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PATENT SPECIFICATION

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(54) MODIFIED HIGH SPEED STRANDER

(71) We, SOUTHWIRE COMPANY, a Corporation organised and existing under the laws of the State of Georgia, United States of America, of 126 Fertilla Street, Carrollton, Georgia 30117, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

When manufacturing cable from a plurality of wires, a core wire is usually passed through a path and cable wire is wrapped around the core wire as the core wire moves along its path. This function is usually carried out by relatively high speed machinery, which usually includes a rotatable strander frame or housing and a plurality of wire carrying bobbins located within the frame. The core wire is usually taken from a bobbin mounted outside the frame and passed through the frame, and the wires from the bobbins mounted inside the frame are wrapped around the core wire as the bobbins are rotated with the frame about the core wire.

In the past, the wire carrying bobbins mounted on the frame of a strander have usually been mounted so that the bobbins were required to rotate around their own longitudinal axis in order to pay out their wire. This arrangement usually requires some control of the rotation of the bobbins, such as a brake mechanism for each bobbin, so that the bobbins will not continue to rotate when the frame of the strander has stopped its rotation.

The braking devices cause the tension in the wire extending from the bobbins to vary during the operation of the strander since the braking force required for a full bobbin is significantly more than that required for a partially depleted bobbin. While the initial braking force may be sufficient only to control the bobbins, the same braking force applied to a bobbin with a partially depleted wire supply is frequently sufficient to draw out or stretch the wire to a smaller gage, which causes the cable formed by the strander to be malformed. Also, because of the braking forces being applied to each bobbin before the initial start-up of the strander, there is also a tendency for the wire paying off the bobbins to be drawn before the strander reaches its normal operational speed, and the unnecessary braking of the bobbins during initial start-up of the strander requires more work to operate the strander. Because of the frequent malfunction of the brakes of the stranders, the wire from the bobbins within the frame of the strander occasionally continues to pay out after the operation of the strander has been terminated, and because of the different brake forces applied to different ones of the bobbins and because of the different tensions created in the wire paying out from the bobbins due to the varying effects of the brake forces and supply of wire on the bobbins of the strander, the cable formed by the stranders frequently has one or more cable wires loosely wrapped about the core wire with the remaining wires more tightly wrapped, leading to an inconsistently formed, and therefore, low quality cable product.

In applicant's prior patent specification Serial Number 1343650, there was disclosed a strander for forming cable at high speeds which subtantially eliminated the hazard of forming a cable with loose or drawn wire strands. The apparatus of the aforementioned application included wire-carrying bobbins mounted in a rotatable frame with their longitudinal axes extending approximately parallel to the axis of rotation of the frame. The wire was pulled off the bobbins in the direction of the longitudinal axes of the bobbins without requiring bobbins to rotate about their axes. The wires drawn from the bobbins in this manner usually could be withdrawn with approximately the same wire tension throughout the entire pay off from the bobbin without requiring a braking device.

In the apparatus of the aforementioned patent application, the bobbins were rotatably mounted in the rotatable frame, and counterweight means were provided to

restrain the bobbins from rotating about their own axes during rotation of the frame. In effect, therefore, the bobbins were substantially fixed in space while the frame rotated with respect thereto.

It should be apparent that the apparatus described in the aforementioned patent application required a relatively elaborate bearing arrangement to rotatably mount the bobbins in the frame with their longitudinal axis aligned generally parallel to the axis of rotation of the frame, as well as counterweight means to prevent rotation of the bobbins about their own axes in order to accomplish the object of the invention. The present invention is an improvement over the invention disclosed in the aforementioned application in that it provides an apparatus whereby wire may be withdrawn from bobbins mounted in a rotatable frame of a high speed strander, without requiring the bobbins to rotate about their own axes, while eliminating the necessity to rotatably mount the bobbins in the frame as well as eliminating the necessity to provide counterweight means to restrain rotation of the bobbins.

The present invention resides in a strander for forming cable or the like at high speeds comprising a generally cylindrical rotatable frame, guide means for passing a core wire into one end of said frame, through said frame, and out of the other end of said frame as said frame rotates at high speeds, a plurality of wire-carrying bobbins mounted in said frame, wire feed-out guide means including means rotatably mounted with respect to each of said bobbins for guiding wire from the bobbin generally in the direction of the longitudinal axis of the bobbin during rotation of the frame without requiring rotation of the bobbin about its own axis, means for stranding wire paid off at least one said bobbin with the core wire during rotation of the frame, said bobbins being mounted in the frame with their longitudinal axes disposed perpendicular to the axis of rotation of the frame, and means for preventing relative rotation between said bobbins and said frame, each of said bobbins being mounted on a bobbin support which extends inwardly from said frame and intersects the axis of rotation thereof, said bobbins being disposed on their respective supports so that said axis of the frame passes through the centers of gravity of said bobbins, and successive ones of said supports extending from diametrically opposite sides of said frame, whereby centrifugal forces acting on the bobbins are minimized and the forces on the rotating frame are balanced.

Figure 1 is a top view of a high speed strander having its bobbins positioned perpendicular to the longitudinal axis of the strander.

Figure 2 is a partial cross section view of the high speed strander of Figure 1, but showing only the details of the bobbin support means.

Referring now in more detail to the drawing, in which like numerals indicate like parts throughout the several views, Figure 1 shows a high speed strander 10 which includes a frame or barrel 11 mounted on a plurality of roller bearings 12 so that it rotates on its longitudinal axis 14. Frame 11 is divided along its length by support and wire guide partitions 15.

Rigidly mounted on the frame is a plurality of bobbin support means 16 arranged to maintain a wire carrying bobbin 17 with its longitudinal axis extending approximately perpendicular to the axis of rotation 14 of said frame. Each bobbin support means includes a hub 18 and a bobbin support stem 19 pivotally connected to each hub 18 by means of pivot pin 20. Stems 19 and hubs 18 extend perpendicular to the axis of rotation 14 of frame 11, and stems 19 are pivotable to a position perpendicular to axis 14 about pivot pins 20. A wire carrying bobbin 17 is mounted on each stem 19 by pivoting the stem 90 degrees, extending a bobbin through an opening in frame 11 and pivoting the bobbin and stem 90 degrees back into the operating position. A lightweight tension control means and wire guide means such as rotatable guide 21 is mounted on the end of each stem and remains attached thereto by cap 22. The arrangement is such that the longitudinal axis 23 of each bobbin extends perpendicular to and intersects the axis of rotation 14 of frame 11, and the axis 14 passes through the center of gravity of each bobbin. Each rotatable guide 21 includes a support arm 24 which extends out beyond the periphery of its bobbin 17 and a U-shaped tubular guide 25 is connected to the remote end of arm 24. Each U-shaped guide 25 is arranged to lift the wire from its bobbin 17 without causing the wire to engage the end flanges of the bobbin. Guides 21 are arranged to rotate freely about the axis 23 of its hub 18, stem 19 and bobbin 17 so that when its bobbin is full the U-shaped guide will rotate relatively slowly, and when its bobbin is substantially depleted of wire the guide will rotate at a higher angular velocity. Successive supports extend from diametrically opposite sides of the frame, whereby the forces acting on the frame are balanced centrifugal forces acting on the bobbins are minimised because their centres of gravity lie on the axis 14.

The wires paying off bobbins 17 are threaded through guide means 26 which are

rigidly attached to frame 11 and openings 27 in the wire guide partitions 15 which are aligned with the axis of rotation 14 of the frame, so that the wire from each bobbin 17 is withdrawn from the bobbin in the direction of the longitudinal axis of the bobbin. Thus, the bobbins are not required to rotate to allow the wire to pay out, and means are provided for preventing such rotation.

The wires passing through guide means 26 and openings 27 of support and wire guide partitions 15, then pass through guide pulleys 28 connected to frame 11. The wires then move toward the winding end 29 of the frame, where they are received by closing head 30. Core wire 31 pays off a bobbin 32 mounted outside frame 11 and enters the frame through rear opening 33. Core wire 31 is guided through the aligned openings 27 in the support and wire guide partitions 15 along the length of frame 11 until it reaches the winding end of the frame, whereupon it passes about guide pulleys 34 which return the core wire to the axis of rotation of the frame. The core wire pays out through the winding end of the frame through opening 35 and the cable wires 36 are wound about the core wire.

Figure 2 is a cross sectional view of the strander showing bobbin 17 in the operating position with locking collars 37 engaging hub 18 and stem 19 to secure the bobbin in its operating position. The collars 37 can be tightened against the bobbins to prevent rotation of the latter. Also shown in phantom line is bobbin 17 pivoted 90 degrees on stem 19 about pivot pin 20, to facilitate its removal through opening 38 of frame 11. The bobbins used with the present invention may be of the type having sloped inner surfaces 39 on their end flanges 40 to assist the pay off of wire from the bobbin.

It should be noted that the wire pays off the bobbins in the direction of the longitudinal axes of the bobbins without requiring the bobbins to rotate, and virtually no variable tension is experienced in the wire in spite of the varying supply of wire present on the bobbin. The result is that the cable formed by the wire is more likely to have uniform tension in its wound wires, and virtually no drawing of the wound wires will be experienced. Moreover, the cable wire is twisted along its length as it pays off a bobbin 17, and a full 360° twist is applied to the cable wire upon each withdrawal of the wire from about the supply of wire on the bobbin. The cable wire maintains this twist or torsion after it has been wound upon the core wire 31. Thus, the twist in the cable wire has a tightening effect with respect to the cable formed by the wires, and this torsion or tightening effect prevents the cable from becoming unwound. Thus, the mounting of the bobbins within the housing with the axis of the bobbins extending perpendicular to the axis of rotation of the housing functions to cause the cable so manufactured to be more tightly wound. It will be seen from the drawings that the wire feed-out guide means is adapted to withdraw the wire over a flange of the bobbin without requiring any turns of the wire which exceed approximately 90°.

WHAT WE CLAIM IS:—

1. A strander for forming cable or the like at high speeds comprising a generally cylindrical rotatable frame, guide means for passing a core wire into one end of said frame, through said frame, and out of the other end of said frame as said frame rotates at high speeds, a plurality of wire-carrying bobbins mounted in said frame, wire feed-out guide means including means rotatably mounted with respect to each of said bobbins for guiding wire from the bobbin generally in the direction of the longitudinal axis of the bobbin during rotation of the frame without requiring rotation of the bobbin about its own axis, means for stranding wire paid off at least one said bobbin with the core wire during rotation of the frame, said bobbins being mounted in the frame with their longitudinal axes disposed perpendicular to the axis of rotation of the frame, and means for preventing relative rotation between said bobbins and said frame, each of said bobbins being mounted on a bobbin support which extends inwardly from said frame and intersects the axis of rotation thereof, said bobbins being disposed on their respective supports so that said axis of the frame passes through the centers of gravity of said bobbins, and successive ones of said supports extending from diametrically opposite sides of the said frame, whereby centrifugal forces acting on the bobbins are minimized and the forces on the rotating frame are balanced.

2. A strander according to claim 1, in which each bobbin is mounted in said frame by means of a bobbin support rigidly secured to said frame, and wherein said means for preventing relative rotation includes locking means for maintaining said bobbin support and bobbin in a relatively fixed position during rotation of said frame.

3. A strander according to claim 2, in which said bobbin support includes means upon which the bobbin associated therewith may be pivoted into a position generally perpendicular to its operating position during rotation of said frame.

rigidly attached to frame 11 and openings 27 in the wire guide partitions 15 which are aligned with the axis of rotation 14 of the frame, so that the wire from each bobbin 17 is withdrawn from the bobbin in the direction of the longitudinal axis of the bobbin. Thus, the bobbins are not required to rotate to allow the wire to pay out, and means are provided for preventing such rotation.

The wires passing through guide means 26 and openings 27 of support and wire guide partitions 15, then pass through guide pulleys 28 connected to frame 11. The wires then move toward the winding end 29 of the frame, where they are received by closing head 30. Core wire 31 pays off a bobbin 32 mounted outside frame 11 and enters the frame through rear opening 33. Core wire 31 is guided through the aligned openings 27 in the support and wire guide partitions 15 along the length of frame 11 until it reaches the winding end of the frame, whereupon it passes about guide pulleys 34 which return the core wire to the axis of rotation of the frame. The core wire pays out through the winding end of the frame through opening 35 and the cable wires 36 are wound about the core wire.

Figure 2 is a cross sectional view of the strander showing bobbin 17 in the operating position with locking collars 37 engaging hub 18 and stem 19 to secure the bobbin in its operating position. The collars 37 can be tightened against the bobbins to prevent rotation of the latter. Also shown in phantom line is bobbin 17 pivoted 90 degrees on stem 19 about pivot pin 20, to facilitate its removal through opening 38 of frame 11. The bobbins used with the present invention may be of the type having sloped inner surfaces 39 on their end flanges 40 to assist the pay off of wire from the bobbin.

It should be noted that the wire pays off the bobbins in the direction of the longitudinal axes of the bobbins without requiring the bobbins to rotate, and virtually no variable tension is experienced in the wire in spite of the varying supply of wire present on the bobbin. The result is that the cable formed by the wire is more likely to have uniform tension in its wound wires, and virtually no drawing of the wound wires will be experienced. Moreover, the cable wire is twisted along its length as it pays off a bobbin 17, and a full 360° twist is applied to the cable wire upon each withdrawal of the wire from about the supply of wire on the bobbin. The cable wire maintains this twist or torsion after it has been wound upon the core wire 31. Thus, the twist in the cable wire has a tightening effect with respect to the cable formed by the wires, and this torsion or tightening effect prevents the cable from becoming unwound. Thus, the mounting of the bobbins within the housing with the axis of the bobbins extending perpendicular to the axis of rotation of the housing functions to cause the cable so manufactured to be more tightly wound. It will be seen from the drawings that the wire feed-out guide means is adapted to withdraw the wire over a flange of the bobbin without requiring any turns of the wire which exceed approximately 90°.

WHAT WE CLAIM IS:—

1. A strander for forming cable or the like at high speeds comprising a generally cylindrical rotatable frame, guide means for passing a core wire into one end of said frame, through said frame, and out of the other end of said frame as said frame rotates at high speeds, a plurality of wire-carrying bobbins mounted in said frame, wire feed-out guide means including means rotatably mounted with respect to each of said bobbins for guiding wire from the bobbin generally in the direction of the longitudinal axis of the bobbin during rotation of the frame without requiring rotation of the bobbin about its own axis, means for stranding wire paid off at least one said bobbin with the core wire during rotation of the frame, said bobbins being mounted in the frame with their longitudinal axes disposed perpendicular to the axis of rotation of the frame, and means for preventing relative rotation between said bobbins and said frame, each of said bobbins being mounted on a bobbin support which extends inwardly from said frame and intersects the axis of rotation thereof, said bobbins being disposed on their respective supports so that said axis of the frame passes through the centers of gravity of said bobbins, and successive ones of said supports extending from diametrically opposite sides of the said frame, whereby centrifugal forces acting on the bobbins are minimized and the forces on the rotating frame are balanced.

2. A strander according to claim 1, in which each bobbin is mounted in said frame by means of a bobbin support rigidly secured to said frame, and wherein said means for preventing relative rotation includes locking means for maintaining said bobbin support and bobbin in a relatively fixed position during rotation of said frame.

3. A strander according to claim 2, in which said bobbin support includes means upon which the bobbin associated therewith may be pivoted into a position generally perpendicular to its operating position during rotation of said frame.

4. A strander according to claims 2 or 3 in which said wire feed-out guide means includes for each bobbin a guide element mounted on said frame and aligned with the longitudinal axis of the bobbin.

5. A strander according to any of claims 1 to 4, further including guide members mounted at spaced intervals along said frame defining guide openings for receiving and guiding wire paid off said at least one bobbin.

6. A strander according to any of the preceding claims, in which said wire feed-out guide means is adapted to withdraw the wire over a flange of the bobbin without requiring any turns of the wire which exceed approximately 90°.

7. A strander substantially as hereinbefore described and illustrated in the accompanying drawings.

MARKS & CLERK

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