

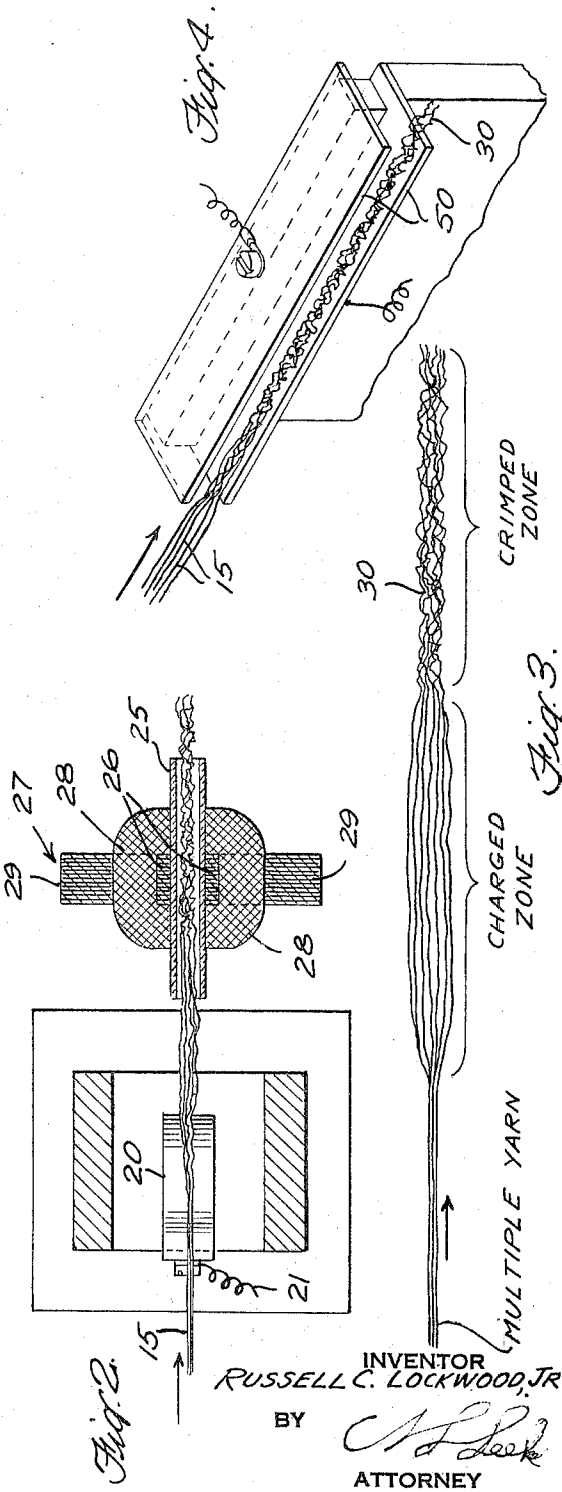
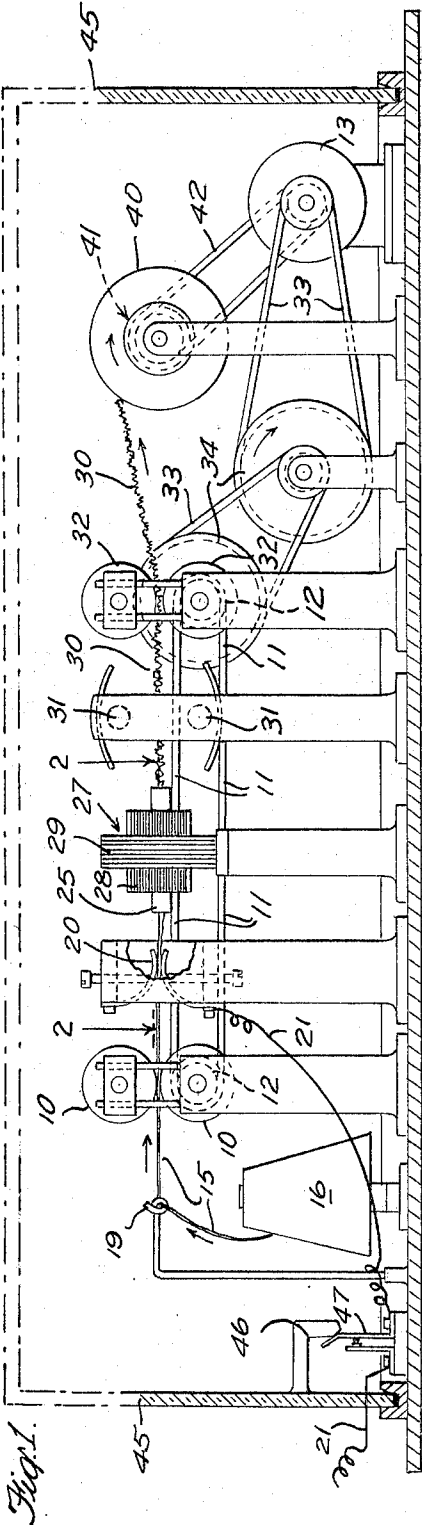
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ELECTRO-MECHANICAL APPARATUS FOR CRIMPING YARN OR THE LIKE

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ELECTRO-MECHANICAL APPARATUS FOR CRIMPING YARN OR THE LIKE

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7 Claims. (Cl. 28—1)

This invention relates to the crimping of yarns or filaments and more particularly to an electromechanical means for imparting an artificial crimp to such materials.

An object is to provide a method for crimping yarns or filaments wherein the yarn or filament is influenced by an electrostatic charge or by an electromagnetic field or both in a manner to introduce a deflecting force for deforming the material.

Another object is to provide a system of the above type wherein a controlled crimp is produced by electro-mechanical means and is permanently set into the material by heat or other suitable means.

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

In accordance with one embodiment of the invention the yarn or filament is passed through a charging zone wherein an electrostatic charge is applied to the material. It is then passed through an alternating magnetic field which acts upon the charged material to cause a deflection in its path of travel. The frequency of the field is synchronized with the rate of feed of the material in a manner to produce the desired configuration in the yarn or filament. This may take the form of a sine curve or of randomly placed loops according to the conditions selected. The material may then be passed through a setting zone where it is subjected to heat or heat and moisture according to the nature of the material and which is adapted to produce a permanent set to the crimp thus introduced. In some instances the heat may be applied while the material is in the crimping zone or the material may be preheated.

In a further embodiment an electromagnetic coating material may be applied to the yarn or filament prior to being introduced into the magnetic field. This coating may or may not be removed from the finished product depending upon the effect desired.

In a further embodiment the yarn or filament carrying an electrostatic charge may be subjected to the influence of an alternating electrostatic field suited to cause the deflection above referred to. The yarn may be heat-set while the material is in the field or subsequent thereto as in the first embodiment.

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

In the drawing:

FIG. 1 is an elevation of apparatus for subjecting a yarn to the influence of an electromagnetic field;

FIG. 2 is a section taken on the line 2—2 of FIG. 1 on an enlarged scale showing the construction of the electro magnetic element;

FIG. 3 is an enlarged detail illustrating various product stages; and

FIG. 4 is a detail of apparatus for subjecting the yarn to the influence of an alternating electrostatic field.

Referring to the drawing more in detail the invention is shown in FIGS. 1 and 2 as comprising a pair of feed rolls 10 which are driven at a constant speed by suitable means shown as a series of belts 11 and a series of pulleys 12 driven from a source of power shown as a motor 13. The feed rolls 10 feed yarn or a filament 15 from a cop 16 through a fixed guide 19 to a charging station shown

as a pair of contact members 20 one of which is connected to a source of high voltage electricity by a line 21. The contact members 20 are adapted to apply a high voltage electrostatic charge to the yarn 15 as it passes through the charging zone.

From the charging zone the yarn 15 passes through a tube 25 of non-magnetic material such as glass or plastic which extends through the core 26 of an electromagnet 27 having a winding 28 and having a magnetic path closed by return members 29. The tube 25 extends through the core 26 and through the coil 28 in a direction normal to the axis of the core 26 so that the yarn is subjected to an intense field as it crosses the axis of the core. The tube 25 should be of sufficient diameter to permit the lateral deflection of the yarn to take place within the tube. This deflection may take the form of sinusoidal bends or of sharp loops 30 as indicated.

From the crimping zone the yarn passes through a heating zone shown as comprising radiant heaters 31 wherein the crimp is permanently set into the yarn.

The yarn is pulled through the crimping and heating zones by a pair of delivery rolls 32 which are driven from the motor 13 by belts 33 and pulleys 34 at a rate which is a fixed ratio to the speed of the feed rolls adapted to maintain the crimped yarn under a predetermined tension such that the crimps are not appreciably pulled out before the heat setting stage. From the delivery rolls the yarn may be wound on a winder 40 which may be of either the constant speed or of the constant tension type and may be driven through slip clutch 41 and belt 42 by motor 13.

In the above described system the charging contact elements may be omitted and a coating of magnetic material applied to the yarn before the yarn is passed through the electromagnetic field so that the field acts on the magnetic material to produce the desired deflecting force.

For protective purposes a shield 45 of non-conducting material may be placed over the charging electrodes and may carry an arm 46 which is adapted to close a pair of contacts 47 when the shield is in place and to allow said contacts 47 to open when the shield 45 is removed. The contacts 47 are connected to interrupt the line 21 supplying the high voltage contact elements 20 when the shield is removed. The shield 45 may also serve as a closure to permit the treating zone to be operated under reduced pressure when desired.

In the embodiment of FIG. 4 the electromagnetic element is replaced by a pair of electrodes 50 which are connected to a suitable source of alternating potential for producing an alternating electrostatic field there between. The yarn carrying an electric charge is passed through this field wherein the electrostatic forces cause the lateral deflecting force which acts in the same manner as the electromagnetic forces above described. In certain instances the preliminary charge may be omitted and the deflection produced directly by the alternating field.

In the above forms the electrostatic charge causes the bundle of filaments to separate and open up and the loops or the like to be formed in the individual filaments as shown in FIG. 3. This serves not only to increase the bulk of the yarn but may produce an entangling of the several filaments which serves to limit the stretch of the bundle. The bundle may be heat-set in this state if desired. A limited stretch or non-stretch bulked yarn is thus formed.

What is claimed is:

1. Apparatus for bulking yarn or the like comprising a charging zone including a pair of electric contact elements carrying a high voltage charge and an electromagnet having a concentrated alternating flux path, feed rolls feeding said yarn to said charging zone and to said electromagnet in a path extending across the axis of said con-

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centrated flux path and a pair of delivery rolls contacting said yarn beyond said electromagnet, said feed rolls and said delivery rolls being driven at a fixed ratio adapted to maintain the crimped yarn under a predetermined tension.

2. Apparatus for bulking yarn or the like comprising an electromagnet having a core and an energizing coil carrying alternating current, said core and coil having an opening extending therethrough in a directional normal to the axis of said core, means sensitizing said yarn to the effect of the field of said coil and means passing the sensitized yarn through said opening for subjecting the same to the effect of said field as it passes across the axis of said core.

3. Apparatus for bulking yarn or the like comprising an electromagnet having a core and an energizing coil carrying alternating current, said core and coil having an opening extending therethrough in a direction normal to the axis of said core, means sensitizing said yarn to the effect of the field of said coil heating means and means passing said yarn through said heating means for setting the crimp therein.

4. Apparatus for bulking yarn comprising an electromagnet having a concentrated core, a charging electrode carrying a charging potential and a heating station and means feeding the yarn in sequence in contact with said charging electrode, through said core and through said heating station while applying an alternating current to said electromagnet whereby the charged yarn is subjected to an alternating electromagnetic field suited to cause lateral deflections therein which are set in said heating station to form a bulked yarn.

5. Apparatus for bulking yarn comprising an electromagnet having a concentrated core, a charging electrode carrying a charging potential and a heating station and means feeding the yarn in sequence in contact with said charging electrode, through said core and through said heating station while applying an alternating current to said electromagnet whereby the charged yarn is subjected

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to an alternating electromagnet field suited to cause lateral deflections therein which are set in said heating station to form a bulked yarn, a protective cover for said charging electrode and contact means actuated by said cover to ground said electrode when said cover is removed.

6. Apparatus for bulking yarn or the like comprising a pair of electrodes carrying an alternating potential adapted to produce an alternating electrostatic field therebetween, means applying a charging potential to said yarn and means passing the charged yarn through said field in a direction adapted to cause lateral deflections therein.

7. Apparatus for bulking yarn or the like comprising an electromagnet having a core and an energizing coil carrying alternating current, said core and coil having an opening extending therethrough in a direction normal to the axis of said core, means sensitizing said yarn to the effect of the field of said coil and means passing a yarn carrying a coating of magnetic material through said field in a direction to cause lateral deflection of said yarn due to the effect of the electromagnetic field on such coating.

References Cited by the Examiner

UNITED STATES PATENTS

2,740,184	4/1956	Thomas	28—72
2,988,799	6/1961	Atwell	28—72
3,024,517	3/1962	Bromley et al.	28—72
3,046,632	7/1962	Tsutsumi	28—1
3,052,009	9/1962	Epstein et al.	28—1
3,076,250	2/1963	Baer	28—1

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