March 9, 1965 P. W. LANGWAY ETAL 3,172,185

YARN PACKAGING AND TREATMENT

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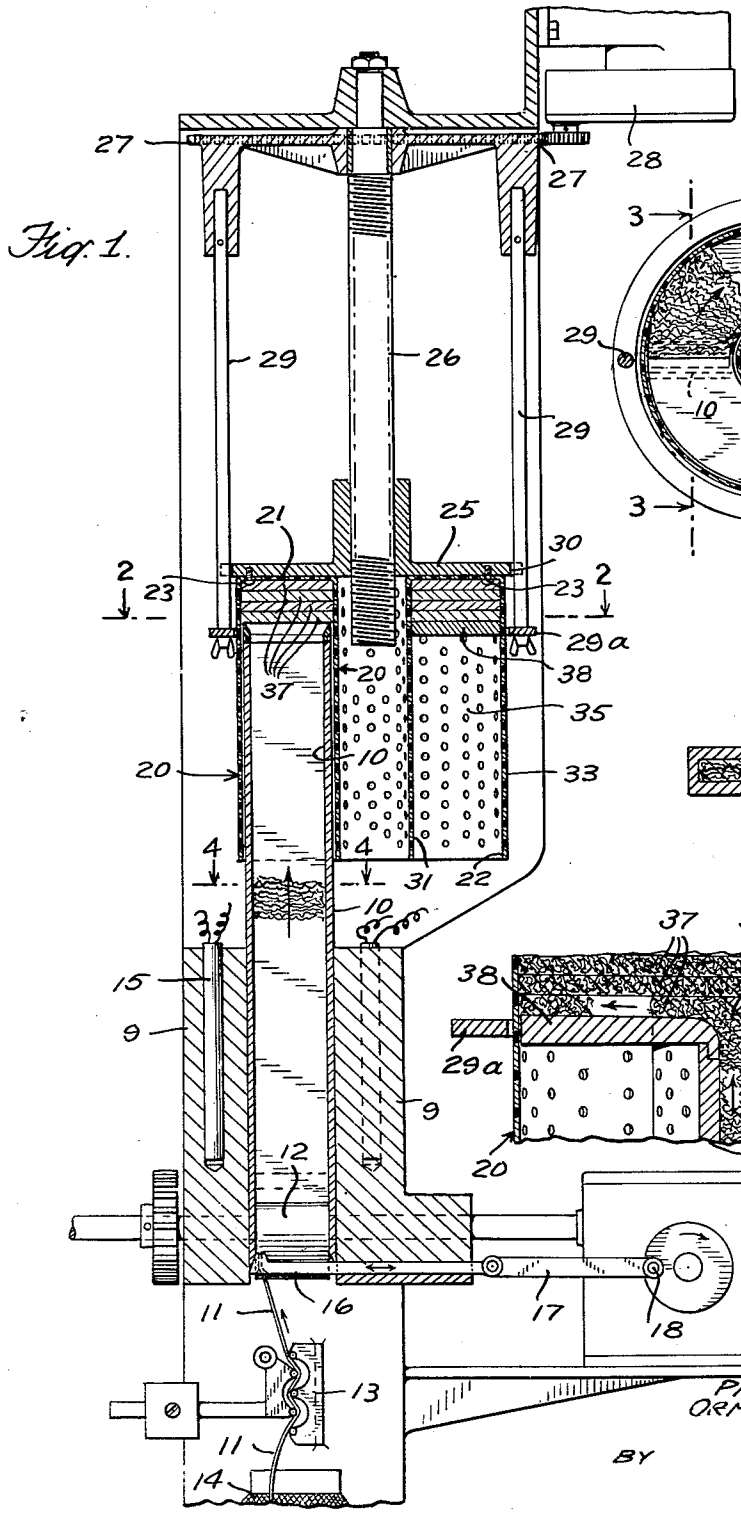


Fig. 1.

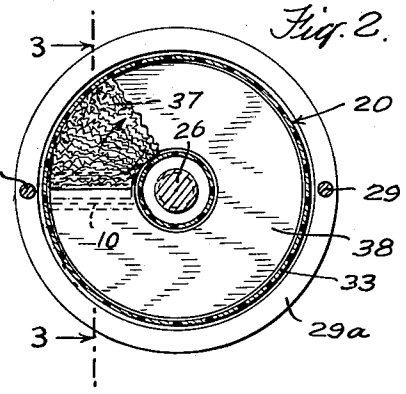


Fig. 2.

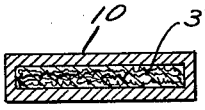


Fig. 4

Fig. 3.

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Fig. 6.

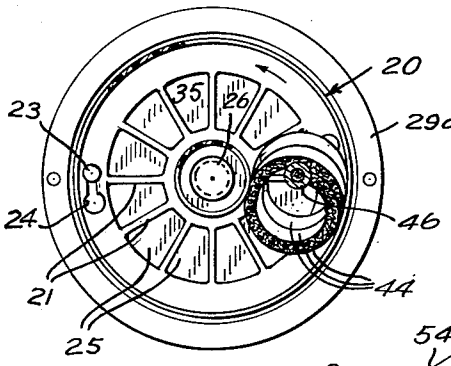


Fig. 5.

Fig. 7.

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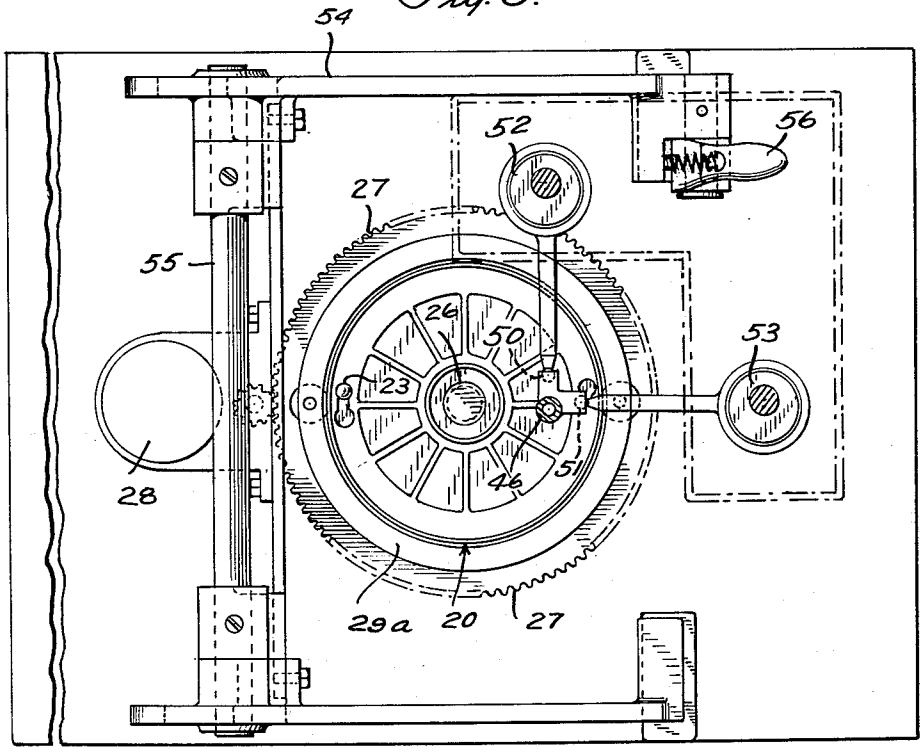
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Fig. 8.



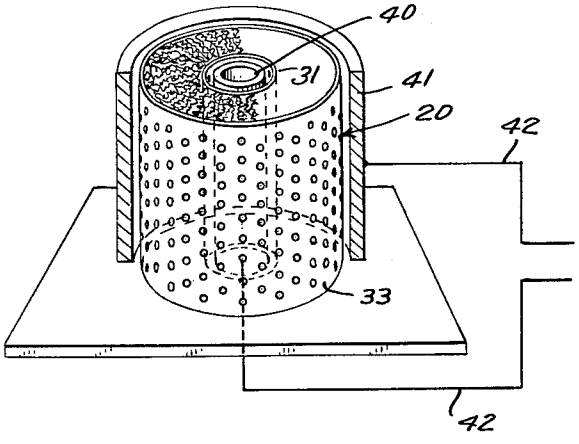


Fig. 9.

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YARN PACKAGING AND TREATMENT

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7 Claims. (Cl. 28—1)

This invention relates to a method and apparatus for crimping and setting yarn and more particularly to a method and apparatus for forming the yarn into a core package and heat-setting the yarn by subjecting the package to dielectric heating.

Another object is to provide a novel and improved method and apparatus of the above type.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

In accordance with the present invention the yarn is first crimped by being fed into a stuffer crimper of the type having an elongated crimping chamber of substantially uniform cross section and adapted to discharge the yarn in the form of a compacted core having a cross section corresponding to that of the chamber. This core is laid in a series of convolutions around a perforated sleeve to form a core package which is self-supporting and which can be subjected to heat or other setting agents in a separate step.

In one embodiment the core package is subjected to a high frequency electric field so as to heat the yarn throughout the package dielectrically to a temperature and for a time to set the crimp in the yarn. After setting, the core package is unwound and the yarn is extracted in any convenient way.

More specifically the invention provides for feeding the core from the discharge end of the crimper directly into a receiver around an axial sleeve with successive convolutions of the core in contact to form an uninterrupted mass wherein the crimps are held compacted during the setting treatment.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which certain specific embodiments have been set forth for purposes of illustration.

In the drawings:

FIG. 1 is a vertical section of a crimping apparatus embodying the invention;

FIG. 2 is a horizontal section taken on the line 2—2 of FIG. 1 showing the drive for the receiver;

FIG. 3 is an enlarged vertical section taken on the line 3—3 of FIG. 2 showing a portion of the core package and associated elements;

FIG. 4 is an enlarged section taken on the line 4—4 of FIG. 1 showing the crimping tube in section;

FIG. 5 is a vertical section similar to FIG. 1 illustrating a further embodiment of the invention;

FIG. 6 is a section taken on the line 6—6 of FIG. 5 showing the receiver for the core package;

FIG. 7 is an enlarged section taken on the line 7—7 of FIG. 5 showing the drive for the receiver;

FIG. 8 is a horizontal section taken on the line 8—8 of FIG. 5 showing the core package and the feed means; and

FIG. 9 is a perspective view, partly in section, showing the core package mounted for dielectric heating.

Referring to the drawings more in detail the invention is shown in FIGS. 1 to 4 as embodied in an apparatus comprising a stuffer crimper having a crimping chamber in the form of an elongated tube **10** of rectangular cross section into which yarn **11** is fed by a pair of feed rolls **12** from a yarn package **14** through an adjustable tension gate **13**. A traverse guide **16** is provided for feeding the yarn axially along the feed rolls so as to maintain a uniform packing of the yarn across the entire section of the tube **10**. The traverse guide **16** is shown as reciprocated by a link **17** and a crank **18**. The tube **10** is supported in a block **9** which may be heated by suitable means shown as heating rods **15**, to facilitate the crimping of the yarn.

In accordance with this invention a receiver **20** in the form of a can, having a closed or partially closed upper end **21** and an open lower end **22**, is mounted by means of pins **23** and key slots **24** on a support **25** which is threaded onto a rod **26** and adapted to be retracted upwardly by the threads as it is rotated. A spur gear **27** driven by a motor **28** carries a pair of rods **29** which extend through recesses **30** in the support **25** and along the sides of the receiver **20** for rotating the same while permitting axial movement of the support and receiver. A ring **29***a* is secured to the lower ends of the rods **29** to provide rigidity.

The end of the tube **10** extends upwardly into an annular space **35** between the outer peripheral wall **33** and a perforated axial sleeve **31** of the receiver **20**. A plate **38** is disposed on the end of the tube **10** and is formed with a curved discharge passage **36** which is adapted to lay the core **37** as it emerges from the tube in the form of a flat coil in the receiver **20**. The plate **38** is adapted to underlie and support the coiled core within the receiver. The surface of the plate **38** is helical to conform to the core as it is laid in the receiver.

In the form shown the core which is discharged from the end of the tube **10** has a cross section corresponding to that of the tube and has a radial width adapted to fill the annular space **35** in the receiver.

In operation the motor **28** is driven at a rate such that the receiver rotates at a speed to lay the core in successive convolutions within the receiver as it emerges from the tube **10**. The thread on the rod **26** is adapted to advance the receiver by the thickness of the core at each revolution so that the core is laid in the receiver as a compact helical winding. The filled receiver may be removed from the crimping apparatus and subjected to any suitable treating step for setting the crimp in the yarn. For example it may be placed in a package drying apparatus and dye or a hot liquid or steam forced through the package. If desired the peripheral wall may be removed and the core package confined in a fabric sleeve or the like to facilitate such treatment.

In the embodiment shown in FIG. 9 the core package is mounted for dielectric heating. For this purpose the receiver is made of electrical insulating material and the sleeve **31** is placed over the center post **40** and the walls **33** within the confines of an annular wall **41** of a high frequency heating device. The post **40** and the walls **41** are made of conducting material and are connected by wires **42** to a source of high frequency electricity, so that the field produced in the core winding heats the yarn in the core to the temperature desired for setting the crimp. If moisture is required for the setting this moisture may be supplied by a preliminary steam or liquid treatment. By heating the core package internally in this way a uniform treatment is assured. After the setting treatment the core package may be unwound to expose the core **37** and the set yarn is extracted therefrom and may be wound onto a yarn package for further use.

In the embodiment of FIGS. 5 to 8 the crimper is generally similar to that above described except that the crimping chamber is disposed to feed vertically downward and the receiver has its closed end at the bottom. In this form the crimping tube **10***a* is provided at its end with a spherical seat **45** and a discharge tube **46** is formed with a spherical socket **47** cooperating with the seat **45**

and held in place by springs **49** so that the discharge tube **46** is free to swing in two directions about its central axis. A pair of sockets **50** and **51** are connected to the tube **46** and are driven by eccentrics **52** and **53** to cause the end of the tube **46** to have a rotary movement adapted to lay the core **37** in the receiver **20** in the form of a succession of coils **44** as shown in FIG. 6. The eccentrics **52** and **53** are timed with respect to the feed of the receiver so as to lay a series of overlapped coils in the annular space **35** in the receiver. The receiver and drive means is otherwise similar to that above described.

The crimper is shown as mounted on a plate **54** which is pivoted to tilt about a shaft **55** so as to extract the end of the tube **46** from the receiver and to provide clearance for the removal of the filled receiver. The plate **54** is latched in operating position by a releasable clamp **56**. The crimper of FIGS. 1 to 4 may be similarly mounted if desired.

What is claimed is:

1. Apparatus for crimping and packaging yarn, comprising an elongated crimping chamber having an inlet end and a discharge end, means feeding yarn for crimping into the inlet end of said chamber to be folded over and crimped against the mass of crimped yarn in said chamber, and to discharge the mass of crimped yarn from the discharge end of said chamber as a core having a cross section corresponding to that of said chamber, a receiver positioned to receive said core as it is discharged, said receiver being in the form of an open-ended can having an end wall disposed adjacent the discharge end of said chamber and having a central sleeve around which said core is laid and means rotating said receiver and retracting said end wall axially from the discharge end of said chamber for thereby laying said core in the form of a helical layer around said central sleeve.

2. Apparatus as set forth in claim 1 in which a cover plate carried by the discharge end of said crimping chamber is disposed around said sleeve and is adapted to slide axially with respect to said bottom wall to accommodate the core winding as it is laid therebetween.

3. Apparatus as set forth in claim 2 in which said cover plate is helical in form to conform to the core convolutions as they are laid in said receiver.

4. Apparatus as set forth in claim 1 in which said crimping chamber is in the form of a tube having an end portion mounted for universal movement about the axis of said tube and means is provided to swing said end portion in a circular path as the receiver rotates for laying the core in successive overlapped coils around said sleeve.

5. Apparataus as set forth in claim 1 in which said receiver includes a peripheral wall spaced from said center sleeve to provide an annular chamber, and the end of said crimping chamber is disposed in said annular chamber to lay the core in successive layers therein as the receiver rotates.

6. Apparatus as set forth in claim 5 in which the radial width of said annular chamber corresponds to the width of said crimping chamber.

7. Apparatus as set forth in claim 1 in which an annular member is disposed around said central sleeve and has a helical surface in contact with the core to maintain a compacting pressure on said core as it is discharged from said chamber.

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