

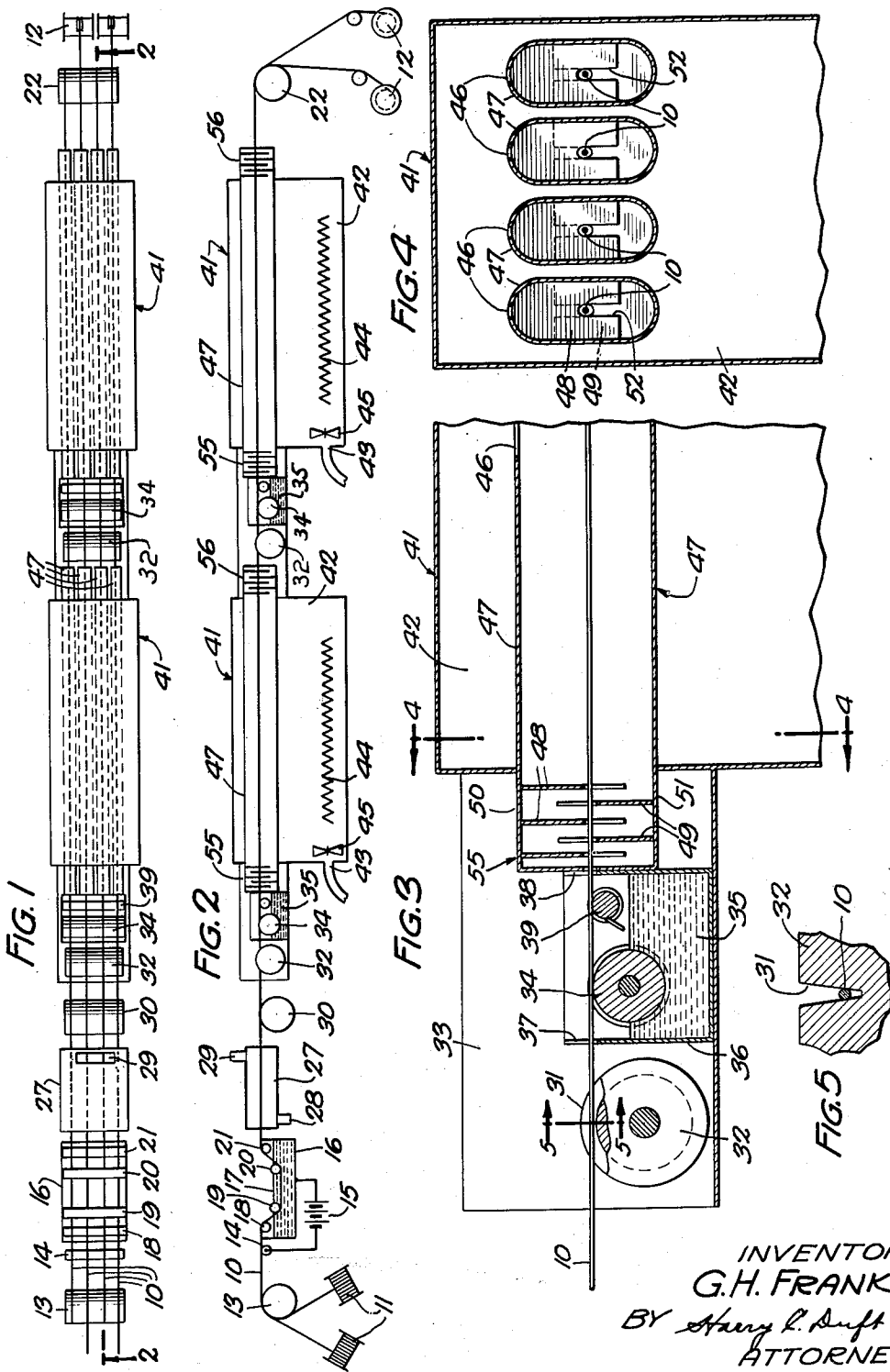
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STRAND COATING APPARATUS

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STRAND COATING APPARATUS

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This invention relates to strand coating apparatus and more particularly to a wire enamelling apparatus.

It is an object of the present invention to provide an apparatus for efficiently and economically applying a uniform coating on a strand.

In accordance with one embodiment of the invention, a plurality of baking ovens are provided in horizontal alignment, each oven having a separate coating bath associated with it whereby different compositions may be applied to the wires travelling in a straight line and not bent from the time they enter the first coating bath until they are completely coated and each oven having a separate baking tube for each strand to which heated air is fed under pressure, the tubes being baffled whereby the heated air may be maintained under pressure therein. In the preferred form of the invention, the wires are electrolytically cleaned and then highly heated in an atmosphere to fuse down slivers just prior to their passage to the first coating bath.

A better understanding of the invention may be had by reference to the following detailed description when considered in conjunction with the accompanying drawing, wherein

Fig. 1 is a schematic plan view of apparatus embodying the invention;

Fig. 2 is a longitudinal sectional view taken substantially along the line 2-2 of Fig. 1 in the direction of the arrows;

Fig. 3 is an enlarged fragmentary sectional view also taken substantially along the line 2-2 of Fig. 1 in the direction of the arrows and showing structural features of one of the coating baths and the forward end of one of the ovens;

Fig. 4 is a fragmentary transverse vertical sectional view taken substantially along the line 4-4 of Fig. 3 in the direction of the arrows; and

Fig. 5 is a fragmentary sectional view taken on the line 5-5 of Fig. 3 in the direction of the arrows showing the means for feeding the wire without bending it.

Referring to the drawing, wherein like reference characters designate the same parts throughout the several views, it will be seen that strands of wire 10 to be coated are withdrawn from supply spools 11 suitably positioned adjacent the entrance end of the apparatus and, after being coated, are taken up on takeup spools 12 at the exit end of the apparatus. The strands 10 withdrawn from the spools 11 are passed over suitable guide sheaves 13 and then into engagement with a contact roller 14. The contact roller 14 is electrically connected to a suitable power source, represented by the battery 15, the other side of which is connected to a tank 16 in which there may be placed a suitable electrolyte 17. Within the tank 16, there are provided four sets of rollers 18, 19, 20 and 21, the rollers 18 and 20

being so positioned that their lower edges are beneath the electrolyte 17 in the tank 16 and the rollers 18 and 21 being positioned to direct the strands 10 to and from the rollers 19 and 20. The rollers 18, 19, 20 and 21 are insulated from the tank 16 in any suitable manner and thus the electrolyte 17 in the tank 16 will serve to remove all impurities from the surfaces of the strands of wire 10 as the strands pass through the tank 16.

Immediately after the strands of wire are guided over the rollers 21, they pass into a highly heated chamber 27 provided with inlet and outlet ports 28 and 29, through which any suitable atmosphere, heated to a high temperature, may be passed. The atmosphere used will depend upon the kind of wire being processed and the temperature of the gas in the chamber 27 should be maintained at such a point that slivers on the wire will be fused down without, however, damaging the main body of the wire. Either hydrogen gas or nitrogen gas may be used in this chamber and the type of gas will depend, as pointed out hereinbefore, on the type of wire which is being processed.

The strands of wire 10 will be fed through the chamber 27 in a straight line, being drawn there-through by a capstan 30. It should be noted at this time that after the strands of wire 10 are directed around the arrangement of guide rollers 18 to 21, through chamber 27 and around capstan 30, the wire is not again bent until after it has been completely processed and reaches a capstan 22 at the exit end of the apparatus. As the strands of wire 10 leave the capstan 30, they will be directed to a notch 31 (Fig. 5) formed in a feed sheave 32, of which there is provided one for each strand of wire. The feed sheaves 32 have the notches 31 cut into them to form a narrow V in which the strands 10 may rest and by which the strands will be driven without the necessity of wrapping the strands around the sheave. In this manner, the wire will not be bent until the coating thereon is completed but will pass through all of the ovens in succession in a straight line. The sheaves 32 are mounted within a casing 33 and may be driven by any suitable power means (not shown) for directing the strands of wire 10 to roller type applicators 34, having their lower halves extending into a bath 35 of enamel in a tank 36. The applicators 34 may be driven to carry enamel 35 up onto the wire or may be freely rotatable in the bath, being driven by the strands of wire. The wires may enter the tank 36 through suitable notches 37 cut in the left-hand wall (Fig. 3) of the tank 36 and may pass out of the tank 36 through notches 38 formed in the right-hand wall of the tank 36, after passing over a stripping roller 39, which is adapted to remove excess enamel from the

strands 10 and to aid in distributing the enamel on the strands.

Each of the strands of wire 10, after having enamel applied to it, will be fed into a baking oven, designated generally by the numeral 41 which includes a large chamber 42 having an inlet port 43 through which a metered quantity of air may be fed from a suitable source of air under pressure (not shown). Within the chamber 42, there is positioned a heating element 44, over which a circulating fan 45 blows the air admitted through the inlet port to maintain the air in the chamber constantly circulating so that the temperature of the air throughout the chamber will be uniform. The air admitted through the inlet port 43, after being heated, will be fed into a series of baking tubes 47, of which there is provided one for each strand fed into the ovens. The interior of the tubes 47 is in communication with the chamber 42, suitable apertures 46 being provided at approximately the middle of the upper surface of each tube to permit the heated air from the chamber to enter the tubes. The baking tubes 47 are provided with baffles 48 extending downwardly and baffles 49 extending upwardly, these baffles being provided only at the entrance and exit ends of the tubes. In order to facilitate the threading of the wires in the ovens, the end portions 55 and 56 of the baking tubes 47 may be made in upper and lower halves 50 and 51 (Fig. 3) with the baffles 48 fixed in the upper half 50 and the baffles 49 fixed in the lower half 51. Each of the halves are slotted, as shown at 52, to form aligned passages through which the strands 10 may pass through the ovens. In a suitable form of baking tube, the lower half 51 may be fixed to end walls of the chamber 42 and the upper half 50 of the end portions 55 and 56 of the tubes 47 may be removable. The baffles 48 and 49 will, in this construction, serve to properly position the halves of the end portions of the tubes with respect one to another. The end portions 55 and 56 of the baking tubes are positioned outside the baking oven 41, as shown in Fig. 3.

The baking oven 41 and its associated parts may be duplicated as many times as it is desired and two of them have been shown in the drawing. In this manner, the strands of wire may be coated with enamel and the enamel baked on them without bending the wire until the baking of the enamel on the wire is completed and, accordingly, inner layers of relatively soft enamel may be covered by outer layers of relatively hard enamel or vice versa. Since the wire, in its passage through all of the ovens, is not bent, but follows a straight line path, different types of coating may be applied to the wire. For example, a hard coating which would crack and break off the wire if wrapped around a guide roller may be covered by a softer tough coating which will hold the hard coating in place, although the hard coating cracks.

In the operation of the apparatus, the wire, after being threaded through the electrolytic cleaning bath 17 and sliver removing chamber 27, may be threaded through the ovens 41, and, since each wire is enclosed in a separate tube, any breakage of a strand of wire 10 will not damage other wires being processed. After the strands of wire 10 have been threaded through the ovens, the fans 45 may be started and heated air for drying the enamel on the strands 10 will be forced through the apertures 46 and into the

tubes 47. In this manner, a small pressure may be built up in the baking tubes and the feeding of a small quantity of air through the chamber 42 and tubes 47 will prevent cold air from entering the open ends of the tube, thereby to facilitate the baking of the enamel on the wire and to, accordingly, provide a more uniform coating. The provision of the feed sheaves 32 with the notches 31 will feed the wires effectively without the necessity of bending them.

What is claimed is:

1. In a wire enamelling apparatus, a plurality of baking ovens, a coating bath adjacent each oven, means for transferring coating material from the baths to a wire, a blower in each oven, and a tube having baffles therein positioned to surround the wire, said tube being in communication with the blower and serving to maintain air delivered to it from the blower under pressure around the coated wire.

2. In a wire enamelling apparatus, a cleaning bath, a sliver removing chamber, a capstan for drawing wire from a supply through the cleaning bath and sliver removing chamber, a takeup capstan for advancing coated wire, a plurality of baking ovens intermediate said capstans arranged in a straight line, a baking tube individual to each oven, means for supplying heated air under pressure to said baking tubes, a coating bath individual to each of said ovens, and means adjacent to each coating bath for advancing and supporting the wire between the baking ovens to carry the wire in a straight line during the coating and baking thereof.

3. In a wire enamelling apparatus, a plurality of coating baths arranged in horizontal alignment, a plurality of ovens in horizontal alignment with said coating baths, applicators at each coating bath for transferring coating material from the bath to the wire, and advancing and supporting means at each bath comprising sheaves having annular V-notches for gripping and advancing the strand tangentially of said sheaves.

4. In a wire enamelling apparatus, a plurality of coating baths arranged in horizontal alignment, a plurality of ovens in horizontal alignment with said coating baths, applicators at each coating bath for transferring coating material from the bath to the wire, and sheaves adjacent the baths provided with cooperating surfaces to grip the wire and advance it by the engagement of said surfaces with the wire only through a small arc whereby the strand travels in a substantially straight line throughout the coating thereof.

5. In a wire enamelling apparatus, a plurality of ovens arranged in tandem, a coating bath adjacent one end of each of said ovens, a takeup capstan for drawing wire from the last oven in the tandem arrangement, grooved sheaves having surfaces for gripping and advancing the wire adjacent each oven, means for electrolytically cleaning a wire before it enters the first oven, and a sliver removing means intermediate the cleaning bath and the first oven.

6. In a wire enamelling apparatus, the combination with a plurality of coating baths and a plurality of baking ovens, of a sliver removing means comprising a chamber through which a wire to be coated is drawn, and means for supplying a highly heated inert gas to said chamber to fuse the slivers.

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