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APPARATUS FOR ELECTROPLATING NARROW STRIP

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FIG. 1

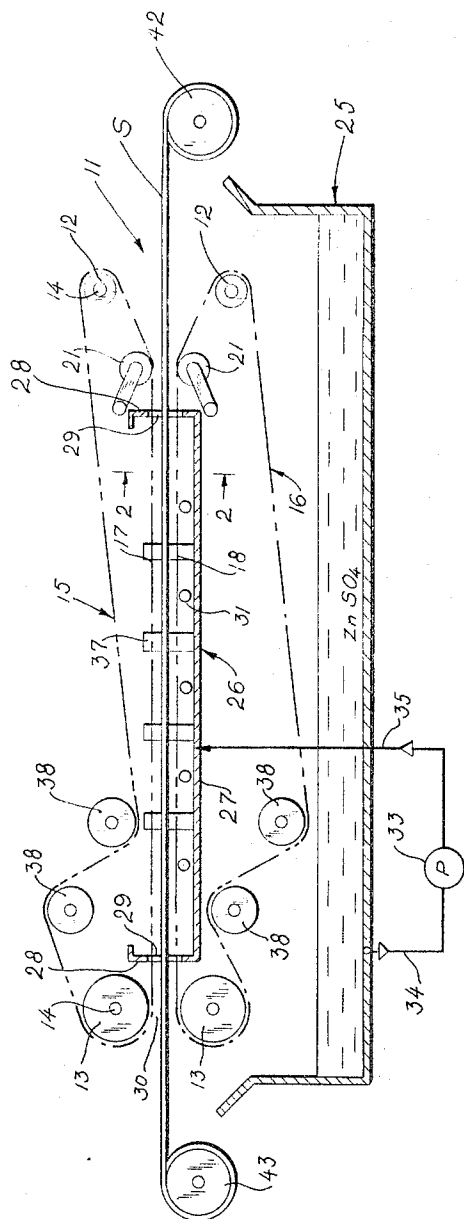
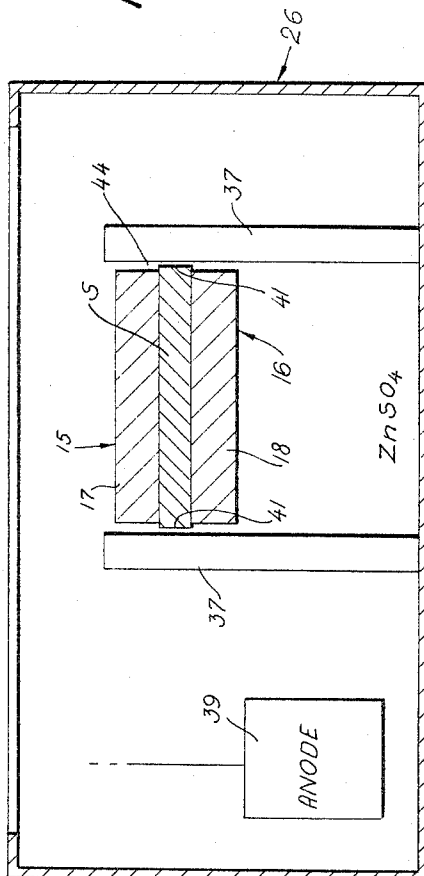


FIG. 2



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APPARATUS FOR ELECTROPLATING NARROW STRIPS

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5 Claims. (Cl. 204—224)

This invention relates to the manufacture of continuous narrow steel strips having completely electroplated surfaces.

As conducive to an understanding of the invention, it is noted that in the manufacture of armored cable, for example, which has a continuous length of steel strip wound around the insulated conductors, to protect such strip from corrosive effect, it is generally completely electroplated as by a zinc coating.

Where a relatively wide strip of electroplated sheet steel is slit into a plurality of narrow strips of desired width, as the slitting operation will result in the narrow strips formed having uncoated edges, these edges must then be electroplated in order that the strip be completely electroplated on all surfaces and edges to afford the desired protection.

It is accordingly among the objects of the invention to provide a relatively simple method and correspondingly simple equipment for processing narrow steel strips which have been electroplated on the opposed surfaces thereof and which have uncoated edges, which method and equipment will completely electroplate the uncoated edges of the strip in a continuous operation utilizing the electroplating method of applying such coating.

According to the invention, these objects are accomplished by the arrangement and combination of elements hereinafter described and more particularly recited in the claims.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

FIG. 1 is a diagrammatic side elevational view of the equipment, and

FIG. 2 is a transverse sectional view taken along line 2—2 of FIG. 1 on an enlarged scale.

Referring now to the drawings, the coating equipment desirably comprises a masking unit 11 which illustratively includes two pairs of vertically aligned rollers 12 and 13, each mounted on a horizontal shaft 14, said pairs of rollers being longitudinally spaced as shown. Encompassing each pair of rollers 12, 13 are endless masking belts 15 and 16 respectively. The masking belts are so positioned that the adjacent runs 17 and 18 thereof extend parallel to each other and vertically aligned as shown, tensing devices 38 being provided to take up slack in the belts.

Suitable adjustable guiding devices 21 of conventional type are provided, which react against the belts 15 and 16 to move them in close proximity as shown in FIG. 1 for the reason hereinafter described.

Positioned beneath the masking unit 11 and extending beyond the ends thereof, defined by the rollers 12 and 13, is a tank 25 which has a bottom wall and side and end walls, but which is open at the mouth thereof. Positioned between the pairs of rollers 12 and 13 is a second tank 26, the floor 27 of which extends beneath the run 18 of conveyor belt 16. The second tank 26 also has end and side walls and an open mouth and the end walls 28 of tank 26 have openings 29 through which the runs 17 and 18 of the conveyor belts may pass, said openings being aligned with the space 30 between the adjacent rollers 12 and 13 of each pair. The tank 26 has a plurality

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of transverse spaced rollers or supports 31 positioned between the floor 27 of the tank and the run 18 of belt 16 which serve as a support for such belt 16.

In conventional manner the tank 25 is filled with an electrolyte such as zinc sulphate ($ZnSO_4$) and such electrolyte is pumped from the tank 25 to the tank 26 by means of a pump 33 connected between the tanks by lines 34 and 35. Thus, when the pump 33 is operating, the electrolyte from tank 25 will be forced into tank 26 and as it overflows from such tank it will drop down into the tank 25 for recirculation.

As shown in FIGS. 1 and 2, the tank 26, which is the plating tank, has upright guide posts 37 of insulating material which straddle the runs 17 and 18 of the masking belts 15, 16 to guide the latter and in addition, a lead insoluble anode 39 is provided to effect the coating action on the metal strip S which functions as the cathode. The cathode, i.e., strip S, and anode 39 are connected to a source of current in conventional manner and since such electroplating is conventional, no further description thereof will be given.

The masking belts 15 and 16, according to the invention, are of magnetic type. Thus, they may be a steel tape that is magnetized and coated with nylar, nylon, Teflon or the like, or they may be of synthetic material having magnetized particles therein. The width of each of the masking belts 15, 16, as is clearly shown in FIG. 2, is but slightly less than the width of the narrow steel strip S, the edges 41 of which are to be electroplated.

In the operation of the equipment, the narrow metal strip S which has an electroplated coating on the top and bottom surface thereof and uncoated edges 41, is fed from a supply reel 42, between the pairs of rollers 12 and 13 and between the spaced parallel runs 17 and 18 of the masking belts. The strip S, as well as the runs 17 and 18 of the masking belts pass through the openings 29 in the tank 26. The free end of the strip is wound around a take-up reel 43. Since the masking belts are magnetized, and are in close proximity, the runs 17 and 18 thereof will be attracted to and adhere to the length of the strip S between the pairs of rollers 12 and 13 and such strip S as well as the runs 17 and 18 will be guided by the upright guide posts 37.

As previously described, the width of the masking belts 15, 16 is but slightly less than the width of the strip S so that not only will the opposed edges 41 of the strip S be exposed, but also the longitudinal edges 44 of the top and bottom surfaces of the strip S will be exposed.

Clearly, the parallel runs 17 and 18 of the belts 15 and 16 thus act to mask the major portion of the top and bottom surfaces of the strip S.

When the pump 33 is energized and plating potentials are applied to the electrode 39 and strip S in the plating tank 26 and the drive means for the take-up reel 43 is energized, the strip S will be advanced through the plating tank from the supply reel 42 on which it is wound, to the take-up reel, moving the masking belts 15, 16 therewith. During the course of movement of the strip S through the plating tank, the electroplating action will take place. Since only the side edges 41 of the strip S and the small portion of the longitudinal edges 44 of the top and bottom surface thereof are exposed in the electrolytic solution in the plating tank 26, only such portions will be electroplated. As the result, the cost of the electroplating process as well as the time required will be greatly reduced over that which would be required if the entire strip had to be electroplated.

Since the electrolyte is continuously recirculating and the strip is continuously fed, it is apparent that the operation above described readily lends itself to mass production manufacturing methods.

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It is of course within the scope of the invention to have a plurality of pairs of masking belts in the plating tank 26 so that a corresponding plurality of metal strips S can be processed simultaneously.

As many changes could be made in the above method and equipment, and many apparently widely different embodiments of the invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as, new and desire to secure by Letters Patent of the United States is:

1. Equipment for electroplating the edges of a narrow elongated strip of metal which comprises a pair of elongated masking belts having spaced vertically aligned parallel runs extending in substantially a horizontal plane between which the metal strip extends, each of said masking belts being of magnetic material and having a non-metallic surface, whereby the parallel runs will adhere to the top and bottom surfaces of said metal strip to mask such surfaces, a tank positioned beneath the parallel runs of said masking belts, said metal strip and the associated portions of the parallel runs of the masking belt adhering thereto, being positioned in said tank, means to effect an electroplating action to the exposed edges of the metal strip in said tank and means to advance the metal strip and the masking belts while said electroplating action is taking place.

2. The combination set forth in claim 1 in which guide

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means are provided in said tank, straddling the metal strip and parallel runs of said masking belt.

3. The combination set forth in claim 1 in which the masking belt are of magnetized steel and each has a plastic coating thereon.

4. The combination set forth in claim 1 in which the masking belts are of plastic material having magnetic material embedded therein.

5. The combination set forth in claim 1 in which a second tank is positioned beneath the first tank and is of greater dimensions than said first tank, said second tank being adapted to contain an electrolyte and means are provided to pump said electrolyte from the second tank to the first tank, whereby overflow from said first tank will be collected into the second tank for recirculation.

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