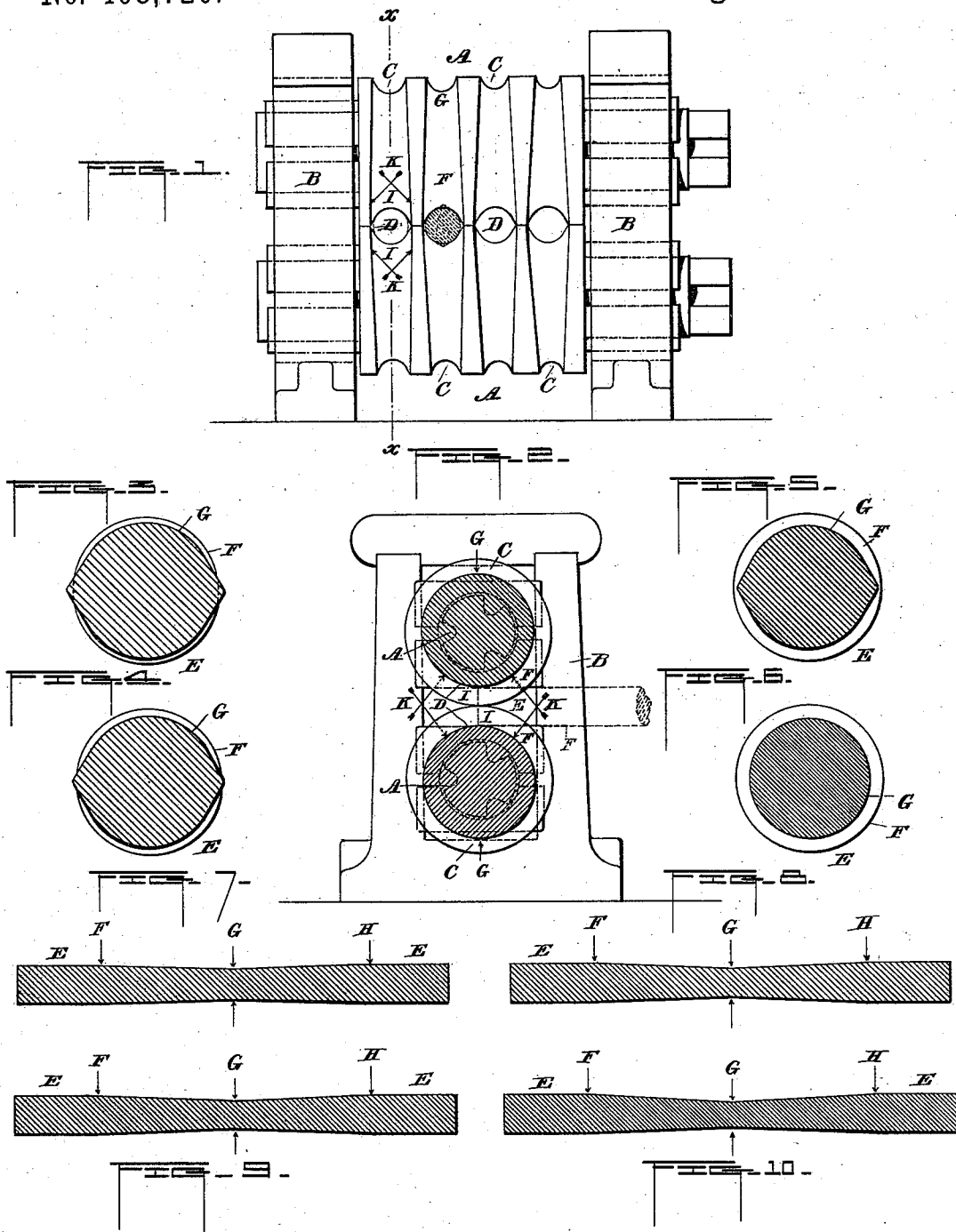


(No Model.)

J. R. JONES.
METHOD OF ROLLING AXLES.

No. 408,720.

Patented Aug. 13, 1889.



WITNESSES.

L. G. Connor Jr.
J. P. Davis.

INVENTOR.

John R. Jones
per R. H. Boyer
his atty.

UNITED STATES PATENT OFFICE.

JOHN R. JONES, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF ROLLING AXLES.

SPECIFICATION forming part of Letters Patent No. 408,720, dated August 13, 1889.

Application filed April 10, 1889. Serial No. 306,647. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. JONES, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Rolling Tapered Axles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the method of making tapered axles.

My object is to roll a bar of metal in such a manner and with such means as to produce a uniform texture in the completed article, besides making it superior in other respects.

With these objects in view my invention consists in the peculiar method more fully described hereinafter, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a front elevation of a set of taper-rolls for carrying out my method; Fig. 2, a sectional view through line $x x$ of Fig. 1, the bar being shown in the act of passing through the rolls. Figs. 3, 4, 5, and 6 represent sectional views of the axle in its successive stages; and Figs. 7, 8, 9, and 10 longitudinal elevations of the axle, showing the length of taper produced by each successive pass through the rolls.

The rolls A are mounted in a suitable housing B and driven by the usual means. The two rails A shown are each provided with four grooves or passes registering with each other. These grooves are made to gradually diminish in depth, so that the shallowest and narrowest part C will be diametrically opposite the widest and deepest part D, as will be more clearly seen in Fig. 2. The rolls are so adjusted that the walls of the grooves will exactly coincide with each other—i. e., the widest part of the grooves in the upper roll will always coincide with the widest part of the lower grooves, as in Fig. 1, and vice versa.

The width and depth of the narrowest part C of the grooves are made to gradually decrease from the left-hand groove toward the right, so that as the blank is passed from left to right through the grooves it will be gradu-

ally reduced at the center and brought to the required state of perfection. As this mechanical arrangement is old, it forms no further part of my present invention than simply to carry out the method which will now be described.

The rolls are first adjusted so that the pass M will assume its largest diameter, as shown in Fig. 2. A blank J, of metal, having a diameter smaller than that of the pass, is then inserted and the rolls given a rotary motion, which moves the blank forward. The pass then grows smaller, and pressure begins upon the blank at the point F and increases until it reaches the center G of the blank or bar, and then as the rolls continue to revolve, the pass grows larger and the pressure decreases until the point H upon the opposite end is reached, when all pressure is removed excepting enough to hold the bar, so that the roll will not slide over it. The blank is always of a predetermined size, so that when the largest sections K of the grooves come opposite each other no pressure will be brought to bear upon it. The first passage between the rolls contracts the center of the bar and lengthens it out, as seen in Fig. 8, so that the compressed portion is left oval in cross-section, as in Fig. 3. After the bar has passed through the rolls as above described the latter are then stopped. The bar is next given a partial or quarter turn, so that its longest diameter will lie in a vertical plane, as shown in the second pass in Fig. 1. The direction of motion of the rolls is now reversed, and the bar is entered into the next or second pass in the same manner and undergoes the same treatment as in the first pass; but the second pass makes the bar still longer, as seen in Fig. 8, and reduces the diameter and makes it more round, as seen in Fig. 4. The motion of the rolls is then stopped and reversed, the bar given a quarter or partial turn and passed through the third pass in the same manner as through the second, which operation still further reduces it, as in Fig. 9, and thus it will be seen that each successive pass of the bar or blank J between the rolls gradually reduces the central taper to the required thickness, shape, and length. In the present instance the drawings represent the axle as completed after having undergone

four successive passes between the rolls and through the four grooves shown in the drawings.

5 The effect of rolling in this manner is to make a more uniform and perfect texture in the metal, thereby producing a much stronger and more durable article.

What I claim as new, and desire to secure by Letters Patent, is—

10 1. The herein-described method of making axles, which consists in first passing a bar of metal between a pair of rolls provided with grooves constructed to form a tapering pas-
15 sage; secondly, giving said bar a partial rotation, and, thirdly, again passing it between the rolls, in the manner and for the purpose specified.

2. The method of making taper-rolled axles, which consists in first passing a bar of metal into tapering passages; secondly, giving the 20 bar a partial rotation; thirdly, reversing the rolls in the opposite direction, and, fourthly, passing the bar into or through the rolls, in the manner and for the purpose substantially
25 as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN R. JONES.

Witnesses:

SAML. H. RALSTON,
EDW. D. WALDRON.

Correction in Letters Patent No. 408,720.

It is hereby certified that in Letters Patent No. 408,720, granted August 13, 1889, upon the application of John R. Jones, of Philadelphia, Pennsylvania, for an improvement in the "Method of Rolling Axles," an error appears in the printed specification requiring correction, as follows: In line 35, page 1, the word "rails" should read *rolls*; and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 27th day of August, A. D. 1889.

[SEAL.]

GEO. CHANDLER,
Acting Secretary of the Interior.

Countersigned:

ROBERT J. FISHER,
Acting Commissioner of Patents.