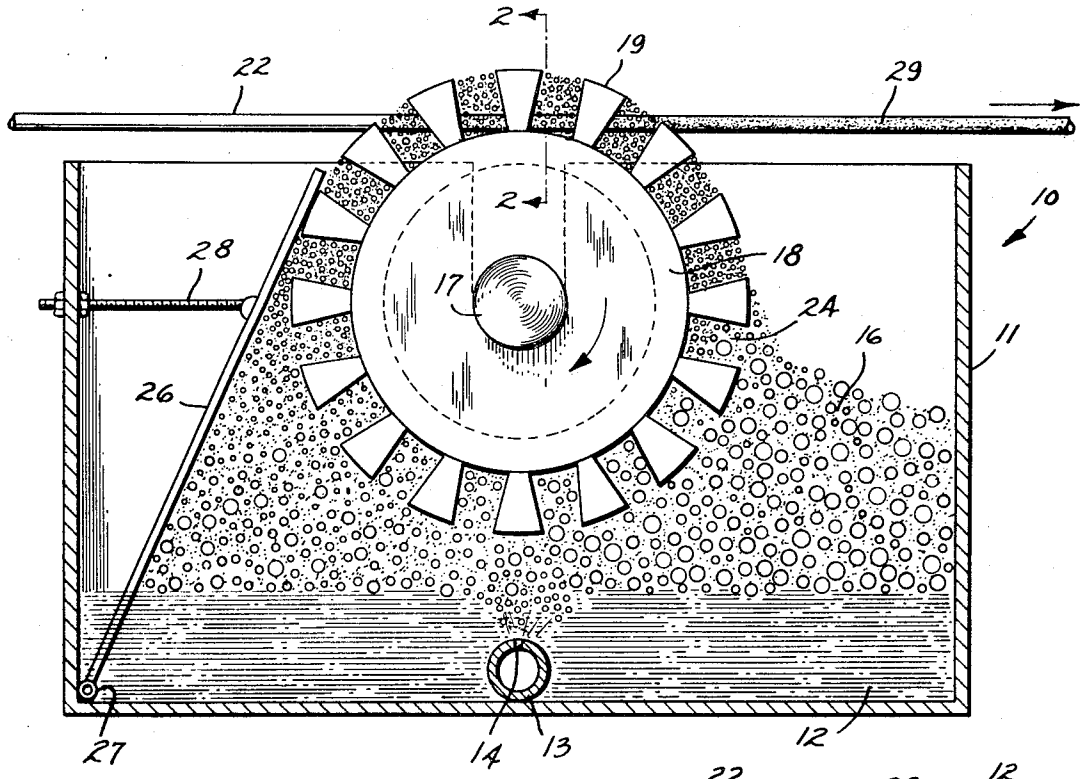
Feb. 6, 1973 C. J. KROGEL 3,714,927

APPARATUS FOR SURFACE DYEING THE PULP INSULATION OF WIRE

Filed Oct. 30, 1969

FIG. 1



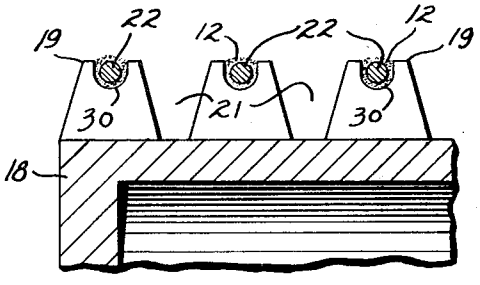


FIG. 3

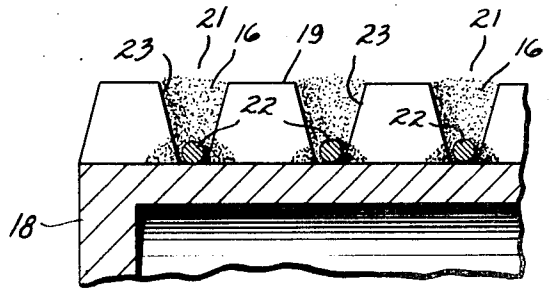


FIG. 2

INVENTOR
C. J. KROGEL
By W. L. Williamson
ATTORNEY

United States Patent Office 3,714,927 Patented Feb. 6, 1973

3,714,927

APPARATUS FOR SURFACE DYEING THE PULP INSULATION OF WIRE

Christopher John Krogel, Cranford, N.J., assignor to Western Electric Company, Incorporated, New York, N.Y.

Filed Oct. 30, 1969, Ser. No. 872,675
Int. Cl. B05c 1/08, 1/16
U.S. Cl. 118—612 3 Claims

ABSTRACT OF THE DISCLOSURE

A pulp-insulated wire is surface dyed by advancing the wire into frictional engagement with receptacles on a freely rotating roller. This rotates the roller to displace the receptacles through a dye solution to transfer the dye solution in the receptacles to the wire. In an alternate embodiment, air, under pressure, is introduced into the dye solution to form a layer of dye foam on the surface of the solution so that the dye foam is transferred by the receptacles to the wire.

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for dyeing elongated articles. More particularly, this invention relates to an apparatus for applying a coating of dye along advancing pulp-insulated wires.

In the electrical cable art, particularly the pulp-insulated wire art, the covers or insulation on the conductors generally are colored, entirely or at discrete intervals, to distinguish one from another. This practice, called color-coding, is necessary in order to identify any particular wire for purposes of installation or maintenance.

In the prior art, various schemes are available for applying a coating of dye to elongated articles. Generally, these schemes, both apparatus and methods, suffer from such disadvantages as too many moving parts and the necessity of providing a driving mechanism. For example, one such apparatus utilizes two marking wheels, two supply rolls, and a complicated gear drive mechanism to move and synchronize the various wheels to apply the dye to an advancing wire. One such method also uses a pair of identical applicator wheels to coat an elongated article, the coating being longer along the sides than along the top and bottom.

Highly desirable would be a method, and an apparatus to perform the method, that would provide continuous or discrete markings on an advancing wire without the need for complicated gear drive mechanisms, excessive moving parts, and duplicate applicators and supply mechanisms. One additional advantage to the use of such an apparatus to practice the method would be the simplicity of operation and maintenance and its attendant economy.

It is, therefore, an object of this invention to provide an apparatus for applying a coating at discrete intervals to an advancing elongated article.

An additional object of this invention is to provide an apparatus for applying a continuous coating to an advancing elongated article.

Another object of this invention is to provide an apparatus that utilizes a minimum of moving parts and needs no gear drive mechanism.

SUMMARY OF THE INVENTION

With these and other objects in view, this invention contemplates providing an apparatus for color-coding an elongated article which includes a tank for containing a dye solution, a roller mounted for free rotation above the tank, and facilities for displacing the elongated article

tangentially to the roller to rotate the roller and sequentially transfer the dye to the advancing elongated article.

In addition, this invention contemplates providing a method for color-coding an elongated article which includes the steps of generating a layer of dye foam and applying the dye foam to the elongated article.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the apparatus, in section, suitable for practicing an exemplary embodiment of the invention;

FIG. 2 is a front end view, in section, taken along the lines 2—2 of FIG. 1; and

FIG. 3 is a front end view, in section, of an alternative embodiment of FIG. 2.

DETAILED DESCRIPTION

Referring now to FIGS. 1 and 2, a detailed description of the invention will be given. Although the principles of this invention are hereinafter discussed with reference to pulp-insulated wire, the invention is not restricted to the coating thereof, but has general application to the marking or coating of any elongated article to which reference will be made later.

In FIG. 1 depicting an exemplary embodiment of the invention, the apparatus **10** includes a tank **11** which can be of any conventional size and shape. However, it must be suitable for holding a certain quantity of dye solution **12** and be of such construction as to allow rotatable suspension of a movable assembly yet to be described. The dye solution **12** is provided with a suitable detergent to facilitate foaming of the solution **12**. The detergent preferably should be non-ionic so as not to destroy the material being dyed.

In order to foam the dye solution **12**, an elongated hollow cylindrical gas distributing means **13** is located near the bottom of the tank **11** and extends along the longitudinal axis of the tank **11**. The cylindrical distributing means **13** is closed at one end and is completely submerged in the dye solution **12**. Holes **14** are symmetrically spaced along the top periphery of the cylindrical distributing means **13** to permit gas to exit the distributing means **13** and flow through the dye solution **12**. In order to maintain the proper pressure head, the distributing means **13** should be maintained level and the gas, exiting the distributing means, should preferably be maintained at no greater than 1 p.s.i. Emission of the gas in the dye solution containing the detergent causes a dye foam layer **15** to form on the top surface of the dye solution **12**.

Suspended over the tank **11** is a shaft **17** which may be rotatably mounted to, or over, the tank **11**. Fixedly mounted to the shaft for free rotation therewith is a dye transfer member or roller **18**. For ease of rotation, the roller **18** is preferably hollow.

The outer periphery of the roller **18** is provided with a plurality of teeth **19—19** which are circumferentially spaced about the roller in a plane perpendicular to the axis of rotation of the roller. As shown in FIG. 2, the teeth **19—19** are also spaced axially across the roller **18** to form a plurality of suitably shaped receptacles **21—21** to hold an article **22** in each receptacle. The teeth **19—19** may be of any suitable size or shape depending on the configuration of the article to be dyed. The sides **23** of the teeth **19—19** are suitably sloped so as to limit the amount of dye foam **16** picked up by surface tension effects in the receptacles **21—21**. This militates against the uneconomical use of the dye foam **16**. The circumferential spacing of the teeth **19—19** about the roller **18** forms a plurality of suitably shaped receptacles **24—24** which also pick up dye foam **16** as the teeth **19—19** are rotated through the foam.

A deflector **26** is located in the tank **11** and pivotally mounted by a hinge **27** at a bottom corner of the tank **11**. As shown in FIG. 1, the deflector **26** is made adjustable as to the arc of rotation by screw **28** secured to both the deflector **26** and the tank **11**. Use of the deflector **26**, in close proximity to the end portions of the teeth **19—19** restricts the dye foam **16** to the receptacles **21** and **24**.

The elongated articles **22—22** to be dyed, for example, a plurality of pulp-insulated wires, are continuously coated with the dye foam **16**, shown as coating **29**, as there is dye foam in receptacles **21** as well as receptacles **24**.

The operation of the apparatus **10** is as follows. First, the dye solution **12** is prepared by taking approximately 100 cc. of liquid detergent, for example, Syntalpol K–4 manufactured by Pioneer Chemical Company, and diluting it with a gallon of water. Approximately 5 grams of dye, such as Dye 3749 manufactured by Allied Chemical Company, Inc., is then added to five gallons of water. Finally, approximately 50 cc. of the previously diluted detergent is added.

The final dye solution **12**, thus prepared, is placed in the tank **11** so as to completely immerse the cylindrical distributing means **13** but leaving sufficient space to allow a dye foam layer **16** to be formed between the dye solution **12** and the roller **18**.

Air, at low pressure, is injected into the distributing means **13**, and is emitted into the dye solution **12** via the holes **14** in the distributing means **13**. In consequence thereof, a dye foam layer **16** is formed which is used in imparting the desired coating **29** on the advancing elongated article **22**.

The roller **18** should be suspended over the dye foam layer **16** such that only the teeth **19—19** and the attendant receptacles **21** and **24** are immersed in the foam **16**. The teeth **19—19** should not touch the dye solution **12** itself.

As a pulp-insulated wire is advanced from a supply source (not shown) it frictionally engages the receptacle **21** on the roller **18**. As the wire continues to advance, the frictional engagement thus created causes the roller **18** to rotate. As seen from FIG. 1 the roller **18** will rotate clockwise if the wire is advanced from left to right.

As the roller **18** rotates, the teeth **19—19** agitate the dye foam layer **16** thereby maintaining the proper bubble size. As the roller **18** rotates, a portion of the dye foam **16** is picked up and retained within the receptacles **21** and **24**. As the roller **18** continues to rotate, any excess dye foam **16**, not contained within the receptacles **21** and **24**, is forced back to the dye foam layer **16** because of the blocking action of the deflector **26**. Further advancement of the wire and rotation of roller **18** allows the dye foam **16** to permeate and hence coat the wire as the wire frictionally engages the receptacle **21**. Then the advancing wire is directed to an oven (not shown) in order to dry the coating **29** heretofore made. In this manner, the elongated article **22** may be colored any desired color to color-code the article and permit ready identification of each article.

In an alternative embodiment, the distributing means **13**, the dye foam **16**, and the deflector **26** are not used. As shown in FIG. 3, the teeth **19—19** are provided with receptacles or grooves **30—30** in the end portions thereof. The roller **18** is suspended over the dye solution **12** such that only the grooves **30—30** are immersed. As the roller **18** rotates, in relation to the advancing wire, the dye solution **12** is captured in the grooves **30—30** by surface tension and is subsequently applied to the wire as discrete marks. The dimensions of the receptacles **21** and **24** are chosen so that surface tension effects are insufficient to pick up and retain sufficient dye in the receptacles to engage the wire. In this manner, the dye is applied in discrete marks rather than a continuous coating. In this embodiment, it is not necessary to use a detergent in the dye solution **12**.

As will be appreciated by one skilled in the art, additional embodiments may be used without departing from the spirit or scope of the present invention. For example, a plurality of apparatus **10** may be linked in series or in tandem depending on what particular color scheme is desired. Then, too, the size and shape of the receptacles **21** and **24** or grooves **30—30** may be varied to correspond to the size and shape of the wire to be coated. Also, the roller **18** may contain grooves between the teeth **19—19** further varying the size and shape of the receptacles **21** and **24**. Considering all these above-mentioned alternatives the apparatus **10** described still requires few moving parts and is hence simple and economical to operate and maintain. Nevertheless, what is herein disclosed is merely illustrative and may be further modified and departed from in many ways without departing from the spirit and scope of the invention.

What is claimed is:

1. Apparatus for color-coding an elongated article, said apparatus comprising:

a tank suitable for containing a dye solution;

means for introducing a gas near the bottom of said tank to foam said dye solution and form a layer of foam on said dye solution;

a roller mounted for free rotation above said tank, said roller having at least a plurality of receptacles radially disposed around the periphery thereof, said receptacles defined by side walls of a plurality of teeth disposed about said roller to define circumferentially extending receptacles therebetween; and

means for displacing the elongated article tangentially to said roller so that upon advancement of said elongated article, said roller will rotate to transfer said foam in said receptacle from said tank to said advancing article.

2. Apparatus according to claim **1** wherein said dye solution contains a non-ionic detergent.

3. Apparatus according to claim **1** comprising, in addition:

a deflector for blocking the upward pasage of any excess foam lying substantially outside said receptacles on said roller.

References Cited

UNITED STATES PATENTS

945,622	1/1910	Slaughter	118—DIG. 20
1,369,450	2/1921	Manss	118—234 X
1,662,086	3/1928	Stuhr	118—234 X
2,331,207	10/1943	Lodge	118—234
3,043,721	7/1962	Burns	118—234 X
3,135,630	6/1964	Bielinski et al.	118—410
3,509,850	5/1970	Geating	118—234 X

JOHN P. McINTOSH, Primary Examiner

U.S. Cl. X.R.

68—202, 207; 118—221, 234