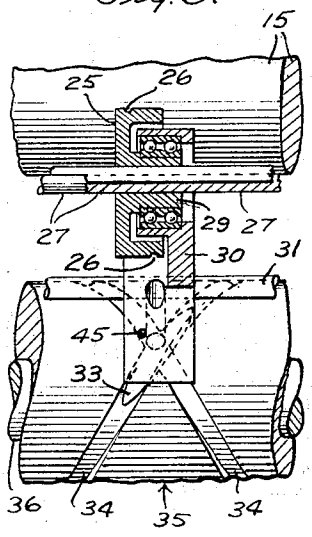
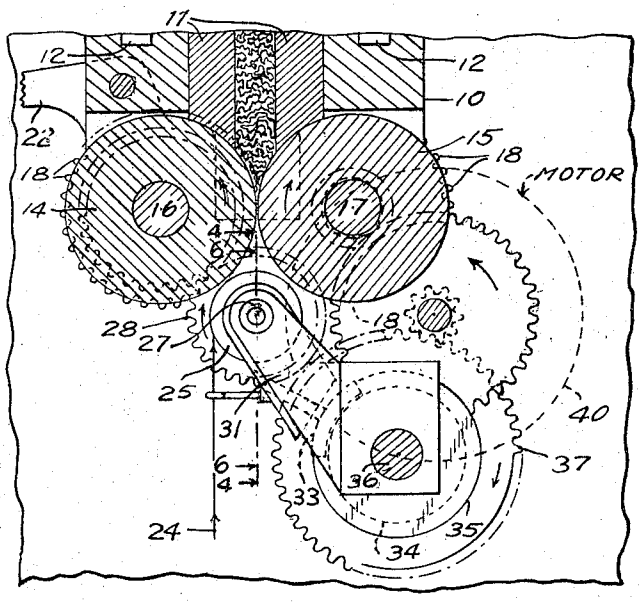


Fig. 3.



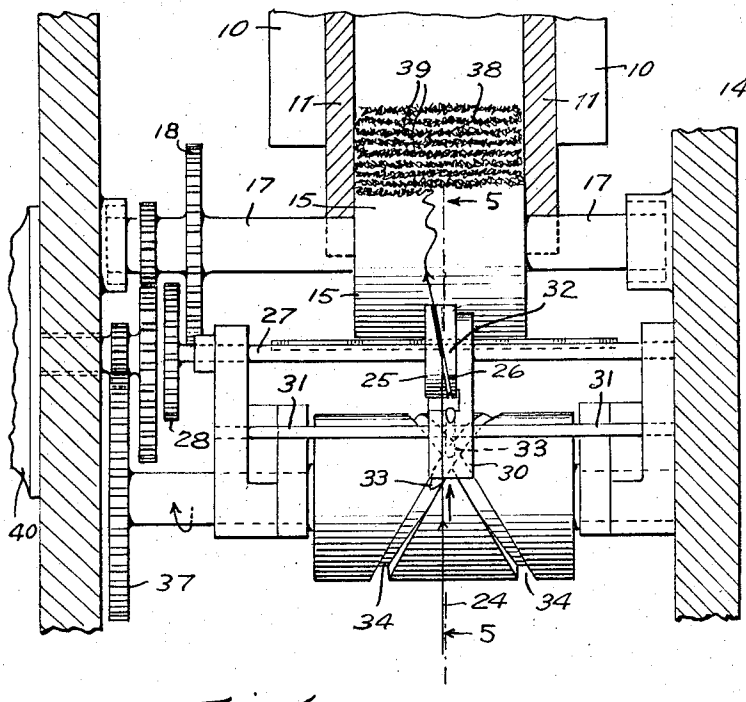


Fig. 4.

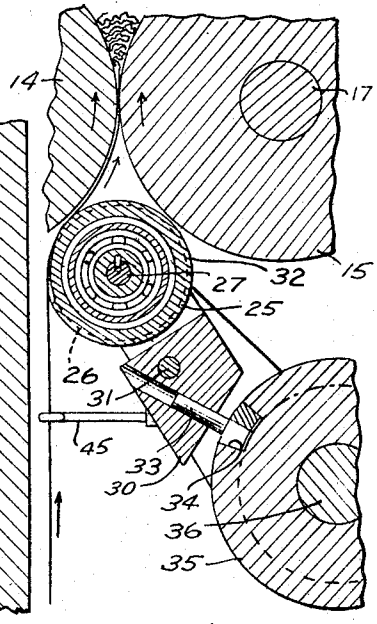


Fig. 5.

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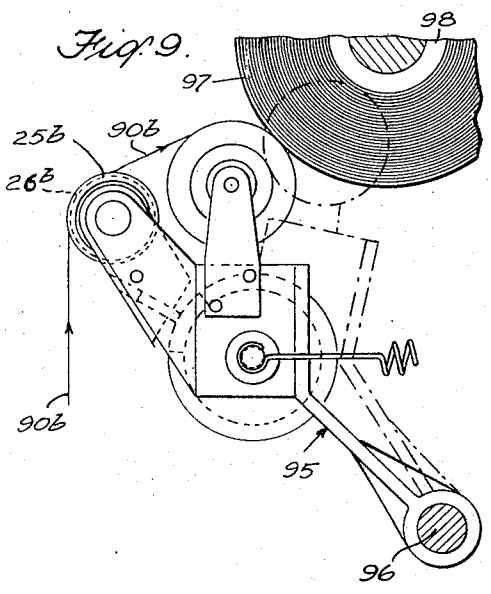


Fig. 9.

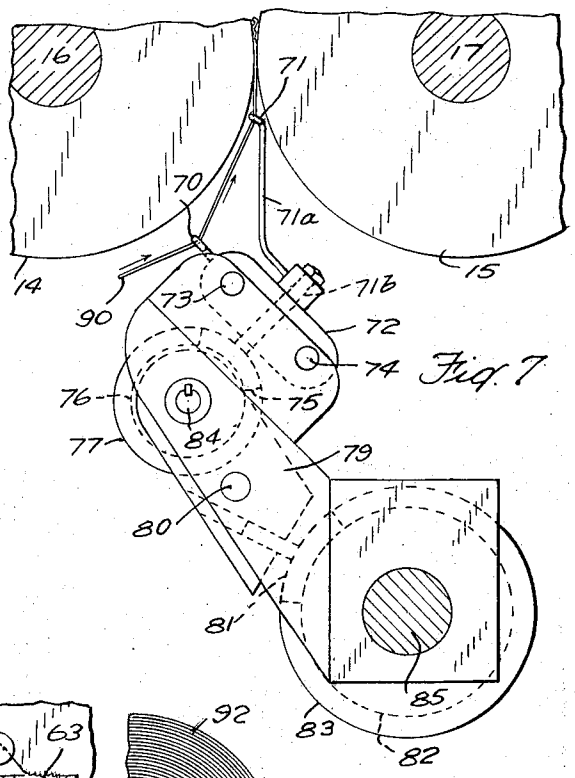


Fig. 7

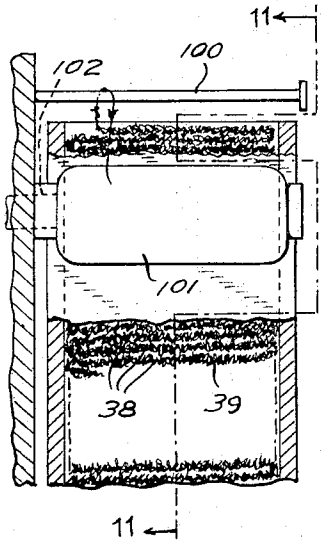


Fig. 10.

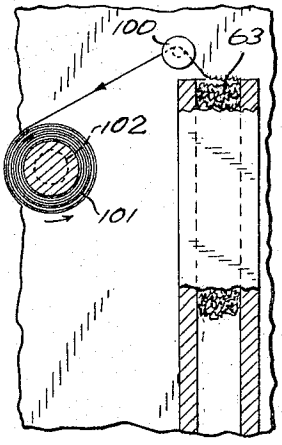


Fig. 11.

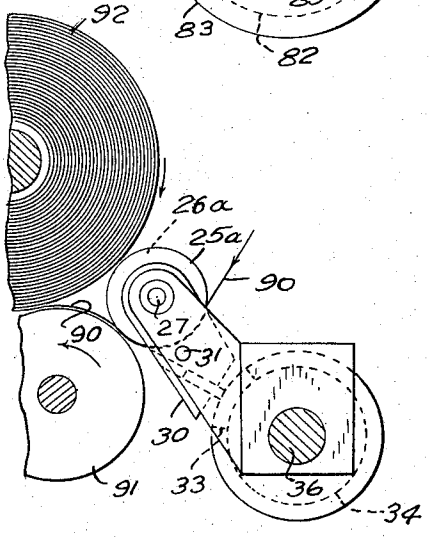


Fig. 8.

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METHOD AND APPARATUS FOR FEEDING YARN INTO A STUFFER CRIMPER

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Filed Aug. 3, 1965, Ser. No. 476,981
9 Claims. (Cl. 28—1)

This invention relates to yarn feed mechanism and more particularly to mechanism for feeding yarn with a compound traverse motion.

An object is to provide mechanism of the above type for feeding yarn to the bite of a pair of feed rolls or to a winder in a novel and improved manner.

A further object is to improve the feed of yarn to a stuffer crimper.

A still further object is to provide an improved core package.

Other objects and advantages will be apperent as the nature of the invention is more fully disclosed.

In a stuffer crimper having a comparatively wide crimping chamber into which the yarn is fed by a traversing guide, there is a tendency for producing variations in crimp characteristics in the yarn at the ends of the core where reversal of the traversing guide takes place. After dyeing and processing the yarn may produce undesirable stripes in the resulting fabric.

In accordance with the present invention this difficulty is avoided by providing a plurality of successive reversals in feed as the yarn traverses the chamber. In one embodiment this is accomplished by superimposing on the traverse movement of the yarn guide a reciprocating movement over a shorter path, such that the direction of feed is reversed at each such reciprocation. In this way any variations in yarn characteristics are repeated at short intervals along the yarn so that a uniform, overall effect is produced.

This compound traverse motion causes the yarn to be laid in the core in a plurality of successive layers each of which is composed of a plurality of overlapped, shingled portions. As the yarn is fed into the chamber, it is crimped against the preceding, shingled portion which tends to hold the yarn separated from the preceding layer. The entangling of the yarn in successive layers is thus avoided with a consequent improvement in the subsequent extraction of the yarn from the core.

The core of crimped yarn is discharged from the crimping chamber in the form of a thick ribbon having a substantially rectangular cross-section and having a substantial width. This core can be reeled into the form of a core package together with a confining tape to form a spiral wound package having a thickness corresponding to the width of the crimping chamber. When one of the flat sides of this package is exposed as by laying the package on its flat side, the crimped yarn can be extracted by pulling the same in a direction parallel to the axis of the package. As the yarn is thus withdrawn the exposed end of the core progressively recedes in a spiral path leaving the confining tape in loose folds as the core is removed.

The mechanism embodying the present invention is also useful for guiding yarn to a winder with a double traverse motion and for various other uses as will be apparent to a person skilled in the art.

The nature of the invention will be better understood by referring to the following description taken in connection with the accompanying drawings in which a specific embodiment has been set forth for the purpose of illustration.

In the drawings:

FIG. 1 is a vertical section illustrating an apparatus according to the invention with certain parts broken away;

FIG. 2 is a vertical section of the apparatus taken on line 2—2 of FIG. 1;

FIG. 3 is a fragmentary vertical section on an enlarged scale taken on line 3—3 of FIG. 2;

FIG. 4 is a fragmentary vertical cross-section taken on line 4—4 of FIG. 3;

FIG. 5 is a fragmentary vertical section of the apparatus on an enlarged scale showing the reciprocating yarn guide mechanism taken on line 5—5 of FIG. 4;

FIG. 6 is a vertical section on a larger scale taken on line 6—6 of FIG. 3;

FIG. 7 is a fragmentary vertical section similar to FIG. 3 showing a modification of the cam controlled mechanism;

FIG. 8 is a fragmentary vertical section similar to FIG. 7 on a reduced scale showing the reciprocating mechanism applied to a package winder;

FIG. 9 is a fragmentary vertical section similar to FIG. 8 illustrating a further embodiment of the invention as applied to a package winder;

FIG. 10 is a fragmentary vertical cross-section of a modified form of apparatus wherein the yarn is fed directly from the core to a winder; and

FIG. 11 is a fragmentary vertical cross-section taken on line 11—11 of FIG. 10.

Referring to the drawings more in detail the invention is shown in FIGS. 1–6 as embodied in a stuffer crimper comprising a block 10 having a longitudinal bore in which a rectangular liner 11 is carried. The liner 11 forms a crimping chamber of elongated substantially rectangular cross-section. Heat may be supplied to the crimping chamber by heating rods 12 which are inserted in suitable bores in the block 10.

A pair of feed rolls 14 and 15 are disposed to feed the yarn for crimping into the crimping chamber. The feed rolls 14 and 15 have their axes parallel to the long sides of the crimping chamber and are mounted on shafts 16 and 17 respectively which are geared together by gears 18 for operation at the same peripheral speeds. The shaft 17 is journalled in a fixed bracket 21 and the shaft 16 is journalled in an arm 22 which is spring pressed to hold the feed rolls in feeding engagement with the yarn 24.

The yarn is fed to the bite of the feed rolls by a traverse roll 25 having an inclined peripheral groove 26 by which the yarn is guided. The traverse roll 25 is keyed for sliding movement on a shaft 27 which is driven by a gear 28. The traverse roll 25 is mounted adjacent but not in peripheral contact with the feed rolls 14 and 15 so that the yarn passes around a portion of the periphery of the feed roll 14 in its path to the bite of said rolls 14 and 15. The axial length of the traverse roll 25 is less than that of the feed rolls so that the reciprocation of the yarn caused by the groove 26 extends over a small portion of the axial length of the feed rolls 14 and 15.

The traverse roll 25 carries an axially projecting hub portion 29 which is journalled in a bearing in an arm 30 which is adapted to slide axially of the feed rolls on a rod 31. The arm 30 has a cam follower 33 which engages a cam groove 34 in a cam roll 35. The cam roll 35 is mounted on a shaft 36 which is driven by a gear 37 from a motor 40 at a much slower speed than the shaft 27. The axial length of cam groove 34 of roll 35 is such that the traverse roll 25 is reciprocated along the entire axial length of the feed rolls and the traverse roll rotates a predetermined number of times during each such traverse of the feed rolls.

By the above described arrangement the yarn is fed from the bite of the feed rolls into the crimping chamber to form a compact core of crimped yarn of elongated substantially rectangular cross-section and is laid in a plurality of successive layers 38 which extend across the

core in a transverse direction. Each layer **38** is composed of a plurality of overlapped shingled portions **39** the length of which corresponds to the throw of the groove **26** of the traverse roll **25**. It has been found that this pattern prevents the crimped yarn in the core from becoming entangled between layers and eliminates any difficulty in extracting the crimped yarn from the finished core.

The yarn is fed to the crimper from a cop **41** mounted on a bracket **42**, through guides **43** and **44** through tension gate **46** to a guide **45** which is mounted on arm **30** in a position to guide the yarn into the groove **26** of the roll **25**.

The crimper block **10** is suspended from a frame **50** carrying a block **51** having a bore **52** which forms a continuation of the crimping chamber **11** and extends upwardly at a slight angle to the axis of the crimping chamber. A curved spring plate **53** is disposed in the bore of the block **51** with its free end **54** in contact with a core package **55** to be described.

The core package **55** is disposed on a spool **56** which is keyed on a shaft **57** journalled in a bearing in a bracket **58** and driven by suitable means. The spool **56** is provided with side flanges **56***a* one of which is removable for exposing the package **55** for extracting the yarn therefrom.

A tape **60** is fed from a reel **61** around a guide roll **62** mounted on the block **51** and over the core **63** on the plate **53** to be wound with the core **63** onto the spool **56**. The reel **61** is mounted on a shaft **64** journalled in a bearing in an arm **65** and carrying a brake drum **66** engaged by a friction band **67** having a weight **68** to control the drag on the tape **60**.

In the operation of this crimper the yarn is fed into the crimper chamber by the reciprocating groove **26** in the traverse roll **25** which in turn reciprocates axially of the feed rolls **14** and **15**. This double reciprocation lays the yarn in the crimping chamber in the form of a series of overlapped folds **39** which extend back and forth across the crimping chamber in the form of successive layers **38**.

As the yarn is fed into the crimping chamber from the bite of the feed rolls **14** and **15** it is folded over and crimped against the mass of previously crimped yarn held compacted in the chamber. As this core of crimped yarn is fed upwardly in the chamber, it is heated to a setting temperature by heat from the heating rods **12** and then advances upwardly through the cooling chamber **52** wherein the crimp is set. The core **63** then advances along the spring plate **53** while being held confined by the tape **60** and is wound in successive layers with the tape onto the spool **56** to form a core package **55**. The spring arm **53** flexes outwardly as the package builds up to its final thickness after which the spool and package are removed from the driving shaft **57** and placed in discharge position wherein one of the flanges **56***a* is removed to expose the spirally wound core and tape.

In discharge position, the end of the yarn may be pulled axially from the package through a tension gate if desired and fed to a winder for winding onto a yarn package. As the yarn is extracted from between successive layers of tape, the core recedes spirally until the package is exhausted. The shingled layers of which the core is composed reduce the tendency of the yarn to tangle or knot, as it is withdrawn from the core package.

FIG. 7 illustrates a further form of double reciprocating feed. In this form the yarn is fed to the bite of the feed rolls **14** and **15** through an eye **70** mounted on a carriage **72** which is adapted to slide on rods **73** and **74** and through an eye **71** carried by a wire **71***a* attached to the end of a rod **71***b* which is journalled in the carriage **72**. The rod **71***b* carries a cam follower **75** engaging a cam groove **76** of a cam roll **77**. The cam roll **77** is formed with a hub journalled in an arm **79** slidable on a rod **80** and in turn having a cam follower **81** riding in a cam groove **82** of a roll **83**. The rolls **77** and **83** are mounted

on shafts **84** and **85**, respectively. The roll **77** is keyed to the shaft **84** for reciprocating movement similar to the roll **25** of FIGS. 1–6.

The operation of this embodiment is similar to that above described except that the yarn is positively traversed or reciprocated by the eye **71** in its double traverse of the feed rolls instead of by the traverse roll **25** of the first embodiment.

In this embodiment the eye **71** travels in an arcuate path as the rod **71***b* reacts in the carriage **75**. This arcuate path is superimposed on the linear path due to the reciprocation of the carriage **72** with the cam roll **77**. The yarn may be overfed to the eye **71**, if desired, so as to permit the free movement of the eye in its double traverse of the feed roll.

In the embodiment of FIG. 8 the double traverse principle is applied to the winding of the yarn onto a yarn package. In this form, the yarn **90** is fed by the groove **26***a* of a traverse roll **25***a* into the bite between a driven roll **91** and a yarn package **92** which rests on the roll **91** and is driven thereby. The traverse roll **25***a* and the drive mechanism therefor is similar to that described in connection with FIGS. 1 to 6 and the corresponding parts have been given the same reference numbers with the suffix *a*. In this embodiment the yarn is laid on the package in successive layers each of which is laid with a double traverse motion of the type above described. Such double traverse winding is more self-supporting and less liable to tangle, is softer and more permeable than the usual type of traverse windings.

FIG. 9 illustrates an embodiment similar to FIG. 8 except that the traverse roll **25***b* and driving mechanism therefor are mounted on a bracket **95** which is pivoted at **96** and is spring pressed against a winding **97** on a driven spool **98**. The driving mechanism has been given the same reference characters as the corresponding mechanism in FIGS. 1 to 6 with the suffix *b*. A double traverse winding is produced as in FIG. 8.

In the embodiment of FIGS. 10 and 11 the double traverse is produced by the position of the yarn in the core of a crimper of the type shown in FIGS. 1 to 6. The yarn is extracted from the core in the chamber **11** over a guide roll **100** onto a package **101** mounted on a driven shaft **102**. As the yarn is laid in overlapped, shingled layers in the core, it feeds across the guide roll with a corresponding double traverse and is laid on the package **101** with a corresponding double traverse motion. The speed of rotation of the package **101** is so related to the speed of the feed rolls **14** and **15** that the core of crimped yarn in the crimping chamber remains at a substantially constant level.

What is claimed is:

1. The method of forming a core of crimped yarn in a stuffer crimper having a crimping chamber with an elongated cross-section, which comprises feeding a yarn into one end of said chamber from the bite of a pair of feed rolls having axes parallel to the longer side of said chamber, reciprocating the yarn axially of said feed rolls to lay the yarn in said chamber in succession of transverse layers in the core, and superimposing on said reciprocating motion a second reciprocating motion over a shorter path adapted to lay the yarn in a series of overlapped, shingled areas in each of said layers.

2. The method of forming a core of yarn in a stuffer crimper which comprises feeding the yarn between the bite of a pair of feed rolls while guiding the yarn to said bite with a compound reciprocating motion comprising a short reciprocating motion superimposed on a longer reciprocating motion.

3. The method of forming a package of crimped yarn which comprises feeding the yarn between feed rolls into a stuffer crimper having a crimping chamber of substantial cross-sectional length while reciprocating said yarn axially of said feed rolls with a double traverse motion comprising a shorter reciprocating motion superimposed

on a longer reciprocating motion so as to lay the yarn in said chamber in the form of successive layers each of which is composed of overlapped shingled portions, advancing said core through said chamber to a discharge point and feeding the yarn from said discharge point onto a yarn package having its axis parallel to the cross-sectional length of said crimping chamber whereby the traverse movement of the yarn, as it is withdrawn from the core, is transferred to the yarn on said package.

4. Apparatus for crimping yarn comprising a crimping chamber of elongated cross-section, feed rolls disposed to feed said yarn into said chamber to be folded over and crimped against a mass of previously crimped yarn in said chamber, a yarn guide member disposed to feed the yarn to the bite of said feed rolls, means reciprocating said guide member axially of said feed rolls for laying the yarn in said chamber in successive layers, and means reciprocating said guide member in a short path as it advances along said rolls, for thereby forming overlapped shingled portions in each of said layers.

5. Apparatus for crimping yarn comprising a crimping chamber of elongated cross-section, feed rolls disposed to feed said yarn into said chamber to be folded over and crimped against a mass of previously crimped yarn in said chamber, a guide roll having an inclined peripheral groove disposed to feed yarn to said feed rolls with a reciprocating motion, means rotating said guide roll and means reciprocating said guide roll axially as it rotates for thereby laying the yarn in successive layers each of which consists of a succession of overlapped, shingled portions.

6. Apparatus for crimping yarn comprising a crimping chamber of elongated cross-section, feed rolls disposed to feed said yarn into said chamber to be folded over and crimped against a mass of previously crimped yarn in said chamber, a guide roll having an inclined peripheral groove disposed to feed yarn to said feed rolls with a reciprocating motion, means rotating said guide roll and means including a cam roll and a cam follower disposed to cause reciprocation of said guide roll as it rotates for thereby laying the yarn in successive layers each of which consists of a succession of overlapped, shingled portions.

7. In combination with an apparatus as set forth in claim 4, a yarn package having an axis parallel to the transverse length of said crimping chamber and disposed adjacent the exit point of said chamber and means feeding the yarn directly from said core onto said package whereby the traverse of the yarn in said core is transferred to the winding of the yarn on said package.

8. Apparatus for crimping yarn comprising a crimping chamber of elongated cross-section, feed rolls disposed to feed said yarn into said chamber to be folded over and crimped against a mass of previously crimped yarn in said chamber, and yarn guide means disposed to feed the yarn to the bite of said feed rolls, said yarn guide means comprising a carriage adapted to reciprocate axially of said feed rolls, a guide member mounted on said carriage and adapted to feed the yarn to the bite of said feed rolls, means reciprocating said carriage axially of said feed rolls, and means reciprocating said guide member on said carriage for thereby superimposing on said guide member a second reciprocating motion over a path which is shorter than that of said carriage.

9. Apparatus for crimping yarn as set forth in claim 8 in which the yarn guide member is pivotally mounted on said carriage and cam means is provided to reciprocate said carriage and said yarn guide member.

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