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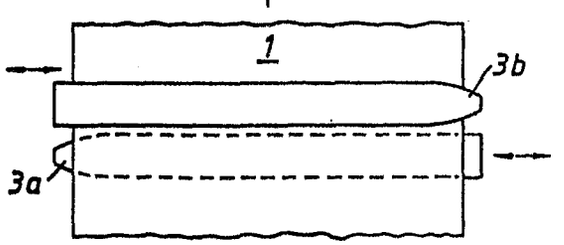
(54) Tension levelling strip material.

(57) A tension leveller for strip material in which co-operating rolls (3a, 3b) on either side of the strip are parallel faced over a major part of their length and tapered at one end, the tapers lying at opposite ends to one another and the rolls being movable along their axes whereby the mutually parallel faces presented to the strip extend over a width variable in dependence on said movement.

FIG. 2.



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TENSION LEVELLING STRIP MATERIAL

This invention relates to tension levelling strip material, either ferrous or non-ferrous, and which may be either coated or uncoated. Typical of such material is steel strip which has a surface coating e.g. galvanised.

Galvanised material which is classified as "full hard", that is high tensile quality sheet having sufficient ductility to be readily roll formed, e.g. into roofing profiles, has a minimum yield stress of 550 N/mm2.

Currently, it is difficult to produce a full hard product which exhibits good shape since the material suffers from edge softening during its processing and attempts to flatten this material by conventional tension levelling equipment with parallel sided rolls have proved unsuccessful, a 'long' edge is produced on both edges of the strip over an extent of 25 to 50mm which manifests itself as wavy or rippled edges. This condition is attributed to the fact that by the combined action of bending over a small diameter roll and the tension applied, the softer and more ductile edges are deformed more than the other parts of the coil.

In any event, such material is unsuitable for roll forming and indeed with the market demanding thinner gauges of full hard material with increasing flatness, the problem to be solved is becoming more critical.

In accordance with this invention there is provided a tension leveller for strip material in which strip is drawn under tension through at least one pair of co-operating rolls to disposal on opposite side of the strip and spaced apart along its length as to bend the strip along its path, the co-operating rolls being parallel faced over a major part of their length and tapered at one end, the tapers lying at opposite ends to one another and the rolls being moveable along their axes whereby the mutually parallel faces presented to the strip extend over a width variable in dependence on said movement.

With this design the width of the mutually parallel faces is such as to lie just within the overall width of the strip so that the strip edges are aligned with the profiled portions of the rolls. These softer edges are thus subjected to less 'work' than the remainder of the strip, indeed the extreme edges may not be subjected to any working. The axial adjustment of the rolls enables various widths of strip to be accommodated to suit particular order requirements.

In order that the invention may be fully understood, one embodiment thereof will now be described, by way of example, with reference to the accompanying drawing, in which:-

Figure 1 illustrates a schematic side elevation of a tension leveller according to this invention; and

Figure 2 illustrates a schematic plan view, on a different scale, of part of Figure 1.

In the drawings galvanised steel strip 1 e.g. zinc or aluminium-zinc alloy coated, is fed through a tension leveller 2 before inspection and coiling. The tension leveller illustrated includes two sets of co-operating rolls 3a, 3b and 4a, 4b typically 30mm diameter over their parallel sections. As will be apparent from Figure 2 each of the rolls is tapered at the end, the tapered ends lying opposite one another.

More particularly, the two rolls in each co-operating set are movable axially relatively to one another, like rolls in the two sets being movable in unison. In this manner, strip of different widths can readily be accommodated and processed in accord with this invention. With rolls of say 2000mm width, strip of maximum width of say 1650mm can be processed equally as well as strip of say a minimum width of 600mm with the rolls being moved away from one another along their axes so that their overlap is reduced in accord with this dimension.

Typically, strip gauges of between 0.2mm and 1.75mm may readily be treated in this fashion although of course thicker gauges may also be accommodated.

Whereas hitherto the Flatness Index (I) of such material subjected to tension levelling has typically been between say 30 and 100 I units, which is frequently unacceptable to customers, in accordance with this invention an I value of the order of 2 to 5 may readily be obtained, that is, the differential change in the length of the edges relative to the centre of the strip in between 0.002% and 0.005%.

Although the invention has been described with reference to the specific embodiment illustrated it is to be understood that various changes may readily be made without departing from the scope of this invention. For example the dimensional references are only given by way of example and the tension leveller may incorporate only a single set of co-operating rolls or indeed more than the two shown and can also include conventional parallel faced rolls. Further, the tapered ends on the upper rolls on the one hand and the tapered ends on the lower rolls on the other hand need not be facing in the same direction as shown, they could be alternated. A billy roll may conveniently be introduced between the two sets illustrated, but in any event there is no purposeful reduction in the gauge of the material exiting from the leveller as compared with the input gauge other than that experienced as a result of the 'stretching' action of the tension leveller; the thickness of the strip is substantially uniform across its width.

CLAIMS

1. A tension leveller for strip material in which strip is drawn under tension through at least one pair of co--operating rolls so disposed on opposite sides of the strip and spaced apart along its length as to bend the strip along its path, characterised by the co--operating rolls being parallel faced over a major part of their length and tapered at one end (3a, 3b), the tapers lying at opposite ends to one another and the rolls being movable along their axes.

2. A tension leveller according to claim 1, characterised by a plurality of pairs of co-operating rolls, the tapered ends on those rolls lying on one side of the strip all facing the same way.

3. A tension leveller according to claim 2, characterised by a billy roll introduced between adjacent pairs of said co-operating rolls.

4. A tension leveller according to any one of class 1 to 3 characterised by at least one pair of co-operating rolls having said tapered ends and at least one pair of co-operating rolls parallel faced over their whole length.

5. A tension leveller according to any one of claims 1 to 4 characterised by being designed to process "full hard" strip material as defined herein.

6. A tension leveller according to claim 5 characterised in that the tapered rolls are designed and dimensioned to process strip having widths lying between 1600 mm and 600 mm.

7. A tension leveller according to claim 5 or claim 6, characterised by being designed to process strip having a gauge between 0.2 mm and 1.75 mm.

FIG. 1.

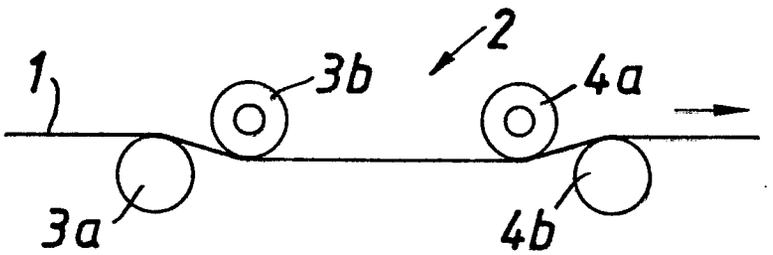

FIG. 2.