

A. M. LANE.
ROLLING SPRING METAL.
APPLICATION FILED DEC. 20, 1915.

1,229,480.

Patented June 12, 1917.

Fig. 1.

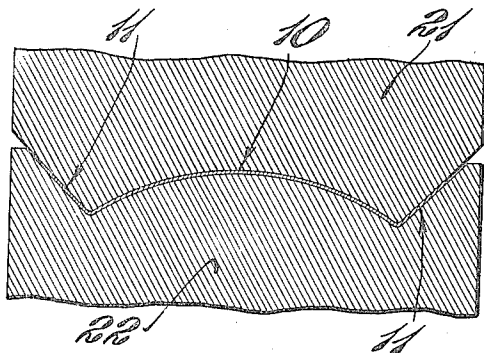


Fig. 4.

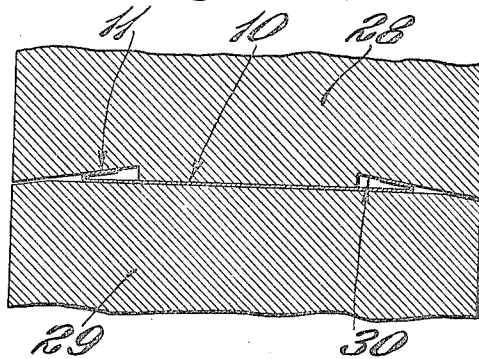


Fig. 2.

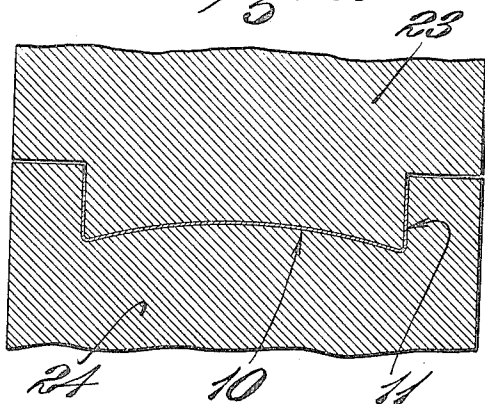


Fig. 5.

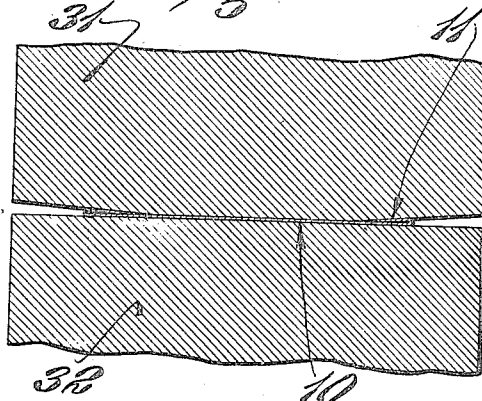


Fig. 3.

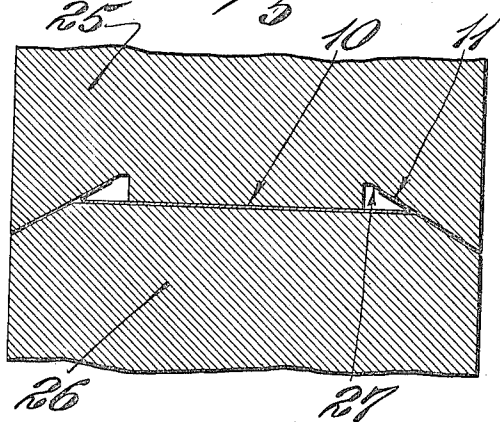
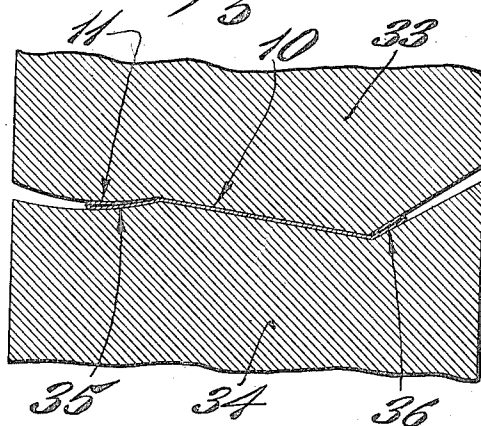


Fig. 6.



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his Attys.

UNITED STATES PATENT OFFICE.

ALFRED M. LANE, OF ST. LOUIS, MISSOURI, ASSIGNOR TO MONARCH METAL WEATHER STRIP COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

ROLLING SPRING METAL.

1,229,480.

Specification of Letters Patent. Patented June 12, 1917.

Application filed December 20, 1915. Serial No. 67,738.

To all whom it may concern:

Be it known that I, ALFRED M. LANE, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Rolling Spring Metal, of which the following is a specification.

This invention relates to rolling thin metal such as weather strips for windows and doors, and it relates particularly to rolling springy metal such as hard copper, brass and bronze.

It has been found difficult to roll spring metal in the form of a strip without twisting or warping the strip or putting kinks into it which interfere with its use. The act of bending certain portions only of the width of the strip to form the shape desired changes the internal structure of the metal of these portions of the strip, causing distortion and unequal hardness of the metal such as to necessitate annealing the entire length of the strip before it is suitable for use.

The object of the invention is to prevent distortion of the strip due either to molecular rearrangement of portions of it which are bent more than other portions or to other causes, and thereby to save annealing the strip.

The invention consists in subjecting the major portion of the width of the strip to bending action and arranging the rolls to do about the same amount of work on all portions of the strip; and the invention also consists in stretching the metal lengthwise slightly between the several operations performed by the rolls.

Further objects of the invention appear hereinafter in connection with the process of rolling a spring metal weather strip illustrated in the accompanying drawings; and what the invention consists in is more particularly defined in the appended claims.

In the drawings, wherein the same reference characters designate the same parts in the several views,

Figure 1 is a cross-section of the meeting portions of a pair of rolls, showing the first rolling operation being performed on the strip; and

Figs. 2 to 6, inclusive, are similar views of the second, third, fourth, fifth and sixth operations on the strip, respectively.

The finished product is shown in Fig. 6 in

cross-section. The invention may be performed in any suitable machine comprising a series of stands of rolls arranged to operate successively upon a strip of metal passing through them, the diameter of each succeeding pair of rolls being greater than that of the preceding pair. Gearing is provided for rotating the successive pairs of rolls each at a slightly faster peripheral speed than the preceding pair.

Strips of metal of suitable width for the product desired are sheared from sheets of the desired length and thickness of metal, and are passed through the machine one after another. In passing through the machine they are operated upon by the rolls, each pair of rolls performing one step in the production of the finished article.

The pass between the first pair of rolls 21, 22 (see Fig. 1 of the drawing) is shaped to bend the middle portion of the strip into a transversely curved form, convex on its upper side, and bordered by two narrow marginal flanges 11 which extend upwardly and outwardly at an obtuse angle to the middle portion. Upon emerging from the first pair of rolls, the spring in the metal causes the convex middle portion to flatten out somewhat, thereby causing the edges of the marginal flanges 11 to approach each other.

The pass between the second pair of rolls 23, 24, has a flatter convex middle portion than that of the first pair of rolls, and the portions which receive side flanges are radial, thereby bending the latter straight up, as shown in Fig. 2. Upon emerging from the second pair of rolls the obtuse angle between the middle portion of the strip 10 and the marginal flanges 11 has been decreased to an angle slightly less than 90°.

The pass between the third pair of rolls 25, 26 has a straight middle portion, with wide grooves at its two ends in the top roll. These grooves have inclined outer walls which slope inwardly from their outer edges, as shown in Fig. 3. The flat middle portions of the rolls flatten out the convex middle portion of the strip and cause the top edges of the flanges 11 to slant toward each other in position to be engaged by the slanting walls 27 of the top roll and bent in still farther.

The pass between the fourth pair of rolls 28, 29 (see Fig. 4) is similar to that be-

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tween the third pair of rolls 25, 26; but in the fourth pair of rolls the side walls 30 of the two edge grooves in the top roll 28 make a flatter angle with the flat middle portion 5 than in the third pair of rolls, and thereby bend the flanges 11 more nearly down against the flat middle portion of the strip.

The pass between the fifth pair of rolls 10 of the strip, only its margins being widened slightly by beveling the edges of the top roll to accommodate the flanges 11 which are completely doubled back on the middle portion of the strip thereby, as shown in Fig. 5.

15 The pass between the last pair of rolls 33, 34 is straight for the middle portion, but arranged at an angle to the axes of the rolls, and the diverging edge portions of the pass are beveled off at a slight angle thereto, one 20 end of the passes being up and the other down, as shown in Fig. 6. The flanges 11 and margins of the strip 10 are engaged by these beveled edges and bent one up and the other down. The margin 35 which is bent 25 down is next to the high edge of the slanting middle portion; and the margin 36 which is bent up is next to the low edge of the slanting middle portion, this arrangement keeping the strip as a whole parallel with the 30 axes of the rolls, and thereby reducing the amount of slip between the rolls and strip, and distortion of the thin metal occasioned thereby. The beveled portions of the rolls which form the margin 35 are respectively 35 convex and concaved slightly to produce a slight concavity along one bent edge of the finished article. The angles and shape of the beveled edges of the rolls which form the oppositely inclined margins of the 40 strip may be changed to suit the shape of strip desired.

It will be noted that each bending operation is performed simultaneously with the rolling and consequent slight reduction in the thickness of substantially the entire 45 width of the strip. Each operation slightly increases the length of the strip, and the following pairs of rolls are speeded up sufficiently a little more than just to keep pace 50 with faster movement of the strip toward the finished end due to its lengthening. This reduction in the thickness and lengthwise stretching of the metal is scarcely measurable, and its hardening effect upon the metal 55 is uniformly slight, but it is effective in taking the wind and kinks out of the flanged edges and middle portion of the metal strip.

It is evident that the width of the blank

strip, and the angles and curvature of the faces of the rolls may be changed within 60 wide limits to suit the shape of finished article desired, and the invention is not restricted to the precise configuration of the rolls shown and described.

I claim the following as my invention: 65

1. The process of bending springy sheet metal strips which comprises passing said strips cold through successive pairs of bending and reducing rolls, each succeeding pair 70 of rolls being driven at a peripheral speed slightly greater than that of the preceding pair.

2. The process of bending springy sheet metal strips which comprises passing said strips cold through successive pairs of gripping and bending rolls, each succeeding pair 75 of rolls being driven at a peripheral speed slightly greater than that of the preceding pair, whereby each strip is stretched slightly between successive pairs of rolls. 80

3. The process of bending springy sheet metal strips which comprises passing each strip cold through successive pairs of rolls 85 each of which makes a slight reduction in the thickness of substantially the entire width of the strip, each succeeding pair of rolls being driven at a peripheral speed slightly greater than that of the preceding pair.

4. The process of bending over the edges 90 of spring metal strips which comprises bending up the middle portion of the strip to convex form simultaneously with bending up the margins at an angle thereto, and subsequently flattening the convex middle 95 portion.

5. The process of bending over the edges of spring metal strips which comprises bending up the middle portion of the strip to convex form simultaneously with bending 100 up the margins at an angle thereto, and subsequently flattening the convex middle portion and margins into parallel planes.

6. The process of bending over the edges of spring metal strips which comprises 105 bending up the middle portion of the strip to convex form simultaneously with bending up the margins at an angle thereto, bending in said margins and reducing the convexity of said middle portion and subsequently flattening the convex middle portion 110 and margins into parallel planes.

Signed at St. Louis, Missouri, this 15th day of December, 1915.

ALFRED M. LANE.