

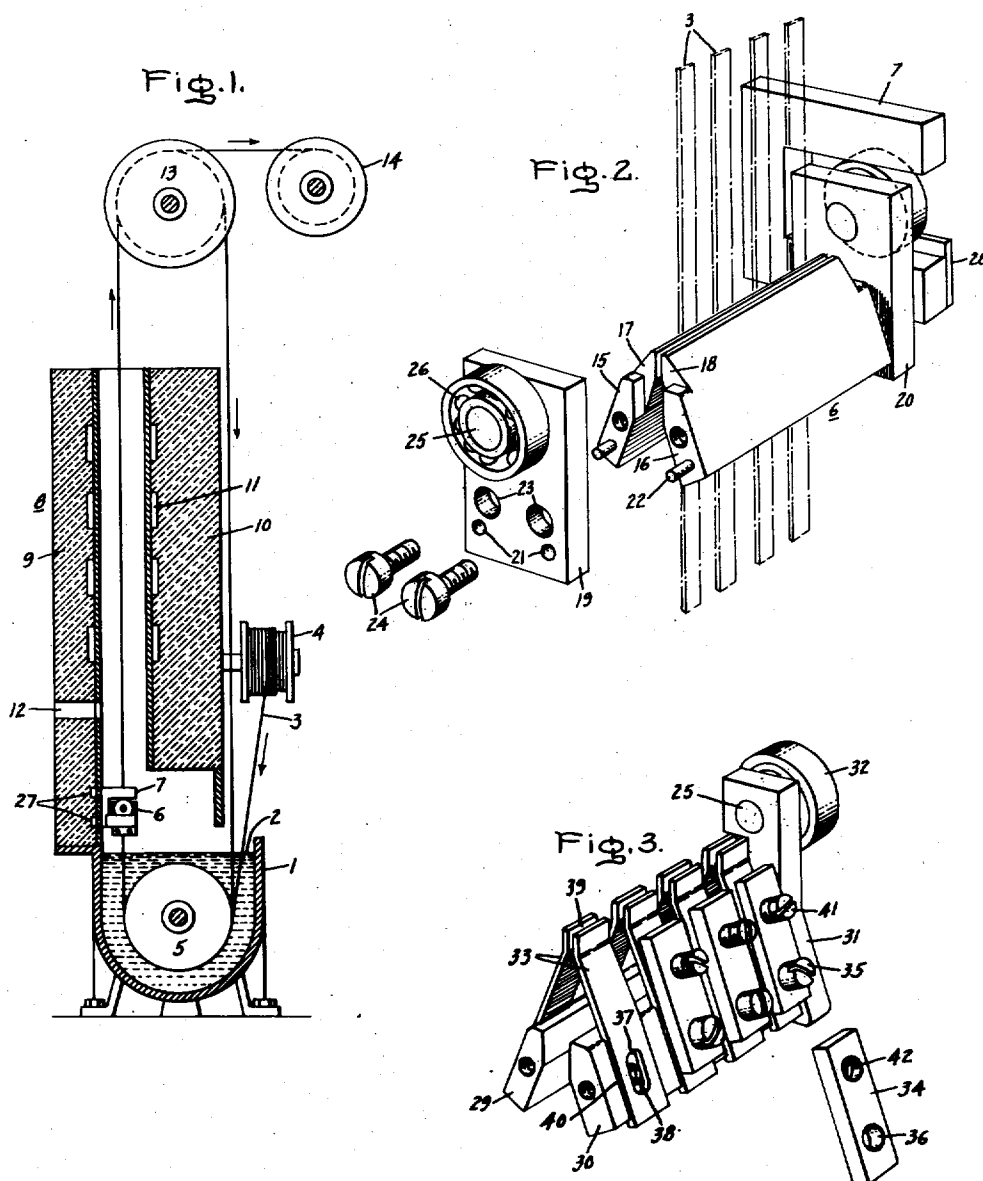
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R. L. KIERSPE

2,380,729

DIE FOR COATING RIBBON WIRE

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UNITED STATES PATENT OFFICE

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DIE FOR COATING RIBBON WIRE

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10 Claims. (Cl. 91—53)

The present invention relates to dies for coating wire especially ribbon wire with enamel, varnish, lacquer or like viscous coating material. The usual ribbon wire has a width of the order of 100 mils and a thickness of about 4–15 mils.

The object of my invention is to provide an improved die whereby one or several coatings of uniform thickness may be effectively applied to ribbon wires.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing.

In the drawing Fig. 1 illustrates an apparatus for enameling ribbon wire including a die embodying my invention; Fig. 2 is an exploded perspective view of the die of Fig. 1; and Fig. 3 illustrates a modification of the die.

The enameling or coating apparatus in the present example as shown in Fig. 1 comprises a container 1 for viscous coating material 2. A ribbon wire 3 to be coated is brought from a pay-off reel 4 over a guide sheave 5 immersed within the liquid coating material 2. The wire leaves the container 1 with its surface covered with a non-uniform thick layer of coating material. In order to spread the coating material uniformly over the wire and to remove excessive coating material therefrom the wire passes through a die 6 floatingly held on a support 7 secured to the lower end of a baking oven 8. The latter has spaced parallel walls 9, 10 and is heated, in the present example by a plurality of electric heating elements 11 disposed within recesses of the walls 9, 10. The lower end of the wall 9 forms a channel 12 for admitting air to the oven.

On its passage through the oven the coating material is baked. Usually the wire is provided with several coatings and to this end a wire with its first heat-hardened insulating coating leaving the oven is passed over a sheave 13 and then recirculated through the coating material and the die a number of times, depending upon the desired number of coatings to be applied. After the last coating has been baked the wire is wound onto a separate take-up reel 14 with a constant speed capstan.

In Figs. 2 and 3 I have shown two dies suited for applying one to four coatings. The die 6 comprises two plates 15, 16 inclined toward each other to form a V-shaped space between them and having upper extensions 17, 18 with adjacent parallel surfaces cooperating with opposite surfaces of the wire 3 to be coated. In Fig. 2 I have

indicated in dash-dotted lines four different sections of the wire 3 passing at one time through the single die 6. The plates 15, 16 are secured to end plates 19, 20. Each of these end plates 19, 20 has two openings 21 each for receiving a dowel pin 22 on one of the plates 15, 16. In addition each end plate 19, 20 has a pair of openings 23 for receiving screws 24 to fasten the end plates to the plates 15, 16. The die is floatingly supported. To this end an upper portion of each end plate 19, 20 located vertically above the plates 15, 16 is provided with a shaft stub 25 secured thereto and attached to the inner race of a ball bearing 26, the outer race of which engages a track formed by the support 7. The latter is in the form of a U-shaped bracket with parallel lower and upper horizontally disposed legs and a base suitably supported, in the present instance, secured to the wall 9 of the oven by means of screws 27 (Fig. 1). To limit sidewise movement of the die and to avoid frictional engagement between the adjacent surfaces of the plates 19 and 20 and the lower legs of the U-shaped bracket, a plate 28 is secured to the outer surface of the lower leg of each bracket. This limits any tendency of the die to turn about the axis of the wire. On the other hand the die is free to move along the track formed by the support and it is also free to swing about the axis of the roller bearings. During operation the roller bearings are forced towards the respective upper legs and when out of operation they rest on the lower legs.

The adjacent surfaces of the extension 17, 18 of the plates 15, 16 constitute wiping surfaces because they wipe from the wire passing between them excessive amounts of coating material. These wiping surfaces contact the coating material but they do not contact the metallic surface of the wire because the die is self-centering. This is accomplished by the V-shaped space formed below the wiping surfaces of the die. During operation this V-shaped space fills itself with coating material to an extent which depends upon the viscosity of the material. The width of the wiping slot formed between the plates 15, 16 is slightly wider than the thickness of the ribbon wire plus the total thickness of the coating to be formed on opposite sides thereof. As long as the wire is centered in the wiping slot, that is, uniformly spaced from the wiping surfaces, the hydraulic pressure of the coating material produced by the upward movement of the wire will be the same on opposite sides of the wire within the wiping slot. If now for some reason,

for instance in case of a short bump on the wire, the die should move closer toward one side of the wire, then the hydraulic pressure of the coating material developed by the upward movement of the wire will increase on said side and decrease on the opposite side of the wire. The hydraulic pressure difference between the two sides of the wire will then automatically force the wire back to the center of the wiping slot or, from another angle, causes the die to assume a position in which the wire passes centrally through the wiping slot. The die shown in Fig. 1 permits the simultaneous coating of several separate wires or several sections of the same wire with coatings of like thickness.

The die of Fig. 2 permits the application of coatings of a fixed thickness only. In some instances it is desirable to apply successive coatings of different thicknesses and also to vary the thickness of successive coatings. A die suitable for such purposes is shown in Fig. 3. It comprises two supporting plates 29, 30 corresponding to the plates 15, 16 of Fig. 2 except that these supporting plates 29, 30 do not have upper integral extensions forming wiping surfaces. The plates 29, 30 are secured to end plates 31 corresponding to the end plates 19, 20 of Fig. 2 and provided with ball-bearing supporting means 32 for engaging a bracket as described above. In place of the extensions 17, 18 of Fig. 2 the die in Fig. 3 is provided with four pairs of wiping blades or fingers 33. The fingers of each pair are secured to the supports 29, 30 by means including a bar 34 and a screw 35 projecting through a bore 36 of the bar and a slot 37 of the finger and engaging a threaded bore 38 in the plate 29 or 30. The end portions of the fingers form adjacent parallel wiping surfaces 39 similar to the wiping surfaces of the extensions 17, 18 in Fig. 2. In order to keep the fingers of each pair, especially the end portions thereof, parallel and to reduce misalignment, each finger is preferably positioned in a slot 40 of the plates 29, 30. In order to vary the width of the wiping gap between the surfaces 39 of the fingers, the screws 35 are loosened and the fingers are moved up or down. Upon downward movement of the fingers the gap is increased to apply a thicker coating and, vice versa, upon upward movement of the fingers the width of the gap is reduced to apply a thinner coating. More accurate adjustments of the fingers are readily accomplished by an adjusting screw 41 screwed into a threaded bore 42 of each plate 34 and bearing against a finger. As one of the screws 41 is threaded deeper into the bore 42 the respective finger is forced closer towards the cooperating finger and vice versa. With this arrangement, coating of different thicknesses may be applied to a wire and the different pairs of fingers may be differently set to apply successive coatings of different thicknesses to a wire. This type of die does not wipe the edges of ribbon wire. This in general is not needed with ribbon wire because the surface tension of the coating material causes spreading thereof from the edges towards the sides thereof. The adjustable fingers or blades are preferably made of spring steel to permit any irregularities such as a heavy burr to pass between them without causing breaking of the wire. During operation the wire moves freely through the wiping slot without any scraping action on the edges thereof.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment

thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an apparatus for applying liquid coating material to a ribbon wire the combination of a support including two U-shaped brackets with horizontally extending parallel legs and a die for removing excessive coating material from such wire after having passed through a body of liquid coating material, said die having two plates arranged at an angle towards each other, said plates being formed with extensions having adjacent parallel surfaces forming a wiping slot, and means including ball bearings secured to the ends of the plates and supported between the legs of the U-shaped brackets.

2. A die for coating ribbon wire comprising two plates inclined towards each other and having extensions with adjacent parallel surfaces forming a wiping slot between them, end plates secured to the respective ends of said plates, and means for floatingly supporting the die comprising a shaft stub secured to each end plate, a support forming parallel tracks and ball-bearing means supporting the shaft stubs on the tracks.

3. A die for coating ribbon wire comprising two plates arranged at an angle towards each other and having extensions integrally formed therewith, said extensions having adjacent parallel surfaces defining a wiping slot of a width equal to the thickness of the wire to be coated plus the thickness of the coating on opposite sides of the wire, said wiping slot having a length sufficient to permit simultaneous passage therethrough of several parallel spaced sections of a wire, means rigidly connecting the ends of the plates, and means including antifriction bearings on the last named means for floatingly supporting the die.

4. A die for coating ribbon wire comprising two plates having upper portions with parallel adjacent surfaces defining a wiping slot and lower portions bent outwardly to define a V-shaped space decreasing in width towards the wiping slot, means rigidly connecting the plates, shaft means secured to the last named means, and means including bearings for the shaft means for floatingly supporting the die.

5. A die for coating ribbon wire comprising two plates inclined towards each other, a pair of fingers adjustably secured to the plates and having lower portions inclined towards each other and upper portions parallel with each other and forming a wiping slot, means rigidly connecting the ends of the plates, and means including ball-bearings connected to the last named means for floatingly supporting the die.

6. A die for coating ribbon wire comprising two plates inclined towards each other, each having a plurality of parallel slots, a plurality of pairs of fingers, means adjustably securing the fingers in said slots, each pair of fingers having upper portions forming a wiping slot, and plates with shaft stubs secured to the ends of the plates, and means including roller bearings on the shaft stubs for floatingly supporting the die.

7. A die for coating ribbon wire comprising a pair of inclined plates having outer surfaces with parallel slots, a plurality of pairs of fingers, each pair of fingers being positioned in corresponding slots of the plates and having upper portions forming a wiping slot between them, and means adjustably securing each finger in a slot of the plate.

8. A die for coating ribbon wire comprising a pair of inclined plates having outer surfaces with parallel slots, a plurality of pairs of fingers, each pair of fingers being positioned in corresponding slots of the plates and having upper portions forming a wiping slot between them, and means adjustably securing each finger in a slot of the plate, said means including a slot formed in the lower portion of each finger, a bar engaging the finger and a screw projecting through an opening in the bar and through the slot of the finger and being secured to the respective plate.

9. A die for coating ribbon wire comprising a pair of inclined plates having outer surfaces with parallel slots, a plurality of pairs of fingers, each pair of fingers being positioned in corresponding slots of the plates and having upper portions forming a wiping slot between them, and means adjustably securing each finger in a slot of the plate, said means including a bar having a lower portion secured to the finger and the respective plate and a screw threaded through an upper portion of the bar and having an end bearing

against an upper portion of the finger, the fingers being made of spring steel whereby adjustment of said screws causes the fingers of each pair to move relative to each other.

10. A die for coating ribbon wire comprising a pair of inclined plates having outer surfaces with parallel slots, a plurality of pairs of fingers, each pair of fingers being positioned in corresponding slots of the plates and having upper portions forming a wiping slot between them, and means adjustably securing each finger in a slot of the plate, said means including a bar having a lower portion secured to the finger and the respective plate and a screw threaded through an upper portion of the bar and having an end bearing against an upper portion of the finger, separate end plates secured to the ends of said plates, each end plate having a portion located vertically above the fingers, shaft stubs secured to the last named portions, ball bearings for the shaft stubs, and stationary brackets forming tracks for the ball bearings.

RAYMOND L. KIERSPE.

CERTIFICATE OF CORRECTION.

Patent No. 2,380,729.

July 31, 1945.

RAYMOND L. KIERSPE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 64, claim 6, for "and plates" read --end plates--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of November, A. D. 1945.

Leslie Frazer

First Assistant Commissioner of Patents.

8. A die for coating ribbon wire comprising a pair of inclined plates having outer surfaces with parallel slots, a plurality of pairs of fingers, each pair of fingers being positioned in corresponding slots of the plates and having upper portions forming a wiping slot between them, and means adjustably securing each finger in a slot of the plate, said means including a slot formed in the lower portion of each finger, a bar engaging the finger and a screw projecting through an opening in the bar and through the slot of the finger and being secured to the respective plate.

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