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METHOD FOR TREATING SHEET METAL STRIP

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The present invention relates to Venetian blind slats and the like, and a method of and apparatus for preparing sheet metal strips therefor.

Modern Venetian blinds are usually made up of thin sheet metal strips, for example, in the neighborhood of 0.008 of an inch thick. This thin sheet metal strip as it is received from the mill includes uncontrollable distortions that must be removed before the strip can be used as a slat for a Venetian blind. Furthermore, the transverse contour of such strip material preferably is of a predetermined form in order to prevent transverse buckling of the slats and to impart to it sufficient stability so that it functions properly when employed as a Venetian blind slat.

Heretofore, apparatus has been provided for feeding the sheet metal strip, as it is received from the mill, through certain devices for subjecting the strip to certain stresses and counterstresses in order to relieve the distortions inherent in the strip material as it is received from the mill. Thereafter, the strip is fed through various forming rolls to impart to it a desired transverse contour that will enable the strip to function properly as a Venetian blind slat. These known methods, while generally satisfactory, have not been wholly satisfactory with respect to slat strength and stability.

The principal object of this invention has been to provide strip sheet metal in a form that will overcome the above as well as other difficulties encountered with known strip sheet material.

Another object of the present invention has been to provide strip sheet material with longitudinally extending corrugations for imparting to the strip material adequate stability for its use as Venetian blind slats.

Another object of the invention has been to provide such longitudinally corrugated strip material having a desired transverse contour that will be suitable for Venetian blind slats.

Still another object of the invention has been to provide apparatus for subjecting the strip material to stresses and counterstresses at different transverse points and at intervals along the length of the strip material, which stresses and counterstresses equalize those between the center of the strip and the side edges to eliminate uncontrolled distortion of the strip.

Another object of the invention has been to provide such apparatus including a pair of grooved rollers through which the strip is passed, which rollers impart to the strip material longitudinally extending corrugations.

A further object of the invention has been to provide such an apparatus in which the strip material is passed between the transverse contouring rolls to provide the desired bow to the strip material so that it will be ideally suited for Venetian blind slats.

A still further object of the invention has been to provide such an apparatus that will operate on the strip material without in any way injuring its coating.

In one aspect of the invention, coated strip material as received from the mill is fed through a device which applies stresses and counterstresses transversely of the strip material as it is fed therethrough and at intervals longitudinally along the strip.

In another aspect of the invention, the strip material is fed between a pair of grooved rolls that are biased toward each other under a predetermined force, and which rolls impart corrugations longitudinally of the strip.

In a further aspect of the invention, the strip material is successively fed between other grooved rollers that impart to it the transverse contour of predetermined design, while reducing the corrugated effect near the edges of the strip and at the same time retaining the corrugated effect in the longitudinal central area thereof.

In another aspect of the invention, the strip material is drawn through the apparatus by a force applied longitudinally of the strip at the exit of the apparatus.

Other and further objects, features and advantages of the invention will become apparent from the following description taken in connection with the appended drawings, in which:

FIG. 1 is a perspective view of apparatus to which the principles of the invention have been applied;
FIG. 2 is a section of the strip material as it is received from the mill;
FIG. 3 is a sectional elevational view through the corrugating rolls and taken substantially along line 3—3 of FIG. 1;
FIG. 4 is a sectional elevational view taken substantially along line 4—4 of FIG. 1;
FIG. 5 is a sectional view taken substantially along line 5—5 of FIG. 1;
FIG. 6 is a sectional elevational view taken substantially along line 6—6 of FIG. 1;
FIG. 7 is a sectional elevational view taken substantially along line 7—7 of FIG. 1; and
FIG. 8 is a sectional view through the finished strip material in its condition for use as Venetian blind material.

Referring to the drawings, and particularly to FIG. 1, the principles of the invention are shown as applied to apparatus including a unit 10 having a guide roll 11 adapted to guide the strip material 12 into the unit 10. An outlet roll 13 guides the strip 12 as it leaves unit 10. Unit 10 may be any one of a number of commercial items which are adapted to apply stresses and counterstresses transversely to the strip 12 and at intervals longitudinally therealong as the strip passes through unit 10. The stresses and counterstresses are intended to relieve the strip 12 of the stresses inherent in the strip as it is received from the mill. One such device 10 is shown and described in U.S. Patent 2,717,689 to H. L. Johnson, granted Sept. 13, 1955, to which patent reference is directed for an understanding of the operation of the unit 10. Unit 10 might also be constructed as shown in U.S. Patent 2,294,434 to A. B. Wilson.

A support 14 may have fixed to it a frame 15 in which are grooved rolls 16 and 17 between which the strip 12 passes. The rolls 16 and 17 are arranged so that the crests of one roll fit into the troughs of the other. Referring to FIG. 3, the frame 15 may include parallel side walls 18 between which journal blocks 19 and 20 may be mounted for supporting rods 21 and 22 on which the corrugated rolls 16 and 17 are journaled. Rolls 16 and 17 are retained on the rods 21 and 22 by nuts 23 and 24. The block 20 is rigidly fixed to a bottom wall 25 of the frame 15, and the block 19 is mounted for vertical reciprocation between the walls 18 of the frame 15. Vertical adjustment of the block 19 and the grooved roll 16 may be effected by a threaded rod 26 that is threaded through the top wall 27 of the frame 15. A handwheel 28 may be fixed to the threaded rod 26, and its lower end may be connected to, or may act on the top of block 19.

In the embodiment disclosed, the rolls 16 and 17 may include a plurality of grooves that mate with each other so that as strip 12 passes therebetween, it becomes corrugated longitudinally. While the roll 16 is shown as having four troughs and three crests, and the roll 17 is shown...
as having three troughs and four crests, any number of troughs and crests may be employed to produce any number of corrugations longitudinally of strip 12.

Referring again to FIG. 1, the support plate 14 may have attached to it another plate 29 for supporting other combinations of rolls to be described. A rod 30 may be fixed in plate 29 and it may extend transversely of strip 12, beneath the same, and support an idler roller 31 which is held onto the rod 30 by a nut 32.

Another rod 33 may be anchored in plate 29 and it also may extend transversely of the strip 12 and journal a concave roll 34 which is held on rod 33 by nut 35. A bar 36 may be pivotally mounted to the plate 29 by pivot 37 and may support a threaded rod 38, the axis of which is in a vertical plane passing through the axis of rod 33. Rod 38 may journal a convex roller 39 which may be held on rod 38 by a nut 40. Referring to FIG. 4, convex roll 39 may cooperate with the concave roll 34, and as strip 12 passes therebetween, the outer corrugations 41 and 42 of strip 12 are reversely bent to reduce the corrugated appearance at the edges of strip 12.

Another rod 43 may be anchored in plate 29, and it may support a concave roller 44 held on rod 43 by nut 45. A rod 46 may be attached to the bar 36, and its axis may lie in the same vertical plane as that in which the axis of rod 43 lies. A convex roll 47 may be held onto the rod 46 by a nut 48.

Referring to FIG. 5, the convex roll may fit into the concavity of the roll 44 in such a manner as to further relieve the severity of the corrugations near the outer edges 41 and 42 of the strip 12. This is a further step in reducing the appearance of the corrugations while retaining the rigidity of the strip 12 by virtue of such corrugations.

Another rod 49 mounted on the plate 29 supports an idler concave roller 50 that is held on rod 49 by nut 51.

The bar 36 may include a shoe element 51 that is connected to one end of a screw 52 that is threaded into a block 53 of a bracket 54, which latter is attached to plate 29. A handwheel 55 is connected to the screw 52, and the construction of the parts is such that rotation of the handwheel 55 causes arcuate movement of the bar 36 about the pivot 37 to vary the position of rolls 39 and 47 relative to their cooperating groove 34 and 44, respectively.

Nuts 56 and 57 set to lock the screw in vertically adjustable position when the desired spacing of the rolls 34, 39, and 44, 47 have been effected.

Another rod 58 may be anchored in the plate 29 and extends transversely of the strip 12. Rod 58 may support a sharp projecting roller 59 that is held on shaft 58 by the nut 60. A plate 61 may be pivotally attached to plate 29 by a pin 62. It may support a rod 63 on which a roll 64 is mounted which closely fits the groove 65 within roll 59.

Referring to FIG. 6, it is evident that the roll 64 further reduces the severity of the corrugations at the edges 41 and 42 of strip 12, while retaining the severity of the corrugations within the center of the strip.

Another rod 66 may be anchored in the plate 29 and it may support a concave roll 67 held thereon by a nut 68. A plate 69 may be attachably mounted on the plate 29 and it may support a rod 70, the axis of which lies in the same vertical plane as the axis of rod 66. A convex roll 71 may be held on the rod 71 by a nut 72. Referring to FIG. 7, it is noted that the roll 71 conforms very closely to the contour of the concave portion of roll 67 to further reduce the appearance of corrugations near the edges 41 and 42 of the strip 12. In this instance, it is noted that the first two corrugations inwardly from each edge 41 and 42 are acted upon by the rolls 71 and 47, while retaining the central portion of the strip 12 substantially in the manner in which it left the corrugating rolls 16, 17. Movement through the unit 10 and past the corrugating rolls 16, 17, as well as past the rolls 39, 34, 47, 44, 64, 59, 71 and 67 may be effected by applying a longitudinal pull in the direction of the arrow 73 (FIG. 7).
stresses at longitudinally spaced intervals along said strip material; forming longitudinally extending corrugations along said strip material; and reducing the effect of the corrugations in stages near the edges of said strip material while retaining the effect of said corrugations in the longitudinal central region of said strip material.

10. The method of preparing relatively thin, narrow strip metal for use as slats for Venetian blinds and the like, which comprises applying stresses and counter-stresses at longitudinally spaced intervals along said strip metal; forming longitudinally extending corrugations along said strip metal; and reducing the effect of the corrugations in stages near the edges of said strip metal while retaining the effect of said corrugations in the longitudinal central region of said strip metal.

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