

Aug. 4, 1964

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METHODS AND APPARATUS FOR APPLYING
COVERINGS TO ELONGATED MEMBERS

3,143,583

Filed Sept. 26, 1961

2 Sheets-Sheet 1

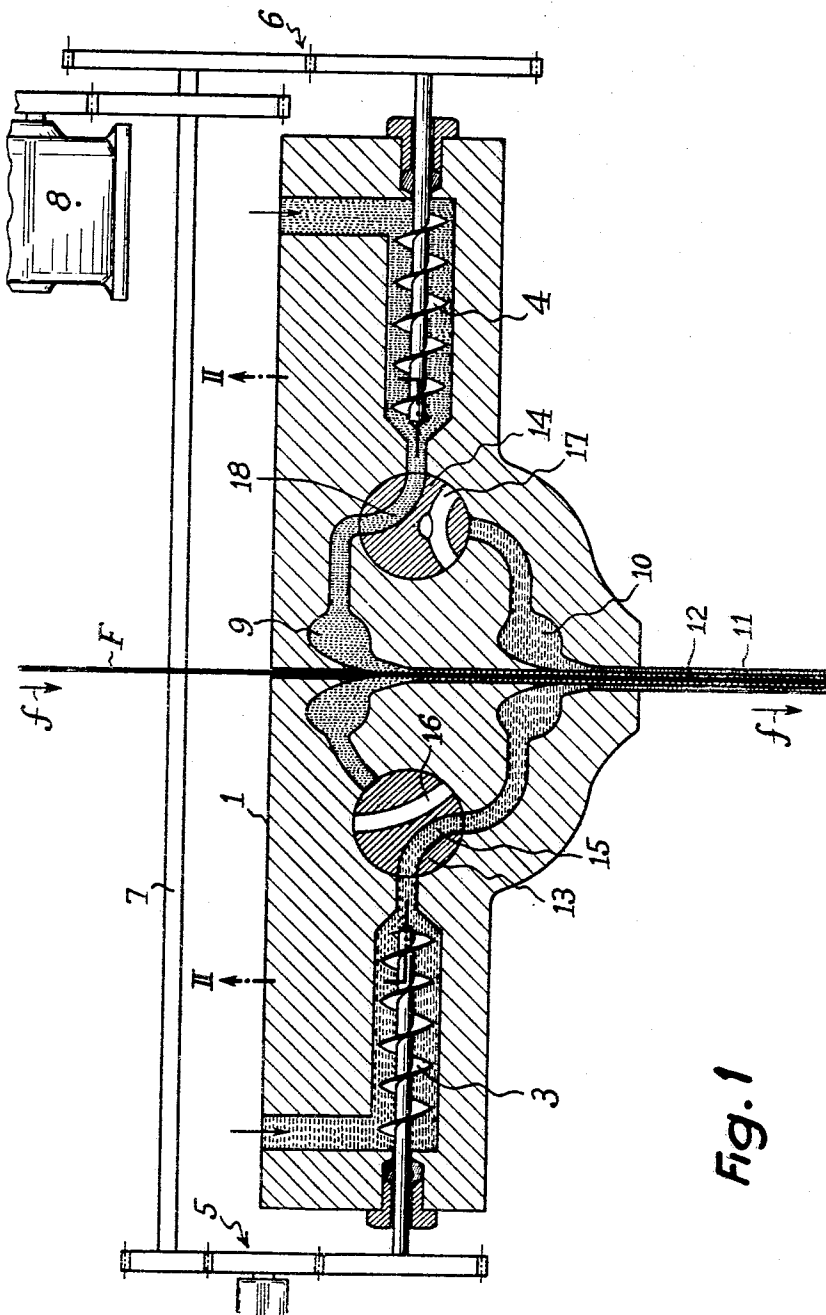


Fig. 1

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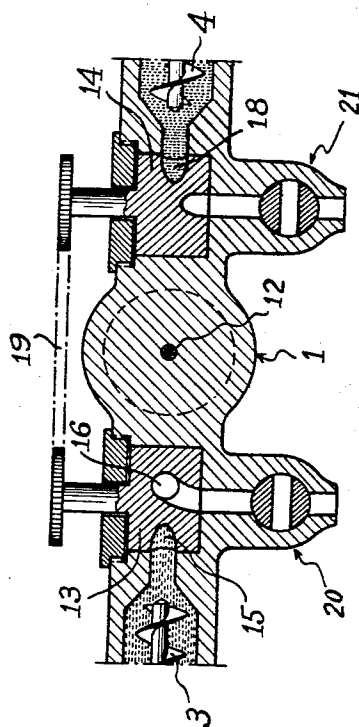
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Fig. 2



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METHODS AND APPARATUS FOR APPLYING COVERINGS TO ELONGATED MEMBERS

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Filed Sept. 26, 1961, Ser. No. 140,888

Claims priority, application France Sept. 29, 1960

7 Claims. (Cl. 264—174)

The present invention relates to methods and apparatus for applying coverings, consisting of at least two superimposed layers of material, to elongated members, such as wires or cables.

Telephone cables generally comprise a large number of individual conductors or wires which are identified by the color of their coverings. It is thus desirable to provide a method and associated apparatus which not only allows an insulating covering of the desired color to be applied to the wire but also enables the color of this covering to be changed quickly without interrupting the operation of the apparatus and with the minimum wastage of wire and covering material.

In known machines for applying coverings, in order to change the color of the covering it is necessary to stop the machine and clean the body, the extrusion screws and the extrusion head thereof. This is a long and delicate process and is expensive, since all the material inside the machine is wasted. In covering telephone cables having a plurality of conductors requiring a number of colors, the cleaning operation must be repeated so often that the production rate of the machine tends to fall, sometimes below half the theoretical rate of production.

In order to avoid the above drawback, the present invention has for an object to provide methods of applying successive coverings of different colors to an elongated member without interrupting the output of this member. The method consists in the steps of applying a covering composed of at least two superimposed layers of material of different colors to the member, said layers being applied successively, and altering the order of application of said layers when it is desired to alter the color of the outer layer.

From the practical point of view two layers will most often be used so that, on alteration or reversal, the inner layer becomes the outer layer. Thus the color of this inner layer only appears after reversal, but it is capable of being prepared inside the corresponding extrusion head so that instead of having to clean a single head in order to be able to apply a second color after a first, it is sufficient to apply the first color as an outer layer and then to reverse the layers when it is desired to cause the second color to appear on the outside. At the moment of reversal, there may, of course, be a certain mixing of the two colors on the outside, but this drawback occurs only over a short length of wire so that only a small quantity of wire and material is wasted. In any case, the apparatus does not have to be cleaned and therefore it does not have to be stopped.

It is another object of this invention to provide apparatus for applying a covering composed of at least two superimposed layers of material to a continuously moving elongated member, in which the layers are applied successively to the member and their order of application can be altered.

Of course in the case in which more than two layers are applied, the apparatus will have as many extrusion screws as layers, but it will be apparent that it is the material supplied to the extrusion screw which feeds material to the point of application located furthest forward on the member to be covered which gives the member its final color. Thus it will be sufficient to describe

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the present invention with relation to two extrusion screws.

Other objects and advantages of this invention will be apparent from the following description in association with the accompanying drawings wherein:

FIGURE 1 is a section through apparatus incorporating one embodiment of the present invention employing two extrusion screws, and

FIGURE 2 is a section on the line II—II of FIGURE 1.

Referring to the drawing, the apparatus comprises two extrusion screws 3 and 4, arranged coaxially and opposite one another in a single body member 1. However, it will be apparent that the screws can also be arranged angularly inclined or staggered in relation to one another. The extrusion screws are shown as applying layers of material successively to an elongated member in the form of a metal wire F, which is continuously moving in the direction of the arrows f. The two extrusion screws are driven by means of gears 5 and 6, respectively, from a single shaft 7 rotated by a motor 8.

Between the two extrusion screws are located two extrusion heads 9 and 10, which coaxially feed the material coming from the two screws on to the wire F. The two layers 11 and 12, and the material delivered by the heads 9 and 10 about the wire F must be equivalent in quantity of material, the output of the two screws 3 and 4 being the same, as will be apparent from the following description.

Rotary valves 13 and 14 are located at the ends of the extrusion screws 3 and 4 respectively. The valves comprise a pair of channels 15, 16 and 17, 18 respectively arranged in such a way that each screw may deliver material to one of the two heads while being isolated from the other and vice versa. In other words, as may be better seen in FIGURE 2, the two valves 13 and 14 are connected by a connection 19 so that the extrusion screws constantly feed a constant total amount of material, but each screw delivers to a different extrusion head.

The lengths of the channels connecting the screws to the heads 9 and 10 are substantially equivalent so as to avoid any differential in the quantity of material respectively delivered by each head. As may be seen in FIGURE 2, a relief system is provided for each head by the valves 20 and 21.

The operation of the apparatus is as follows:

Assuming of course that the outer layer of material is sufficiently opaque for the inner layer to be undetectable therethrough, the outer layer is constituted by the desired color, whilst the inner layer may have any color.

In the position shown, it is the extrusion screw 3 which feeds material for the outer layer 11, by means of the channel 15 of the valve 13, into the head 10. During this time, the screw 4 feeds material of any color into the head 9 via the channel 18 of the valve 14, this color not appearing but remaining in the form of an inner layer. In this position the head 9 cannot be in communication with the screw 3, since the channel 16 of the valve 13 is blocked. Similarly the screw 4 cannot be in communication with the head 10 since the channel 17 of the valve 14 is also blocked.

Thus any length, for example 10,000 metres, of the same outer color may be extruded onto the wire F without concern about the color simultaneously being extruded by the head 9 in the form of the inner layer 12. It is only when it is desired to change the color of the outer layer that reversal must be prepared for by introducing the color of the new outer layer into the extrusion screw 4 without, however, reversing the valves 13 and 14. During this preliminary operation the two colors, that is the color of the former inner layer and the color of the next outer layer are mixed, then the new color progressively drives off the old one and completely replaces it.

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Assuming that this change takes place in the inner layer, it is not visible from outside. The length of wire F moved through the apparatus during this time is almost negligible, but obviously it should correspond at least to the length necessary for the duration of time required for the complete change of color.

Once this preliminary preparation is finished, the apparatus is stopped for a moment and the position of the valves 13 and 14 is reversed so that the screw 3 communicates with the head 9 via the channel 16 and the valve 13, whilst the channel 15 becomes blocked off, and the screw 4 communicates with the head 10 via the channel 17 of the valve 14, whilst the channel 18 becomes blocked off. During this time the relief valves 20 and 21 may be opened in order to extract any material remaining in the channels and in the heads themselves. Since this volume of material is very small the operation takes a very short time and any wastage is negligible.

The relief valves 20 and 21 are then closed and the apparatus is once more set in motion and the subsequent length of the wire F is covered. The screw 4 now feeds material for the new outer layer color, whilst the material of the former outer layer, fed by the screw 3, forms the inner layer and is no longer visible.

Obviously, it is possible to carry out the alteration of color without even stopping the machine; the wastage will simply be a little more considerable since a certain length of wire F will be covered with a mixture of colors. In this particular case the valves 13 and 14 must be operated in synchronism via the mechanism 19, and the total number of channels connecting the screws to the heads must remain constant so that the total quantity of extruded material remains the same; in this case the relief valves 20 and 21 can, of course, be eliminated since the material drawn off then constitutes a small portion of the covering of the wire.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that this invention is not limited to this precise form of apparatus and that changes may be made therein without departing from the scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for applying a covering consisting of at least two superimposed layers of material to a continuously moving elongated member, comprising means defining a path of movement for said elongated member, a plurality of extrusion heads located at successive points along said path, a corresponding number of extrusion screws and selectively operable means for connecting said extrusion screws to selected heads.

2. Apparatus for applying a covering consisting of at least two superimposed layers of material to a continu-

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ously moving wire, comprising means defining a path of movement for said wire, two extrusion heads located one after the other along said wire, two extrusion screws, and valve means selectively operable to connect said extrusion screws to different heads.

3. Apparatus as claimed in claim 2, comprising a pair of channels leading from each of said extrusion screws respectively to the extrusion heads, valve members associated with each pair of channels for directing the material from the associated extrusion screw into one or other of said channels, and means for co-ordinating the movement of said valve members to cause said members to connect the extrusion screws to different heads.

4. A method of applying successive coverings of different color to an elongated member comprising covering the member along a portion of the length thereof with inner and outer layers of material wherein the outer layer is substantially opaque and completely covers the inner layer, changing the color of the inner layer to that which it is desired to cover a further length of the elongated member with and while the outer layer is still being applied around the inner layer, and reversing the positions of the layers on said member for said further length so that the inner layer with the desired color is outermost on the member for said further length thereof.

5. A method of applying successive coverings of different color to a wire comprising feeding the wire axially thereof, covering the wire, as the same is being fed, with an inner layer of material and with an outer opaque layer which completely covers the inner layer, changing the color of the inner layer while still covering the inner layer with the opaque outer layer, and then reversing the position of the layers on the wire such that subsequent lengths of the wire will be covered with the former inner layer of changed color.

6. A method as claimed in claim 5 wherein said wire is continuously fed during said changing of the color and during said reversal of the position of the layers on the wire.

7. A method as claimed in claim 5 wherein said wire is continuously fed during said changing of the color but is interrupted during said reversal of the position of the layers on the wire.

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