

No. 647,200.

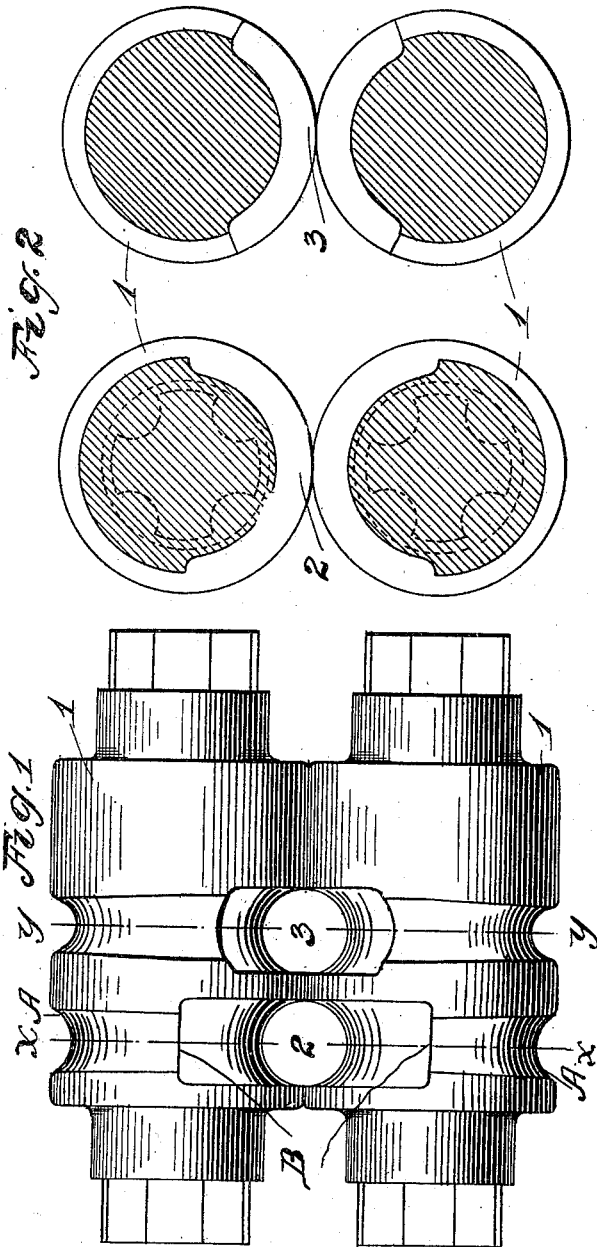
Patented Apr. 10, 1900.

J. T. ROWLEY.  
METHOD OF PRODUCING TAPERED BARS.

(Application filed Nov. 10, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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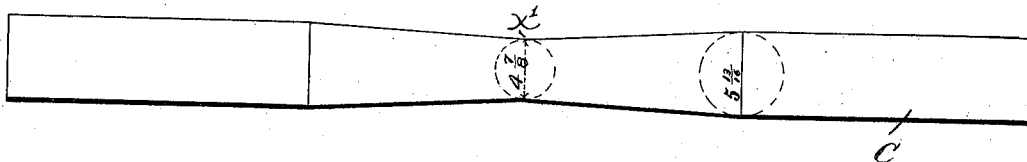
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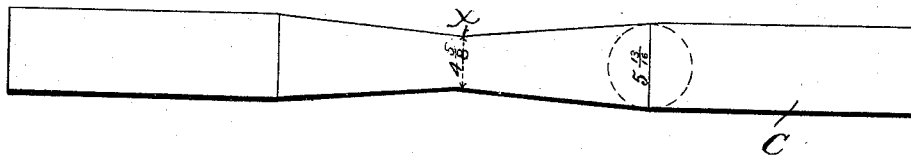
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2 Sheets—Sheet 2.

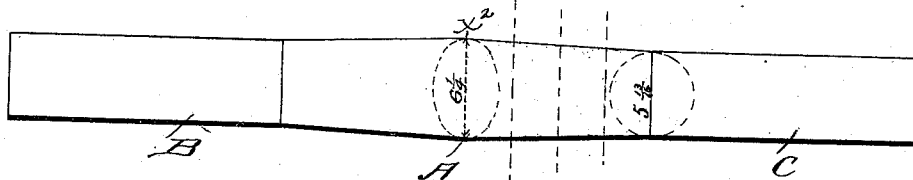
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

JOHN THOMAS ROWLEY, OF BEAVER FALLS, PENNSYLVANIA.

## METHOD OF PRODUCING TAPERED BARS.

SPECIFICATION forming part of Letters Patent No. 647,200, dated April 10, 1900.

Application filed November 10, 1898. Serial No. 696,025. (No specimens.)

*To all whom it may concern:*

Be it known that I, JOHN THOMAS ROWLEY, a citizen of the United States, residing at Beaver Falls, in the county of Beaver, State of Pennsylvania, have invented or discovered certain new and useful Improvements in Methods of Producing Tapered Bars or Rods Having Different Cross-Sections, of which the following is a specification.

My invention relates to methods for producing tapered bars or rods.

The object of my invention is to produce tapered bars or rods having different cross-sections; and to this purpose my invention consists in heating a bar or rod of the requisite and predetermined cross-section, the bar or rod previous to the first pass, as shown in the drawings, being five and thirteen-sixteenths inches in diameter, and passing the same between rolls cam-grooved, the first pass or groove tapering the bar or rod oviform in cross-section at the center—i. e., the side surface of the piece being carried outwardly from the longitudinal axis of the same and the bottom and top surfaces of the same piece being carried inwardly toward its longitudinal axis a distance greater than the outwardly-forced surfaces are carried from the axis, as shown in Figures 4 and 5 of the drawings—the groove widening at its central operative part so as to enable the sidewise flow of the metal at such point and produce at the first pass a bar or rod one diameter of which has been reduced at such point and enlarged on the diameter perpendicular thereto, the inward-forced opposite surfaces being carried toward the longitudinal axis a distance greater than the outward-forced surfaces are carried from the axis, then passing the bar or rod through a groove circular in cross-section in all axial planes, carrying the previously outwardly carried surfaces inwardly toward the longitudinal axis of the piece, and the previously inwardly carried surfaces outwardly from the longitudinal axis of the piece, the diameter of the second or last-mentioned groove being greater than the least diameter of the first groove to enable the metal to spread sidewise or laterally at its center operative parts, and the operative part of said second groove being

of greater peripheral length than that of the first groove.

By imparting to the bar or rod the peculiar shape described at the first operation the metal is so disposed that by slightly bringing back the outwardly-crowded surfaces, and consequently slightly expanding the inwardly-brought surfaces, the whole forming operation is completed.

One of the characteristic features of my invention lies in the fact that I flatten and widen the entire body of the mass at the center of the bar, carrying all portions of the sides outward and bringing inward the top and bottom parts to lines near the axis. To provide for this, the grooves for the first pass are materially wider at the center line of their operative parts than they are at the end lines thereof. This construction of grooves provides a free space or chamber, into which the metal is carried without resistance from the side walls, the widening being on lines parallel to the axes of the rolls and transverse to the lines of pressure. In the second pass the previously inwardly brought central portion of the piece is permitted to expand or spread horizontally—that is, on a line parallel with the axes of the roll—from (to illustrate) four and five-eighths inches, as shown at X in Fig. 4, to four and seven-eighths inches, as shown at X', Fig. 3—while the previously outwardly carried portion is reduced from six and one-quarter inches, as shown at X<sup>2</sup>, Fig. 5, to four and seven-eighths inches, as shown at X' in Fig. 3.

In the application of my method it will be noted that the point of reduction in the first pass coincides with that of the second pass. In other words, the point where the rolls leave off work coincide in both passes. Simultaneously with this feature of the shaping occurs also the elongating or crowding endwise of the metal of the bar at its central portion. This rapidly increases from the end of the groove to its central line, and with such elongation there is a proportionate reduction at the successive transverse planes of the cross-sectional area of the bar.

I will describe a mill adapted to the application of my method herein described, refer-

ence being had to the accompanying drawings, which form a part of this specification, in which like reference characters indicate like parts wherever they occur throughout the several views thereof.

In the accompanying drawings, Fig. 1 indicates a front elevation of a mill adapted to the application of my improved method for producing tapered bars or rods. Fig. 2 is a sectional view on lines *x x* and *y y* of Fig. 1, showing modified form of the mill. Fig. 3 is a longitudinal elevation of the piece after the final pass. Figs. 4 and 5 are respectively longitudinal elevations and plan views of the piece after the first pass.

Referring to said drawings, 1 1 are rolls horizontally arranged and adapted to be mounted in suitable housings and to be driven in the usual manner. The said rolls are provided with passes or grooves 2 and 3, which may be formed in independent pairs of rolls arranged tandem, as shown in Fig. 2, instead of being formed in one pair of rolls, as shown in Fig. 1. The pass or groove 2 gradually widens toward the point A and narrows toward the point B, so that the bar or rod C is ovaform in cross-section, the groove 2 being as to its depth tapered reversely—*i. e.*, from the ends toward the center. In other words, it is shallower at point A than at B, thus producing a tapered oval, as shown in the accompanying drawings, Figs. 4 and 5.

3 indicates a groove which is semicircular in all axial planes and is wider at its center operative parts on a line parallel to the axis of the rolls than the least diameter of the

first groove and shallower at its center operative part than the greatest diameter of the first pass as to permit the sidewise flow of the metal. The said groove 3 is also of greater peripheral length than the groove 2.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

The herein-described improvement in the art of forming tapered bars or rods of varying circular cross-section, which consists in, first, heating a circular bar or rod, then flattening and widening the central part, longitudinally thereof, whereby two diametrically-opposite surfaces are brought toward the longitudinal axis and two diametrically-opposite surfaces are carried away from said axis, the inward-brought surfaces being carried toward the axis a distance greater than that to which the outward-carried surfaces are taken, and subsequently forming outward from the axis the surfaces previously carried inward, and simultaneously forcing inwardly the surfaces previously carried outward, and at the same time elongating the center portion of the said bar, whereby a bar or rod is produced circular at all points in cross-section and enlarging in diameter from its longitudinal center toward its ends, substantially as set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JOHN THOMAS ROWLEY.

Witnesses:

C. A. WILLIAMS,  
W. J. BROWN.