

Aug. 27, 1963

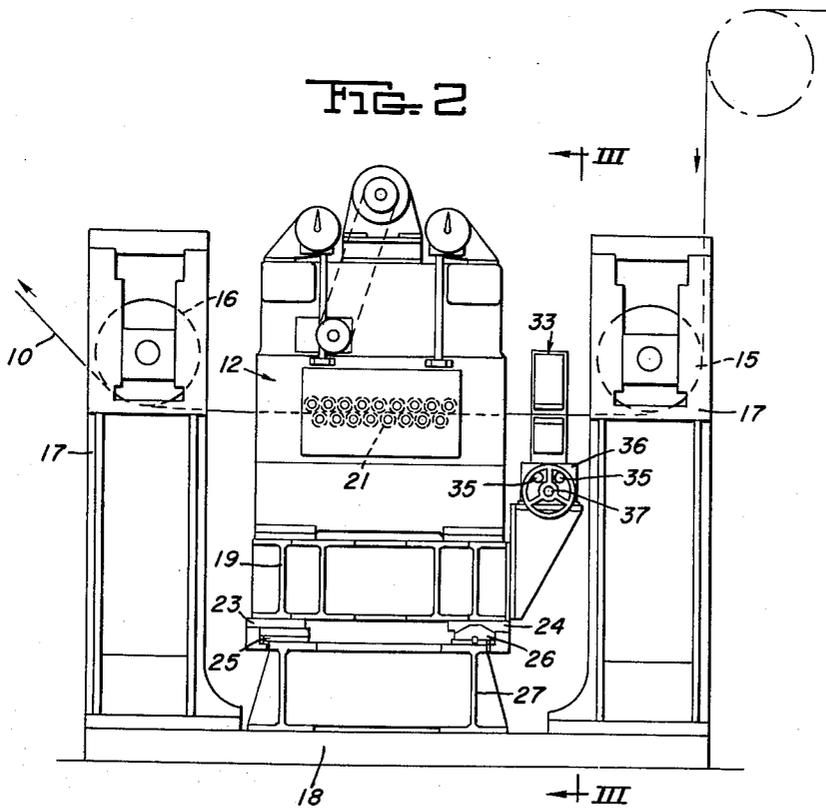
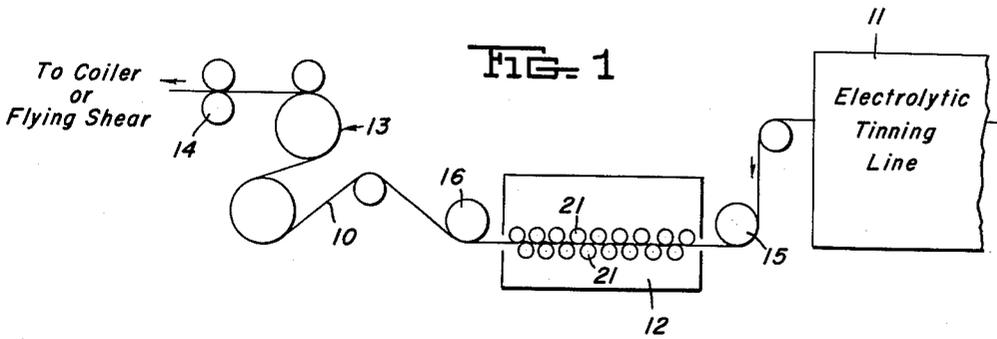
R. R. SHEDD

3,101,767

MANUFACTURE OF TIN PLATE

Filed June 4, 1959

2 Sheets-Sheet 1



INVENTOR
ROBERT R. SHEDD
By *Donald G. Dalton*
Attorney

Aug. 27, 1963

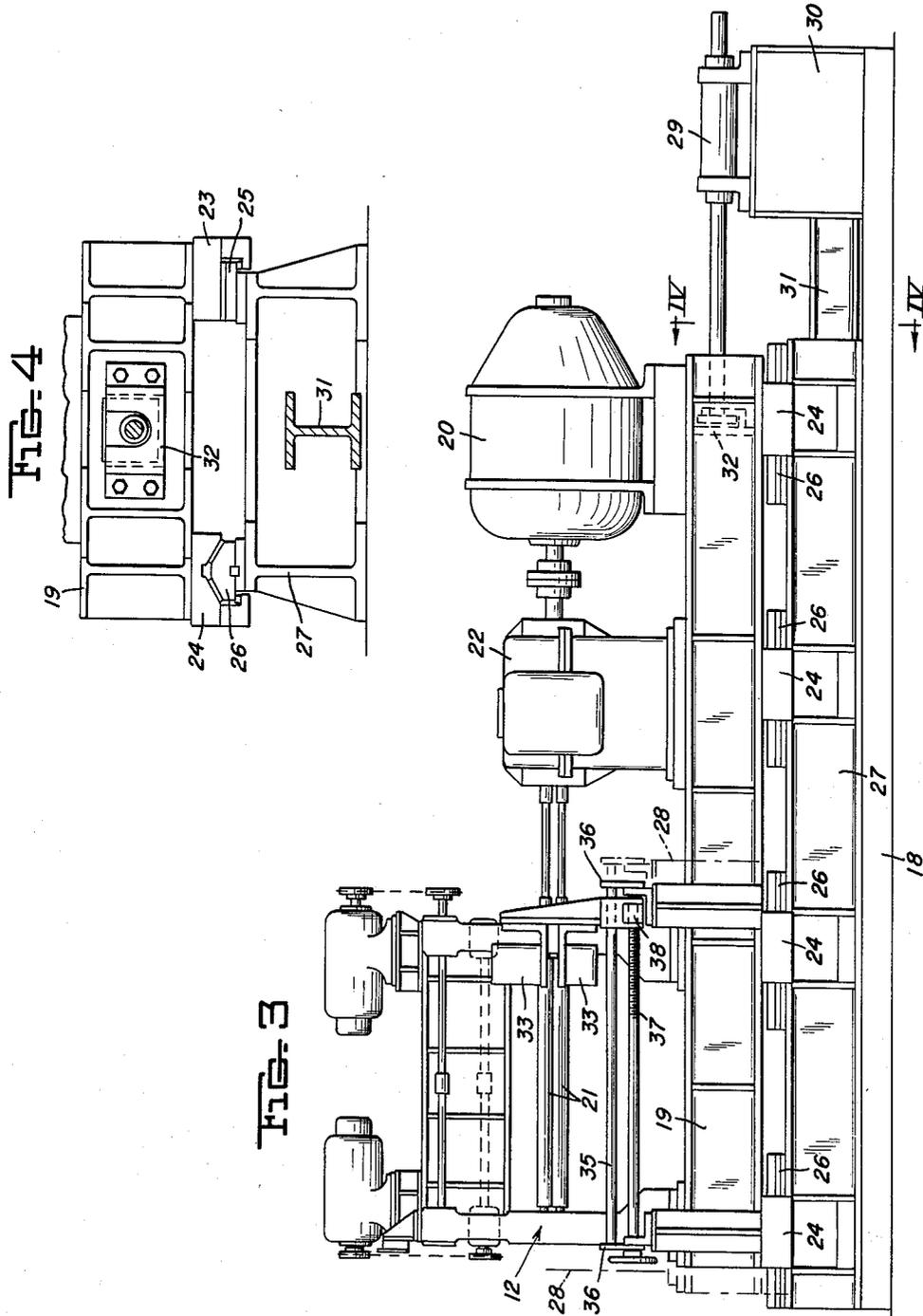
R. R. SHEDD

3,101,767

MANUFACTURE OF TIN PLATE

Filed June 4, 1959

2 Sheets-Sheet 2



INVENTOR
ROBERT R. SHEDD
By *Donald G. Dalton*
Attorney

1

3,101,767

MANUFACTURE OF TIN PLATE

Robert R. Shedd, Fairless Hills, Pa., assignor to United States Steel Corporation, a corporation of New Jersey

Filed June 4, 1959, Ser. No. 818,196

2 Claims. (Cl. 153-92)

This invention relates to a method of and apparatus for processing of relatively wide and thin metal strip and, more particularly, to the production of metal strip adapted to be subsequently coated with tin, zinc, aluminum or lead.

In the operation of electrolytic tinning lines, for example, as practiced heretofore, it has been customary to level and flatten the product by passing it through a roller leveller as the last operation before shearing the strip into sheets. In cases where only relatively low speeds of strip travel were involved, i.e., under 750 f.p.m., the small-diameter leveller rolls (e.g., 2½" in diameter) which are necessary for good flattening, performed satisfactorily. The higher operating speeds of electrolytic tinning lines which are now common (up to 1500 f.p.m.), however, made it necessary to use levellers with rolls of larger diameter (e.g., 3") despite their lesser effectiveness in flattening. In order to avoid the loss of flattening, it has been proposed to perform a preliminary levelling operation ahead of the shearing, using small-diameter rolls, with looping pits on both sides of the leveller, whereby the path of the material traversing it could be controlled by side guides. This produced satisfactory results where the strip was subjected to a second levelling before being sheared into sheets, but installation of the leveller ahead of the flying shear precluded its use for production of coils.

Tin-plate users are now ordering the material in coils instead of sheets. Since tin plate in strip form must be coiled under tension, the expedient just explained may be resorted to only at the expense of coiling under constant tension as a separate operation, subsequent and in addition to the roller levelling. I have invented a method and apparatus whereby the strip may be given a preliminary or initial levelling under tension and immediately coiled in final form of delivery to the user.

In a preferred practice and embodiment of the invention I provide a roller leveller in a tin plate or other coating line, ahead of the traction bridle ordinarily employed to pull the strip through the line under constant tension. I also make provision for moving the leveller laterally of the center of the line to conform to any tendency of the strip to weave from one side to the other because of camber therein or variations in thickness, hardness, etc. Thus, even though the strip is under constant tension and cannot be controlled by side guides, it is subjected to a flattening effect which is uniform across the entire width of the strip, producing a coiled strip of a high degree of flatness.

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 diagrammatic sectional along the center of a portion of an electrolytic tinning line having the invention incorporated therein;

FIGURE 2 is a side elevation of the roller leveller shown diagrammatically in FIGURE 1;

FIGURE 3 is an end elevation of the leveller; and

FIGURE 4 is a sectional view taken along the plane of line IV-IV of FIGURE 3, with parts in elevation.

Referring now in detail to the drawings and, for the present to FIGURE 1, low-carbon steel strip 10 preferably of light gauge is drawn continuously through a processing line such as an electrolytic tinning line, indicated

2

generally at 11, then through a roller leveller 12 under constant tension by a drive bridle 13 or set of traction rolls driven in any suitable manner. From the bridle 13, strip passes to a set of back-tensioning pinch rolls 14 and thence to a coiling reel of known construction (not shown). Leveller 12 is provided with entry and exit guide rolls 15 and 16. The details of construction of the leveller are shown in FIGURES 2 through 4.

As best shown in FIGURE 2, guide rolls 15 and 16 are journaled in housings 17 upstanding on opposite ends of a bed plate 18. Leveller 12 is disposed between housings 17 and is mounted on a base 19 fabricated by welding, from plate and structural members. Base 19 is elongated transversely of the direction of strip travel, to accommodate a motor 20 which drives the rollers 21 of the leveller through the usual pinion stand 22 also mounted on the base. Base 19 has plane and V-block shoes 23 and 24 spaced along opposite sides thereof, respectively, which engage correspondingly shaped ways 25 and 26 carried by a sub-frame 27 secured to bed plate 18. Frame 27 is also fabricated from plate and structural members.

By the construction described, leveller 12 and its driving means are slidable laterally of the center line of strip travel, on both sides thereof, as indicated by chain lines 28 in FIGURE 3. I provide power means for effecting such movement, in the form of a double-acting fluid-pressure motor 29 mounted in a supporting frame 30 secured to plate 18, with a spacer block 31 between it and frame 27. The piston rod of motor 29 is secured to base 19 by an anchor plate 32 (FIGURE 4).

Leveller 12 is of known construction in general and needs no detailed description but is provided with special means indicated at 33 for scanning an edge of a strip passing therethrough and controlling the admission of power fluid to one end of motor 29 and its release from the other, so as to keep the leveller approximately centered relative to the strip, despite weaving thereof from the normal center line because of camber and other factors. Scanning means 33 is adjustable along ways 35. These ways are mounted on brackets 36 on the entry side of the base 19. A screw shaft 37 journaled in bearings on brackets 36, parallel to ways 35 cooperates with a nut 38 in the lower portion of the scanner to effect adjustment thereof. Edge scanners of the type described are known, one example being that manufactured by GPE Controls, Inc., designated as "Askania," and serve to operate solenoid valves controlling the motor 29.

It will be apparent from the foregoing that even though the strip passing through leveller 12 is under constant tension and cannot be controlled by side guides, the leveller is kept substantially centered relative to the strip, despite weaving of the latter to one side or the other of its normal path because of camber, etc. As a result, it is feasible to make the length of rollers 21 but slightly greater than the maximum width of strip to be processed and this permits the use of small-diameter rollers, e.g., 2½", without excessive deflection. With rolls of this small diameter, better results are obtained in overall edge-to-edge working on highly tensioned strip at higher than normal speeds. Uniform levelling action across the width of the strip is assured because the strip is always engaged by the same portion of the rollers, and the small diameter thereof results in better levelling action, removing defective conditions such as diagonal and cross corrugations.

Although I have disclosed herein the preferred embodiment of my invention as utilized in conjunction with a tinning line for example only, 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:

1. Apparatus for making metal strip comprising, in combination, a unit effective to apply a surface treatment continuously to strip passing therethrough, traction means spaced from the delivery end thereof for pulling strip continuously through said unit under constant tension, a roller leveller located between said end and said means, effective to flatten the strip while under said tension, means mounting said leveller for movement transversely of the path of the strip, and means responsive to sidewise shifting of an edge of said strip for moving the leveller whereby to maintain it approximately centered relative to the strip despite lateral weaving thereof.

2. Apparatus as described in claim 1, characterized by said mounting means including a base on which said leveller is mounted, a sub-frame supporting said base and ways on said sub-frame guiding movement of the base.

References Cited in the file of this patent

UNITED STATES PATENTS

202,027	Harvey	Apr. 2, 1878
1,911,321	Long	May 30, 1933
2,008,626	Murakami	July 16, 1935
2,228,257	Collins	Jan. 14, 1941
2,439,858	Muddiman et al.	Apr. 20, 1948
2,454,935	Miller	Nov. 30, 1948
2,733,750	Todd	Feb. 7, 1956
2,797,476	Sendzimir	July 2, 1957

OTHER REFERENCES

Metals Handbook 1948 Edition, American Society for Metals, page 355 relied on.