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J. H. HOAG
APPARATUS FOR HELICALLY STRIPING AN ELONGATED
CYLINDRICAL ARTICLE

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2 Sheets-Sheet 2

FIG. 3.

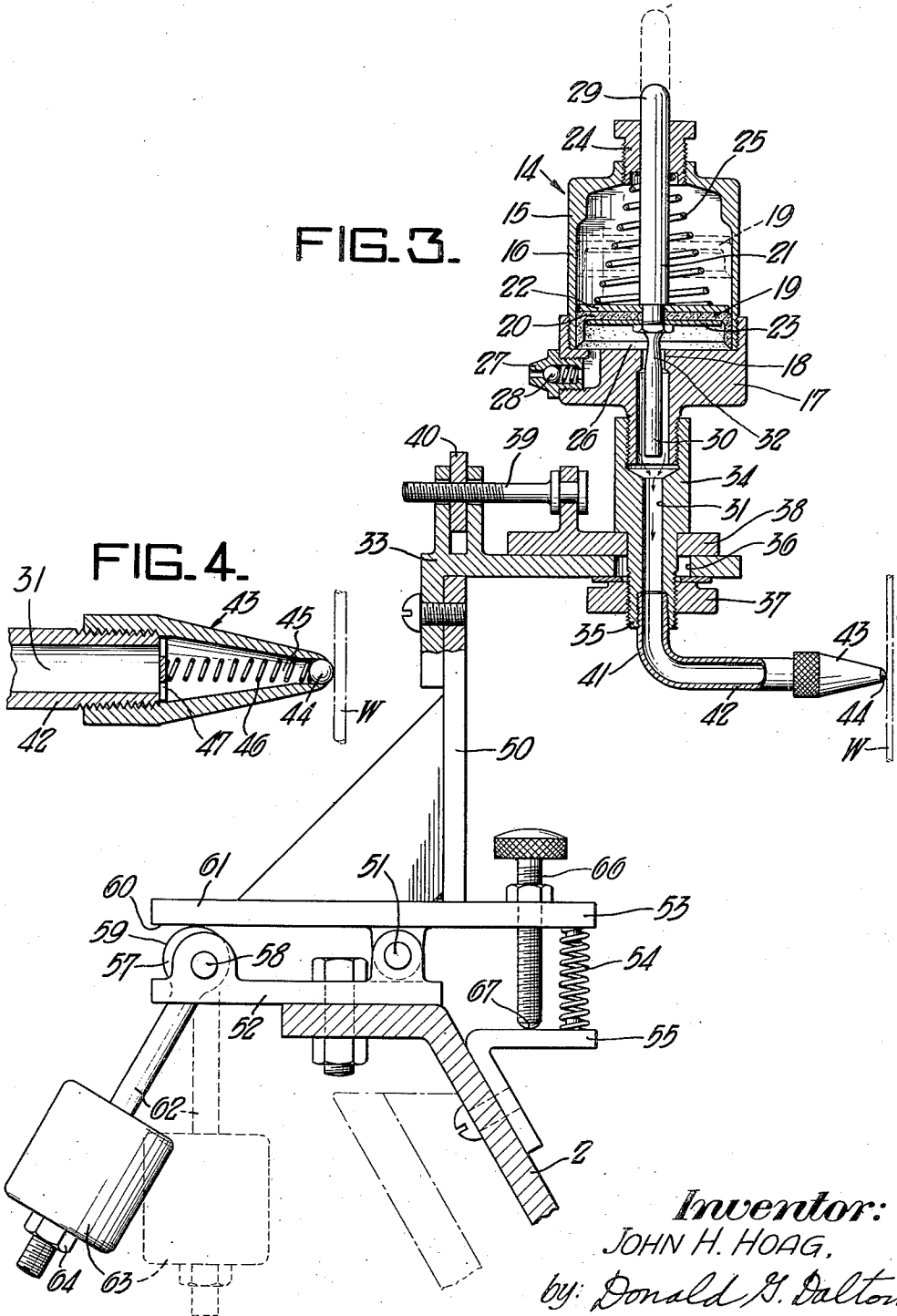


FIG. 4.

Inventor:
JOHN H. HOAG,
by: Donald H. Dalton
his Attorney.

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APPARATUS FOR HELICALLY STRIPING AN
ELONGATED CYLINDRICAL ARTICLEJohn H. Hoag, Worcester, Mass., assignor to United States
Steel Corporation, a corporation of New Jersey

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11 Claims. (Cl. 118—3)

This invention relates to an apparatus for printing a spiral stripe on the surface of insulated wire and the like and is directed to an improved form of apparatus of this character.

Conventional apparatus for marking spiral stripes on insulated conductors employ marking wheel assemblies mounted on a rotatable frame inside a cup or well which contains the marking ink. Three such marking assemblies are usually provided on the machine and are spaced 120° apart. The insulated wire is fed vertically through the center of the machine and the marking wheels are adjusted to contact the surface of the insulation with a minimum of pressure. As the wire is pulled through the machine, the frame mounting the marking wheels is rotated about the wire and the forward motion of the wire rotates the marking wheels. The ink which is at the bottom of the well when the machine is at rest is thrown up and out by centrifugal force when the machine is run to a position in which it contacts the marking wheel, thereby supplying ink to the wheel during operation. Conventional apparatus of this character have several disadvantages. First, the size of the ink well or reservoir is small and the consequent and inadequate ink supply necessitates frequent stopping of the machine to refill the wells. Second, the feeding of the ink by centrifugal force results in considerable spillage and loss of ink. Third, the rigidly mounted steel marker wheels cut the surface of the article being marked if the pressure exerted thereby is too great.

One of the principal objects of this invention is to provide an improved apparatus which eliminates the above-mentioned disadvantages of conventional apparatus. To this end, the apparatus of this invention employs, as ink reservoirs, expansible chambers respectively having a piston urged by a spring for forcing ink through a supply tube against the action of centrifugal force to marking devices in the form of ball pens. In this manner, a greater reservoir supply of ink is had thereby eliminating the necessity of frequent stoppage to replenish the ink supply. In addition, the troubles incident to feeding of the ink by centrifugal force are eliminated. According to another feature of the invention, the marking devices, including the expansible chamber reservoir, ink supply tube and marking pen, are mounted on a rotating table for movement to and from a position in marking engagement with the insulated conductor. These marking devices have resilient means in the form of a spring biasing their movement to a position out of marking engagement with the article being striped, and adjustable means comprising a centrifugally operated counterweight which is actuated in response to rotation of the mounting table are provided for actuating the marking devices to their operative marking positions, a stop being provided for limiting their movement by the centrifugally responsive means. In a manner to be described, this feature of the invention enables a more accurate adjustment of the contact pressure of the marking device with the insulated wire which eliminates damage to the wire by too great a contact

2

pressure and provides a more distinct striping action without the constant attention required of conventional apparatus.

Other objects and advantages of the invention will become apparent from the following description.

In the drawings, there is shown a preferred embodiment of the invention. In this showing:

Figure 1 is a side elevational view of the apparatus of this invention in which parts of the apparatus are shown somewhat diagrammatically;

Figure 2 is a front elevational view of the apparatus shown in Figure 1 with the rotating table and drive therefor shown in vertical section;

Figure 3 is an enlarged elevational view, with parts thereof shown fragmentarily and in vertical section, of one of the marking devices of this invention showing the manner in which it is mounted on the rotating table of the apparatus; and

Figure 4 is an enlarged detail view of the ink applying marking pen shown in Figure 3.

In Figures 1 and 2 of the drawings, the numeral 1 designates a support having a rotatable table 2 supported thereon. The table 2 has a tube 3 depending from its center to provide a concentric and axially extending opening 4 through which the wire to be marked is drawn. A bevel gear 5 is keyed to the lower end of the tube 3 and is driven by a bevel gear pinion 6 from a belt and pulley drive 7. Rotation of the gear 5 rotates the table 2 about the axis of the wire feed opening 4.

The wire, diagrammatically illustrated and designated by the letter W, to be striped is fed from a payoff reel 8 to a guide sheave 9. A capstan 10 draws the wire vertically upwardly through the opening 4 and the wire is collected from the capstan 10 on a take-up reel 11. A chain and sprocket drive 12 rotates the capstan 10, both of the drives 7 and 12 being driven from a common drive motor 13 so that the speed of rotation of the table 2 bears a definite relation to the speed of wire travel. In this manner, a marking device having engagement with the surface of the wire and rotated by the table 2 will apply a spiral stripe to the wire as it moves vertically through the opening 4.

The marking devices of this invention are respectively designated as a whole by the numeral 14, and, in a manner to be described, are mounted on the table 2 for rotation therewith. Three marking devices 14 are shown in each of Figures 1 and 2 and are arranged at intervals of 120° about the circumference of the table 2. By using three marking devices 14, three spiral stripes will be applied and uniformly spaced about the surface of a wire moving through the opening 4 when the table 2 is rotated. A greater or lesser number of marking devices 14 may be provided for varying the number of stripes applied to the wire.

As best shown in Figure 3, each marking device 14 includes an expansible chamber ink reservoir 15. Each reservoir 15 comprises a cylinder 16 of inverted cup shape having its lower end secured to a cap closure or base 17 having a centrally located discharge opening 18. A piston 19 is mounted in the cylinder 16 and includes a cup-shaped packing member 20 of leather or other suitable packing material which is mounted on a guide stem 21 by upper and lower clamping discs 22 and 23. The stem 21 has its upper end projecting upwardly through an opening in a guide nut 24 which has threaded engagement in an opening in the upper end of the cup-shaped cylinder 16. A spring 25 has its upper end engaged with the nut 24 and its lower end engaged with the piston 19 for resiliently biasing the movement of the piston 19 downwardly in the cylinder 16.

The space 26 in the cylinder 16 underneath the piston 19 constitutes an ink reservoir into which a supply of

ink may be forced under pressure through a fitting 27 having a spring-biased ball-check valve 28 for preventing the escape of ink from the reservoir 26. As ink is forced inwardly through the fitting 27, the piston 19 is raised to the position indicated in dotted lines against the biasing action of the spring 25. As ink is withdrawn from the reservoir chamber 26 in accordance with the requirements of the marking operation, the piston 19 is moved downwardly by the action of the spring 25. In this manner, the piston 19 has its lower surface engaged at all times with the ink supply in the space 26 and the space 26 constitutes an expansible chamber which continually varies in accordance with the supply of ink therein. The portion 29 of the guide stem 21 projecting outwardly through the guide nut 24 provides an indication when replenishment of the ink supply in the chamber 26 is required.

The lower end 30 of the guide stem 21 projects through the opening 18 and acts as a valve controlling the supply of ink to the ink conduit 31. The opening 18 is reduced in size at the upper end of the conduit 31, and the stem 30 has a diameter slightly less than the diameter of the opening 18 to provide an annular space about the stem 30 through which ink is delivered from the chamber 26. The quantity of ink flowing into the conduit 31 will thus be dependent upon the size of the annular space about the stem 30. The upper end 32 of the valve stem 30 is tapered to increase the size of the annular space or valve opening thereabout when the piston 19 moves to its lowermost position at which time the ink supply is almost exhausted and the biasing force of the spring 25 is at a minimum. The taper at 32 provides for continued ink flow under decreasing spring pressure.

Each reservoir 15 is adjustably supported on a bracket 33 by a fitting 34 having an axially extending opening constituting part of the conduit 31. The lower end 35 of fitting 34 extends through an enlarged opening 36 in the bracket support 33 and has a clamping nut 37 which cooperates with a clamping plate 38 on the upper side of the bracket support 33 for clamping the fitting 34 in position on the bracket support 33. The clamping plate 38 is slidably supported on the upper surface of the bracket 33 and is connected with an adjusting bolt 39 with which an adjusting nut 40 has threaded engagement. Upon rotation of the adjusting nut 40, the position of the fitting 34 in the opening 36 is adjusted radially of the table 2 for a purpose to be described.

The lower end of the fitting 34 is connected with an L-shaped ink supply tube 41 having a horizontal portion 42 which extends radially with respect to the table 2. The outer end of the tube 42 has an ink applying nozzle 43 thereon. The nozzle 43 is in the nature of a ball pen having an ink applying ball 44 which is seated in the outer end 45 of the supply conduit 31 by a spring 46 having one end bearing against the ball 44 and its other end bearing against a disc 47 having openings through which ink may flow from supply passage 31 to the passage 45. When pressure is applied to the ball 44 by moving it against the surface of the conductor, it moves inwardly a slight amount so that ink will be applied to its outer surface when it is rotated by engagement with the moving surface of the conductor wire being striped. The surface of the ball 44 is preferably serrated as this has been found to improve its ink applying action. By rotating the nut 40, the radial position of the nozzle 43 with respect to the table 2 is adjusted to provide proper engaging pressure of the ink applying ball 44 with the surface of the conductor wire to obtain the desired ink applying action on the wire.

As also shown in Figure 3, the bracket 33 is mounted on a bracket 50 which is pivotally connected by a pivot 51 to a fixed bracket 52 secured to the table 2. The pin 51 supports the marking device 14 for pivotal movement in a plane extending radially and vertically of the table

2 and has its axis normal to such plane. The lower end of the bracket 50 has a portion 53 which extends radially inwardly of the pivot 51 with respect to the table 2. A spring 54 has its upper end bearing against bracket portion 53 and its lower end bearing against a bracket 55 secured to the table 2 to provide a resilient bias for pivotally moving the bracket 50 and marking device 14 carried thereby in a counter-clockwise direction as viewed in Figure 3. The pivotal movement of the bracket 50 by the spring 54 is effective, when the apparatus is at rest, to move the ink applying roller 44 at the end of the nozzle 43 out of engagement with the conductor wire.

The bracket 50 and marking device 14 are rotated in a clockwise direction, as viewed in Figure 3, about the axis of the pivot 51 to engage the ink applying roller 44 with the surface of the conductor wire in response to rotation of the table by centrifugally operated actuating means including cam 57. The cam 57 is secured to the table mounted bracket 52 by a pivot pin 58 having its axis parallel to the axis of the pin 51. An eccentric camming surface 59 on the periphery of the cam 57 engages with the undersurface 60 on a part 61 of the pivotal bracket 50 which is positioned radially outwardly of the pivot 51 with respect to the table 2. The cam 57 has an operating lever 62 secured thereto which extends downwardly in the position shown in dotted lines in Figure 3 when the apparatus is at rest. The lever 62 mounts a counterweight 63 which has its position adjustably supported on the lever 62 by an adjusting nut 64. When the apparatus is started and the table 2 rotated, the centrifugal force due to rotation will cause the counterweighted lever 62 to move outwardly to the position shown in solid lines. This rotates the cam 57 and the movement of its camming surface 59 over the surface 60 rotates the mounting bracket 50 in a clockwise direction to move the ink applying roller 44 into engagement with the surface of the conductor wire moving through the table opening 4.

An adjusting screw 66 has a threaded connection with the bracket 53 and engagement of its lower end 67 with the table mounted bracket 55 limits pivotal movement of the bracket 50 and marking device 14 in a counter-clockwise direction as viewed in Figure 3. By adjusting the nut 40 and stop screw 66, the engaging pressure of the ink applying roller 44 with the surface of the wire being striped can be precisely adjusted.

To place the apparatus in operation, the belt drive 7 and the capstan drive 12 are actuated to impart rotation to the table 2 and to draw the insulated conductor W through the opening 4 centrally of the table 2. As rotational movement of the table is brought up to speed, the counterweighted lever 62 is swung outwardly to the position shown in Figure 3, and, through the cam 57, pivots the bracket 50 against the action of the biasing spring 54 to move the marking device 14 and thereby the ink applying roller 44 into operative ink applying engagement with the surface of the conductor wire. As the wire moves vertically through the opening 4, the roller 44 is rotated about the surface of the wire by rotation of the table 2 and a spiral stripe will be applied to the surface of the wire.

Attention is particularly directed to the fact that the provision of the expansible ink reservoir chamber 26 and the effect of the biasing spring 25 constituting a part thereof provides a pressure on the ink in the reservoir chamber 26 which positively feeds it through the conduit 31 to the roller 44 and against the action of centrifugal force on the portion of the ink in the supply conduit 31 in the horizontal portion 42 of the supply tube. The centrifugal force tending to prevent movement of the ink in the horizontal portion of the supply tube 42 is relatively small compared to the force of the spring 25 and ink is thus positively supplied to the roller 44 at all times during operation of the apparatus. It will thus be ap-

5

parent that the expansible chamber 15 provides a greater ink capacity than conventional forms of apparatus in which the ink supply is dependent upon centrifugal force and avoids the spillage commonly encountered in conventional apparatus.

Attention is also particularly directed to the manner in which the ink marking device 44 of this invention is mounted for movement to and from a position in operative marking engagement with the surface of the wire. Since the marking device 44 is moved to its position in operative marking engagement with the wire in response to rotation of the table and has a resilient bias for movement out of its operative marking engagement position, it will be apparent that the marking device 44 will automatically move out of marking engagement with the wire whenever the table 2 is slowed down or stopped. In this manner, damage to the wire insulation incident to stoppage of the apparatus is effectively prevented. It will also be noted that the precise adjustment of the final operative position of the marking device 44 can be effectively controlled by adjustment of the nut 40 and stop screw 66 and that this feature of the invention further minimizes possible damage by the marking device to the insulation on the wire being striped.

While one embodiment of my invention has been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, a bracket secured to said table for rotation therewith, a marking device having a pivotal connection with said bracket for pivotal movement to and from a position in operative marking engagement with the wire being drawn through said opening, a cam having a rotatable support on said table and operative upon rotation thereof to pivot said marking device to said operative position, and centrifugal means for rotating said cam in response to rotation of said table including a lever connected with said cam and having a weight thereon, said lever and weight being movable by centrifugal force in response to rotation of said table for operating said cam.

2. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, a mounting bracket secured to said table for rotation therewith, a movable bracket having a pivotal connection with said mounting bracket for pivotal movement about an axis normal to a plane extending diametrically of said table, a marking device carried by said movable bracket for marking engagement with the wire being drawn through said opening, a spring positioned radially inwardly of said pivotal connection and having its ends in bearing engagement with each of said brackets and biasing the movement of said movable bracket to a position in which said marking device is out of marking engagement with said wire, a cam positioned radially outwardly of said pivotal connection and mounted on said mounting bracket for rotation about an axis parallel to the pivotal axis of said movable bracket, said cam having a camming surface in its periphery engaged with a portion of said movable bracket and operable upon rotation of the cam to pivot the movable bracket to move said marking device into marking engagement with the wire, and means comprising a weighted lever connected with said cam and centrifugally responsive to rotation of said table for rotating said cam.

3. An apparatus as defined in claim 2 characterized by said marking device comprising an ink supply tube extending radially inwardly with respect to said table from said movable bracket and ink distributing means at its end for marking engagement with the wire.

6

4. An apparatus as defined in claim 3 characterized further by the provision of an ink reservoir connected with said tube and having means for forcing ink through said tube against the action of centrifugal force resulting from its rotation with said table.

5. An apparatus as defined in claim 3 characterized further by the provision of an ink reservoir connected with said tube in the form of an expansible chamber including a piston and a spring for moving the piston to force ink through said tube against the action of centrifugal force resulting from its rotation with said table.

6. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, and a marking device mounted on said table for rotation therewith comprising an ink supply tube extending radially inwardly with respect to said table and having ink distributing means at its end for marking engagement with the wire, and an ink reservoir connected with said tube and comprising an expansible chamber including a piston and a spring for moving the piston to force ink through said tube against the action of centrifugal force resulting from its rotation with said table.

7. An apparatus as defined in claim 6 characterized by said ink distributing means comprising a nozzle having an opening at its outer end, a serrated ball having seated engagement in said opening with a portion thereof extending beyond the end of said nozzle, and a spring resiliently biasing said ball to its seated position.

8. An apparatus as defined in claim 6 characterized by said ink supply tube having a mounting on said table for movement to and from a position with its ink distributing means in marking engagement with the wire, and means responsive to rotation of the table for moving said tube to said position.

9. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, and a marking device mounted on said table for rotation therewith comprising an ink supply tube extending radially inwardly with respect to said table and having ink distributing means at its end for marking engagement with the wire, an ink reservoir mounted on said table for rotation therewith and connected with said tube, and means for applying pressure to the surface of the ink in said reservoir to force the ink through said tube against the action of centrifugal force resulting from its rotation with said table.

10. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, and a marking device mounted on said table for rotation therewith comprising an ink supply tube extending radially inwardly with respect to said table and having ink distributing means at its end for marking engagement with the wire, said ink distributing means comprising a nozzle having an opening at its outer end, and a serrated ball having seated engagement in said opening, an ink reservoir mounted on said table for rotation therewith and connected with said tube, and means for applying pressure to the surface of the ink in said reservoir to force the ink through said tube against the action of centrifugal force resulting from its rotation with said table.

11. An apparatus for marking a spiral stripe on insulated wire and the like comprising a rotating table having a central opening through which the wire is drawn, and a marking device mounted on said table for rotation therewith comprising an ink supply tube extending radially inwardly with respect to said table and having ink distributing means at its end for marking engagement with the wire, means mounting said tube on said table for movement to and from a position with its ink distributing means in marking engagement with the wire, means re-

sponsive to rotation of the table for moving said tube to said wire marking engagement position, an ink reservoir mounted on said table for rotation therewith and connected with said tube, and means for applying pressure to the surface of the ink in said reservoir to force the ink 5 through said tube against the action of centrifugal force resulting from its rotation with said table.

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