APPARATUS FOR CONTINUOUSLY DISPLACING A FLEXIBLE STRIP IN A TREATMENT INSTALLATION

Inventor: Marcel A. P. Giros, Ancerville, France

Assignee: Societe Meusienne de Constructions Mecaniques, Ancerville, France

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ABSTRACT

A method and mechanism for advancing and guiding an endless flat web of flexible, non-stretchable material, e.g. metal, through a treatment station, where the web is looped around two opposite drums in several consecutive loops arranged side by side, the upper strands of the loops being twisted into an upended position in which they can be shifted laterally by bedding them over a pair of guide rollers, which thus create a parallel offset in the strands.

5 Claims, 2 Drawing Figures
APPARATUS FOR CONTINUOUSLY DISPLACING A FLEXIBLE STRIP IN A TREATMENT INSTALLATION

BACKGROUND OF THE INVENTION

1. Field of the invention

Strips of metal of great length, as supplied in metallurgy, have to be pickled or scoured before use in the tube industry, or other industries, and the main object of the invention is to provide means to operate such a treatment, or other treatments, when the width of the strip is too large for using conventional methods and processes.

2. Description of the Prior Art

In my U.S. Pat. No. 2,651,104, I have disclosed a method of and a device for continuously moving a flexible strip or wire of a material such as metal through a bath or a treatment chamber. It is possible by this method to pass continuously through such a chamber a plane, profiled or filiform flexible strip of great length, consisting of a material which is to undergo a treatment therein. The method consists in causing the strip, preferably coiled on itself, to unwind therein and to move in general helical form along the whole path in which it is treated, whereafter it is again coiled on itself, if desired.

This method is not exclusively applicable to strips of small width, such as those which have been produced for some years in metallurgy, but it is not very suitable for the treatment of strip of a width of several hundred millimeters as now supplied in this industry, because difficulty is encountered in bringing such wide strips into the form of a helix and maintaining them in this form in tanks or treatment chambers. On the other hand, hard problems arise in passing a wide helical strip above the walls of tanks when its width reaches a certain value.

The present invention has for its object to provide a method by which a band or strip of greater width can be continuously passed through one or more treatment baths or chambers than by the devices of the prior art.

SUMMARY OF THE INVENTION

In accordance with the invention, the strip follows a path which leads it alternately from one roll to a second roll and vice versa, means being provided to ensure that the passage from the first roll to the second roll takes place with a shift of a length substantially equal to the width of the strip.

An apparatus according to the invention comprises a chamber of generally rectangular elongated form, a first transverse drive roll in the neighborhood of one end of the said chamber, a second transverse drive roll parallel to the first in the neighborhood of the other end of the said chamber, the two rolls being intended to support and to drive strip along a general flattened helical path which causes it to travel successively from the first roll to the second roll and vice versa, and means for inverting and laterally shifting the strip in at least one of the two paths along which it travels from one roll to the other.

2 BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 illustrates schematically an apparatus according to the invention as seen in perspective, and FIG. 2 is a schematic plan view of the same apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to these two figures, it will be seen that a treatment tank 1 is filled with a treatment liquid 2 to a certain level 21.

Disposed transversely in the said tank are two shafts with rolls 3 and 4 being rotated at equal speed by appropriate means in the direction of arrows 31 and 41 (these rolls are half dipped in the liquid bath 2). A strip generally denoted by 10, which comes from a store, for example, enters the bath at 11; after having passed under the roll 4, the strip 10 forms a substantially horizontal run 12, which leads it to the roll 3; after having passed under this roll, the strip 10 forms a run 13 which leaves the roll 3 in flat form and passes over a roller 51 on a vertical axis; between the roll 3 and the roller 51, the strip 10 undergoes a twist at a right angle, and it thereafter passes between the roller 51 and a roller 52 and runs on to the roll 4 after having undergone a further right-angled twist in the same direction as before (run 14). The strip thereafter enters the bath 2, returns to the roll 3 and so on.

Each time the strip 10 travels from the roll 4 to the roll 3, it forms a substantially horizontal run such as 12, and each time the strip travels from the roll 3 to the roll 4 it undergoes a double twist, and in addition it is laterally shifted by a certain amount.

It will be noted that the two twists which the strip 10 undergoes before and after passing over a pair of rollers such as 51 and 52 are of like direction. Consequently, it is not the same face of two contiguous runs such as 12 and 15 which is the upper face, that is to say, the strip is turned over each time it dips into the treatment bath. These conditions are favorable to the treatment itself.

It will also be observed that the diameter of the rollers 51 and 52 is substantially equal to their height, that is to say, to the width of the strip, and that the axes of two rollers of one pair are not exactly in a common longitudinal plane of the tank. This results in a slight gap such as 42 between two successive strips such as 16 and 17 on each roll.

After having passed around the rolls 3 and 4 a number of times, the strip 10 runs off at 18, whence it passes to a place of utilization after having been treated in the tank 1 or to another tank in order to undergo a further treatment therein.

The rollers such as 51 and 52 are, for example, are mounted on crossmembers such as 5, which are only partially shown in the figures in order not to overload the latter.

I claim:

1. A method of advancing and guiding a continuous flat web of flexible, non-stretchable material through a treatment station such as a chemical bath or the like, comprising the steps of:

looping the web around two parallel spaced horizontal reversing drums in a plurality of adjacentl
running elongated open web loops, with each web loop forming an upper and a lower web strand between the reversing drums;
longitudinally twisting a first length portion of the upper web strand of each web loop by a quarter turn so that the flat web is forced to run in an upended orientation;
maintaining the upended web in that orientation over a subsequent second length portion of the web strand;
laterally offsetting the web strand in its upended length portion by running the web over two spaced bending guides, the two bending guides deflecting the web by equal opposite angles; and
longitudinally twisting a subsequent third length portion of the web strand by another quarter turn, so as to return the web from the upended orientation to the orientation required for running around the reversing drums; the thus twice twisted and twice bent web running around the two reversing drums in successive laterally shifted loops.

2. A mechanism for advancing and guiding a continuous flat web of flexible, non-stretchable material through a treatment station such as a chemical bath or the like, comprising in combination:
two horizontal reversing drums arranged with their axes in parallel and spaced apart a greater distance as is required for twisting of the web by one-half turn without permanently deforming the latter, the width of the reversing drums being a multiple of the web width;
structural means for supporting the two reversing drums and drive means for driving at least one of the reversing drums in order to advance the web;
means for guiding the web around the reversing drums in several consecutive, adjacently running elongated open web loops, with each loop forming two web strands between the reversing drums; the guiding means engaging one of the web strands of each web loop in such a way that a first length portion of the strand is longitudinally twisted by a quarter turn to force the web to run in an upended orientation, a second length portion of the strand is maintained in the upended orientation, a third length portion of the strand is again longitudinally twisted by a quarter turn to return the web from the upended orientation to the orientation required for running around the reversing drums, and that the upended web in the second length portion of the strand is bent to create such a lateral offset between the first and third length portions of the strand that each consecutive web loop runs adjacent to the preceding one.

3. The web advancing mechanism as defined in claim 2, wherein the web guiding means and the continuous web are so arranged that the twisting in the first and third length portions of the web is in the same sense so that the web is inverted by the web guiding means, as it travels from one reversing drum to the other.

4. A web advancing mechanism as defined in claim 2, wherein the web guiding means include a pair of stationary guide rollers, whose parallel axes are perpendicular to the drum axes and which are so spaced along the upended second length portion of the web strand that the web is bent over the two guide rollers at opposite sides thereof by equal amounts.

5. The web advancing mechanism as defined in claim 4, wherein the two stationary guide rollers and the two reversing drums determine between them the beginning and end of each of the three consecutive length portions of the strand, the twisting first and third length portions extending each between a drum and a guide roller, and the upended second length portion extending between the two guide rollers.

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