Dec. 30, 1947. B. MULVEY 2,433,673

DIE FOR COATING WIRE

Filed Aug. 23, 1944

Fig. 1.

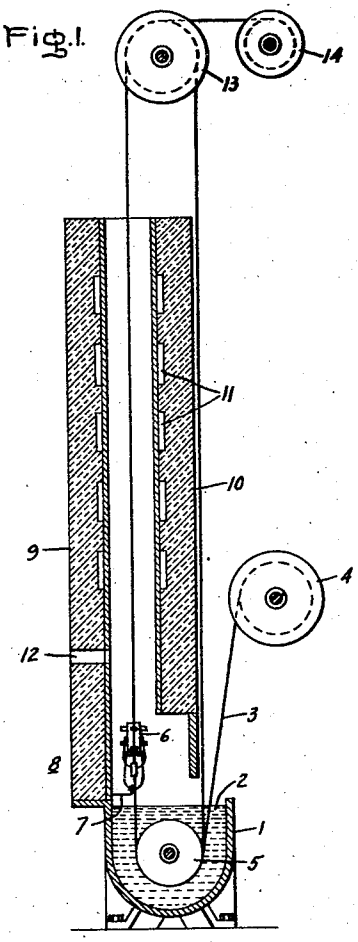


Fig. 2.

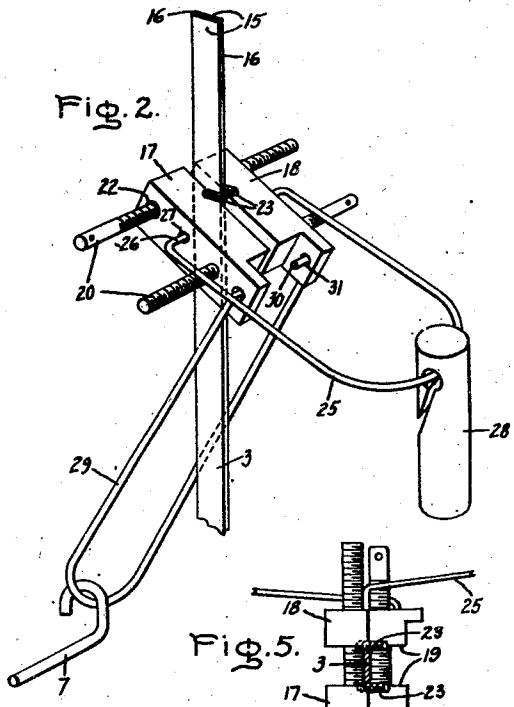


Fig. 5.

Fig. 3.

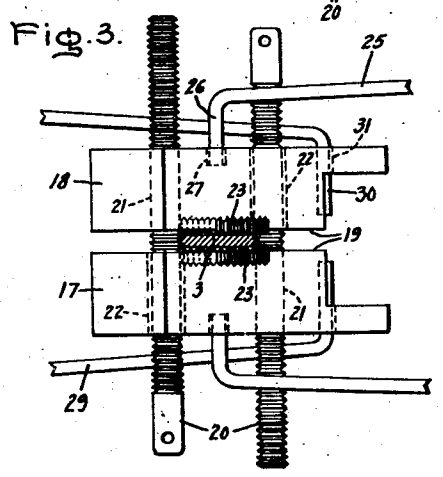
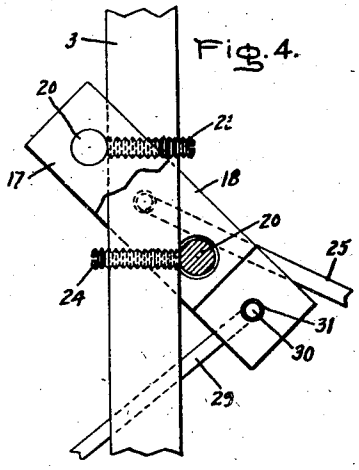


Fig. 4.



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DIE FOR COATING WIRE

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7 Claims. (Cl. 91—53)

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The present invention relates to dies for coating wire polygonal in section, particularly rectangular wire, with enamel, varnish, lacquer or like viscous coating material and is particularly suited for rectangular flat wire having a pair of relatively wide, opposite parallel surfaces and another pair of relatively narrow opposite surfaces or edges.

The object of my invention is to provide an improved construction and arrangement of dies of the type aforementioned which are simple in construction, cheap in manufacture, and effective in operation.

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 wire including a die embodying my invention; Fig. 2 is an enlarged perspective view of the die in Fig. 1; Fig. 3 is a top view of the die in Fig. 2; Fig. 4 is a side view partly broken away of Fig. 3; and Fig. 5 shows the die in a different operating position.

The apparatus for applying enamel or coating material to a wire as shown by way of example in Fig. 1 comprises a container 1 for viscous coating material 2. Rectangular wire 3 to be coated is drawn from a pay-off reel 4 over a guide sheave 5 immersed in the liquid coating material 2. The wire leaves the container 1 with its surfaces covered with a non-uniform layer of coating material. In order to spread such coating material uniformly over the wire and to remove excess material therefrom the wire is passed through a die 6 which is floatingly supported by frictional engagement with the wire itself and prevented from moving upward with the wire by connection to a hook 7 secured to the lower end of a baking oven 8. The latter has spaced parallel walls 9, 10 and in the present example is heated 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. In many instances the wire is provided with several successive coatings. The wire therefore with its heat-hardened insulating coating of enamel thereon is passed over a driving sheave 13 and then recirculated one or several times through the liquid coating material and additional dies each time to be baked in the oven. Upon baking of the last coating the wire is wound onto a take-on reel 14. The wire, as

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indicated in Fig. 2, in the present example is substantially ribbon-shaped, that is, it has two wide opposite surfaces 15 and two relatively narrow opposite surfaces or edges 16.

The die is arranged to cooperate with an upward moving substantially vertical portion of the wire. The die comprises two bars or side members 17, 18 which have adjacent parallel spaced wiping surfaces 19. The bars are connected by a pair of threaded parallel rods 20. Each bar has a pair of bores 21, 22 of which one, in the present example the bore 21, is threaded, whereas the bore 22 is smooth. Each threaded rod 20 is threaded into the threaded bore 21 of one bar and has sliding fit in the smooth bore 22 of the other bar. Thus, the rods 20 connect the bars 17, 18 loosely. Intermediate portions of the threaded rod (Fig. 3) cooperate with the narrow side or edges of the wire, whereas the adjacent wiping surfaces of the bars cooperate with the wide surfaces of the wire. The rod portions cooperating with the edge portions broadly constitute grooved members for removing excessive coating material from the edge portions and for leaving a certain amount of coating material on the edge portions, depending upon the width of the grooves and the spacing thereof.

In the present example I have provided similar grooved members in connection with the wiping surfaces of the bars. Each bar 17, 18 is provided with two parallel threaded members 23, 24 threaded into parallel openings of the bar, each having a center line at right angles and in the same plane with the center line of one of the rods 20. The threaded members 23, 24 which in the present instance are in the form of screws form a number of uniformly spaced projections extending from the respective wiping surfaces of the bar towards the wide surfaces of the wire to be coated. In order to maintain the bars in engagement with the wire or the coating material thereon, suitable spring means, in the present example a U-shaped spring 25, is provided which has legs with inwardly bent end portions 26, each projecting loosely into an opening 27 of one of the bars 17, 18, and located between the rods 20.

The spacing of the threaded rods 20 is considerably greater than the width of the wire to be coated. Therefore the die must be positioned at an angle to effect engagement of intermediate portions of the rods 20 with the edges of the wire. In order to effect and maintain such engagement during operation, the U-shaped spring member 25 is weighted downward at its base by a weight 28 (Fig. 2). As best shown in Fig. 2, intermediate

portions of the spring 25 pivot on the lower rod 20 and thereby force an intermediate portion of the lower rod into engagement with one edge of the wire and an intermediate portion of the upper rod 20 into engagement with the opposite edge of the wire. As previously pointed out the die is supported on the wire itself. In order to prevent the die from moving upward during the upward travel of the wire it is connected to the aforementioned hook 7 on the oven by means of a U-shaped connecting wire 29 held at its base on the hook 7 and provided with inwardly bent leg portions 30 loosely projecting into openings 31 in the bars 17, 18.

During operation an excessive amount of coating material is applied to the wire, in the present example by passing the wire through the body of coating material 2. This excessive coating material is removed from the wire by the die 6. During upward travel the wide sides of the wire first engage the threads of the lower screw 24 (Fig. 4) and thereafter the threads of the upper screw 23. While the wire engages or passes over the lower screws 24, its right-hand edge portion in Fig. 4 engages the lower rod 20 and while thereafter the wide surfaces engage the screws 23 the left-hand edge portion of the wire engages the upper rod 20 (Fig. 4). Upon leaving the die the coating material left on the wire flows or spreads uniformly over the surfaces thereof and is ready to be baked and hardened in the oven.

With the particular width of the wire illustrated the screws 23, 24 are positioned substantially horizontally during operation (Fig. 4). During the coating of a wire of different width the screws 23, 24 are in an inclined position. Good results are obtained in either case. Broadly, these screws 23, 24 constitute short projections extending from the wiping surface of one bar 17 towards the wiping surface of the other bar 18 to preclude actual contact between the wiping surfaces of the bars and the metallic surface of the wire and thereby to assure the application of a certain amount of coating material to the surfaces of the wire.

Thus, with my invention I have provided a simple and effective die for coating wires. Generally a die according to my invention includes two bars having adjacent wiping surfaces with short projections. These bars are loosely positioned on a pair of rods and biased together by a U-shaped spring weighted to effect engagement between the wire and intermediate grooved portions of the rod. Such die is suited for coating wire differing widely in width and thickness.

In the example described above and illustrated in Figs. 2 to 4, the wide sides of the wire are wiped by the parallel adjacent surfaces of the bars 17, 18, more particularly by the projections formed thereon by the screws 23, 24. These screws, as can best be seen in Fig. 4, extend across the entire width of the wide surfaces of the wire. In some instances, the width of the wide surfaces of the wire may be greater than the effective length of the screws or the die may not be provided with screws 23, 24. In those cases it is preferable to operate the die in the manner illustrated in Fig. 5 in which the different elements are designated with the same reference characters as in Fig. 3. In this arrangement the die is arranged so that the wide surfaces of the wire 3 are wiped by the threaded or grooved surfaces of the rods 20 and the narrow edge surfaces of the wire are wiped by the wiping surfaces of the bars 17, 18.

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. Die for coating rectangular wires comprising two bars having parallel wiping surfaces, said bars being provided with parallel and aligned openings, a pair of spaced rods projecting through said parallel openings in the bars, and a spring biasing the bars towards each other, the spacing of the rods being greater than the width of the wire to be coated.

2. Die for coating rectangular wires comprising a pair of bars having parallel spaced wiping surfaces, said bars being provided with parallel and aligned openings, a pair of threaded rods each projecting through said aligned openings of the bars perpendicular to the wiping surfaces, and means connected to the bars to bias them towards each other and to force them into a tilted position during operation.

3. Die for coating rectangular wires comprising a pair of bars having parallel wiping surfaces facing each other, each bar being provided with parallel openings one of which is threaded, a pair of spaced rods each projecting through said openings of the bars and being threaded into the corresponding threaded opening, spring means biasing the bars towards each other, and means connected to one end of the bars to force them into a tilted position during operation to hold the rod in engagement with the wire.

4. Die for coating rectangular wires comprising a pair of bars having wiping surfaces facing each other, said bars being provided with parallel and aligned openings, a pair of rods having threaded portions projecting through said aligned openings in the bars perpendicular to the wiping surfaces, a U-shaped spring having legs with inwardly bent end portions connected to the bars and biasing them towards each other, an intermediate portion of the spring having pivotal engagement with end portions of one of the rods, and a weight held on the base of the U-shaped spring.

5. Die for coating rectangular wires comprising a pair of bars having parallel wiping surfaces with short projections facing each other, said bars being provided with parallel and aligned openings, a pair of spaced threaded parallel rods projecting through the openings in the bars, a U-shaped spring having legs with end portions connected to portions of the bars intermediate the rods to force the bars together, intermediate portions of the legs of the spring resting on end portions of one of the rods, and a weight supported on the base of the spring to force the die into a tilted position during operation.

6. Die for coating rectangular wires comprising a pair of bars having parallel wiping surfaces facing each other, each bar being provided with parallel openings one of which is threaded, screw means including a screw secured to each bar with its center line parallel with the wiping surfaces and portions of its threads projecting slightly away from the wiping surface of the respective bar towards the other bar, spaced parallel rods each projecting loosely through the opening in one of the bars and being threaded into the threaded opening in the other bar, and biasing means forcing the bars towards each other and into a tilted position during operation.

7. A die for coating rectangular wire compris-

ing, in combination, a pair of bars adapted to be mounted on opposite sides of the wire, each bar having an opening therein, a rod having a grooved surface carried by each bar, the rod of one bar extending into the opening in the other bar for sliding movement therein whereby the spacing of the bars may vary in accordance with variations in wire size, said rods engaging opposite sides of the wire, and additional grooved rods carried by the bars for engaging the remaining two sides of the wire, and spring means biasing the bars toward each other.

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