Aug. 27, 1963

R. R. SHEDD

3,101,767

MANUFACTURE OF TIN PLATE

Filed June 4, 1959

2 Sheets-Sheet 1

FIG. 1

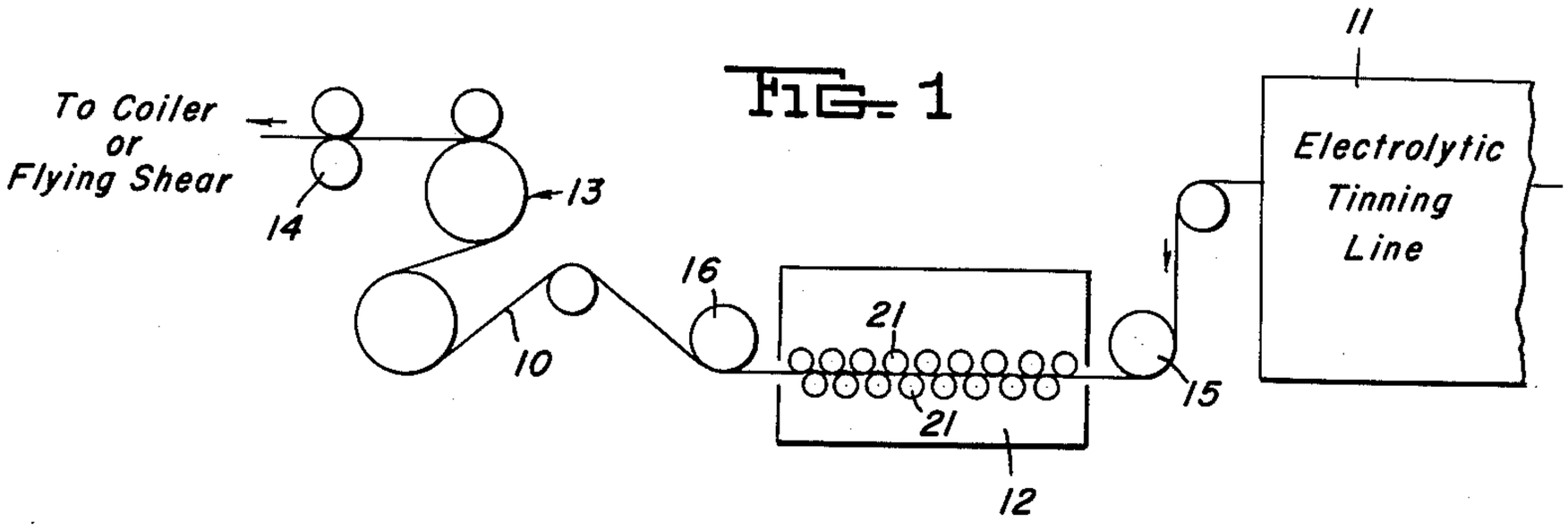
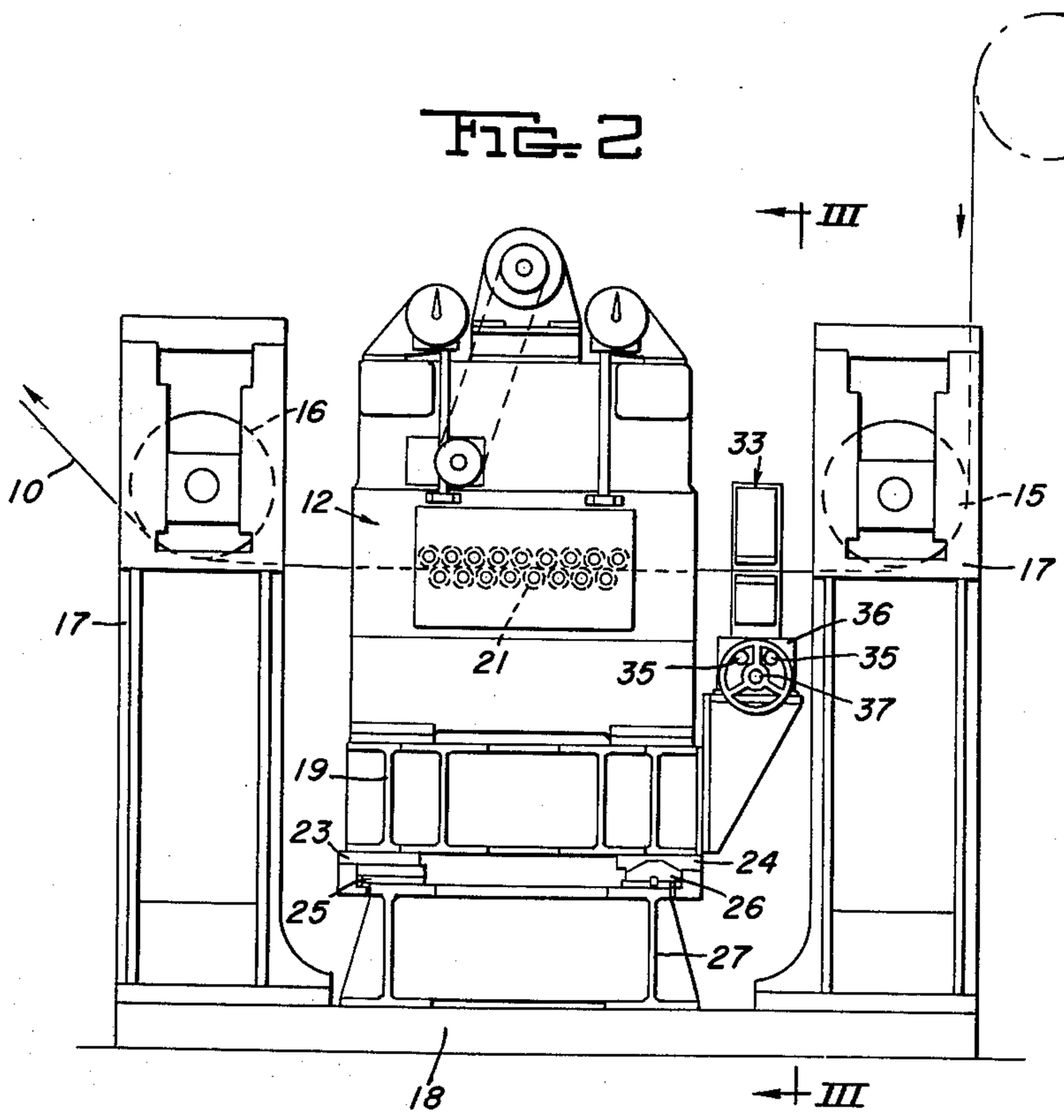


FIG. 2



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2 Sheets-Sheet 2

FIG. 4

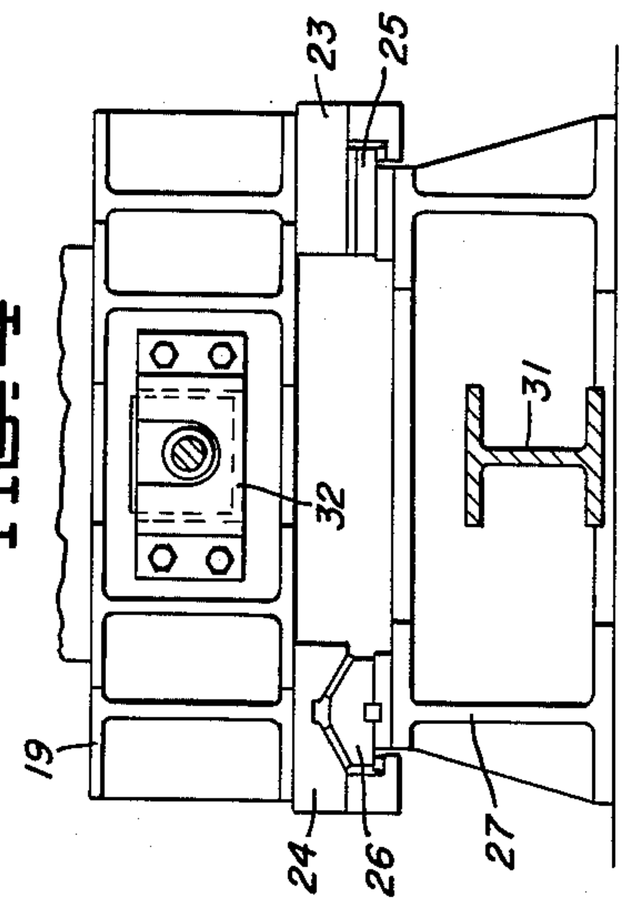
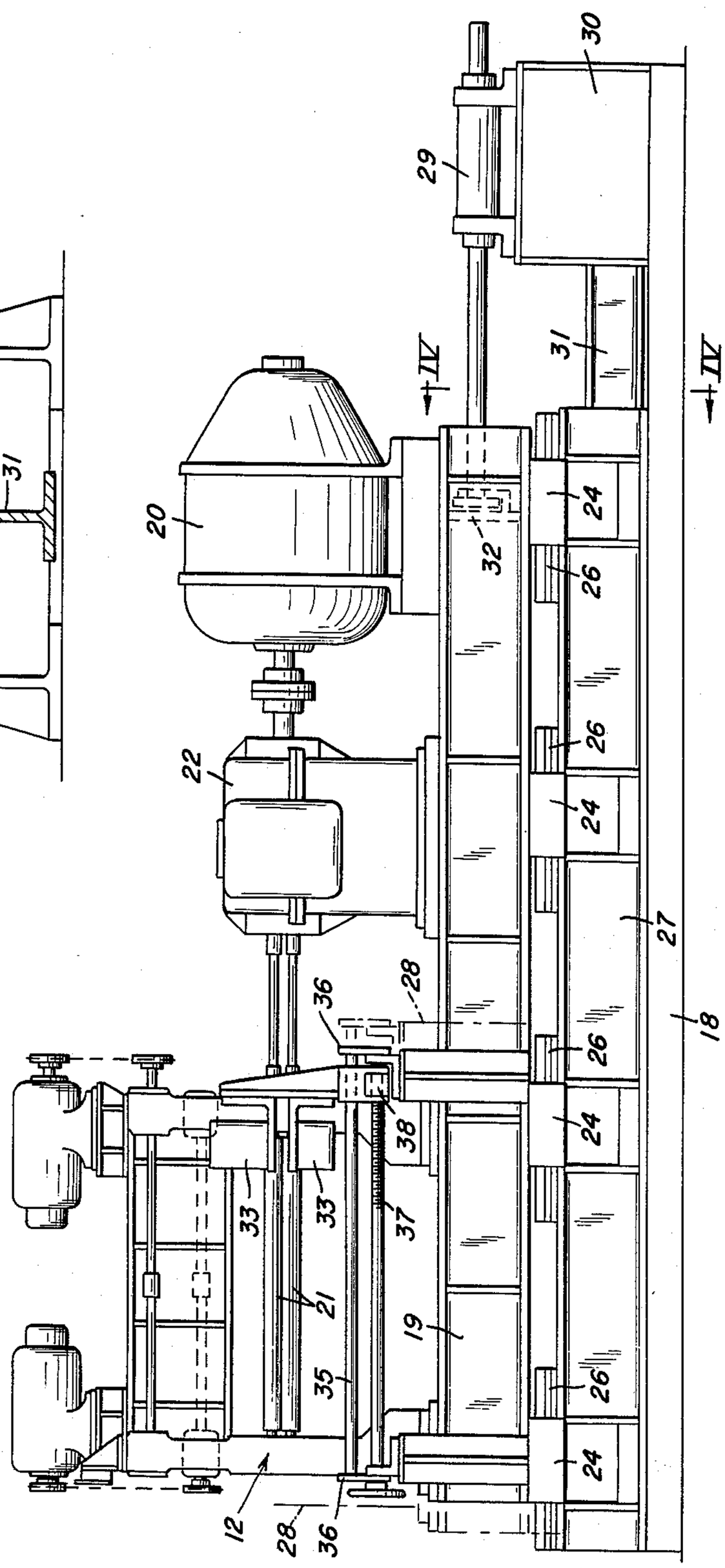


FIG. 3



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MANUFACTURE OF TIN PLATE

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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

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.

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