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STRAND COLORING APPARATUS

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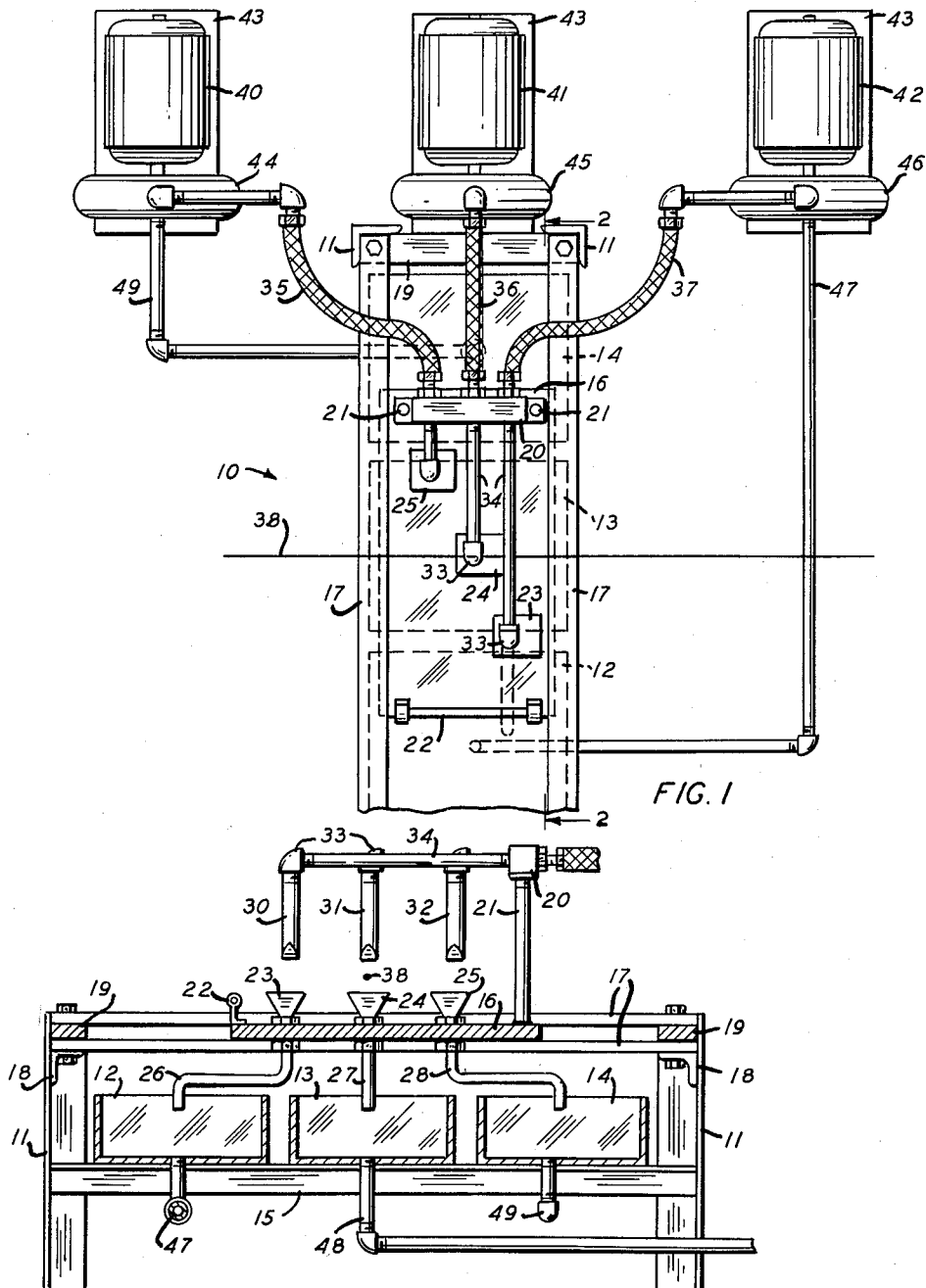


FIG. 2

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This invention relates to strand coloring apparatus, and more particularly to apparatus for applying a coloring fluid to a continuously advancing strand, such as an insulated conductor.

In the manufacture of cables which are used in the communication field, the cable is frequently composed of a plurality of insulated conductors. Because of the large number of similarly constructed insulated conductors contained within a single cable, it is necessary to provide means for identifying single conductors, or groups of conductors, contained therein. An obvious means of identifying the various conductors, and one which has been known to the art for a long time, has been the application of insulation of different colors to the various conductors.

When one is desirous of coloring an insulated conductor for purposes of identification, and the insulating of the conductor involves the application of an extrudable material by passing the conductor continuously through a conventional plastics extruder, one must make a choice between introducing colored plastic material into the extruder as against applying the coloring matter to the insulation subsequent to extrusion. The former method has proved costly because it involves intermittent operation of the extrusion apparatus, since it is necessary to shut down the extruder and dismantle the tools in order to thoroughly purge the extruder of insulating material when it is desired to change from one color to another.

Accordingly, it has been suggested that a covering of a plastic insulating material be applied to the conductor by means of an extruder, and that a liquid coloring material be applied to the covering immediately after extrusion. However, for certain purposes the apparatus heretofore known has not proved to be entirely satisfactory.

An object of this invention is to provide new and improved strand coloring apparatus.

Another object of this invention is to provide new and improved apparatus for applying a coloring fluid to a continuously advancing strand, such as an insulated conductor.

A further object of this invention is to provide new and improved strand coloring apparatus which permits changing from one color to another with substantially no scrap and with no interruption of extruder operation.

An apparatus illustrating certain features of this invention may comprise means for continuously supplying a stream of coloring fluid, means for directing the stream generally across the path traversed by a continuously advancing strand, and means for moving the stream of coloring fluid into and out of contact with the strand.

A complete understanding of the invention may be obtained from the following detailed description of an apparatus constituting a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a plan view of an apparatus embodying the invention with certain portions broken away, and

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Fig. 2 is a vertical section taken along line 2—2 of Fig. 1.

Referring now in detail to the drawings, Fig. 1 shows a frame, designated generally at 10, supported by legs 11—11, which are suitably secured to the floor. A plurality of containers 12, 13 and 14 are supported within the frame 10 by angle irons, such as the angle iron 15 (Fig. 2). A plate 16 is slidably mounted between two pairs of bars 17—17 secured to the legs 11—11 by means of angle clips 18—18 and spaced apart by members 19—19. A pipe support 20 is secured to the plate 16 by means of posts 21—21. The plate 16 is fitted with a handle 22 and is freely movable along the guideway formed by the bars 17—17, the maximum amplitude of movement being controlled by the abutment of the sides of the plate 16 with the members 19—19.

A plurality of funnels 23, 24 and 25 are rigidly mounted on the plate 16 by means of suitable pipe couplings. A plurality of spouts 26, 27 and 28, one for each funnel, each leading to a separate one of the containers, are attached to the bottom of the plate 16 in a suitable manner so as to provide a conduit from each funnel to the containers 12, 13 and 14, respectively. As shown in Fig. 2, the configuration of the spouts 26, 27 and 28 and the size of the containers are such as to eliminate interference between these members as the plate 16 is advanced to the right or to the left. The spouts may be made of flexible plastic tubing of sufficient length to permit free motion of the plate 16 without withdrawing the tubing from its associated container.

A series of nozzles 30, 31 and 32, one for each of the funnels 23, 24 and 25, are mounted in the pipe support 20 by means of elbows 33—33 and nipples 34—34, so that each nozzle is immediately above one of the funnels. Flexible hoses 35, 36 and 37 are suitably connected to the nipples 34—34. As shown in Fig. 2, sufficient clearance is provided between each nozzle and its associated funnel to permit a strand, such as an insulated conductor 38 to pass therebetween.

Electric motors 40, 41 and 42 are mounted on plates 43—43 suitably affixed to the floor. Positive displacement, gear pumps 44, 45 and 46 are also mounted on the plates 43—43, each operatively connected to its respective motor. The discharge side of each of the pumps 44, 45 and 46 is connected to the flexible hoses 35, 36 and 37, respectively. The use of the flexible hoses makes it possible to advance the plate 16 to the right or to the left freely. One end of each of inlet pipes 47, 48 and 49 is connected to the inlet side of the pumps 44, 45 and 46, respectively, while the other end of each pipe is connected to the particular container from which a given pump withdraws fluid.

From the above description, it is apparent that this embodiment of the invention contemplates a plurality of fluid circuits, in which each circuit includes a container connected by suitable piping to an inlet side of a pump, thence through a flexible hose to a nozzle, a funnel, and through a spout back to the container.

Operation

Each of the containers 12, 13 and 14 is filled with a coloring fluid of a different hue. Upon the operation of a pump, such as the pump 44, fluid is drawn from the container 14 through the pipe 49 to the pump 44. From the pump 44 the fluid is advanced continuously through the flexible hose 35, the nozzle 32, the funnel 25, and the spout 28, back into the container 14. Coloring of the continuously advancing insulated conductor 38 is accomplished simply by moving the plate 16 along its slide until the stream of coloring fluid supplied by the pump 44 falls upon the advancing conductor.

In order to maintain a continuous flow of fluid, and in

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order to color the surface of the advancing conductor completely, the quantity of fluid supplied by the pump 44 is greatly in excess of the quantity which would be required to cover a unit length of insulated conductor using a conventional applicator, such as a brush.

When it is desired to change the color being applied to the advancing conductor from that which has been placed in the container 14 to that which has been placed in another container, such as the container 13, without interrupting the continuous advance of the conductor, the pump 45 is placed in operation. The operation of the pump 45 causes a stream of a colored fluid of another hue to pass from the nozzle 31 to the funnel 24, and a change of the color being applied to the advancing conductor may be rapidly accomplished, and with substantially no scrap, by shifting the plate 16 until the colored stream passing from the nozzle 31 to the funnel 24 contacts the insulated conductor.

A typical coloring fluid, and one which would be suitable for coloring a plastic insulation, may be composed of a pigment, such as Blue Toner, a dispersing agent, such as light process oil, and a vehicle, such as carbon tetrachloride, and may be combined in the following proportions: 10 grams of pigment, 60 milliliters of oil, and 1200 milliliters of carbon tetrachloride.

Typical plastic insulating materials, which may be used in the practice of this invention, may include compounds of polyvinyl chloride resins, or polyethylene resins which are applied in cellular form.

While the above-described apparatus operates upon a single strand, it is further obvious that it may readily be adapted to operate upon a plurality of advancing strands.

What is claimed is:

1. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a support positioned adjacent to and movable transversely across the path of the strand, a plurality of nozzles directed generally towards the path of the strand and mounted spacedly on the support in a row which extends transversely across said path, a plurality of fluid supply means connected to the nozzles to supply one of a plurality of differently colored fluids to each of the nozzles, means for moving the support to a plurality of positions spaced transversely across the path of the strand to bring a selected one of the nozzles into alignment with said path and direct a single colored fluid onto the advancing strand, and a plurality of separate containers one for each of the differently colored fluids posi-

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tioned below the nozzles to catch the fluids emitted by the nozzles.

2. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a frame positioned adjacent to the path of the strand, a track mounted on the frame and extending transversely across said path, a support mounted slidably upon the track, a plurality of nozzles directed generally towards the path of the strand and mounted spacedly on the support in a row which extends transversely across said path, a plurality of pumps connected to the nozzles to supply one of a plurality of differently colored fluids to each of the nozzles, means for moving the support along the track to bring a selected one of the nozzles into alignment with said path and thereby direct a single colored fluid onto the advancing strand, and a plurality of separate containers one for each of the nozzles and their associated pumps mounted on the frame below the nozzles to catch the differently colored fluids emitted by the nozzles.

3. An apparatus for applying to a strand advancing longitudinally along a predetermined path a colored fluid selected from a plurality of differently colored fluids, which comprises a frame positioned adjacent to the path of the strand, a plurality of containers mounted on the frame one for each of a plurality of differently colored fluids, a track mounted on the frame above the containers and extending transversely across the path of the strand, a support mounted slidably upon the track, a plurality of nozzles directed downwardly each toward one of the containers and mounted spacedly on the support above the path of the strand in a row which extends transversely across said path, a plurality of constant displacement pumps each connected to one of the containers, a plurality of flexible hoses connecting the pumps with the nozzles to supply one of the plurality of differently colored fluids to each of the nozzles, and means for moving the support along the track to bring a selected one of the nozzles into alignment with said path and thereby direct a stream of colored fluid emitted from the selected nozzle onto the advancing strand.

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