Feb. 21, 1956 G. L. SHERWOOD 2,735,474

METHOD OF PRODUCING COMPRESSION STRESSES IN THE EDGES AND SUBSTANTIALLY REDUCING THE CAMBER OF AN ELONGATED FLEXIBLE METAL STRIP

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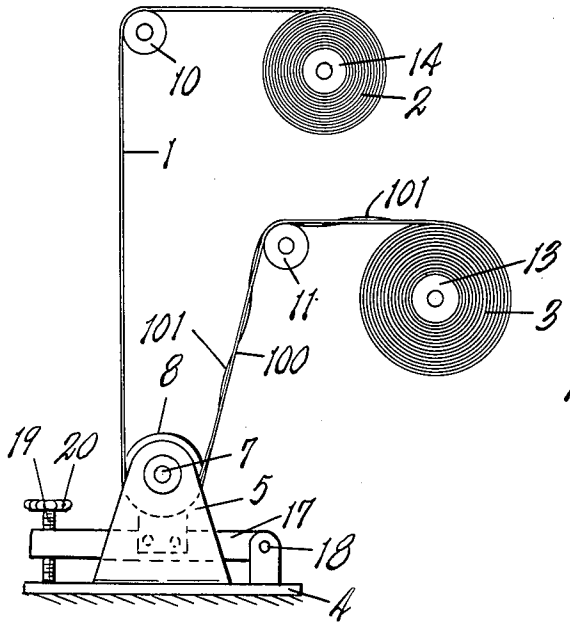


Fig. 1.

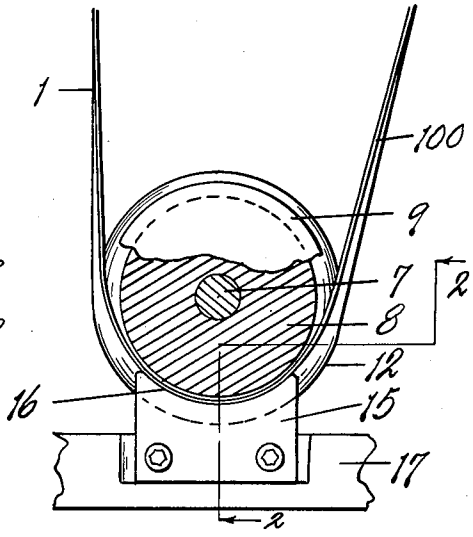


Fig. 3.

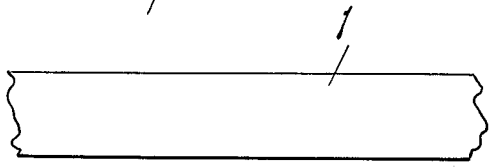


Fig. 4.

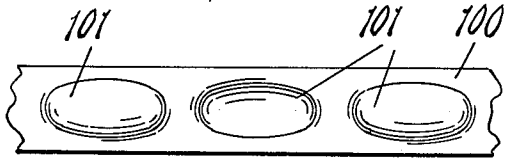


Fig. 5.



Fig. 6.

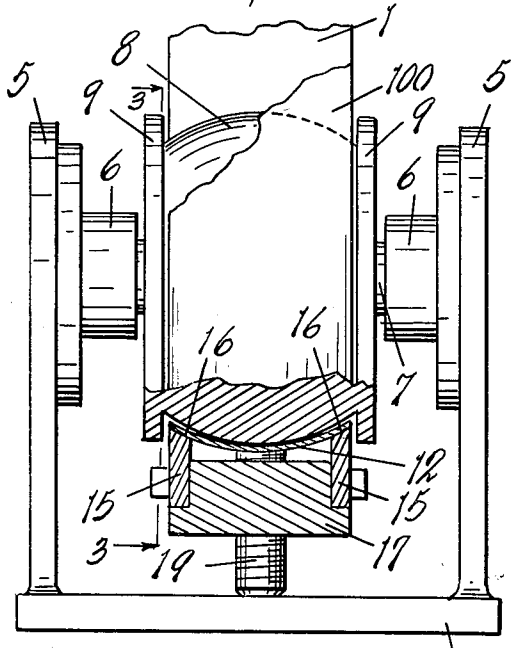


Fig. 2.

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METHOD OF PRODUCING COMPRESSION STRESSES IN THE EDGES AND SUBSTANTIALLY REDUCING THE CAMBER OF AN ELONGATED FLEXIBLE METAL STRIP

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Original application March 9, 1951, Serial No. 214,748, now Patent No. 2,717,626, dated September 13, 1955. Divided and this application October 28, 1952, Serial No. 317,276

7 Claims. (Cl. 153—32)

This invention relates to improvements in method of producing compression stresses in the edges and substantially reducing the camber of an elongated flexible metal strip.

This application is a division of my application for Letters Patent filed March 9, 1951, Serial Number 214,748, now Patent No. 2,717,626, granted September 13, 1955.

The main objects of this invention are:

First, to provide a method for producing compression stresses in the edges of an elongated flexible metal strip without longitudinal stretching of any portion of the strip.

Second, to provide a method of producing compression stresses in the edges of an elongated flexible metal strip and substantially reducing the camber of the strip.

Third, to provide a method of substantially reducing the camber of a thin elongated metal strip without longitudinally stretching any portion thereof.

Fourth, to provide a method of accomplishing this result which enables very rapid and economical production of stock and which is well adapted for use in the forming of Venetian blind slats and the like.

Further objects will appear from the description to follow. The accompanying drawing illustrates one apparatus which is satisfactory for the practicing of my method.

Fig. 1 is a fragmentary side elevational view of an apparatus adapted for the practicing of and illustrating certain steps of my method, the parts being shown more or less conventionally.

Fig. 2 is an enlarged fragmentary view looking from the right of Fig. 1 and partially in vertical section on a line corresponding to line 2—2 of Fig. 3 and further illustrating steps of my method.

Fig. 3 is a fragmentary view in section on a line corresponding to line 3—3 of Fig. 2 and likewise illustrating steps of my method.

Fig. 4 is a fragmentary plan view of a strip of thin metal stock which may be processed by my method.

Fig. 5 is a fragmentary plan view of the stock after it has been treated by my method.

Fig. 6 is an edge view thereof.

In the accompanying drawing 1 represents the stock to be treated or processed by my method to produce compression stresses in the edges and reducing the camber thereof, and 100 the strip after treatment with the bulges or distortions 101 therein resulting from the compression stresses produced in the edges of the strips. It should be understood that the distortions 101 between the edges in which the compression stresses have been produced are shown very greatly exaggerated and they are shown

as being alternately and quite uniformly disposed. While they are usually more or less uniformly disposed, the illustration in Figs. 5 and 6 is for the purpose of indicating that while the edges of the strip have compression stresses set up therein there is no longitudinal stretching of the central portion of the strip. The numeral 2 represents the roll of stock 1 and the numeral 3 the roll of processed stock.

The method of my invention is particularly desirable for use in making or forming slats for Venetian blinds. As an example, the strip of stock 1 may be cold rolled steel two inches wide and in the order of .004 to .008 in thickness. These dimensions are appropriate or suitable for production of Venetian blind slats such, for example, as are used in homes.

The apparatus illustrated comprises a suitable base 4 which may be bolted or otherwise secured to a table or bench or a supporting part of a slat forming machine. The base plate is provided with spaced bearing uprights 5 provided with bearings 6 for the spindle 7 of the pulley 8. The spindle 7 rotates freely in the bearings or if desired, the pulley may rotate on the spindle. The pulley is formed with a substantial crown and is provided with annular guide flanges 9 at its ends. The strip of stock 1 is translated endwise around the pulley, the guide pulleys 10 and 11 being arranged so as to guide the stock as it is endwise translated around the pulley to longitudinally curvedly bend successive portions thereof. In the machine illustrated the bend is substantially U-shaped.

Means for winding the stock on the spool 13 are not illustrated. Desirably suitable brake means are provided for the spool or arbor 14. It is desired to point out, however, that in the practice of the method only sufficient tension is applied to the strip to keep the successively curvedly bent or bight portions of the strip in internally supported engagement with a substantial arc of the pulley. It will be noted that only the central portion of the strip is in interiorly supported engagement with the periphery of the pulley and that the edge portions thereof are in diverging relation thereto and not in supported engagement with the pulley and are interiorly unsupported. Simultaneously with the longitudinal curving of the strip around and with the central portion only of its longitudinally curved portion in interiorly supported relation to the pulley the longitudinally curved portion of the strip is simultaneously transversely curved or bent.

In the apparatus illustrated this is accomplished by the shoe-like supporting members 15 which have work engaging edges 16 desirably inwardly beveled. The work engaging faces of these members 15 are disposed supportingly to engage the edge portions of the strip so that they travel in a path at a radial distance from the axis of the pulley substantially less than the radius of the pulley at the center of its crown. The surfaces 16 are spaced from the pulley so that the edges of the strip are not clamped or urged against the pulley but are interiorly unsupported and in diverging relation to the face of the pulley as is shown in Fig. 2. The members 15 are mounted on an adjustable support 17 pivoted at 18 at one side of the pulley and adjustably supported at its other end by the screw 19 which is provided with a hand wheel 20 for convenience in adjustment.

This apparatus serves to longitudinally curvedly bend successive portions of the strip as it is translated around the pulley and simultaneously transversely bend such curvedly bent portions. The edges of the strip are sup-

ported so that the travel thereof is substantially less than that of the interiorly supported central portion of the strip with the result that the compression stresses are produced in the edges of the strip and no stretching stresses are imparted to any portion thereof. The processed strip is desirable for use in the forming of various parts but it is particularly adapted as stock for the forming of Venetian blind slats of curved or other nonplanar cross section. The strip is not subjected to stretching or other stresses which tend to distort the granular structure thereof. As stated, the bulges **101** illustrated in Figs. 5 and 6 are greatly exaggerated.

The strip is subjected to only such longitudinal stress or tension as is required to translate it around the pulley and keep it sufficiently taut to maintain the central portion of the longitudinally curved section of the strip in interiorly supported relation to the pulley. The treated or processed stock after leaving the pulley is substantially flat as is illustrated. Most thin elongated stock of the type commonly used for Venetian blinds has substantial camber and my method removes or reduces the camber at least sufficiently so that the processed stick may be used for Venetian blind slats, for example, without further treatment to remove camber.

It is explained in this connection that camber is caused by one edge of a strip being longer than the other. When such stock passes around the crowned pulley, the longer edge tends to form in a larger loop, and inasmuch as, the two shoe-like supporting members **15** are uniformly set in relation to the crowned pulleys, the larger loop naturally presses harder on the shoe member **15** which engages it. The effect is to shorten this edge to a greater extent than the opposite edge producing stock in which camber is substantially reduced.

I have illustrated and described a practical apparatus for the practice of my method. I have not illustrated other mechanisms which may be desirable to use in commercial production as it is believed that this disclosure will enable those skilled in the art to practice my method as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of producing compression stresses in the longitudinal edges of a thin relatively narrow elongated springably bendable metal strip comprising the steps of translating the strip longitudinally and while the strip is traveling continuously springably longitudinally bending the strip in one portion of its travel, and simultaneously transversely springably bending substantial arcs of the longitudinally curvedly springably bent portion of the strip with the central portion of the bend interiorly supported and externally unsupported and wth the longitudinal edge portions at each side of the internally supported central portion externally supported and interiorly unsupported, such longitudinal edge portions being exteriorly supported so that the travel of the said longitudinal edge portions through a major portion of the longitudinal bend of the strip is substantially less than that of the interiorly supported central portion of the strip.

2. The method of producing compression stresses in the longitudinal edges of a thin relatively narrow springably bendable metal strip comprising the steps of translating the strip endwise and simultaneously with the translation thereof and without the application of longitudinal stretching stress thereto longitudinally curvedly springably bending the strip in one portion of its travel over a convexed supporting surface contacting only the central portion of the strip with longitudinal edge portions of the springably curvedly bent portion at each side of said central supported portion internally unsupported, and simultaneously transversely springably bending substantial arcs of the longitudinally curvedly springably bent portion and externally supportedly guiding the internally unsupported longitudinal edge portions in an arc of less radius than the internally supported central curved portion of the strip.

3. The method of producing compression stresses in the longitudinal edges of a thin relatively narrow springably resilient metal strip comprising the steps of translating the strip endwise and simultaneously with the translation thereof and without the application of longitudinal stretching stress thereto longitudinally curvedly springably bending the strip in one portion of its travel with the central portion of the bent strip interiorly supported and with edge portions of substantial width at each side of said central interiorly unsupported portion exteriorly supported, and guiding the interiorly unsupported longitudinal edge portions of the bend of the strip in a path spaced radially inward of the path of the interiorly supported central portion of the strip.

4. The method of producing compression stresses in the edges of a thin elongated springable relatively narrow metal strip comprising the steps of longitudinally translating and longitudinally curvedly springably bending the strip within one portion of its travel around a crowned surface with a central portion of the strip of substantial width in internally supported engagement with the crowned surface and with longitudinal edge portions of the strip of substantial width at each side of said central internally supported portion internally unsupported, and simultaneously transversely springably bending a substantial arc of the longitudinally curvedly springably bent portion by externally supporting longitudinal edge portions thereof so that the travel of the edge portions is less than the travel of the interiorly supported central portion of the strip.

5. The method of producing compression stresses in the edges and reducing the camber of a thin relatively narrow springably resilient metal strip comprising the steps of translating the strip endwise and successively and longitudinally curvedly springably bending the strip within one portion of its travel with the central portion of the bent portion internally supported and with longitudinal edge portions of the strip at each side of the central internally supported portion internally unsupported, and simultaneously with the longitudinal bending of the strip transversely springably bending a substantial arc of the longitudinally curvedly bent portion by externally supporting longitudinal edge portions thereof so that the travel of the edge portions through the longitudinally curvedly bent portion is in paths substantially less than the interiorly supported central portion of the strip.

6. The method of reducing camber in a thin relatively narrow springable resilient metal strip comprising the steps of translating the strip longitudinally and without longitudinal stretching and simultaneously with the travel thereof longitudinally curvedly springably bending the strip within one portion of its travel while in internally supported relation to a convexedly curved surface, and simultaneously springably bending the longitudinally curved portion of the strip transversely with longitudinal edges of the longitudinally curvedly bent portion of the strip externally supported so that the path of travel thereof through the longitudinal curve is substantially less than that of the central portion of the strip, the externally supported edge portions of the strip being internally unsupported.

7. The method of producing compression stresses in the longitudinal edges of a thin elongated springably flexible relatively narrow metal strip comprising the steps of translating the strip longitudinally and while the strip is traveling, longitudinally curvedly springably bending the strip within one portion of its travel into a substantial U-bend with an intermediate portion of the U-bend of substantial arc interiorly and unyieldingly supported and with longitudinal edge portions of substantial width at each side of said interiorly supported intermediate portion interiorly unsupported permitting free flexing thereof and simultaneously exteriorly unyielding supporting and

guiding substantial arcs of the interiorly unsupported longitudinal edge portions of the U-bent portion of the strip so that substantial arcs of the longitudinally curved bent and interiorly unsupported longitudinal edge portions are transversely bent and the travel of the unyieldingly supported edges thereof is substantially less than that of the interiorly unyieldingly supported intermediate portion of the strip.

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