Jan. 24, 1939. F. MEIWALD 2,144,887

METHOD OF APPLYING A KNITTED COVERING TO A CORD-SHAPED BODY AND A KNITTING MACHINE FOR COVERING A CORD-SHAPED BODY

Filed Jan. 26, 1937 2 Sheets-Sheet 1

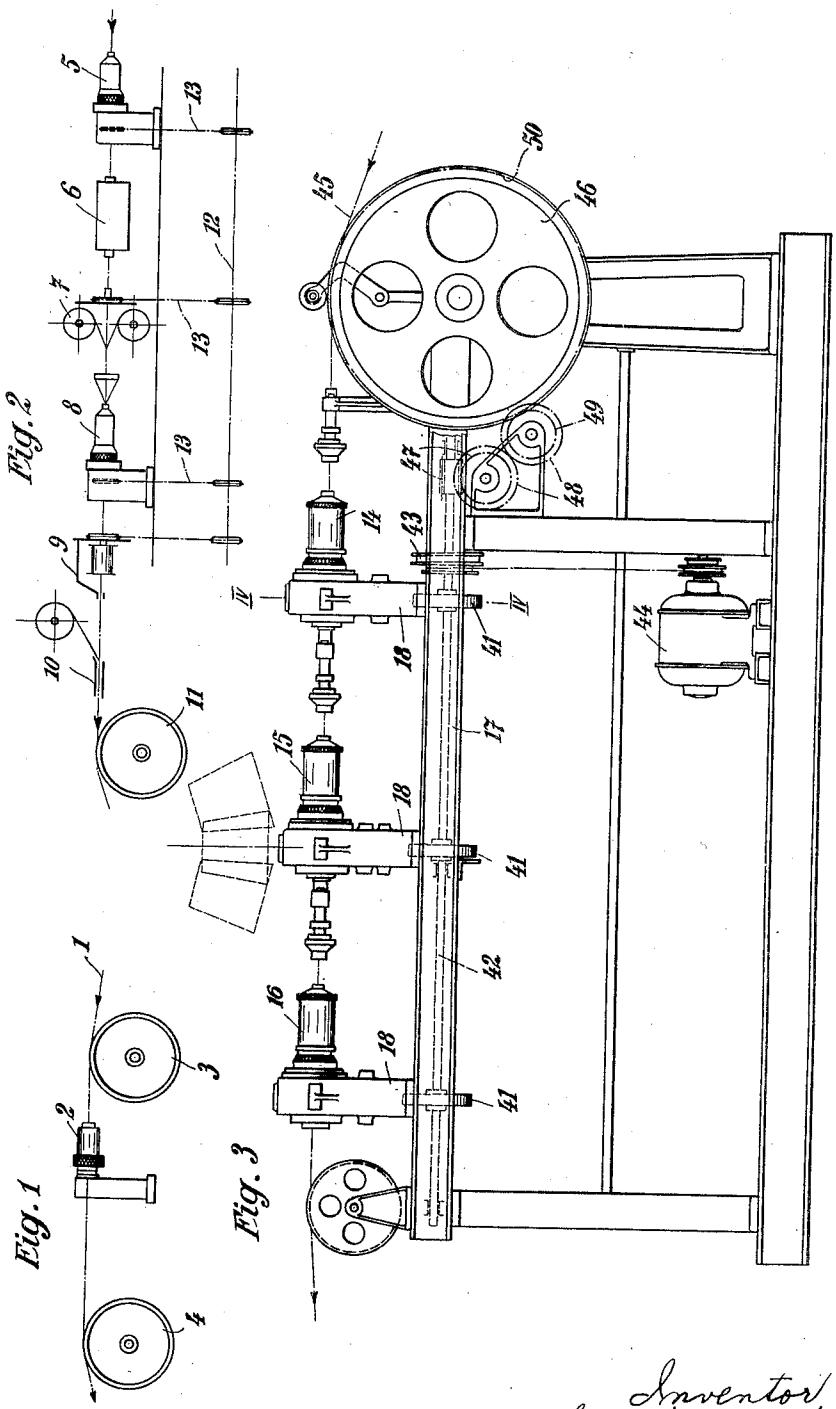


Fig. 1

Fig. 2

Fig. 3

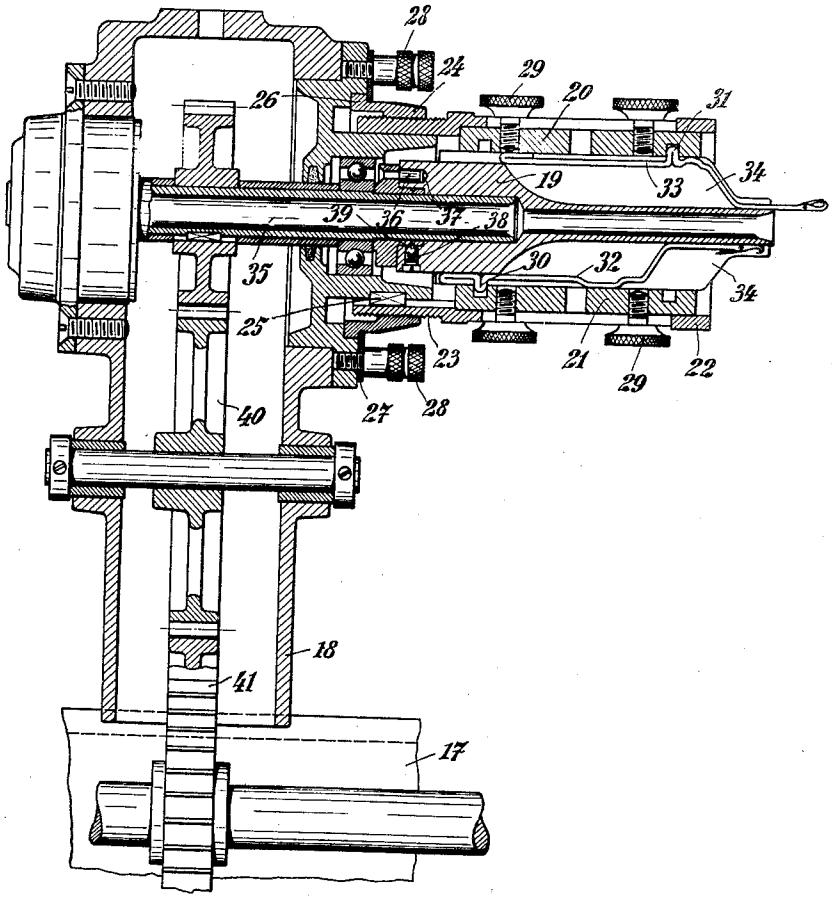
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Fig. 4



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Patented Jan. 24, 1939 2,144,887

UNITED STATES PATENT OFFICE

2,144,887

METHOD OF APPLYING A KNITTED COVERING TO A CORD-SHAPED BODY AND A KNITTING MACHINE FOR COVERING A CORD-SHAPED BODY

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Application January 26, 1937, Serial No. 122,466
In Austria December 12, 1936

7 Claims. (Cl. 66—9)

This invention relates to the covering of cord-like bodies, and more particularly electric conductors, by knitting, and has for its main object to carry out the further working operations necessary in the treatment of the cord-shaped body consecutively and in an uninterrupted working stage. Broadly, the invention consists in conducting the cord-shaped body in a horizontal direction through the knitting head, covering it by knitting, and withdrawing it. In further development of the invention the cord-shaped body is conducted through two or more knitting heads disposed in horizontal sequence, and provided in a single working stage with two or more independent knitted coverings. Before or after traversing the knitting head or heads, the cord-shaped body may be passed through auxiliary devices in which it is for example soaked with insulating substances and if desired dried and/or served with strip or spun material, impregnated, smoothed, and provided with a protective sheathing joined together by a longitudinal folded seam. Further features and objects of the invention will become apparent in the course of the ensuing description.

In a suitable machine according to the invention for applying a plurality of knitted coverings to a cord-shaped body there are provided in juxtaposition on a machine framework bearing blocks or brackets for the supporting of a plurality of knitting heads with their axes in alignment, the needle cylinders of which are driven from a common through shaft. The stitches of the knitting work, which are disposed in a known manner helically about the body to be covered, run counter to each other in the consecutive independent coverings, this result being obtained in accordance with the invention by arranging for the consecutive needle cylinders of the machine to rotate in opposite directions. The method according to the present invention is particularly well suited for the manufacturing of electric conductors with two or more knitted coverings, with if desired layers of insulation between the wire core and the knitted coverings.

Forms of construction of machines for the application of knitted coverings to cord-shaped bodies in accordance with the present invention are shown, by way of example, in the accompanying drawings, in which:—

Fig. 1 shows a diagrammatically represented machine having one knitting head.

Fig. 2 shows, likewise diagrammatically, a form of machine having two knitting heads.

Figs. 3 and 4 show, in side elevation, and in section on the line IV—IV of Fig. 3, respectively a machine with three knitting heads.

Referring to Fig. 1, the cord-shaped body 1 is fed to the knitting head 2 over a feed roll 3 which regulates the rate of feed in a known manner. The core body passes horizontally through the knitting head 2, and is taken up and spooled by a disc 4. In front of and behind the knitting head there may be provided auxiliary devices, such as impregnating devices for furnishing insulation, serving devices, sheathing devices, and the like, through which the core body passes in succession, so that all the working operations can be carried out in a single working stage, with the avoidance of repeated winding and unwinding of the core body or changing of direction by arrangements of guiding rollers which are more particularly troublesome in connection with core-shaped core bodies of considerable thickness.

Fig. 2 is a diagrammatical representation of a knitting machine in accordance with the invention with two knitting heads, in which the cord-shaped body, after traversing the first knitting head 5 passes through a tank 6 containing impregnating composition, then through a serving machine 7, through the second knitting head 8 in which it is provided with a further knitted covering, then through a machine 9 in which a spun covering is applied, and finally through a device 10 which applies an outside sheath. The finished cable is drawn off and wound up by the roll 11. The knitting heads 5 and 8, the serving machine, and the machine for applying a spun covering are all driven from a common shaft 12, for instance through the intermediary of sets of chain driving gear 13.

The machine shown in Figs. 3 and 4 is provided with three knitting heads, 14, 15 and 16 of which the knitting head 15 rotates in the opposite direction to the other two, with the result that the helical row of stitches formed by this head runs counter to and crosses the rows of stitches constituting the other two coverings. In this manner the result is achieved that when the cord-shaped body is subjected to bending strain the individual coverings can yield more easily than would otherwise be the case, and the coverings are less apt to become damaged by such straining. Each of the knitting heads is mounted in a block or bracket 18 secured to the framework 17 of the machine, and consists of the needle cylinder 19, the two cam rings 20, 21, and the casing 22. This casing is provided at 23 with a screw threading with which it is screwed into a setting ring 24 rotatably fitted in the bearing bracket, and is

locked against rotation relatively to the bearing bracket by means of a key 25. The setting ring 24 is provided with a flanged rim 26 with which it engages in an annular recess in the bearing bracket, and can be locked against rotation by means of a clamping ring 27 and holding down screws 28. The cam rings 20, 21 are displaceable between the needle cylinder 19 and the casing 22 and capable of being held fast by means of screws 29. In the grooves of the cam rings there engage the feet 30, 31 of two groups of knitting needles 32, 33 which are guided in slots 34 in the needle cylinder. The needle cylinder can be slidingly fitted on to a hollow driving spindle 35, and is capable of being coupled up by the engagement of a pin 36 pertaining to the spindle 35 in a socket 37 provided in the end of the needle cylinder. A ball 39 which is housed in a radial hole drilled in the rear end of the needle cylinder, and which is pressed into engagement with a circumferential groove in the driving spindle 35, prevents unintentional axial displacement of the needle cylinder. The spindle 35 is driven from the spur wheel 41 on the main driving shaft 42, through an intermediate gear wheel 40. In the bearing bracket for the needle cylinder 15 there are provided two intermediate wheels, in order to rotate this needle cylinder in the opposite direction to the other two. The main shaft 42 is driven, through the intermediary of belt pulleys 43, from a motor 44. The cord-shaped body 45 is taken up from the running-off drum (which is not shown in the drawings) by means of a disc 46 which is driven from the main shaft 42 through the intermediary of worm gear 47, change wheels 48, and spur wheels 49, 50. The drive for the winding drum (not shown) for the finished covered cable is derived in a known manner from the shaft of the disc 46, through the intermediary of friction gearing. The cord-shaped body is furnished by the described machine with three superposed knitted coverings in which the stitches are disposed in a known manner in helical rows, and if desired with staggered and crowded arrangements of stitches. The middle knitted covering then consists of stitches disposed in helical rows running counter to those of the two other coverings.

I claim:

1. A method of covering a cord-shaped body, and more particularly an electric conductor, which consists in feeding the said body horizontally to a plurality of knitting devices, covering the said body, consecutively, with a plurality of knitted coverings, and withdrawing and gathering the knitting-covered body, all in a single uninterrupted working process.

2. A method of covering a cord-shaped body, and more particularly an electric conductor, which consists in feeding the said body horizontally forward, covering the same by knitting, applying insulating material, drying, serving with strip material, applying a spun covering, impregnating, smoothing, and furnishing with a sheathing joined by a longitudinal seam, during the said feed movement, and withdrawing and gathering the knitting-covered and treated body, all in a single uninterrupted working process.

3. A knitting machine for covering a cord-shaped body, and more particularly an electric conductor, comprising a framework, a through driving shaft supported in the said framework, brackets on the said framework, a plurality of knitting heads mounted in horizontal alinement with each other in the said brackets, power transmission means between the said driving shaft and the needle cylinder of each of the said knitting heads, means for driving the said shaft, means for feeding the said cord-shaped body horizontally to the said knitting heads, and means for withdrawing and gathering the knitting-covered body.

4. A knitting machine as claimed in claim 3, in which the said transmission means are adapted to rotate the needle cylinders of alternate knitting heads in opposite directions, so that the stitches of consecutive knitted coverings are disposed in rows following helical lines which run counter to each other, substantially as described.

5. A method of covering a cord-shaped body, and more particularly an electric conductor, which consists in causing a length of said body to traverse a substantially horizontal path under continuous feeding movement, causing said body to primarily pass through a horizontal knitting head to receive a knitted covering, causing said body to secondarily pass through a horizontal treating tank, and applying a second covering to said body while moving in said horizontal path.

6. A method of covering a cord-shaped body, and more particularly an electric conductor, which consists in causing a length of said body to traverse a substantially horizontal path under continuous feeding movement, causing said body to primarily pass through a horizontal knitting head to receive a knitted covering, causing said body to secondarily pass through a horizontal treating tank, applying a second covering to said body while moving in said horizontal path, and knitting a third covering on said body while in said horizontal path.

7. A method of covering a cord-shaped body, and more particularly an electric conductor, which consists in causing a length of said body to traverse a substantially horizontal path under continuous feeding movement, causing said body to primarily pass through a horizontal knitting head to receive a knitted covering, causing said body to secondarily pass through a horizontal treating tank, applying a second covering to said body while moving in said horizontal path, and successively knitting a third covering on the body, spinning a fourth covering on said body and sheathing said body all while the body is moving in said horizontal path.

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