

[54] **METHOD OF APPLYING A COATING TO BOTH SIDES OF A MOVING STRIP**

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[58] Field of Search. **117/68, 104 R, 113, 115, 117/105.3; 118/323, 325**

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[57]

ABSTRACT

This invention relates to a method of simultaneously coating both sides of a moving strip with a solution, said strip having a pass line above the bath of said solution, comprising the steps of lifting a column of said solution out of said bath, said column being wider than said strip and higher than the pass line of said strip, passing said strip through said column of solution, and controlling the speed of said strip and the height and width of said column relative to the width of said strip and height of the strip pass line whereby both sides of said strip are coated simultaneously. The strip can be a galvanized strip treated with a chromate conversion coating or can be a tin plate treated with palm oil.

4 Claims, 5 Drawing Figures

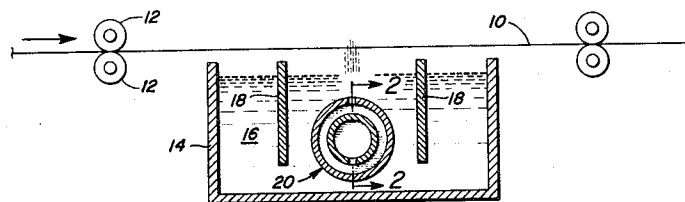


Fig. 1

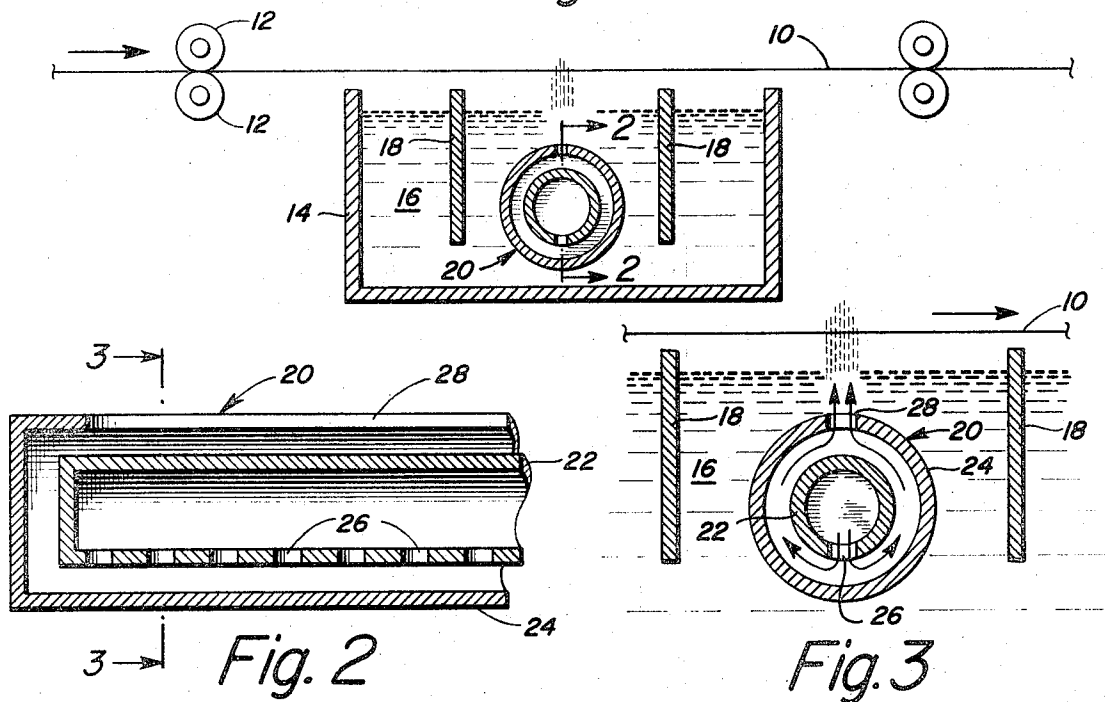


Fig. 2

Fig. 3

Fig. 4

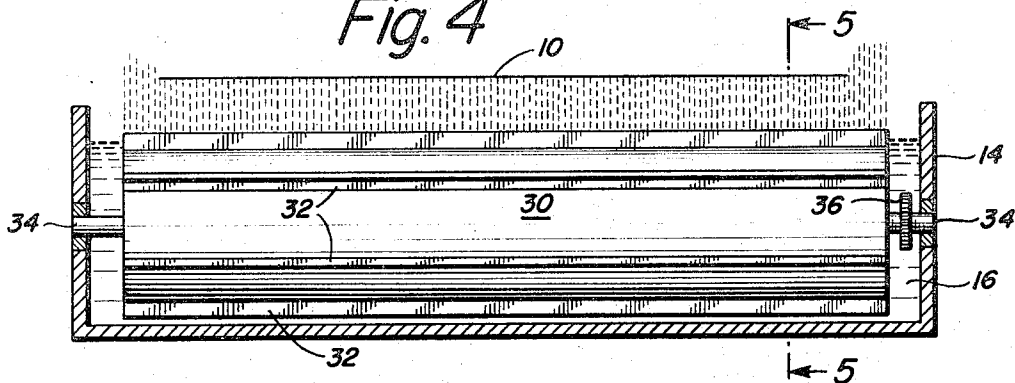
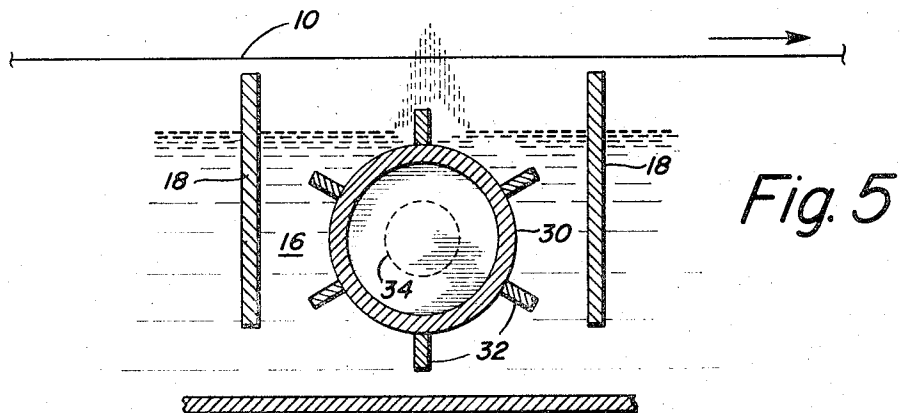


Fig. 5

METHOD OF APPLYING A COATING TO BOTH SIDES OF A MOVING STRIP

BACKGROUND OF THE INVENTION

This invention relates to a method of applying a coating to a moving strip, and more particularly to a method of applying a coating to a moving strip having a pass line above the level of the coating solution bath.

It is often desirable to apply a post-treatment coating, such as a rust inhibitor, for example, to galvanized strip prior to coiling and storage. A chromate conversion coating, for example, inhibits the formation of white rust during long periods of storage in relatively humid atmospheres. Likewise, a phosphate coating improves the paintability of galvanized strip.

Inasmuch as not all galvanized strip is to be stored for long periods of time in humid atmospheres or subsequently painted, it is clear that not all galvanized strip is given the same, or any, post-treatment. Therefore, it is desirable to provide a coating line which is versatile in its posttreatment capabilities.

In the past, it was customary to provide a galvanizing line with an additional dip tank with the post-treatment coating solution therein, and to change the pass line of the strip from within the tank to above the tank when a post-treatment was not desired. This required stopping the coating line while the pass line was changed and rinsing the guide rolls through which the strip was guided through said tank. The rinsing operation tended to dilute the coating solution, requiring periodic chemical additions to increase the concentration thereof.

It is an object of this invention to provide a method of coating a moving strip in which the coating line can instantly be switched from a post-treatment condition to a no post-treatment condition without any need to either stop the coating line or rinse the guide rolls.

SUMMARY OF THE INVENTION

We have discovered that the foregoing object can be obtained by providing a strip-coating line in which the pass line of the strip is above the bath of post-treatment coating solution. Means are provided for lifting a column of the solution out of the bath, the column being wider than the strip and higher than the pass line. When the lifting means is actuated, strip passing above the bath passes through the column and is simultaneously coated on both sides thereof, while when the lifting means is not actuated strip passes over the bath without any coating being applied thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view of one embodiment of apparatus used in performing the method of the invention.

FIG. 2 is a fragmentary side elevational view along lines 2—2 of FIG. 1 showing pneumatic means used in performing the method of the invention.

FIG. 3 is a sectional view through the lines 3—3 of FIG. 2.

FIG. 4 is a fragmentary side elevational view showing mechanical means used in performing the method of the invention.

FIG. 5 is a sectional view through the lines 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, a strip 10, which has just been galvanized, passes through guide rolls 12 over a tank 14 filled with a chromate conversion coating solution 16. Disposed in the tank 14 are baffle plates 18 and means 20 for lifting a column of solution 16 out of the tank 14.

The preferred embodiment of means 20 is shown in FIGS. 2 and 3, and comprises a pipe 22 coaxially disposed within an outer pipe 24. The inner pipe 22 is supplied with air from a source (not shown) and is provided with a plurality of openings 26 disposed longitudinally of the pipe along the bottom thereof. The outer pipe 24 is provided with a longitudinal slot 28 along the top thereof, i.e., about 180° from the openings 26.

Air supplied to the inner pipe 22 at a pressure of about 1 ¼ to 4 psi. causes a column of solution to rise out of the tank 14 to about 2 ¼ to 6 ½ inches above the level of the bath. The pressure must be adjusted until the column rises about ½ inch to 2 ½ inches above the pass line of the strip. Less than ½ inch results in incomplete coverage of the center of the strip, while more than about 2 ½ inches results in incomplete coverage at the edges of the strip.

The strip is completely covered with coating solution primarily due to the slight downward concavity transversely of the strip in combination with the frictional transverse forces resulting from the forward speed of the strip. Both of these factors tend to force the coating inwardly, i.e., toward the center of the strip.

The slot 28 must be longer than the width of the widest strip to be coated. As a result of the 180° distance of the slot 28 from the holes 26, the air leaves the slot 28 with a minimum of turbulence. Turbulence of the solution 16 is minimized by the baffles 18. The strip preferably travels at about 50 to 300 ft./min.

An alternative means for lifting the column of solution 16 is shown in FIGS. 4 and 5, and comprises a cylinder 30 having a plurality of longitudinal fins 32 affixed to the periphery thereof to form a paddle wheel. The cylinder 30 is provided with a shaft 34, rotatably mounted in bushings (not shown), and provided with a sprocket gear 36 connected to drive means (not shown). In order to uniformly lift a column of solution out of the tank 14, the following ranges of parameters are preferred. The paddle wheel should be rotated at a speed of 50 to 200 rpm. The strip should have a pass line ½ to 1 inch above the fins of the paddle wheel, and the paddle wheel should be submerged at a depth such that the solution level is from 1 inch above the uppermost part of the fin to 2 inches therebelow. The use of the foregoing parameters results in a uniform lift of the solution of ½ to 3 ¼ inches.

The method of the invention is also useful in applying other coating solutions to other types of strip, e.g., in applying palm oil to tin plate.

We claim:

1. A method of simultaneously coating both sides of a moving strip with solution, said strip having a pass line above a bath of said solution, comprising:
 - a. lifting a column of said solution out of said bath, said column being wider than said strip and higher than the pass line of said strip,
 - b. passing said strip through said column of solution, and

3

c. controlling the speed of said strip and the height and width of said column relative to the width of said strip and height of the strip pass line whereby both sides of said strip are coated simultaneously.

2. A method as recited in claim 1, in which said column extends to about $\frac{1}{2}$ to $2\frac{1}{2}$ inches above said pass

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line.

3. A method as recited in claim 2, in which said strip moves at a speed of 50 to 300 ft./min.

4. A method as recited in claim 1, in which said strip is characterized by a transverse downward concavity.

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