March 26, 1963 D. M. PATERSON 3,083,120

METHOD FOR MAKING DIFFERENTIALLY COATED GALVANIZED STEEL SHEET

Filed June 28, 1960

FIG. 1

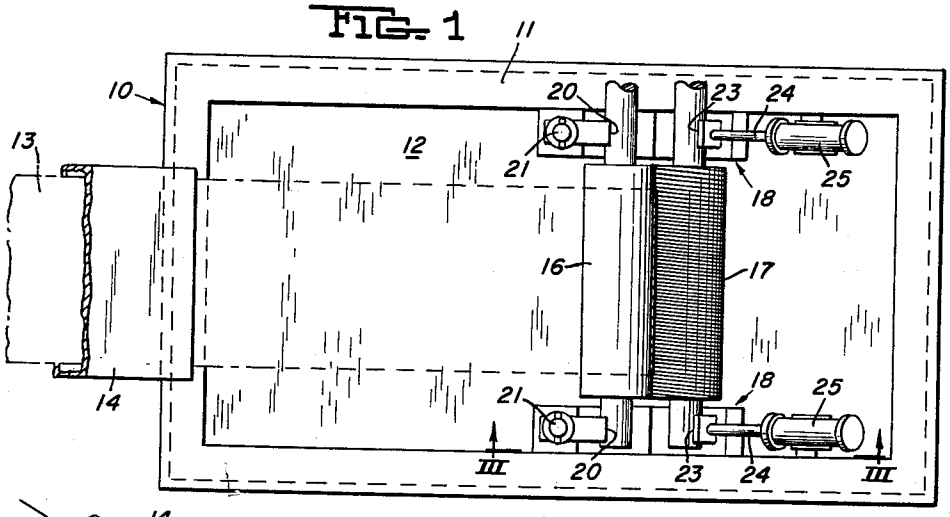


FIG. 2

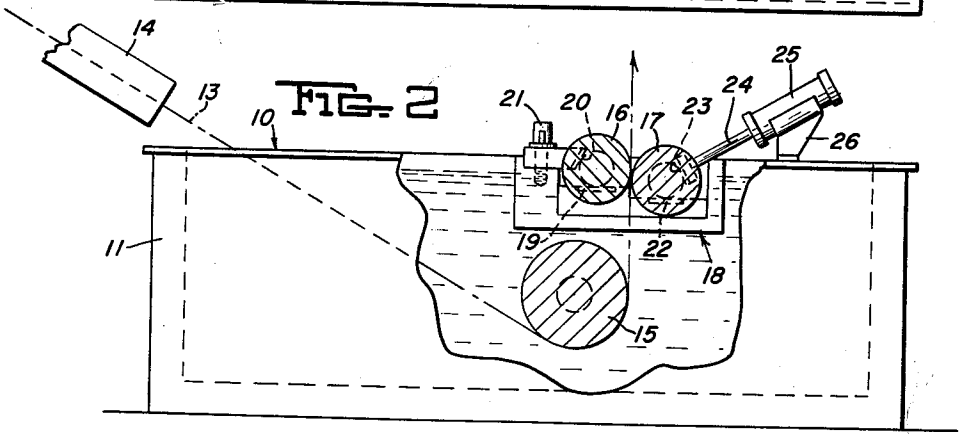
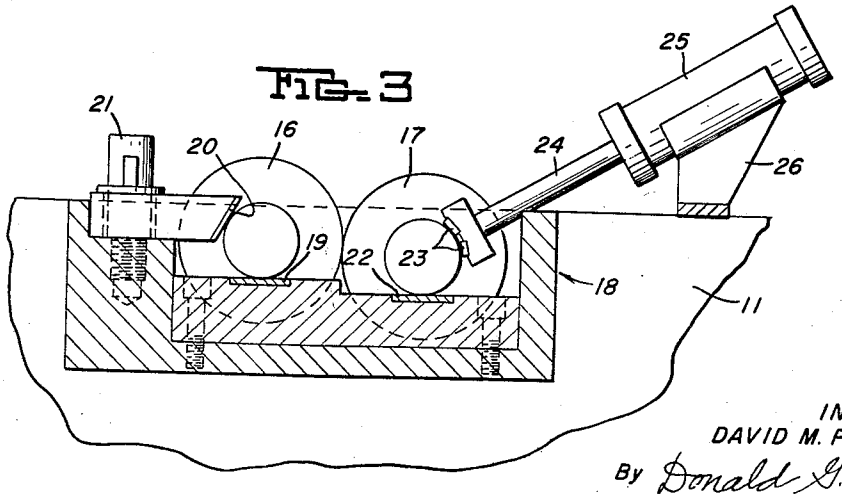


FIG. 3



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METHOD FOR MAKING DIFFERENTIALLY COATED GALVANIZED STEEL SHEET

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1 Claim. (Cl. 117—68)

This invention relates to the galvanizing of steel sheets and, in particular, to a method and apparatus for making galvanized sheets having a heavier coating on one surface than on the other.

A demand has recently arisen on the part of consumers of galvanized steel sheets for a product having a heavier coating on one side than on the other, and difficulty has been experienced in making such product. I have discovered a simple method and apparatus which are satisfactory for the purpose and may be readily incorporated in a conventional strip-galvanizing line. Thus, the great productivity of such lines may be taken advantage of in respect to differentially coated as well as standard product (coated equally on both sides).

My invention is based on the discovery that differential coating of steel strip introduced into and drawn upwardly out of a bath of molten zinc, will result if the strip emerging from the bath is drawn between exit rolls at about the level of the surface thereof, but one being positioned above the other and one being smooth-surfaced and the other circumferentially grooved. The former should be the upper roll.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings:

FIGURE 1 is a plan view of a strip-galvanizing apparatus incorporating the invention;

FIGURE 2 is an elevation, partly broken away and partly in section; and

FIGURE 3 is a partial section to enlarged scale taken along the plane of line III—III of FIGURE 1.

Referring now in detail to the drawings, a conventional strip-galvanizing apparatus **10** comprises a zinc pot **11** heated by any suitable means (not shown) and containing a bath **12** of molten zinc. Steel strip **13** enters the bath on a downward incline from a snout **14** and passes around a sink roll **15** and then upwardly between exit rolls **16** and **17** journaled in a frame or "rig" **18** carried on the walls of the pot **11**. Except for the novel features more particularly described below, the foregoing apparatus is generally known ("Making, Shaping and Treating of Steel," published by United States Steel Corporation, 7th Ed., pp. 669–672).

I have found that the desired difference between the weights and thicknesses of the coatings applied to the opposite sides of the strip may be reliably produced by positioning exit roll **16** at a slightly higher level than roll **17** and giving it a smooth surface while providing a helical

groove on the surface of roll **17**. The groove may be quite small, e.g., 1/64" high and 1/64" wide, and may conveniently form a single continuous helix with a pitch of 1/4". With the described arrangement of the exit rolls, a coating is produced on the side of the strip in contact with smooth roll **16** which amounts to about 0.15 oz./sq. ft. while the coating on the surface in contact with ribbed roll **17** amounts to about 0.4 oz./sq. ft., the thicknesses of the coatings being proportional to their weights.

FIGURE 3 shows in greater detail the mounting of rolls **16** and **17** in rig **18**. As there shown, the necks of roll **16** rest on a flat horizontal bearing **19** and are disposed against flat inclined bearings **20** keyed to studs **21** threaded into the side plates of rig **18**. The necks of roll **17** rest on flat horizontal bearings **22** and are urged toward roll **16** by flat inclined bearings **23**. Bearings **23** are mounted on the ends of piston rods **24** reciprocating in air cylinders **25** mounted on rig **18** by brackets **26**. It will be observed that bearings **19** for roll **16** are slightly higher (1/4" to 3/4") than bearings **22** for roll **17**. This difference in elevation, together with the fact that roll **16** is smooth and roll **17** is grooved, produces a relatively light coating on the side of the strip engaged by roll **16** and a relatively heavy coating on the other side.

My invention has the obvious advantage of extreme simplicity. It may, furthermore, be incorporated directly in existing high-speed galvanizing lines without reducing their efficiency or increasing the cost of operation.

The invention may be used for making aluminum-coated strip as well as galvanized strip.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

I claim:

A method of making sheet metal differentially coated with another metal comprising introducing the base metal into a bath of molten coating metal and drawing it upwardly therefrom between parallel cooperating exit rolls at about the surface of the bath, each of said rolls being partially submerged in the bath of molten coating metal; one of the rolls being at a higher elevation than the other, said one roll being smooth-surfaced and the other roll having a circumferential groove.

References Cited in the file of this patent

UNITED STATES PATENTS

616,491	Rees	Dec. 27, 1898
1,980,961	Sommer	Nov. 13, 1934
2,227,976	McLin	Jan. 7, 1941
2,759,850	Knopf	Aug. 21, 1956
2,950,215	Slater et al.	Aug. 30, 1960

OTHER REFERENCES

Bablik: Galvanizing (Hot Dip), 1950, page 434 relied on, E. & F. N. Spon, Ltd., 22 Henrietta Street, London W.C. 2, England.