F. H. WILLIAMS.

BAR TWISTER.

APPLICATION FILED JUNE 24, 1912. RENEWED JULY 21, 1917.

1,257,435.

Patented Feb. 26, 1918.

3 SHEETS—SHEET 1.

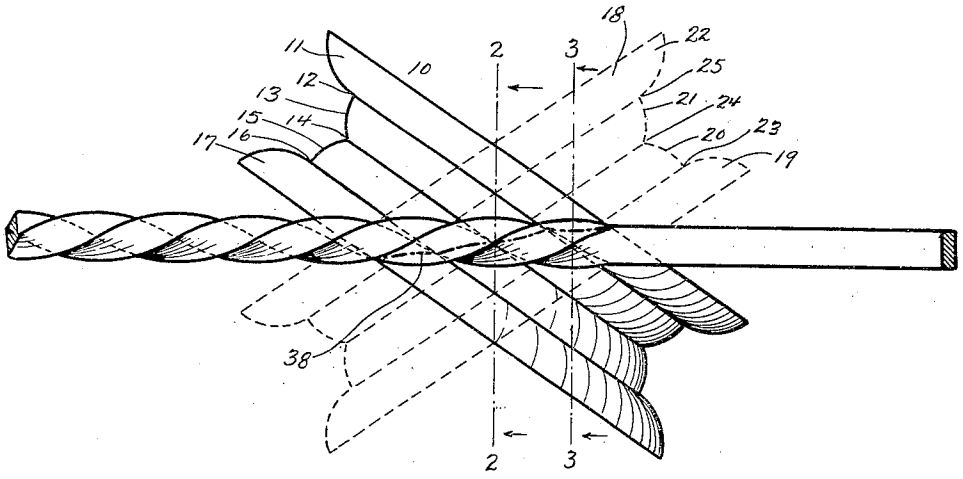


Fig. 1.

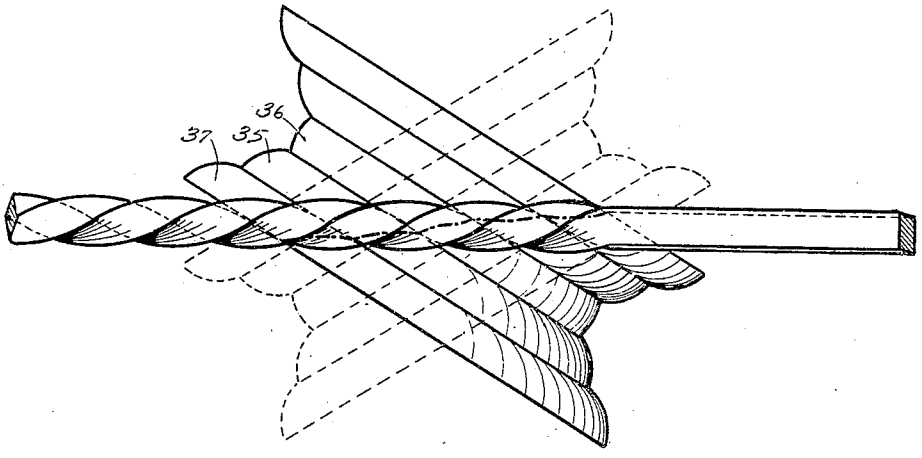


Fig. 4.

WITNESSES:

Walter H. Kelley

Bessie E. Dempsey

INVENTOR

Frank H. Williams

BY J. W. McEllis

ATTORNEY

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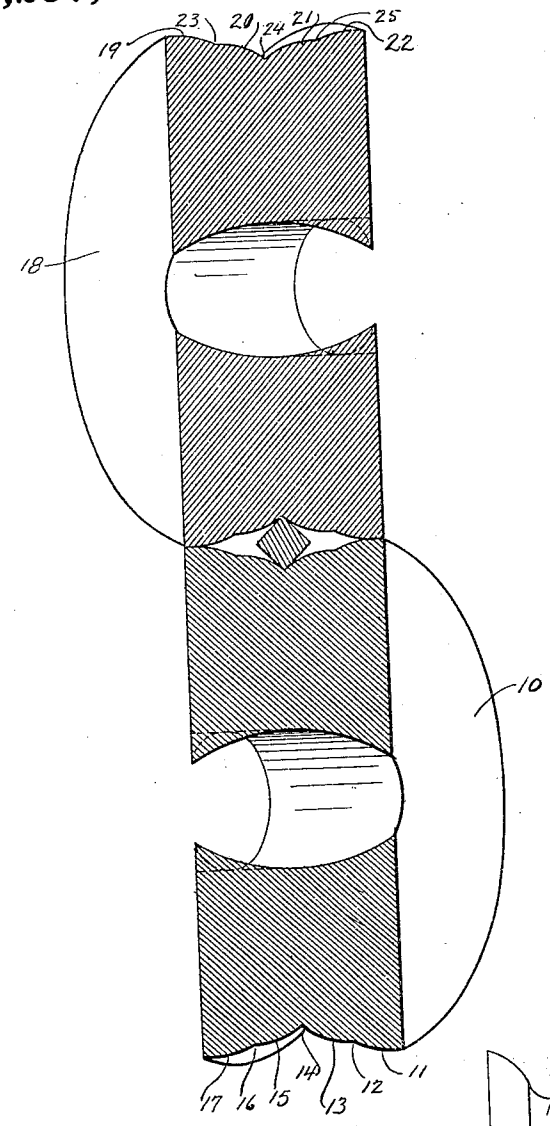


Fig. 2.

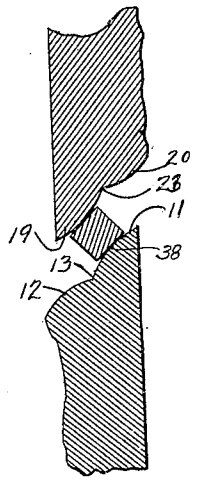


Fig. 3.

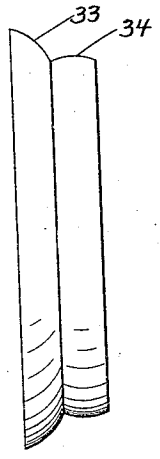


Fig. 7.

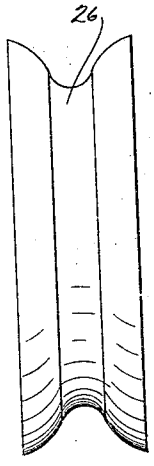


Fig. 8.

WITNESSES:

Walter H. Kelley

Bessie E. Dempsey

INVENTOR

Frank H. Williams

BY J. W. McClellan

ATTORNEY

F. H. WILLIAMS.

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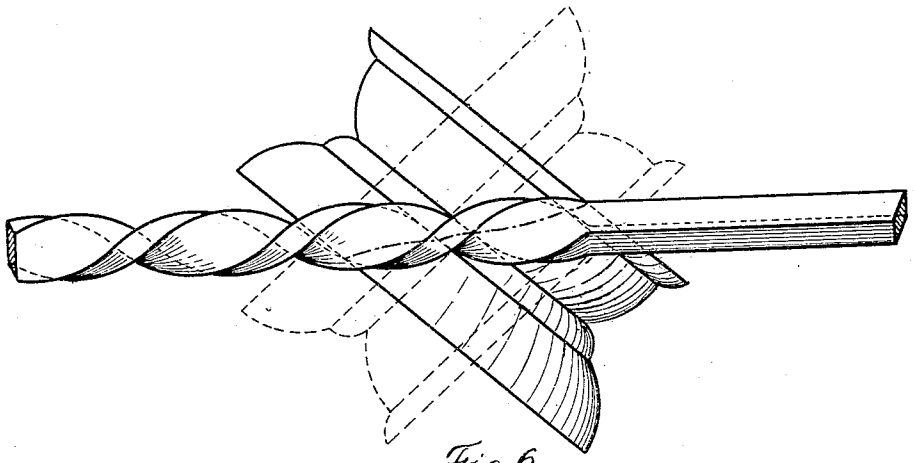


Fig. 6.

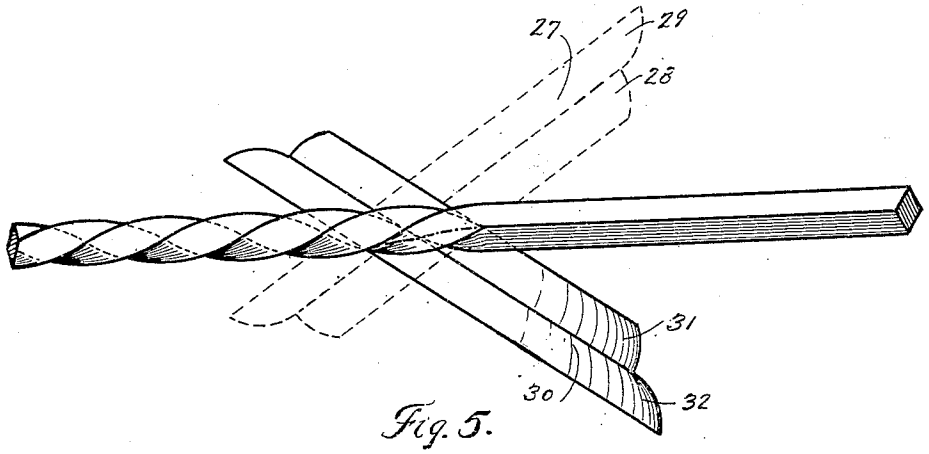


Fig. 5.

WITNESSES:

Harter A. Kelley

Bessie E. Dempsey

INVENTOR

Frank H. Williams

BY J. W. Ellis

ATTORNEY.

UNITED STATES PATENT OFFICE.

FRANK H. WILLIAMS, OF BUFFALO, NEW YORK.

BAR-TWISTER.

1,257,435. Specification of Letters Patent. Patented Feb. 26, 1918.

Application filed June 24, 1912, Serial No. 705,390. Renewed July 21, 1917. Serial No. 182,091.

To all whom it may concern:

Be it known that I, FRANK H. WILLIAMS, a citizen of the United States of America, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Bar-Twisters, of which the following is a full, clear, and exact description.

My invention relates generally to devices for twisting metal bars after they have passed through the pass rolls of a rolling mill and preferably while they are still hot.

One of the main objects of my invention has been to produce a bar twister which shall twist metal bars by a rolling action.

Another object has been to provide a bar twister which shall produce twisted metal bars having a uniform degree of twist; also to provide a device which is very simple and durable in its construction.

Moreover, my device, when twisting a metal bar, rolls the surface thereof and thus increases the tensile strength of the bar.

Furthermore, my device may be operated either by power applied to the shafts of the rolls or by the power being applied to the bar to force it through the rolls.

I have accomplished the advantages above set forth by the invention herein described, but obviously, many other advantages than those herein set forth will be apparent to those skilled in the art.

In the drawings, which form part of this specification, like characters of reference indicate like parts throughout the several views of which:

Figure 1 is a plan view of my twisting rolls showing the upper roll in dotted lines and the lower roll in full lines and a bar passing between said rolls.

Fig. 2 is a sectional elevation of the rolls shown in Fig. 1 and is taken on line 2—2 of that figure.

Fig. 3 is a fragmental section of my rolls taken on the plane 3—3 of Fig. 1 and shows the bar in one of its positions when in contact with the rolls.

Fig. 4 is a plan view, similar to Fig. 1, and shows rolls of a modified form for twisting the bars of the same cross section as that shown in Fig. 1.

Fig. 5 is a plan view, similar to Fig. 1 and shows a pair of single-sided rolls.

Fig. 6 is a plan view, similar to Fig. 1, and shows rolls of a modified form for twisting a bar having a rectangular cross section.

Figs. 7 and 8 show rolls of modified forms.

The rolls in my device are mounted upon suitable shafts, journaled in a suitable housing, which shafts and housing, for clearness in the drawings, have not been shown.

The upper and lower rolls of my device are each provided with a plurality of convex surfaces, as shown. When forming these convex surfaces on the rolls, a forming tool having a cutting edge of the same shape as the cross-section of the bar to be twisted, is used. This tool is mounted to rotate and travel forward in the same plane and at the same degree of twist as that of the desired degree of twist of the finished product. The helix described by any fixed point on the forming tool makes a certain angle with the axis of the forming tool and this angle will hereinafter be referred to as the angle of the helix. The axis of the forming tool is the same as the axis of the bar when being twisted and each of the superimposed rolls is set with its plane of rotation at an angle to the axis of the forming tool which is substantially equal to the angle of the helix. Substantially half of the upper roll is angularly disposed on one side of the said axis and the corresponding half of the lower roll on the other side thereof, so that, the said axis bisects the angle formed by the planes of rotation of said rolls.

The rolls when being formed are rotated in a direction opposite to that in which they normally revolve when operating to twist the bar. The forming tool, having its axis in coincidence with the axis of the bars when being twisted, is now revolved and moved forward and in between the rolls. The forming tool is made to follow the path of travel of a predetermined helix and as it enters between the rolls, it cuts a helical path there-between corresponding to the shape of the cutting edge of the tool and thus generates the convex surfaces on the periphery of the rolls.

Thus when forming the rolls shown in Fig. 1, which are designed for twisting a bar having a square cross-section, the side of the forming tool which first comes in contact with, for instance, the lower roll 10, first generates and cuts the convex surface 11 thereof. The corner of the cutting tool at

the end of the first side thereof cuts the groove 12; the second side of the tool cuts the convex surface 13; the next corner cuts the groove 14; the third side of the tool cuts the convex surface 15; the third corner cuts the groove 16; and the last side generates and cuts the convex surface 17. The path of travel of the part of the cutting edge of the forming tool which contacts with the surfaces generated, is shown by the heavy dot and dash line in Fig. 1, which is marked 38.

While the surface of the lower roll 10 is being generated and cut, the upper roll 18 (shown in dotted lines) is also being operated upon by the forming tool and is thus formed with convex surfaces 19, 20, 21 and 22 and grooves 23, 24 and 25. The path of travel of the part of the cutting edge of the tool which contacts with the upper roll 18 will be diametrically opposite to the path 38 of the lower roll of Fig. 1, as well as the other forms of rolls shown.

The other forms of rollers shown are generated and cut in the manner just described and in each case the cutting edge of the forming tool is made of a shape to conform to the cross section of the bar to be twisted. In each of the several figures is indicated, in a similar manner to Fig. 1, the path of travel 38 of that part of the cutting edge of the tool which contacts with the lower roll.

The conformation of the center portion of the rolls depends upon the angular relations of the corners of the bar, as it passes the said center portion, to a vertical center line drawn through the center of the two superimposed rolls. The rolls shown in Figs. 1, 5 and 6, are formed for twisting a bar, the two opposite corners of which lie in the vertical center line of the rolls as the bar passes the center of said rolls, while the rolls of Figs. 4 and 7 are formed to twist a bar which has its top and bottom faces at right angles to the said center line as it passes the same. While I have shown rolls for twisting a bar in the two positions indicated, it is obvious that when the forming tool is inclined at any angle between the two positions mentioned, the rolls will be cut accordingly and thus the shape of the rolls may be modified. The roll shown in Fig. 8 has the center portion cut away and is provided with a clearance recess 26, which illustrates that the said center portion is not an essential part of the operating surface when twisting the bar.

Fig. 4 shows a pair of rolls for twisting a bar having a square cross section and these are very similar to the rolls shown in Fig. 1 except that, when cutting the same, the forming tool was set so as to have its top and bottom faces at right angles to a vertical center line drawn through the center of the rolls as it passed the said center line.

Fig. 6 shows a pair of rolls for twisting a rectangular shaped bar and shows the conformation of the surfaces of said rolls for twisting a bar, the two opposite corners of which lie in a vertical center line passing through the center of the two rolls.

In Fig. 5 I have shown a pair of rolls comprising a right-handed roll and a left-handed roll. These rolls are superimposed and disposed opposite to each other. These rolls are for twisting a bar of square cross section and the bar bears the same relation to a vertical center line drawn through the center of the rolls as does the bar shown in Fig. 1. The upper roll 27 has convex surfaces 28 and 29 which correspond with the convex surfaces 21 and 22 respectively of roll 18 shown in Fig. 1. The lower roll 30 is formed with convex surfaces 31 and 32, which correspond with convex surfaces 15 and 17, respectively of the roll 10, shown in Fig. 1.

Fig. 7 shows a roll similar to those shown in Fig. 5 and is provided with convex surfaces 33 and 34, which correspond to surfaces 35 and 36 of the roll 37 shown in Fig. 4.

After the convex surfaces of the rolls have been generated and cut, as hereinbefore described, a bar, being passed between said rolls, will consequently be twisted to conform to the same predetermined helix as that of the forming tool. When the bar strikes the first convex surface of the rolls, as, for instance, the surfaces 11 and 19 of the rolls 10 and 18, respectively, in Fig. 1, it is immediately twisted to its full degree of twist and as it continues to travel between the rolls it contacts with the other convex surfaces thereof, which convex surfaces slightly roll the surfaces of the bar and thereby increase the tensile strength. The path of contact of the lower roll 10 with the bar as it passes between the rolls is indicated by the heavy dot and dash line 38 of Fig. 1. (Reference is to be had to Fig 3 where the said point of contact of the rolls with the bar is clearly shown).

It will thus be seen that practically all of the work of twisting the metal bar, comes on the surfaces of the rolls which first come in contact with the bar to be twisted. Should these surfaces become excessively worn, the point on the rolls at which the bar is initially twisted, will move back in between the rolls and in substantially the path indicated by the heavy dot and dash line of the Figs. 1, 4, 5 and 6.

While it is preferable to have rolls as shown in Figs. 1, 2, 4 and 6, it is obvious that the rolls shown in Figs. 5 or 7 will perform the work of twisting with equal efficiency.

Obviously many modifications may be made from the device as herein shown

and described, without departing from the spirit of my invention or the scope of the appended claims, and I do not wish to be limited to the exact embodiment herein shown and described.

Having thus described my invention, what I claim is:

A bar twister comprising two superimposed rolls, each of them being oppositely set with its plane of rotation at an angle to the axis of the bar being twisted, which is substantially equal to the angle of the helix of the twisted bar and having its periphery formed with a plurality of convex surfaces, each successive convex surface from the intersection of the planes passing through the axes of the bar and rolls being of greater diameter of revolution than the next preceding convex surface, whereby said successive convex surfaces are tangent to the successively treated twisted surfaces of the bar.

In testimony whereof, I have hereunto signed my name in the preesnce of two subscribing witnesses.

FRANK H. WILLIAMS.

Witnesses:
J. Wm. Ellis,
Walter H. Kelley.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."