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APPARATUS FOR PROVIDING A STRIPED COVERING ON A WIRE

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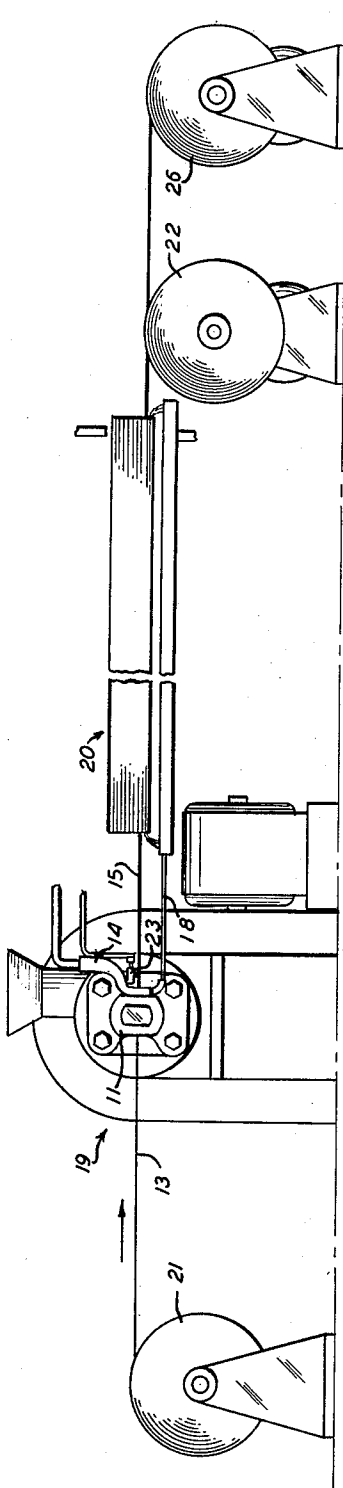


FIG. 1

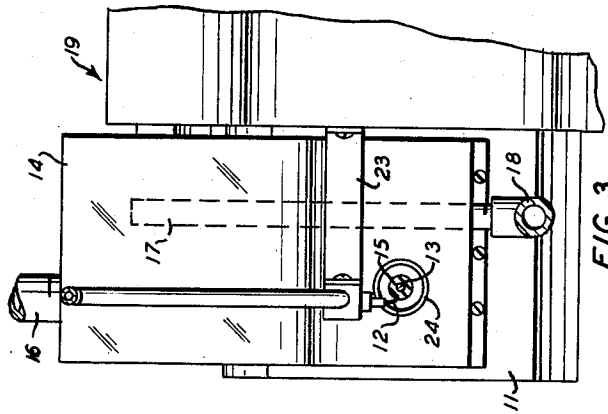


FIG. 3

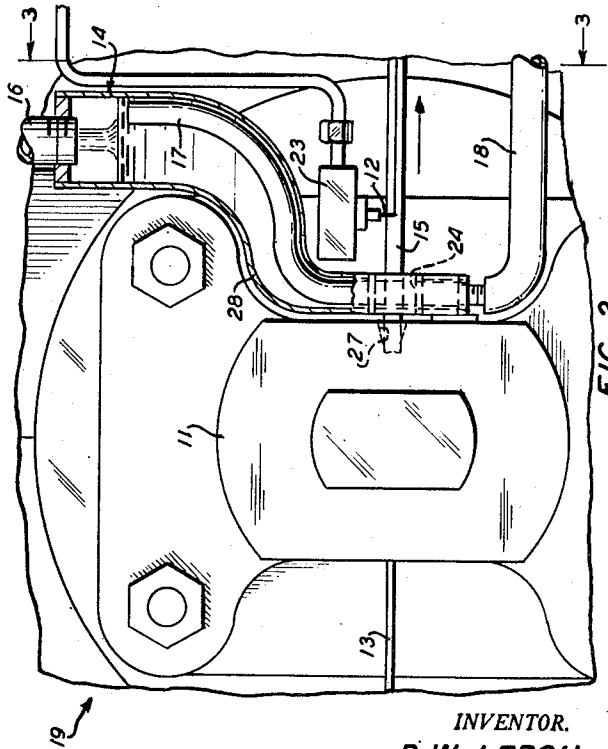


FIG. 2

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6 Claims. (Cl. 18—13)

This invention relates to apparatus for covering and striping a conductor, and more particularly to water-cooled baffles used for the protection of striping equipment in the manufacture of color striped insulated conductors.

In the manufacture of cables used in the communications field, the cable is frequently composed of a plurality of insulated conductors. Because of the large number of similar conductors contained within a single cable, it is necessary to provide means for identifying single conductors or groups of conductors contained therein. A means of identifying the conductors is the application of coloring matter to the insulation subsequent to extrusion; however, coloring matter placed on thermoplastic insulation, such as polyethylene, after the insulation has cooled and hardened tends to flake off because of the poor bond thereby produced between the coloring matter and the insulation. In order to weld the coloring material to the conductor insulation, it has been determined that a desirable location for apparatus placing a colored stripe or stripes on the continuously moving conductor is just adjacent to the extrusion orifice where the insulation is still hot and plastic. Two more desirable results of positioning the coloring apparatus at this point are that the hot wire quickly volatilizes the striping compound solvent thus preventing smearing, etc., and also the insulated conductor manufacturing line is thereby made shorter and more compact.

Because of the hot, plastic, easily damaged nature of the insulation covering as it leaves the extrusion orifice, the striping needle squirts on the ink rather than contacts the insulation surface. For the same reason no guide sheaves or other possible damage causing devices are allowed to contact the surface of the insulation immediately after its emerging from the extrusion orifice. This situation permits an increasing amplitude of vibration in the wire as it leaves the extrusion orifice, which makes it desirable that the striping needle be located very near to the head of the extruder so as to allow a smooth, uninterrupted and uniform stripe to be placed on the moving conductor. It is necessary to use inks in the striping equipment which have volatile solvents in them such as acetone or the like so that the ink will be completely dry before the fast moving conductor reaches the next operation in the production line. Because of the volatile nature of the ink solvent, it is necessary that the striping device and needle be kept cool to prevent clogging of the ink supply in the striping needle.

One possibly obvious solution to this problem might be covering the striping equipment with a coating of fibre glass or the like, however, such a solution would make it difficult for the operator to adjust the delicate hypodermic type needle of the striping device and also would fail to shield the operator's hands from the heat of the extruder while he makes adjustments.

It is, therefore, an object of this invention to prevent heat radiated from the extrusion head from reaching the striping equipment.

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Another object of the invention is to shorten the production line by allowing the striping device to be close to the extrusion orifice.

A further object is to produce a more uniform stripe on the conductor by allowing the striper to be located close to the extrusion orifice.

A related object is to prevent clogging of the ink emerging from the needle of the striper.

Yet another object is to make possible the welding of the coloring matter to the surface of the insulation while the surface is still hot and plastic.

Yet still another object is to protect the hands of the operator making an adjustment on the striping device.

Other objects and features of the invention will be more readily understood from the following detailed description, when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevation of an insulated conductor production line;

Fig. 2 is an expanded fragmental side elevation of the extruder head, striping device and liquid-cooled baffle, with part of the baffle broken away for clarity, and

Fig. 3 is a cross section taken along line 3—3 of Fig. 2 with portions thereby broken away for clarity.

Referring now in detail to the drawing, Fig. 1 shows an extrusion line for the extrusion of insulation around a moving conductor. The conductor 13 is drawn by a capstan 22 from a supply reel 21 to an extrusion unit, indicated generally at 19, through the extrusion head 11, where a covering of polyethylene or the like is extruded around it, and through a cylindrical opening 24 (Figs. 2 and 3) in a liquid-cooled baffle 14 mounted on the extrusion unit 19 between a striping device 23 and the extrusion head 11.

As the conductor advances in the direction of the capstan 22, a hypodermic type needle 12 (Figs. 2 and 3) of the color applicator 23 squirts a stream of coloring fluid on the side of the covered conductor 15 to produce a stripe thereon. The conductor is then drawn through a water trough 20, the principle purpose of which is to solidify the plastic insulation, but which also coagulates excess ink and condenses fumes produced by the extruder 19. After passing around the capstan 22, the covered conductor 15 is drawn onto a powered takeup 26.

Referring to Figs. 2 and 3, the liquid-cooled baffle 14 must have a liquid tank 28 of sufficient height and width to protect the striping equipment 23 from the heat of the extrusion head 11. As is shown in the figures the tank is so located as to shield the striping device 23 from the head of the extruder and since the striping device is located above the advancing wire the major portion of the tank 28 is also located above the wire. The small diameter and rapid movement of the covered conductor emerging from the extruder head 11 make it necessary to locate the striping needle 12 close to the extrusion orifice 27 of the extrusion head 11 because of the excessive vibration of the conductor as it moves away from the extrusion head. Therefore, the tank 28 must necessarily have a depth less than the distance between the extrusion head and the striping equipment.

In order to produce the desired cooling with a slight depth, the liquid-cooled baffle must have an efficient system of cooling which is provided for by a cooling liquid inlet pipe 16 secured to and opening into the upper portion of the tank 28, an overflow piping system comprising a hot liquid exhaust pipe 18 secured to the lower portion of the tank 28 and opening into the lower end of a drain pipe 17 projecting upwardly from the lower surface of the tank 28 and extending to a point below and near, yet not in line with the lower end of the pipe 16, so that a cooling liquid flowing into the tank

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28 from the inlet pipe 16 will circulate through the tank 28 before entering the exhaust pipe 18.

Operation

As above described, the conductor 13 is drawn by the capstan 22 through the extrusion head 11, where it is covered by polyethylene or like insulation, through the liquid-cooled baffle 14; under the striping device 23; and through the water trough 20. As a result of the extruder operation, heat radiates from the extrusion head 11 in all directions. Mounted on the extrusion unit 19 is the liquid-cooled baffle 14 between the striping device 23 and the extrusion head 11. A cooling liquid, for example water, is allowed to flow into the upper portion of the tank 28 by the pipe 16, and fills the tank to the top of the drain pipe 17, into which the overflow exits and passes to the pipe 18. This arrangement maintains a mass of relatively cold liquid in the tank 28 having a level equal to the top of the drain pipe 17 because the cold liquid introduced by the pipe 16 goes to the bottom of the tank, and the heated liquid rises and overflows so that there is always a sufficient amount of cold liquid in the tank 28 to keep the heat of the extruder from reaching the striping device 23 and evaporating the solvent in the striping compound emerging from the needle 12, thus preventing clogging of the needle.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. Apparatus for applying plastic insulation and color striping a moving conductor comprising an applicator for applying a coating of insulating material on a moving conductor, striping means of the type using a striping compound which is adversely affected by heat, said striping means being mounted adjacent to said applicator, and a liquid-cooled baffle mounted between said applicator and said striping means for protecting the striping means from the heat of the applicator.

2. Apparatus for applying plastic insulation and color striping a moving conductor comprising an applicator for applying a sheath of insulating material on a moving conductor, a striping device of the type using a striping compound containing a volatile solvent, said striping de-

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vice being mounted adjacent to said applicator so that the moving conductor has a minimum amount of vibration, and a liquid-cooled baffle mounted between said applicator and said striping device for protecting the striping device from the heat of the applicator.

3. Apparatus for applying plastic insulation and color striping a moving conductor comprising an extruder having an extrusion orifice, cooling means for hardening the plastic insulation on the conductor after the insulation has been extruded around the conductor, a striping device of the type using a striping compound containing a volatile solvent, said striping device being mounted between said extruder and said cooling means and adjacent to the extrusion orifice so that the moving conductor has a minimum amount of vibration, and a liquid-cooled baffle mounted between said extrusion orifice and said striping device for protecting the striping device from the heat of the extruder.

4. Apparatus of claim 2 in which the liquid-cooled baffle comprises a tank, a drain pipe having an inlet orifice which is located in the upper portion of said tank, and an inlet pipe opening into said tank and located so that a cooling liquid flowing into said tank from said inlet pipe will circulate through the tank before entering said inlet orifice.

5. Apparatus of claim 3 in which the liquid-cooled baffle comprises a tank, a drain pipe having an inlet orifice which is located in the upper portion of said tank, and an inlet pipe opening into said tank and located so that a cooling liquid flowing into said tank from said inlet pipe will circulate through said tank before entering said inlet orifice.

6. Apparatus of claim 3 in which said liquid-cooled baffle comprises a tank, an overflow pipe projecting through and upwardly from the lower surface of the tank and extending upwardly to a point below and near the upper surface of said tank, and an inlet pipe secured to and opening into the upper portion of said tank and located so that a cooling liquid flowing into said tank from said inlet pipe will circulate through said tank before entering said overflow pipe.

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