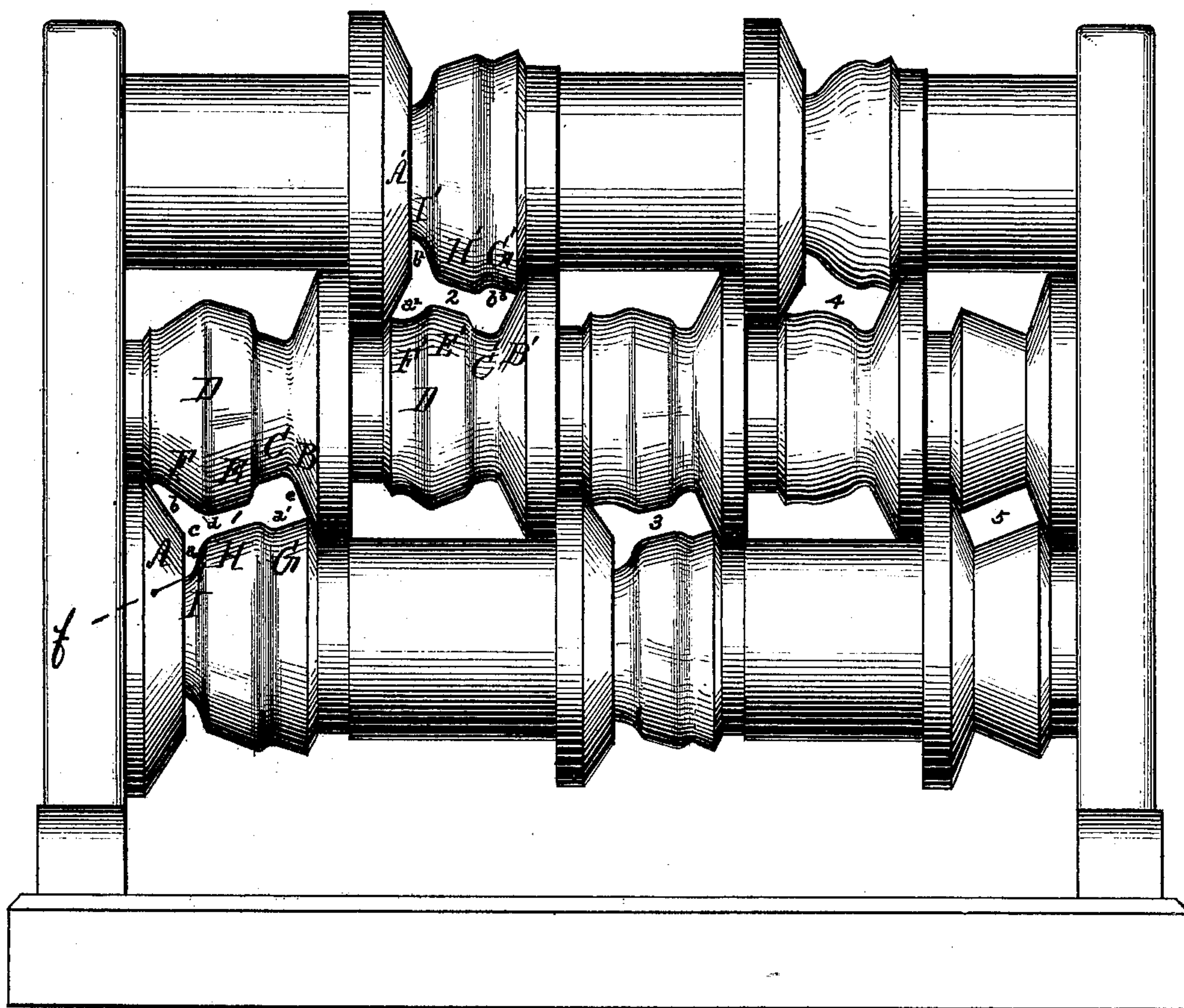


C. HEWITT.

Roll for Reducing Railway-Rails.

No. 220,239.

Patented Oct. 7, 1879.



Attests

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UNITED STATES PATENT OFFICE

CHARLES HEWITT, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN ROLLS FOR REDUCING RAILWAY-RAILS.

Specification forming part of Letters Patent No. **220,239**, dated October 7, 1879; application filed March 31, 1879.

CASE A.

To all whom it may concern:

Be it known that I, CHARLES HEWITT, of Trenton, New Jersey, have invented a new and useful Improvement in Rolls for Reducing Railway-Rails or Flanged Bars, of which the following is a full and complete specification.

The object, generally speaking, of my invention is the reduction of old railroad-rails, fag-ends, or other flanged bars to bars or billets of a different and preferably of rectangular shape.

My invention relates to that well-known method of rolling in which the rollers are provided with reducing grooves or passes oblique to the axes of the rolls, and in which thereby the compression is exerted in all directions upon the object under reduction, rolls of the above character having been employed for reducing various forms of metal products, including rails.

The more specific object of my invention is to provide a means of reducing railroad-rails or fag-ends of rails, whereby the flanges may, by reduction and displacement, be consolidated with the stem and with each other without lapping or crimping the metal, the flanges, head, and stem being made to disappear, and a bar, rod, or billet of any desired cross-section produced.

Hitherto two principal ways of reducing rails and like flanged bars have been resorted to, viz:

First, where the grooves in the rolls were so formed that the rail would either stand vertically or would lie flat, so that the plane of the under surface of its flange would be vertical. In the first above-named position of the rail the action of the rolls is to crimp the external surface of the rail upon itself, while in the second position of the rail the action of the rolls would not serve to reduce the rail in depth.

Second, it has been proposed to employ rolls having grooves of a contour or section similar to that of the rail or bar to be rolled, said grooves being placed or formed at an angle with the axes of the rolls in such manner that a line across the lower face of the flange would be at an angle other than a right angle with the axes of the rolls.

It has been alleged that in the operation of

rolling with grooves formed at an angle with the axes of the rolls the action of crimping the metal upon itself is to some extent avoided, but, it is believed, not avoided to such extent as to render the plan practicable, for the reason that in rolls, as heretofore devised, with grooves oblique to the axes, no provision has been made whereby the metal of the flange to be reduced could be displaced into the stem of the rail.

I have, however, discovered that the efficiency of rolls provided with grooves at an angle to the axes of the rolls is greatly increased and the tendency to crimping the metal upon itself wholly obviated by so forming said grooves that, first, a portion of the flange of the bar shall, in its passage through the rolls, be bent at an angle to the other portion of the flange; and, second, that one portion of the bent flange in each successive pass shall occupy such position in the groove that its plane shall be vertical, while the plane of the other portion of the flange shall be at an angle with the axes of the rolls, as will hereinafter be fully explained.

My invention consists, substantially, first, in an improvement in the art of reducing old rails or other flanged bars to bars or billets of different shape, which consists in first bending the flanges of the rail to form obtuse angles with each other and with the stem of the rail; and, second, in compressing or reducing first one bent flange and then the other by vertical pressure acting upon the edge of the given flange while in a vertical position, and in the direction of its breadth, in such manner that the material of first one flange and then of the other is vertically forced up or down, according to position, into the web or stem of the rail, while meanwhile the other portions of the rail lie obliquely to the axes of the rolls, and are compressed generally in the old manner common to all rolls having passes oblique to their axes.

My invention consists, secondly, in the reducing-rolls, hereinafter more specifically described and claimed.

Referring to the drawings, the following is a description of a form of rolls which conveniently effectuate my method of reduction:

The rolls represented are three-high, and,

as illustrated, are provided with five grooves or passes, 1, 2, 3, 4, and 5.

Pass 1 is formed between the two lower rolls in the following manner:

A, upon the lowermost roll, represents an angular flange of such form that it presents an angled surface, against which the base of the flange of the rail registers, and over the angled edge of which said flange is bent, so that the two sides of the flange are caused to form an angle with each other, and, in consequence, with the stem of the rail.

B, upon the middle roll, is a flange flared to correspond to the tread-surface of the head of the rail.

C, upon the same roll, is a groove of such curvature as to embrace the upper side (considered in reference to angular position) of the head.

D, upon the same roll, is a double-angled fillet, whose two faces, E F, respectively, correspond to the upper side of the web and the top face of the left-hand flange.

G, upon the lower roll, is a corrugation corresponding to the lower side of the head of the rail, considered as in the oblique position.

H, upon the same roll, is a flat rounded projection corresponding to the lower side of the web, and I is a corrugation corresponding to the top face of the right-hand flange.

The portion of the pass which is formed by the flange A and corrugation I is vertical in position and of lesser depth (breadth in terms of the rail) than the portion between the side F of the fillet D and the flange A, which is in position angular with the axes of the rolls.

The operation of the groove 1 upon the rail is as follows: The supposed portions of the flange, which are indicated by the letters *a* and *b*, are bent, as shown. The portion *a*, whose plane is vertical to the axes of the rolls, is reduced in the direction of its width, as from *a* to *c*, and the metal of said flange is displaced toward and into the portion of the stem of the rail which is joined to said flange, and the stem thereby thickened out, as from *c* to *d*. The portion *a* of the flange being vertical to the rolls is to the greatest extent reduced, and the portion *b* of the flange having been bent out of line with the portion *a* removes the material, otherwise resisting the displacement of the material of the portion *a*, so that the material of the vertical portion *a* is, in its passage through the roll, not only reduced, but displaced toward and into the stem of the rail.

The height of the rail, as from *c* to *e*, is also reduced. The head of the rail is reduced, as at *a*¹, and the stem, where it is joined to the head, is thickened out.

The pass 2, through which the rail is caused to travel after its passage through the pass 1, is slightly smaller, but essentially the same in structure as pass 1, with, however, the structure A', I', H', and G', corresponding to parts A, I, H, and G, which formed the under portion of pass 1, made to form the upper portion

of pass 2, while parts F' E' C' B', corresponding to F E C B of pass 1, constitute the under portion of pass 2, the result of which is that the pass 2 lies at an angle opposite to that of pass 1, and that the rail in pass 2 lies at an angle opposite to that in which it lay in pass 1, and that the vertical groove formed between A' and I' of pass 2 acts upon the opposite portion of the flange to that which was acted upon by the corresponding vertical groove of pass 1.

In the passage of the rail through groove 2 the operation is as follows: The vertical portion *a* of the supposed flange shown in groove 1 becomes the oblique portion, as at *a*² in groove 2. The oblique portion of the flange *b* of groove 1 becomes the vertical portion in groove 2, as shown at *b*². The head of the rail is reduced and displaced alternately at *a*¹ and *b*³, &c., in successive passes of the rail through the grooves 1 2 3, &c. At the same time the height of the bar or rail is reduced in the usual manner, and there finally results a bar or billet of compact form, and of a section like groove 5, or other desired section.

Pass 3 corresponds in structure, position, and relation of component elements to pass 1, while, of course, of lesser dimension and proportion than either pass 1 or 2; and the same is in like manner true in respect to pass 4 and pass 2, while pass 5 is formed to such section as it may be desired that the resulting product should assume.

By a construction and arrangement of grooves such as I have described, whereby the flange of the rail is bent and subsequently reduced and displaced, as above set forth, a mode is provided whereby railroad or other flanged rails or bars may be more perfectly reduced to bars or rods of different form, without crimping the surfaces of said flanged bar, than can be done by other rolls in use for the same purpose.

The bar or billet produced by the last pass or groove of the roll above described is of such shape as to be capable of being rolled down to finished form without reheating.

My invention is distinguished from those embodied in other rolls heretofore in use, in which the passes are angular with the axes of the rolls, in that my rolls are provided, as hereinbefore described, in each pass with grooves so formed as to first bend the flanges of the rail to form an angle with each other, and, second, to reduce first one flange while in a vertical groove, and then the other flange while also in a vertical groove, in the direction of their respective breadths, displacing their material by such action into the stem of the rail alternately throughout the series of passes until the form of the rail has merged into that of the resulting product.

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

1. The improvement in the art of rolling down old railroad-rails to bars or billets of rectangular or other shape in rolls having ob-

lique passes, which consists, first, in bending the flanges of the rail to form an angle one with the other, and, second, in successively compressing or reducing first one bent flange and then the other, while the flange acted upon is in a vertical position, by vertical pressure, so as to force the material of first one flange and then of the other into the stem of the rail, substantially in the manner shown and described, and for the purpose specified.

2. Rolls for reducing old railroad-rails to bars or billets of different shape, provided with a series of grooves, 1 2 3, &c., con-

structed and arranged substantially as hereinbefore described, and adapted, first, to bend the flanges of the rail so as to form them into an angle with each other, and, second, to compress first one and then the other of the bent flanges while in a vertical position into the stem of the rail.

In testimony whereof I have hereunto signed my name this 18th day of March, A. D. 1879.
CHAS. HEWITT.

In presence of--

J. BONSALL TAYLOR,
THEO. C. MAPLE.