This invention relates to wire-enameling apparatus, and more particularly to apparatus for holding a die used to produce a thin uniform coating of enamel or other coating composition about a wire. The invention has for its principal object the provision of a simple but efficient apparatus for holding a wire-enameling die so that the die is free to move laterally to a considerable extent to accommodate irregular lateral movement of the wire being coated, whereby the die is at all times maintained centered about the wire.

In the coating of wires with relatively thin enamels such as the oleo-resin enamels that have been used for many years, it is not necessary to provide special means for insuring formation of a thin uniform film of the enamel about a wire being coated. This is because such enamels are quite thinly fluid and naturally tend to form thin and uniform films when applied to a wire. In recent years, however, ever-increasing amounts of wire are being enamelled with viscous coating compositions of comparatively recent development. Such compositions normally tend to form thick and uneven coatings on the wire, due to their viscous nature, and special means are required to insure the formation of smooth films of uniform thickness on all sides of the wire.

Various means have been proposed to accomplish this purpose. These means range from simple wipers to accurately formed dies for removing excess of the coating composition. The use of wipers is generally unsatisfactory, because such devices cannot be relied upon to insure production of films of uniform thickness. Accurately made dies are satisfactory for this purpose, but heretofore considerable difficulty has been encountered in mounting the die so that it is free to move laterally to accommodate irregular lateral movement of the wire passing therethrough and so remain at all times centered about the wire. Most of the mechanical means heretofore proposed for supporting wire-coating dies have permitted the die considerable freedom of motion in some directions, but have seriously limited its freedom to move in other directions. The present invention provides a novel form of die-coating apparatus which is simple in construction, but which effectively holds the die devoid of any freedom in all directions. The present invention provides a novel form of die-coating apparatus which is simple in construction, but which effectively holds the die devoid of any freedom in all directions.

The new die-holding apparatus comprises a substantially rigid supporting block, and a forked die-holding member mounted pivotally on the block with the fork prongs extending outwardly therefrom. The fork prongs are spaced apart such a distance as to permit a wire to pass therebetween, but are sufficiently close together so as to hold thereon a wire-coating die. A plurality of the forked members may be mounted at spaced intervals along a single supporting block, if it is desired to provide die-holding apparatus on machines coating a considerable number of wires simultaneously. Advantageously, the supporting block is slotted, as by making it of channel section, and the end portion of the forked member is inserted in the slot and therein is pivotally secured to the block. The forked prongs advantageously are tapered inwardly and rearwardly in such manner as to facilitate centering, with respect to the fork prongs, of a rounded die held thereon.

A die held on the fork prongs is free to move the length of the prongs, and because of the pivotal mounting of the fork, is also free to move laterally. By a combination of these two directions of movement, the die is enabled to accommodate irregular lateral movement of the wire to a considerable extent in any direction.

The invention will be better understood from the following description of a preferred embodiment, considered in connection with the accompanying drawing, in which:

Fig. 1 is a schematic view of wire-enameling apparatus equipped with die-holding apparatus according to the invention;
Fig. 2 is a front elevation of die-holding apparatus embodying the invention;
Fig. 3 is a cross section taken substantially along the line 3--3 of Fig. 2; and
Fig. 4 is a section taken substantially along the line 4--4 of Fig. 3.

The wire-enameling apparatus shown in Fig. 1 comprises a vessel containing a pool of a viscous coating composition being applied to a wire. An oven is provided to dry the coating after it has been applied to the wire. Wire from a reel is passed over pulleys and which direct it through the pool of coating composition in the vessel. Thus a coating of the viscous composition is applied to the wire. To insure that this coating is smooth and of uniform thickness on all sides of the wire, the wire from the pulley passes through a die which removes excess of the coating composition from the wire. From the die the wire passes into and through the drying oven. The die is held by die-holding apparatus constructed in accordance with the
invention and shown in greater detail in Figs. 2 to 4. The die-holding apparatus comprises a substantially rigid supporting block 20 which is advantageously of channel section, and which may be secured to the wire-enameling apparatus by brackets 21 (Fig. 1) of any suitable design.

Mounted on the supporting block 20 are a plurality of forked die-holding members 22. The end portion of each of these forked members extends through the semicircularly or semispherical opening of the channel-shaped supporting block 20, and therein is pivotally secured to the supporting block by a pivot pin 23. The prongs 24 of each forked member are spaced apart sufficiently so that the wire being coated may pass freely therebetween. However, the prongs 24 of each fork are close enough together so as to hold the dies 16. Advantageously each of the fork prongs 24 in transverse cross-section is tapered inwardly and rearwardly, as shown at 25 (Fig. 4), so as to facilitate centering (with respect to the fork prongs) of the rounded die 16 (which is shown in the drawing as being substantially spherical). The surfaces 25 serve as bearing surfaces against which the rounded bearing surface of the die 16 is held by the pull of the wire.

In operation of the apparatus, a wire 26 with its freshly applied, thick and relatively irregular coating of the viscous enamel is passed through the die opening in the die 16. The entrance 27 to the die opening is flared outwardly, and as the wire is drawn through the die (in the direction of the arrows in Figs. 1, 3 and 4), the pressure exerted by the coating composition accumulating in the flared entrance 27 serves to center the die about the wire. The die 16 is held from falling by the wire itself, and is operatively held quite firmly against the fork prongs by the pull of the wire passing therethrough.

If the wire in the course of its passage through the die whips or otherwise moves irregularly in a lateral direction having a vertical component, the die 16 is free to slide up or down on the fork prongs 24. If such irregular lateral movement of the wire has a horizontal component, then the fork against which the die is held swings about its pivot mounting to one side or the other. The resultant of the movement of the die 16 lengthwise of the fork and of the fork itself angularly about its pivot permits the die 16 to move to a considerable extent in any direction to accommodate any irregular lateral movement of the wire as it passes through the die, and thus to remain centered at all times about the wire. Consequently a smooth coating of uniform thickness on all sides of the wire is insured.

Although the die-holding apparatus is shown in the drawing with the forks 22 depending vertically from the block 20, it is of course possible to mount the apparatus by means of suitable brackets so that the forked members extend horizontally or in any other desired direction from the supporting block, depending upon the type (vertical or horizontal) of enameling equipment employed, or on other considerations.

I claim:

1. Die-holding apparatus of the character described comprising a substantially rigid supporting block, and a forked die-holding member mounted pivotally on said block with the fork prongs extending outwardly from the block, the fork prongs in transverse cross-section being tapered inwardly and rearwardly in such manner as to facilitate centering of a rounded die held thereon.

2. In a wire-enameling apparatus, a die-holder and a die comprising a forked die-holding member pivotally secured to a support therefor with the fork prongs extending outwardly from the support, the fork prongs in transverse cross-section being tapered inwardly and rearwardly, and a rounded die adapted to be held against the tapered prongs of the forked member by the passage therethrough of freshly enameled wire and being capable of accommodating irregular lateral movement of the wire by movement longitudinal of the fork prongs and by angular movement of the forked member about its pivot.

3. In a wire-enameling apparatus, the improvement which comprises a die for passing the enameled wire therethrough, a supporting member, a forked die-holder pivotally connected to the supporting member with the fork prongs extending outwardly from the support, the die having a rounded bearing surface near the opening of the die and each prong having a long bearing surface against which the rounded bearing surface of the die is held by the wire when it is pulled through the die whereby the die may adjust itself to irregular movement of the wire.

4. In a wire-enameling apparatus, the improvement which comprises a plurality of dies for passing the enameled wire therethrough, a supporting member, a plurality of forked die-holding members pivotally connected to the supporting member with the fork prongs in a depending position, each die having a rounded bearing surface and each prong having a long bearing surface against which the rounded bearing surface of the die is held by the wire when it is pulled through the die whereby the die may adjust itself to irregular movement of the wire.

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