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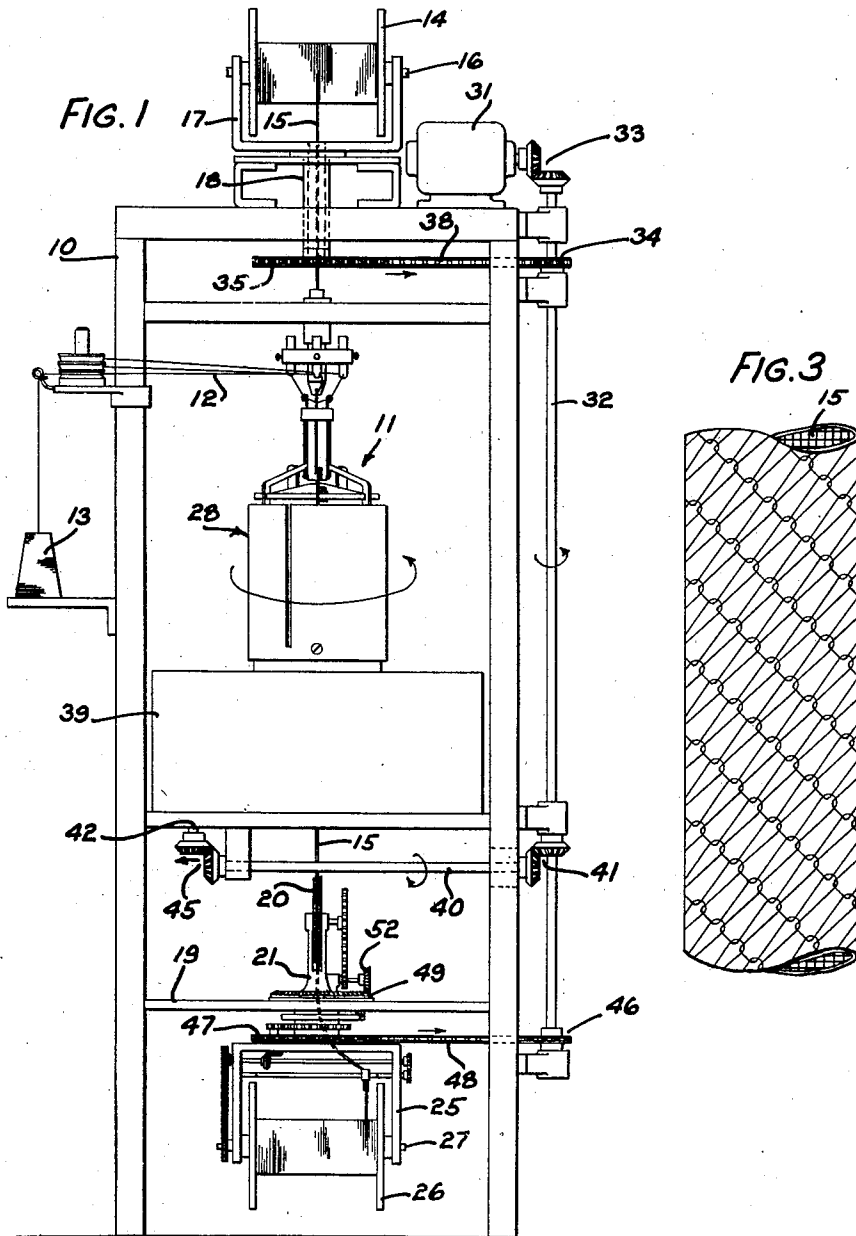
C. N. STOVER

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METHOD OF AND APPARATUS FOR MAKING FABRIC COVERED CORES

Filed Oct. 30, 1941

2 Sheets-Sheet 1



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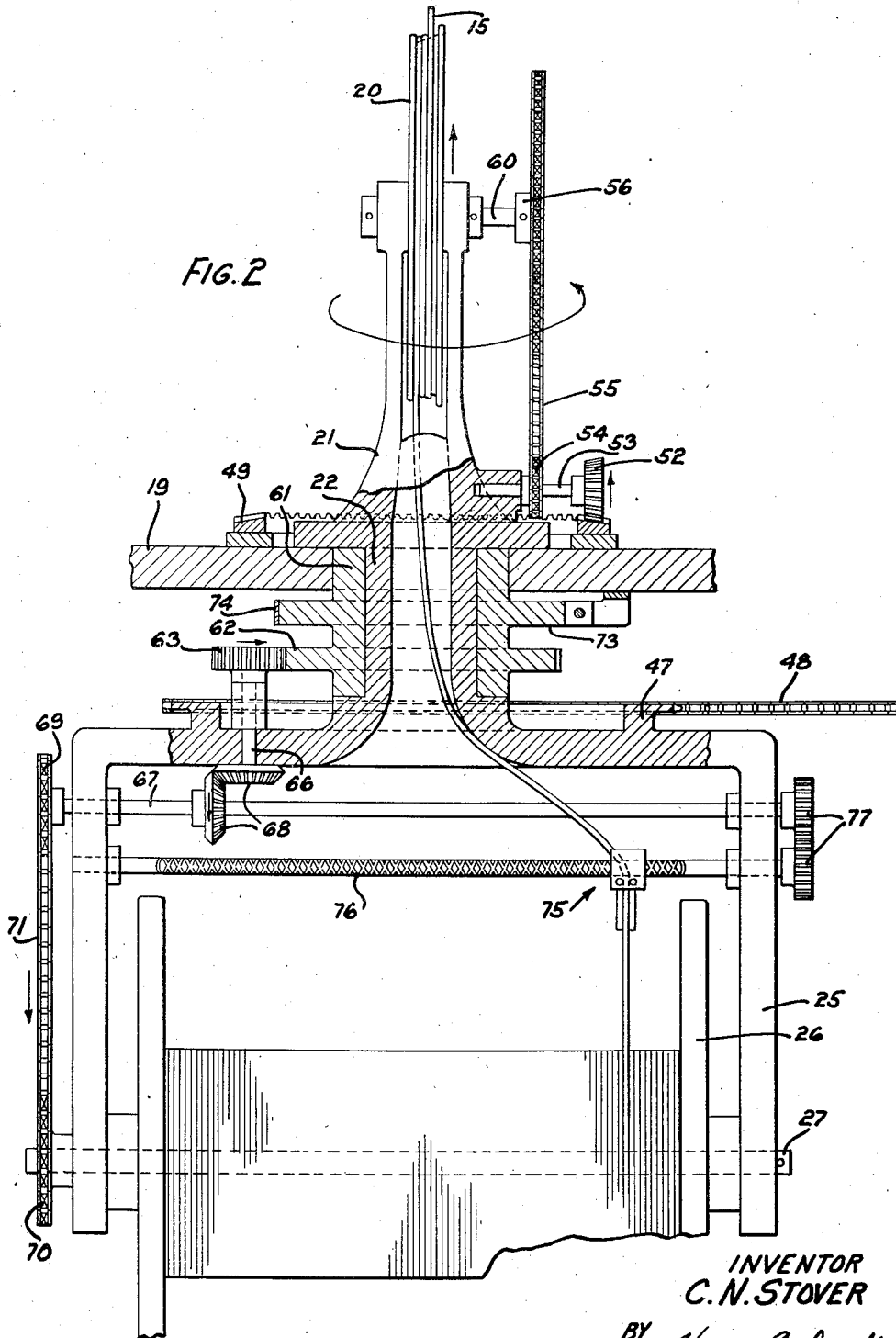
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METHOD OF AND APPARATUS FOR MAKING FABRIC COVERED CORES

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METHOD OF AND APPARATUS FOR MAKING
FABRIC COVERED CORESClyde N. Stover, Towson, Md., assignor to Western
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7 Claims. (Cl. 66—9)

This invention relates to a method of and apparatus for making a fabric covered core.

In weft knit coverings for conductor cores in which the courses run parallel to the longitudinal axis of the conductor there is a tendency for the meshes of the knitted fabric to open when the conductor is twisted. This is not objectionable for many uses of such coverings but for some purposes it is desirable to have a fabric in which the meshes do not open when the conductor is twisted in either direction.

Objects of the present invention are to provide, a method of and apparatus for making a knitted fabric covering for a conductor in which the meshes do not open when the conductor is twisted.

In accordance with one embodiment of the invention, a knitted fabric covering is applied to an electrical conductor in such a manner that the courses spiral around the core in one direction and the wales spiral therearound in the opposite direction whereby any tendency of the meshes of the knitting to open upon twisting or bending the conductor is reduced to a minimum. One form of apparatus by means of which the method may be practiced comprises a knitting head carried upon a stationary frame upon which above and below the knitting head are bodily rotatable core supply and take-up reels, respectively, and a bodily rotatable capstan between the knitting head and the take-up reel, all rotating in a direction similar to that of the knitting head needle carrier.

Other objects and advantages will be apparent from the following detailed description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a somewhat diagrammatic front elevational view of one embodiment of a knitting machine embodying features of the invention and by means of which the method may be practiced,

Fig. 2 is a greatly enlarged fragmentary view of Fig. 1; partly in section, showing the lower portion of the machine, and

Fig. 3 is an enlarged diagrammatic fragmentary view of a knitted fabric produced by the machine of this invention and applied to a core.

Referring now to the drawings in which an apparatus embodying the features of this invention is shown diagrammatically and particularly to Fig. 1, a stationary frame 10 is shown upon which is mounted a knitting head, indicated in general at 11, which may be of any suitable construction, the particular knitting head shown be-

ing of the type described more in detail in U. S. Patent No. 2,239,406 to C. N. Stover, of April 22, 1941. In the operation of the apparatus a suitable number of threads 12 are drawn from supply spools or cops 13 supported on the frame 10.

Bodily rotatable about the vertical axis of the knitting head 11 at the upper end of the frame 10 is a supply reel 14 carrying a core or electrical conductor 15 to be covered in accordance with the method of this invention. The reel 14 is rotatable about its longitudinal axis upon a spindle 16 carried on a yoke shaped frame 17 having a depending hollow vertical spindle 18 suitably journaled in the frame 10 and through which the conductor 15 travels from the reel to the knitting head 11.

Mounted below the knitting head 11 upon a cross frame 19 of the frame 10 is a bodily rotatable capstan 20 (Fig. 2) for drawing the conductor 15 from the supply reel 14 and through the knitting head 11. The capstan 20 is rotatably mounted on a hollow standard 21 rotatably journaled on the cross frame 19 about the vertical axis of the knitting head. Depending from the standard 21 is a hollow spindle 22 to which is attached a yoke shaped frame 25 for supporting a take-up reel 26 for the covered conductor 15, the take-up reel being suitably attached to a rotatable spindle 27 journaled in the frame 25. The conductor 15 passes from the capstan 20, through the hollow standard 21 and spindle to the take-up reel 26 which is rotatable about its longitudinal axis with the spindle 27.

The core supply and take-up reels 14 and 26 respectively, and the capstan 20 in the present embodiment of the invention are bodily rotated in a counterclockwise direction viewed from above as indicated by the arrow upon the knitting head 11. A needle carrier, indicated in general at 23, of the knitting head 11 also rotates in a direction similar to that of the supply and take-up reels and capstan although at a higher rate of speed. For bodily rotating in unison in a counterclockwise direction the supply and take-up reels and capstan, rotating the capstan and take-up reel about their horizontal axes and for operating the knitting head 11, the following driving mechanism, in the present embodiment of the invention, is provided.

Mounted on the upper end surface of the frame 10 is an electric driving motor 31 which drives a vertical shaft 32, which is journaled upon the frame 10, through a pair of bevel gears 33 fixed to the motor shaft and the shaft 32. Fixed to

the shaft 32 below the gears 33 is a sprocket wheel 34 which is operatively connected to a sprocket wheel 35 fixed to the hollow spindle 13 of the supply reel frame 17 by a sprocket chain 36. Below a base and gear box 39 of the knitting head 11 is a horizontal shaft 40 which is driven at one end from the shaft 32 by bevel gears 41 fixed to the shafts. The shaft 40 at its opposite end drives a shaft 42 depending from the knitting head gear box 39 by means of bevel gears 45 fixed to the shafts. At its lower end below the cross frame 19 the shaft 32 has fixed thereto a sprocket wheel 46 which is operatively connected to a sprocket wheel 47 carried by the take-up reel frame 25 by a sprocket chain 48.

During the bodily rotation of the capstan 20 and its standard 21 the capstan is rotated at a suitable speed about its longitudinal axis in order to draw the covered conductor 15 through the knitting head and feed it to the take-up reel 26. This is effected by means of a stationary beveled ring gear 49 surrounding the standard 21 and fixed to the cross frame 19 and meshing with a beveled pinion 52 fixed to a shaft 53 journaled on the standard. Attached to the shaft 53 is a sprocket wheel 54 which is operatively connected by a sprocket chain 55 to a sprocket wheel 56 fixed to a shaft 60 journaled in the standard 21 carrying the capstan 20. It will be apparent during the counterclockwise bodily rotation of the capstan 20 and its standard 21 which carries the bevel pinion 52 that the latter will be rotated due to its engagement with the stationary beveled ring gear 49 and thereby through the sprocket and chain connection drive the capstan 20 at a suitable speed in a counterclockwise direction as viewed from the left in Fig. 2.

Also, during the bodily rotation of the take-up reel frame 25 and the capstan 20 the take-up reel 26 will be rotated about its longitudinal axis with the spindle 27 in order to take-up the covered conductor 15. Due to the increasing diameter of the wound-up covered conductor 15 on the reel it is necessary in order to maintain a substantially constant tension on the covered conductor and to take it up uniformly that the speed of rotation of the reel be reduced as the diameter of the covered conductor wound-up on the reel increases. Surrounding and rotatably free on the spindle 22 which depends from the capstan standard 21 is a sleeve-like member 61 having a gear 62 formed thereon. The gear 62 meshes with a pinion 63 fixed to a shaft 66 journaled in the take-up reel frame 25. Journaled in the frame 25 is a horizontally extending shaft 67 which is driven from the shaft 66 by beveled gears 68 fixed to the shafts. To an end of the shaft 67 is attached a sprocket wheel 69 which is operatively connected to a sprocket wheel 70, fixed to the take-up reel spindle 27, by a sprocket chain 71.

The member 61 is also formed with a brake drum 73 around which extends a brake band 74 which is suitably tensioned and controlled by means (not shown) which functions to apply the desired braking action of the band 74 on the drum 73. A reduction in the speed of rotation of the pinion 63 is effected through slippage of drum 73 reducing the speed of rotation of the take-up reel 26 as it becomes filled with the covered conductor 15.

The covered conductor 15 as it is wound upon the reel 25 is uniformly laid back and forth across the reel by a suitable distributor mechanism indicated in general at 75. A rotary distributor shaft

76 for traversing the mechanism 75 is driven from the shaft 67 by cooperating gears 77 fixed to the shafts.

A more detailed description and disclosure of the means described above for laying the covered conductor uniformly across the reel is not believed necessary since such mechanisms are well known in the art of reeling and are not believed necessary to a full understanding of this invention.

A fabric made by the apparatus described as stated above has its courses spiralling around the core in one direction and its wales spiralling around the core in the opposite direction. Another way of describing the knitted covering of this invention would be to say that the lines or series of knots formed at the bases of the loops spiral around the core in one direction and the loops spiral around the core in the opposite direction.

It will be noted that the thread supplies in the apparatus described do not rotate about the axis of the core or conductor being covered. If, therefore, the conductor were not rotated during the application of the covering the courses would be substantially parallel to the axis of the conductor, but by bodily rotating the conductor the courses may be spiralled at any desired angle or pitch, depending upon the rate of rotation of the conductor for a given longitudinal speed. In order for the courses and wales to spiral in an opposite sense the needle cylinder and conductor must rotate in the same direction. It is obvious from these considerations that the conductor may be made non-rotative and the thread supplies and needle cylinder rotated in opposite directions to produce the same result.

It will be understood that the nature and embodiments of the invention herein disclosed are merely illustrative and that many changes and modifications may be made therein without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A method of applying a knitted covering to a conductor which comprises drawing a conductor through a knitting head, and causing simultaneous rotation of the knitting head needle cylinder and the conductor at different speeds while maintaining the thread supply stationary to produce a fabric in which the courses and wales spiral around the conductor in opposite directions.

2. A method of applying a knitted covering to a conductor which comprises drawing a conductor through a knitting head, and causing simultaneous rotation of the knitting head needle cylinder and the conductor at different speeds in the same direction while maintaining the thread supply stationary to produce a fabric in which the courses spiral around the conductor in one direction and the wales in an opposite direction.

3. An apparatus for applying a knitted fabric covering to a core comprising thread supplies, a needle cylinder, a rotatable core supply, means for drawing a core through said needle cylinder to knit a covering thereover, including a rotatable take-up mechanism, and means for rotating said core supply and take-up mechanism to cause the courses and wales to spiral in opposite directions around the core.

4. An apparatus for applying a knitted fabric to a core comprising stationary thread supplies, a rotatable needle cylinder, a bodily rotatable core supply, means for drawing the core from

the rotating supply and through the needle cylinder, and means for simultaneously rotating the core supply and needle cylinder in the same direction at different speeds effective to cause the courses and wales to spiral in opposite directions around the core.

5. An apparatus for applying a knitted fabric to a core comprising a supply means for a core, take-up means for a core, means arranged between said supply and take-up means for applying a knitted fabric to said core, and means for rotating said supply and take-up means on the longitudinal axis of the core passing through the means for applying the knitted fabric in such a direction and at such speed as to cause the courses and wales to spiral around the core in opposite directions.

6. An apparatus for applying a knitted fabric to a conductor comprising a stationary frame, stationary thread supplies carried thereon, conductor supply and take-up means carried upon opposite ends of said frame, a needle cylinder between said supply and take-up means, and means for simultaneously bodily rotating said supply and take-up means at the same speed and the needle cylinder at a different speed in the

same direction on the longitudinal axis of the conductor passing through the needle cylinder to cause the courses and wales to spiral in opposite directions around the conductor.

7. An apparatus for applying a knitted fabric to a conductor comprising a stationary frame, stationary thread supplies carried thereon, rotatable conductor supply and take-up means carried upon opposite ends of said frame, a rotatable needle cylinder carried upon said frame between said supply and take-up means, a rotatable and driven capstan carried upon said frame between said needle cylinder and take-up means for drawing the conductor through said needle cylinder from said supply, and means carried on said frame for simultaneously bodily rotating said supply and take-up means, needle cylinder and capstan in the same direction on the longitudinal axis of the conductor passing through the needle cylinder and driving said capstan at a suitable speed to cause the courses and wales to spiral in opposite directions, the needle cylinder being rotated at a higher rate of speed than said bodily rotation of the supply and take-up means and capstan.

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