

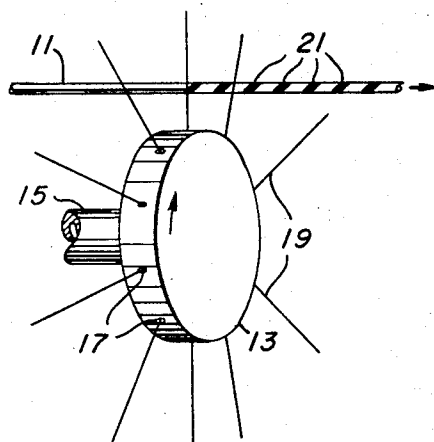
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3,343,981

COLOUR CODING APPARATUS

Filed Nov. 29, 1963



PRIOR ART

FIG. 1

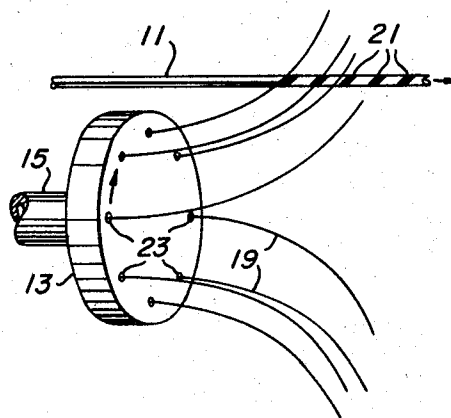


FIG. 2

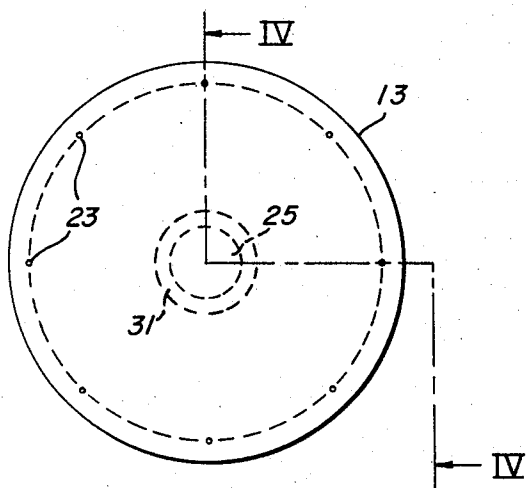


FIG. 3

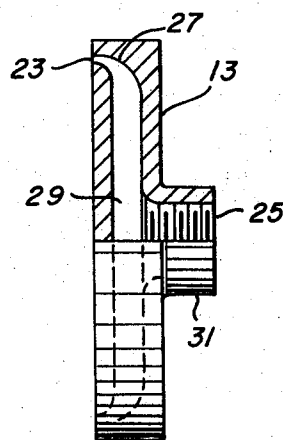


FIG. 4

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3,343,981

COLOUR CODING APPARATUS

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ABSTRACT OF THE DISCLOSURE

A conventional color coding apparatus in which a wire passing therethrough is coated at spaced intervals with liquid coloring from outlets on the periphery of a rotating wheel which rotates about an axis parallel to the direction of movement of the wire having as an improvement the disposition of the outlets on the face of the wheel facing in the direction of movement of the wire to provide the liquid color ejected therefrom besides a velocity component towards the wire due to the centrifugal force applied by the rotating wheel, a velocity component in the direction of the wire such that the liquid coloring contacts the wire downstream of the rotating wheel and allows for the marking of high-speed wires.

The present invention relates to an improvement in colour coding apparatus for applying liquid colouring to a moving member such as a wire.

In the electrical and communications engineering arts, it is frequently necessary to apply colour coding to electrical conductors such as wires for the purpose of identifying the wires or their characteristics. Accordingly, colour coding apparatus has been devised to apply colour to the wire. Such apparatus is disclosed, for example, in United States Reissue Patent No. 24,923 (W. L. Hoff, January 17, 1961), United States Patent No. 3,021,815 (J. L. Burke et al., February 20, 1962) and United States Patent No. 2,989,943 (T. C. Fitzgerald et al., June 27, 1961).

Colour coding apparatus as described in the aforementioned patents includes means for moving a wire past the periphery of a hollow wheel whose axis of rotation is parallel to the direction of motion of the wire. The wheel is provided with a plurality of peripheral outlet-ports through which colouring liquid is ejected as the wheel is rotated. As the wire advances, the rotating wheel produces marks along the wire spaced in a manner dependent upon the spacing between adjacent output ports, the size of the ports, the pressure of the liquid, and the speed of rotation of the wheel. If dots are to be marked on the wire, small ports may be used on the wheel, and dashes on the wire are provided by a number of small ports placed in close proximity to one another. Any suitable combination of dots and dashes may be produced by using wheels having an appropriate series of output ports along the periphery of the wheel.

In presently known colour coding apparatus, the hollow wheel such as described above is provided with output ports facing outwards along the outer rim of the wheel. The jets of liquid emanating from the wheel therefore are ejected radially from the periphery of the wheel. Accordingly, if the moving wire is advancing at an appreciable speed, the dots and dashes tend to become blurred as the speed increases, because of the great velocity of the wire

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with respect to the zero axial velocity of the liquid jets.

The aforementioned disadvantage is overcome according to the present invention by providing in colour coding apparatus of the character described, a colour coding hollow wheel having output ports arranged so as to eject colouring liquid axially in the direction of motion of the wire instead of radially from the wheel. Accordingly, if the wheel were absolutely still, the output ports on a wheel constructed according to the present invention would eject liquid parallel or nearly parallel to the wire and in the same direction as the direction of motion of the wire. As soon as the wheel is rotated, however, a centrifugal force component is imparted to the jets of liquid emanating from the ports on the wheel, and the jets tend to escape beyond the confines of the circle defined by the periphery of the wheel. Accordingly, those jets of liquid in the vicinity of the advancing wire will intercept the wire and produce coloured markings on the wire similar to those obtained using previously known colour coding apparatus. However, because of the axial component of the velocity of the escaping liquid, it is possible to advance the wire past the wheel without obtaining blurred marking at much higher velocities than has heretofore been possible. Optimally, the axial velocity of the jets of liquid should equal the speed of travel of the wire, so that the liquid strikes the wire as though the wire were at rest and the liquid jets had only a radial velocity component.

The invention will now be described with reference to the accompanying drawings, in which:

FIGURE 1 is a simplified drawing of colour coding apparatus constructed according to known methods in the prior art;

FIGURE 2 is a simplified diagram illustrating colour coding apparatus constructed according to the present invention;

FIGURE 3 is a view of the face of the wheel used in colour coding apparatus constructed according to the present invention; and

FIGURE 4 is a view partially in section, of the wheel shown in FIGURE 3 taken along the line IV-IV.

A simplified diagram of colour coding apparatus of the character described and known in the prior art is shown in FIGURE 1. In this figure, a wire 11 is shown advancing past the periphery of a colour coding wheel 13. The wheel 13 is hollow and is connected to a hollow drive shaft 15 so that rotation may be imparted to the wheel via the shaft by driving means not shown. Colouring liquid passes through the hollow drive shaft 15 and into the interior of the hollow wheel 13. Liquid escapes from the wheel 13 through peripheral openings 17 spaced along the outer circumference of the wheel. The liquid jets 19 escaping from the peripheral output ports 17 then intercept the moving wire 11 as the wire advances and the wheel 13 rotates, causing a series of markings 21 to be made on the wire 11. The wire 11 is preferably placed above or alongside the wheel 13 so that spurious dripping of liquid from the wheel 13 does not strike the wire 11.

In the wheel constructed according to the prior art, the output ports 17 are placed on the periphery of the wheel 13 and facing outwards so that the jets of liquid 19 escape radially from the wheel. Accordingly, because there is no axial component of the velocity of the liquid jets 19, the markings 21 on the wire 11 tend to become blurred with increasing speed of travel of the wire 11.

A simplified embodiment of colour coding apparatus constructed according to the present invention is illustrated in FIGURE 2. A hollow wheel 13 is driven by a hollow drive shaft 15 according to previously known methods in the same manner as the wheel 13 of FIGURE 1 is driven. The wheel 13, however, is provided with a plurality of spaced output ports 23 which are arranged near the periphery of the wheel 13 and on the face of the wheel 13 which faces in the direction of movement of the advancing wire 11. In the embodiment shown in FIGURE 2, this face is opposite that attached to the drive shaft 15. The colouring liquid for marking the wire 11 advancing alongside the wheel 13 in the direction of the arrow shown in FIGURES 1 and 2, enters the drive shaft 15 in known manner and is conducted, preferably under pressure, to the interior of the wheel 13.

The output ports 23 are oriented in the direction of motion of the advancing wire 11. If the wheel 13 were not rotated, the output jets 19 emanating from the ports 23 would travel parallel to the wire 11 without intercepting it, and would ultimately fall away from the wire 11 because of the influence of gravitational force. However, if the wheel 13 is rotated with some appreciable speed, a centrifugal component is imparted to the velocity of the output liquid jets 19, which then bend away from the periphery of the wheel 13 as shown in FIGURE 2. As the wheel 13 rotates, each jet of liquid in turn strikes the wire 11, because the jets have sufficient centrifugal velocity components to intercept the wire. The interception of the jets by the wire forms a series of spaced markings 21 on the wire 11 as it advances. Because of the initial axial component of velocity of the liquid jets 19, it is possible to move the wire 11 at much higher speeds relative to the wheel 13 than has heretofore been possible, because when the wire is travelling with a velocity equal to the axial velocity of the jets 19, the interception of the jets by the wire occurs as if the wire were standing still, in the axial direction, relative to the source of the jets. In contrast, the colour coding apparatus constructed according to the prior art fails to achieve this advantage because the fluid jets 19 emanating radially from the periphery of the wheel 13 do not have any axial component and therefore the dots would blur due to the back flow of the colouring fluid when the wire is advancing at a high speed.

The construction of the wheel 13 is illustrated in greater detail in FIGURES 3 and 4. As shown in FIGURE 3, the output ports 23 are preferably spaced around a circle on the face of the wheel concentric with the circle defined by the periphery of the wheel 13. As FIGURE 4 shows in greater detail, the output ports 23 are preferably connected with the hollow interior 29 of the wheel 13 via smoothly curved connecting passages 27. The smooth curvature of the passages 27 ensures that frictional forces between the colouring liquid and the wheel do not reduce the escape velocity of the liquid jets unduly.

As FIGURE 4 illustrates, the face of the wheel opposite that provided with output ports 23 is connected to a coupling element 31 which is threaded so that it may be attached to a hollow driven shaft 15 (seen in FIGURE 2). The interior 25 of the coupling element 31 therefore provides a passage for liquid arriving from the interior of the hollow drive shaft 15 to the interior 29 of the wheel 13.

The other constructional details of colour coding apparatus according to the present invention may be similar to those described in United States Patents Nos. 2,989,943, 3,021,815 and United States Reissue Patent No. 24,923, referred to previously. However, because of the impartation of an axial component of velocity to the liquid jets 19, it will be necessary to provide a much larger enclosure for the wheel 13 than has previously been used.

The axial velocity of the escaping jets of liquid 19 can be varied by varying the pressure of the liquid within the hollow wheel 13. To ensure optimum markings of the wire 11, the axial component of velocity of the liquid

jets 19 should be exactly equal to the speed of travel of the wire 11.

While the ports 23 are conveniently manufactured to be parallel to the axis of rotation of the wheel 13, it is possible to arrange the ports at an angle to the axis if this is preferred for any reason. The fluid jets 19 do not need to leave the mouths of the ports 23 having only an axial velocity component—it is possible for them to have other velocity components. However, to obtain optimum results, the jets 19 should have an axial velocity component equal to the speed of travel of the wire 11 and should have no velocity component directed towards the centre of the wheel 13.

Instead of a hollow wheel 13, a plurality of axially directed nozzles connected to a rotating spindle might be used.

What I claim as my invention is:

1. In a method of applying a liquid coloring at spaced intervals along a wire moving at relatively high speed which comprises applying said coloring to said wire from a plurality of outlet ports located on at least one wheel rotating on an axis substantially parallel to the direction of movement of said wire the improvement which comprises projecting said liquid coloring from a plurality of ports located on that side of the wheel transverse to and facing the direction of movement of said wire such that said ejected liquid coloring has a velocity component both transverse of and parallel to said direction whereby to strike said wire downstream of its point of ejection.

2. A method as claimed in claim 1 in which the liquid coloring is supplied to the interior of the said hollow wheel under pressure such that the liquid coloring ejected from said ports has a velocity component parallel to said direction of movement of said wire of substantially the same velocity as said wire.

3. A method as claimed in claim 1 in which liquid coloring is projected onto said wire from two of said wheels located on either side of said wire.

4. In a color coding apparatus for applying liquid coloring at spaced intervals along a wire moving there-through said apparatus including at least one hollow wheel arranged to rotate about an axis substantially parallel to the direction of movement of said wire and a plurality of outlet ports in said wheel adapted to project coloring liquid supplied to the interior of said wheel onto said wire at spaced intervals the improvement which comprises said outlet ports located on that side of the wheel which is transverse to and faces the direction of movement of said wire so as to provide liquid color ejected from said outlet ports with a component of velocity both transversely of and parallel to said direction of movement of said wire.

5. In a color coding apparatus for applying liquid coloring at spaced intervals along a wire moving there-through said apparatus including at least one hollow wheel adapted to axially rotate on a hollow drive shaft about an axis substantially parallel to the direction of movement of said wire the bore of said shaft communicating with the interior of said wheel a plurality of outlet ports in said wheel adapted to project coloring liquid supplied under pressure through said bore to the interior of said wheel onto said wire at spaced intervals the improvement which comprises said outlet ports located on the side of said wheel which is remote from said shaft and is transverse to and faces the direction of movement of said wire so as to provide liquid color ejected from said outlet ports with a component of velocity both transversely of and parallel to said direction of movement of said wire.

6. An apparatus as claimed in claim 5 in which the outlet ports are located adjacent the periphery of said wheel.

7. An apparatus as claimed in claim 5 including two of said wheels located on either side of said moving wire.

8. In a color coding apparatus for applying liquid coloring at spaced intervals along a wire moving there-

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through said apparatus including at least one wheel arranged to rotate about an axis substantially parallel to the direction of movement of said wire and a plurality of outlet ports in said wheel adapted to project coloring liquid supplied thereto onto said wire the improvement which comprises locating said outlet ports so as to project said liquid coloring therefrom in a direction substantially parallel to and in the same direction as the direction of said wire whereby due to rotation of said wheel said liquid color ejected from said outlet ports has a component velocity both transversely of and parallel to said direction of movement of said wire.

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References Cited

UNITED STATES PATENTS

2,878,143	3/1959	Juvinall	117—105.3	X
3,021,815	2/1962	Burke et al.	118—314	
3,031,337	4/1962	Watanabe	117—93.42	
3,144,209	8/1964	Griffiths	239—223	X
3,176,650	4/1965	Woellner	118—314	

FOREIGN PATENTS

1,121,142	1/1962	Germany.
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