

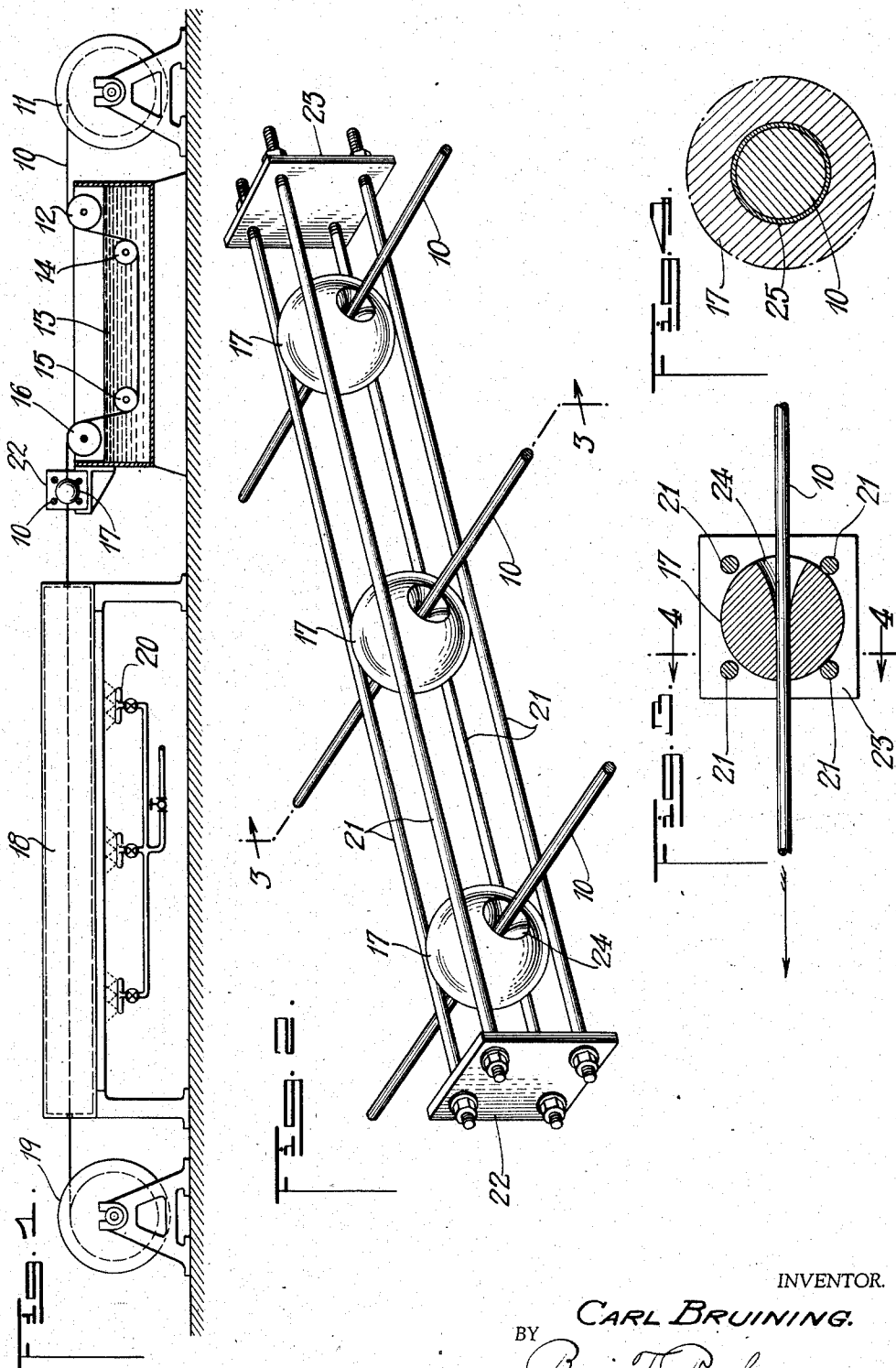
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WIRE COATING APPARATUS

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WIRE COATING APPARATUS

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6 Claims. (Cl. 91—32)

My invention relates to an apparatus for applying a thin coating or film of coating material, such as lacquer, to wire and more particularly to a die and die mounting for such apparatus.

In applying enamel or similar coating to wire, it has been customary to draw the wire continuously through a bath of the coating material or enamel, generally by causing the wire to dip into the bath and under rollers or pulleys immersed therein. If the enameling composition is sufficiently limpid or non-viscous a thin uniform coating of enamel is left on the wire as it leaves the bath. When more viscous enameling solutions, or coating solutions are employed, the excess composition is drawn out of the bath on the wire and must be removed by a die.

Heretofore, the wire has been drawn through a fixed die, the diameter of which is that of the coated wire or equal to the diameter of the wire plus twice the thickness of the coating. In the event that the wire in such prior arrangements is not guided centrally into the die, it has a tendency to be drawn to one edge or the other of the die, particularly if the wire is taut or has a tendency to spring to one side or the other. Accordingly, when this occurs there is a corresponding inequality in the thickness of the enamel coating.

In my present invention I provide a coating apparatus in which the die is so mounted as to be self aligning with respect to the wire and thus to insure an alignment of the axis of the wire and of the die opening regardless of any variations in the position or path of the wire.

In my invention, therefore, I provide a die and die mounting for wires leaving the coating tank and in which the dies may move freely with the shifting or sidewise movement of the respective wires, so as automatically to preserve a centering of the wire in the die. For this purpose I provide a cage at the exit side of the tank in which one or more dies freely slide or move. Where the wires are drawn upwardly over a pulley, a longitudinal cage extending lengthwise of or parallel to the pulley may be provided so that the dies may move lengthwise of it to follow a sidewise shifting of the wires on the pulley. It will be apparent however that any suitable type of floating die supporting or positioning means may be employed.

Preferably the dies are spherical and have a die passage extending diametrically through them. This permits the dies to turn and to slide freely with a variation of directions or positions of the wire. The entering end of this opening is preferably belled or coned to provide a smooth entering

opening without sharp edges and to build up pressure within the opening of the die which aids in the centering of the wire in the die passage.

The wire having been drawn through the coating bath has an adherent layer or coating of the enamel which causes the wire to center itself automatically in the die opening inasmuch as the liquid tends to maintain an equal thickness in the narrow annular passage between the wire and the die passage. The free or floating mounting of the dies avoids any counteracting force or tendency sufficient to impair this evenness of film.

Various features of my invention are illustrated by way of example in the accompanying drawing in which—

Fig. 1 is a diagrammatic sidewise elevation of apparatus embodying a preferred form of my invention.

Fig. 2 is a perspective view of a die and die mounting forming a part of the apparatus shown in Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2, and Fig. 4 is a section of a die and wire passing therethrough, taken on a plan transverse to the wire as indicated in line 4—4 of Figs. 1 and 3.

In the embodiment of the invention shown in the accompanying drawing, wire 10 which may be of any suitable size such, for example, as that used as magnet wire, or of larger sizes, is drawn from a supply reel or spool 11 over a guide pulley 12 and into a tank 13 of lacquer solution. Upon entering the tank 13 the wire 12 passes below the first pulley or roll 14 of a pair of pulleys, thence passes immersed in the bath to a second pulley or roll 15 from whence it passes upwardly out of the bath. It then passes over a guide pulley or roll 16 and through a die 17 to remove excess enamel.

After passing through the die 17 the wire, which has now a uniform film or coating of lacquer solution, passes through a drying chamber 18 to evaporate or remove lacquer solvent or otherwise harden the lacquer and thence is received on a receiving reel or spool 19. The drying or hardening chamber 18 may be heated as indicated diagrammatically by the heaters 20, or may have other means for hardening the lacquer.

It will be understood that a number of wires may be drawn in parallel from a reel or reels 11 through the tank 13 and into the drying or fixing chamber 18 and that each wire will have an individual die 17.

As indicated in Fig. 2, the die 17 for each individual wire 10 is mounted within a cage formed

of parallel rods 21 held in spaced position between end plates 22 and 23.

As shown in Figs. 3 the dies 17 are spherical and the cage is made of four rods 21, this number being a convenient and an effective one for the spherical dies; but it will be understood that this is purely by way of example and that different numbers of rods may be employed to form the cage. The rods are so spaced as to permit a free sliding or movement of the dies 17 without resistance.

Each die 17 is provided with a die passage extending diametrically through the die and preferably having its entrance end belled or diverged outwardly as at 24 to provide a smooth entrance into the die passage. There will be, however, a sufficient length of cylindrical passage in the die immediately back of the opening 24 to give a uniform annular passage between the wire and the passageway of the die. This is indicated in Fig. 4 in which the space between the wire 10 and the die 17 is filled with an annular film of lacquer solution 25.

In the above apparatus, if the wire should shift lengthwise of the roll 16 its respective die 17 is free to shift with it without substantial resistance to overcome the forces in the liquid tending to maintain a uniform film about the wire.

The spherical dies 17 may be made of any suitable material. For example, ball bearings, softened sufficiently to permit drilling, may be employed. The rods 21 may be formed of any suitable material, preferably of metal such as steel drill rod, which can be sprung sufficiently to permit the dies 17 to be slipped into the cage and held when the rods are released.

Through the above invention, therefore, the uniformity of the lacquer coating is not impaired by any shifting of the wire, inasmuch as the dies shift accordingly and thus areas of successive thickness or thinness or bare spots on the wire are avoided.

Various modifications in detail may be made

by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:

1. Apparatus for coating wires, a cage of parallel rods and a die within said cage and movable therein lengthwise of said rods, said die having a die passage therethrough.

2. Apparatus for applying a uniform length of coating to wires or filaments, a cage of parallel rods and a spherical die within said cage and movable therein lengthwise of said rods, said spherical die having a passage extending diametrically therethrough.

3. Apparatus for applying a uniform length of coating to wires or filaments, a cage of parallel rods and a spherical die within said cage and movable therein lengthwise of said rods, said spherical die having a passage extending diametrically therethrough, said passage diverging at its entrance end.

4. Apparatus for coating wires or filaments which comprises a coating tank, a die cage at one side of said tank comprising a number of spaced parallel rods, a die in said cage and movable freely lengthwise of said rods and means for drawing wire successively through said tank and through said die in a direction transverse to the lengths of said rods.

5. Apparatus for coating wires or filaments which comprises a tank of coating material, a die cage at one end of said tank having a number of parallel rods, a plurality of spherical dies mounted in said cage and movable lengthwise of said rods, each said die having a diametrically positioned die passage therethrough, means for drawing a plurality of wires through said tank and individually each through one of said dies.

6. The apparatus of claim 5 in which the die passages through the dies diverge at the ends nearest said tank and in which said cage is made of four rods.

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