

(No Model.)

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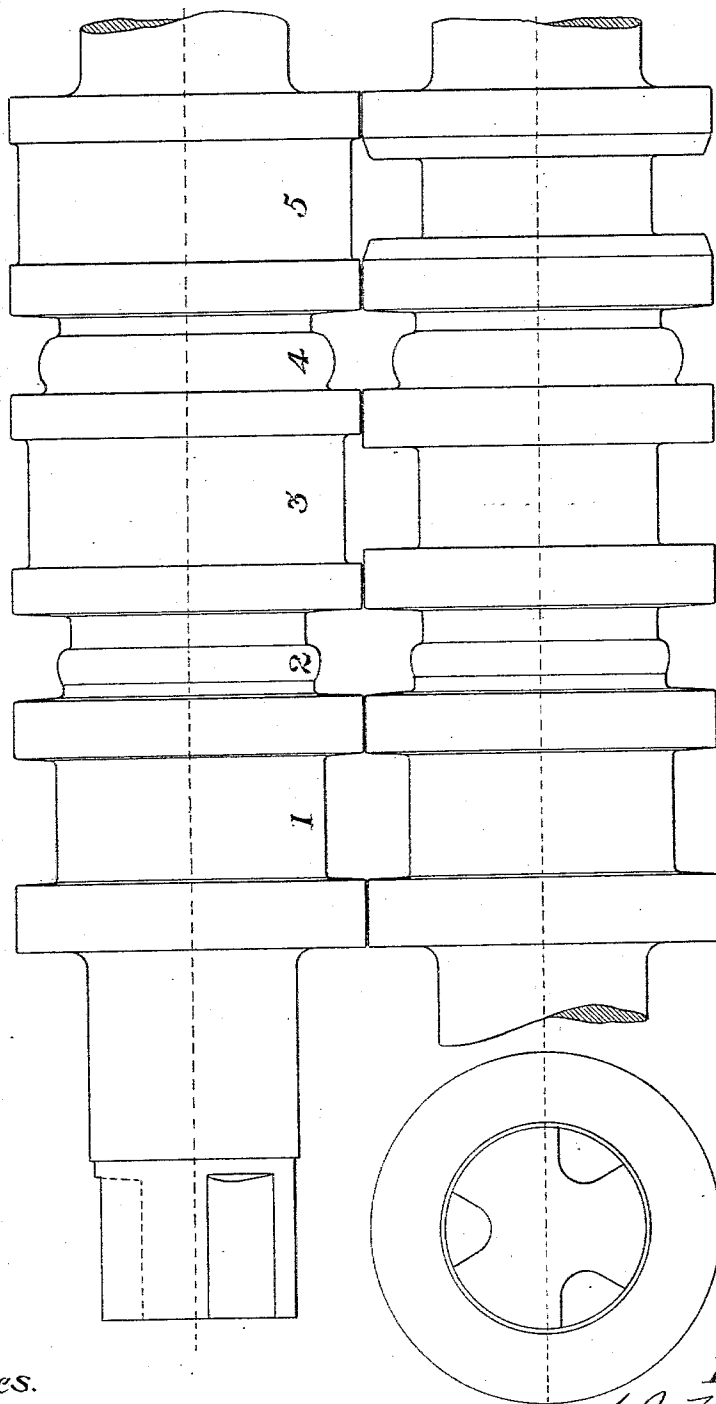
A. J. MOXHAM.

ROLL FOR ROLLING CAR RAILS.

No. 319,009.

Patented June 2, 1885.

Fig. 1.



Witnesses.

Frank Curtis
Francis P. Reilly

Inventor.

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by R. M. Towrhus
att'y

(No Model.)

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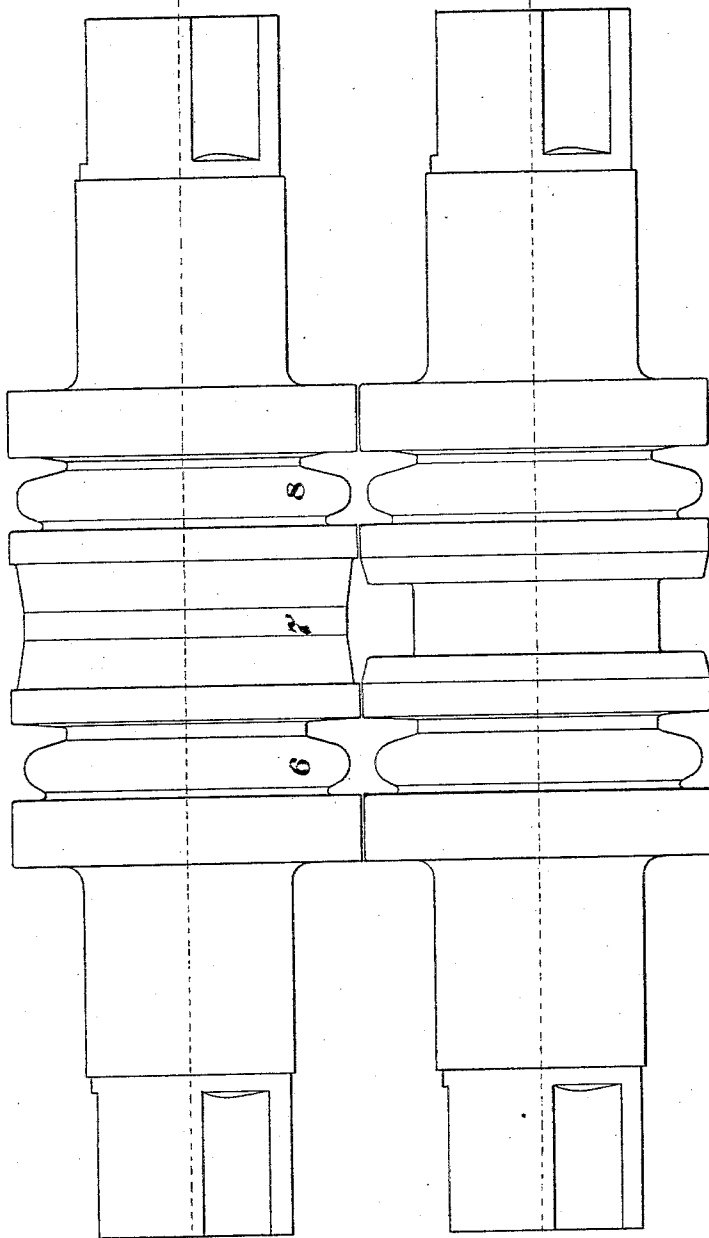
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Patented June 2, 1885.

Fig. 2.



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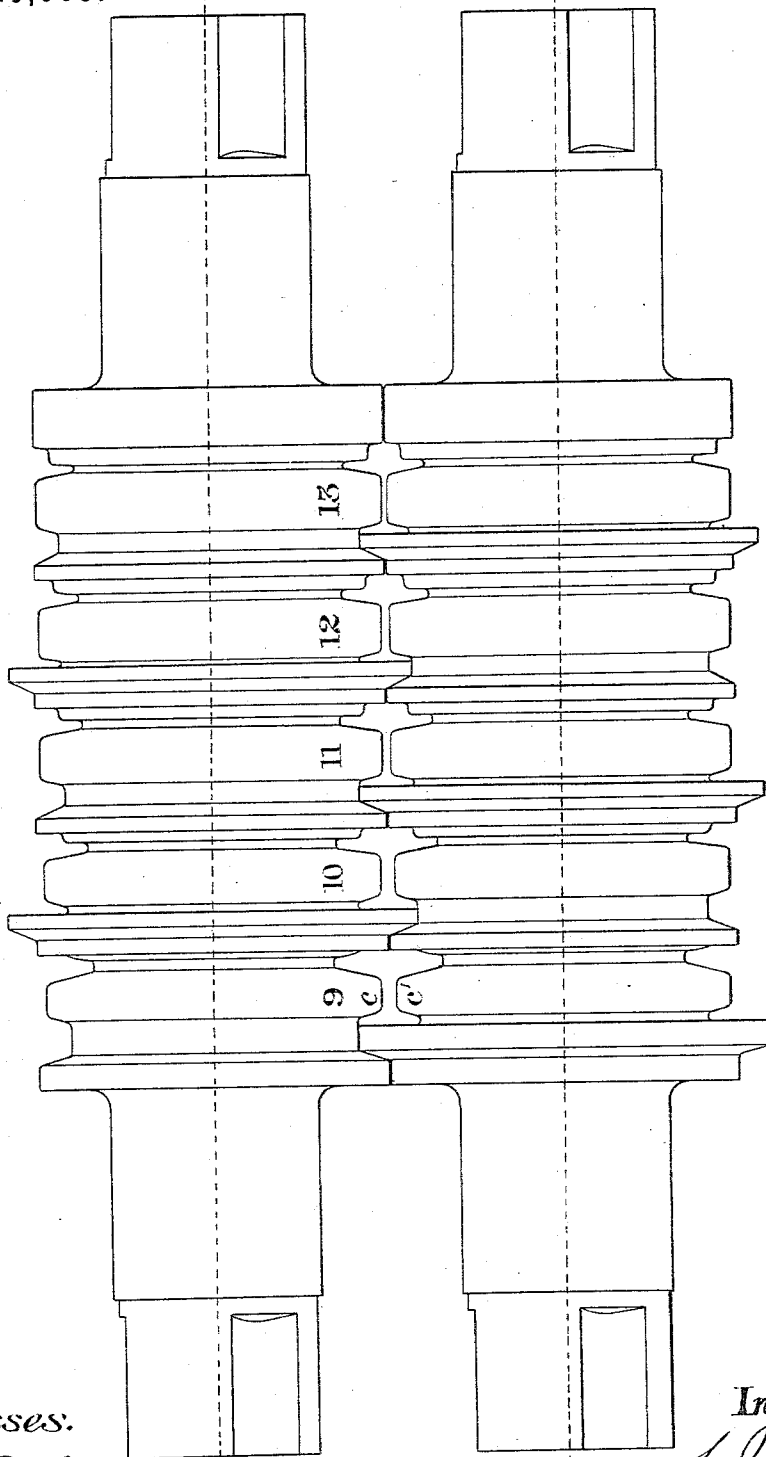
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Patented June 2, 1885.

Fig. 3.



Witnesses:
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A. J. Moxham
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(No Model.)

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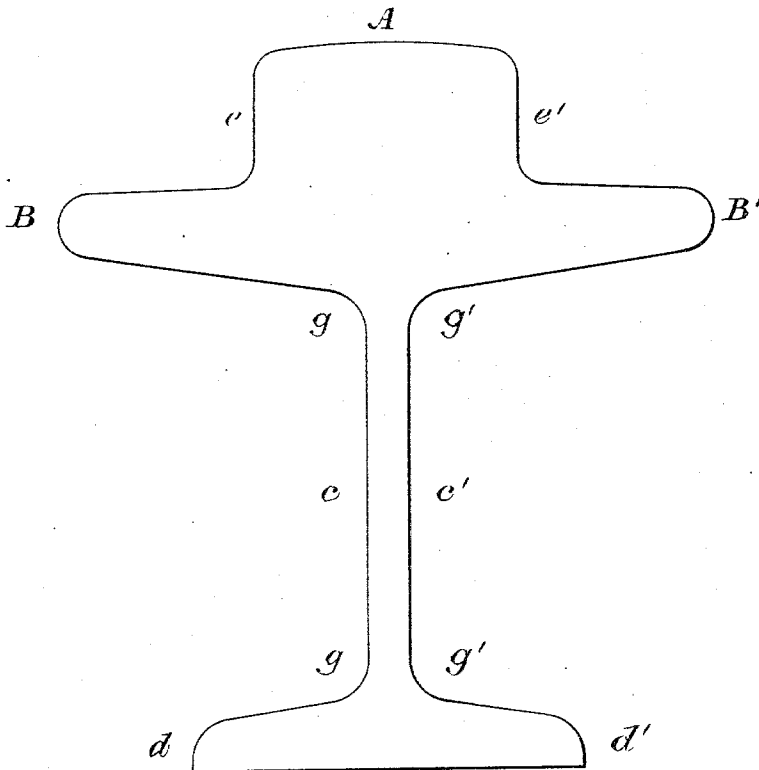
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ROLL FOR ROLLING CAR RAILS.

No. 319,009.

Patented June 2, 1885.

Fig. 4.



Witnesses.

Frank Curtis
Francis P. Kelly

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UNITED STATES PATENT OFFICE.

ARTHUR J. MOXHAM, OF LOUISVILLE, KENTUCKY.

ROLL FOR ROLLING CAR-RAILS.

SPECIFICATION forming part of Letters Patent No. 319,009, dated June 2, 1885.

Application filed March 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MOXHAM, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Method and Means for Rolling Car-Rails, which improvement or invention is fully set forth and illustrated in the following specification and accompanying drawings.

This invention consists of a set of rolls containing roughing and finishing passes in combination with a final pass for shaping the desired form of rail, as hereinafter described, and set forth in the claims.

In the accompanying drawings, Figure 1 shows the first set of roughing-rolls containing the first series of passes, five in number; Fig. 2, the second set of roughing-rolls, containing the second series of passes, three in number. Fig. 3 shows the finishing-rolls, containing five passes, and Fig. 4 the final pass or a section of the finished rail full size.

In said figures the several passes are numbered from 1 to 13, inclusive, No. 1 being the first pass and No. 13 the last pass, from which the finished rail emerges. No. 1 takes the bloom, and is a mere flattening-pass, reducing the metal from the form of the bloom to the shape of the pass. Nos. 3, 5, and 7 are dummy passes, and with these exceptions, Nos. 2 to 13, inclusive, are edging-passes. The bloom, then, being entered at No. 1 and passed there-through, having been merely flattened therein, is next passed on edge through No. 2, then on the flat through No. 3, then on edge through No. 4, then on the flat through No. 5, then on edge through No. 6, then on the flat through No. 7, and thence on edge through No. 8 and all successive passes to and including No. 13, the final pass. These rolls may be used for rolling either iron or steel rails, good proportions for rolling steel being as below given. For rolling iron they may be made somewhat lighter. Diameter of rolls at "pitch-line of delivery," twenty-one inches; diameters of 45 necks of rolls, twelve and one-half inches; length of necks, twelve and one-half inches; length of "warblers," nine and one-half inches; diameter of same twelve inches. In the roughing-rolls there should be a space of 50 three and one-half inches between each groove, and a space of four inches outside of each

groove at each end; in the finishing-rolls, a space of two and one-half inches between each groove, and a space of three and one-half inches outside of each groove at each end. 55 The interspaced grooves, as shown in the drawings, will determine the total length of each roll. These rolls may be made either "two-high," as shown in the drawings, or "three-high," as may be preferred, and the passes 60 may be distributed in two sets of rolls instead of three.

The principle underlying this invention, and the operation of the rolls in reducing the metal to the desired shape, will now be described more in detail. The act of rolling as 65 such always reduces the area of the mass rolled, producing a certain or proportionate elongation of mass as a consequence, which elongation varies in proportion to the reduction in area, as greater or less displacement is provided for. Where the mass is not uniformly 70 reduced, provision must be made for the displacement of such part as is least reduced in area, for such part must go somewhere, as it is necessarily set in motion by the rolling friction of the grooves and by its cohesion to the rest of the mass as it moves under the "draft" to which said mass is subjected in being so reduced. Having in view this principle, in order 80 to draw down the bloom to the rail of desired sectional shape and area, the several passes from No. 1 to No. 9, inclusive, rapidly reduce the metal to a regular and uniform section, as shown in No. 9. During the process of drawing 85 down that part of the mass $c c'$ which ultimately forms the web of the rail, the elongation effected at this point induces, as already described, elongation technically called "wire-drawing" at the points $B B'$, $d d'$. It will be 90 seen that the width of the upper portion of the rail $B B'$ is greater than that of its foot $d d'$; hence an amount of wire-drawing which will not be an evil as regards the foot of the rail $d d'$ must, to leave the desired width of metal 95 at the portion $B B'$, be overcome. This is effected by the use of the edging-passes, which in the earlier grooves reduce the points $d d'$ to a greater extent than the points $B B'$, thus permitting the use of dummy passes, which 10 passes, by displacement, spread the metal at the points $B B'$. There is thus secured a width

of metal which permits of some inevitable wire-drawing and still leaves a sufficient width of metal for the finished rail.

The wire-drawing above mentioned is further reduced to a minimum from the fact that the reduction of the metal at the points *g g*, *g' g'* is greater than at the points *c c*. There results from this irregular reduction, instead of uniform or regular reduction, that the same amount of metal is rolled out but with less wire-drawing than would be the case if the reduction at these points were uniform back to the early grooves of the roughing-rolls. This operation, it will be seen, is common to the passes 9 to 13, inclusive, as well as to the earlier ones already described. In these latter passes the tendency to wire-draw at the points B B' is further neutralized by the means below described.

In rolling down or shaping the head A it will be noted that while excessive draft is effected at the points *e e'*, ample provision is made for the spreading or displacement at the point A, by which means the elongation at the point A is less than would otherwise be the case during the shaping of this part. The diminution of elongation at this point tends to hold in check the greater elongation induced by the action of the rolls at *e e'*, already explained. If a much greater depth of head should be required to be rolled out at the final pass, the head might be commenced by being partly shaped or offset in the dummy passes. If it be desired to curve or turn up the extreme ends of the two side flanges, as is sometimes the case, it may be done, preferably, in an extra pass in said rolls, of the necessary conformation, such as will be evident to all skilled in the art without the necessity of an illustration in the drawings.

I do not confine myself to the exact shape of the first twelve passes herein described and shown, nor to their precise number and order of succession, so long as the same effect is produced in preparing the metal for entering the final pass No. 13, by subjecting it to elongation alone to form the web and foot and to both partial elongation and uniform displacement to form the head and upper flanges in the course of rolling preliminary to the final shape in pass No. 13.

Having thus fully described my said improvement as of my invention, I claim—

1. A set of rolls for rolling iron or steel car-rails, provided with a finishing-pass substantially of the shape shown in Fig. 4, and with roughing and finishing passes shaped and combined as described, whereby the web and foot of the rail are prepared in said passes for said final pass by elongation of metal, and the head and upper flanges of the rail are prepared in said passes for said final pass partly by uniform displacement and partly by elongation of metal, substantially as and for the purposes set forth.

2. In rolls for rolling iron or steel car-rails, in combination with a finishing-pass substantially of the shape shown in Fig. 4, a series of roughing and finishing passes substantially of the respective shapes numbered from 1 to 12, inclusive, whereby the finished rail is produced from the original ingot, substantially as and for the purposes set forth.

A. J. MOXHAM.

Witnesses:

A. MONTGOMERY,
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