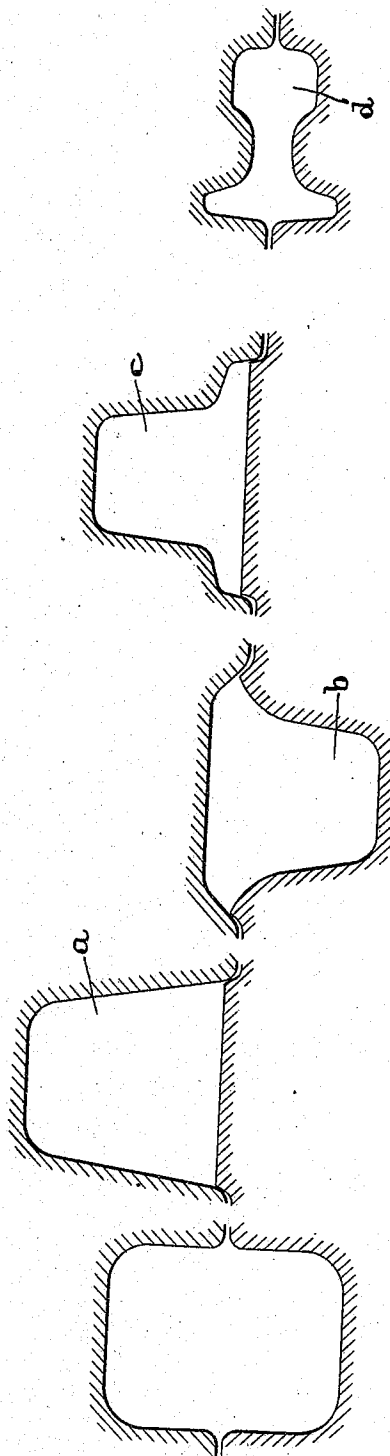


939,320.

N. RENDLEMAN.
METHOD OF MANUFACTURING RAILS.
APPLICATION FILED SEPT. 29, 1908.

Patented Nov. 9, 1909.
4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

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Charles Barnard.

INVENTOR

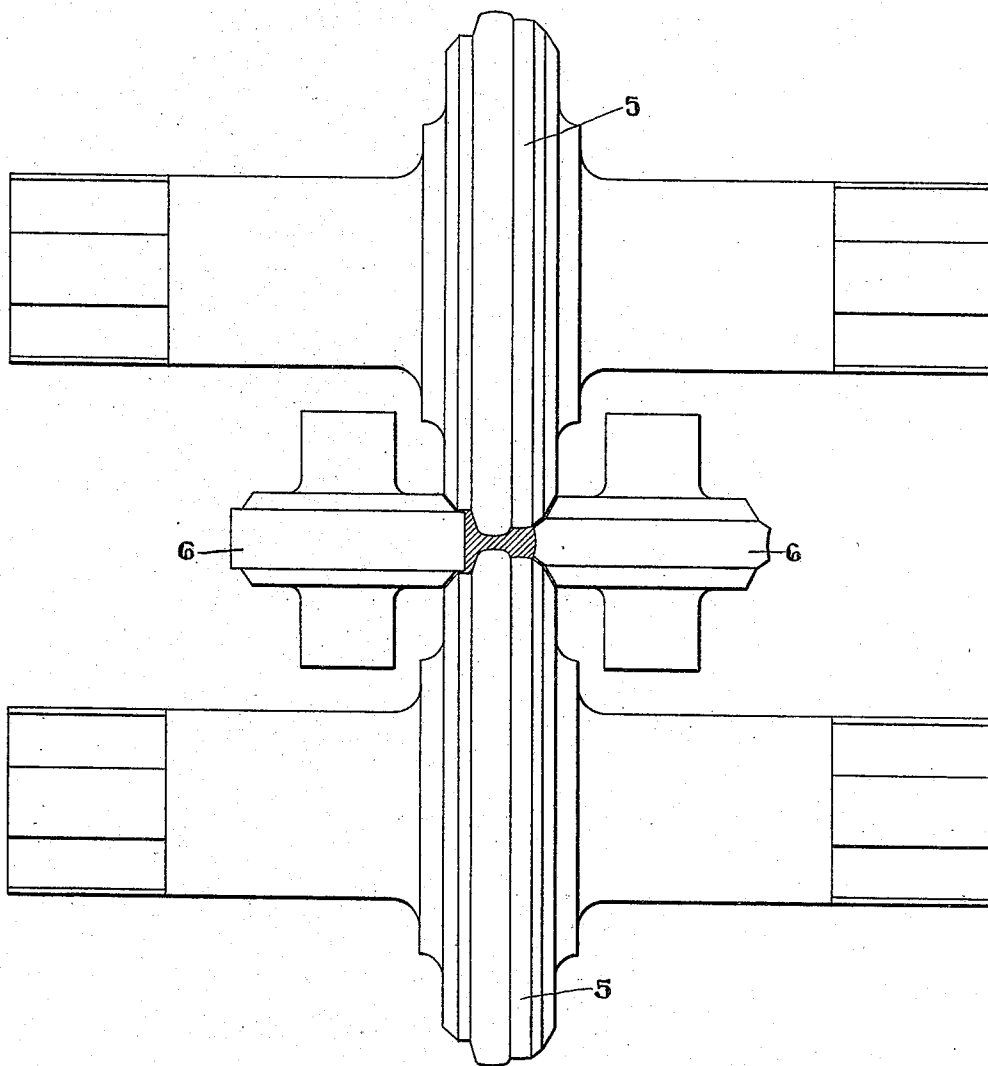
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FIG. 2.



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4 SHEETS—SHEET 3.

FIG. 3.

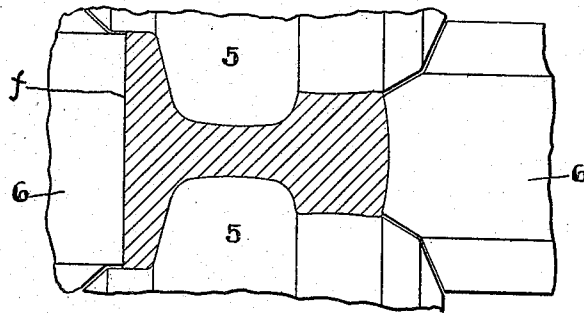


FIG. 4.

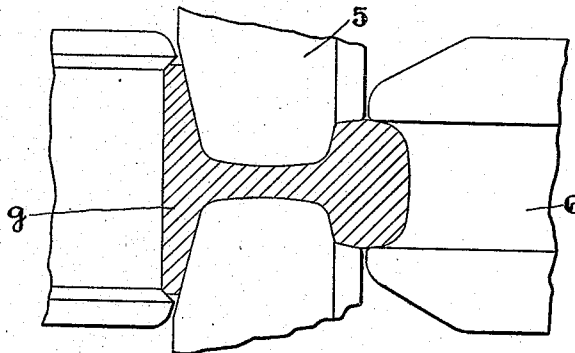


FIG. 5.

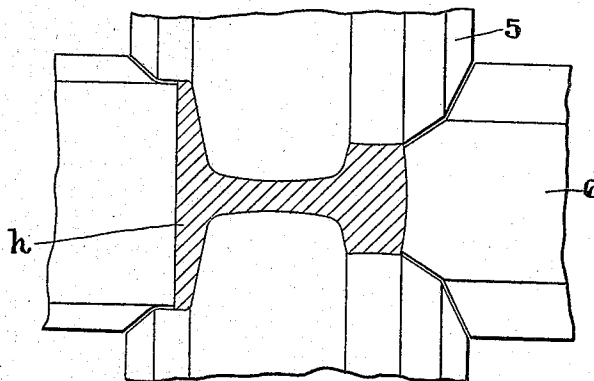
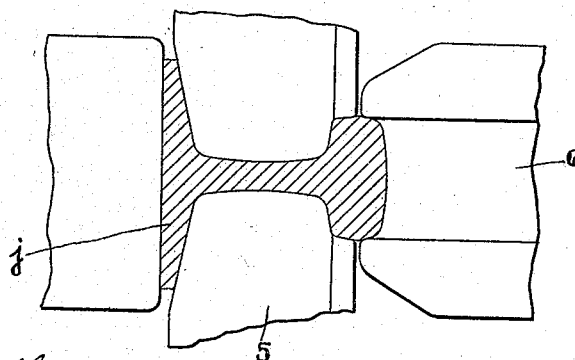


FIG. 6.



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Patented Nov. 9, 1909.
4 SHEETS—SHEET 4.

FIG. 7.

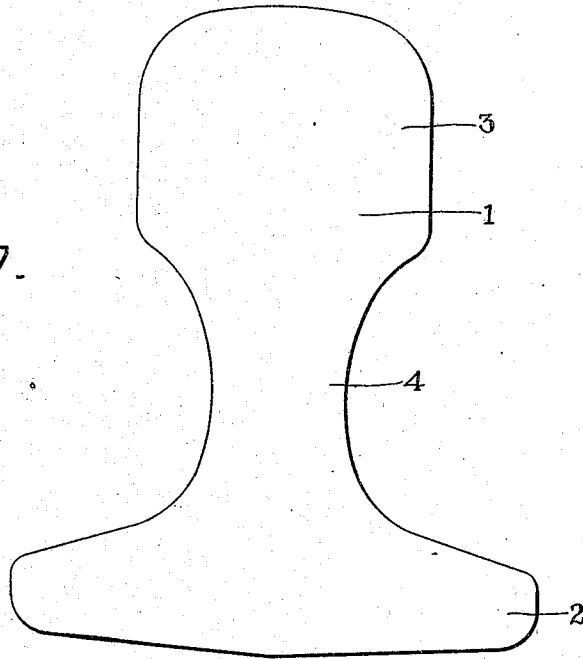
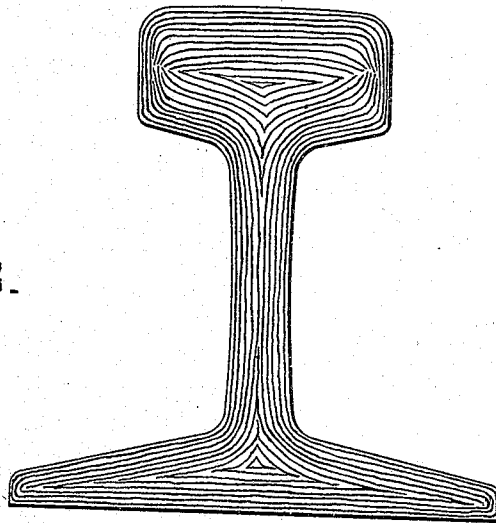


FIG. 8.



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UNITED STATES PATENT OFFICE.

NORMAN RENDLEMAN, OF KNOXVILLE, PENNSYLVANIA, ASSIGNOR TO JONES & LAUGHLIN STEEL COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METHOD OF MANUFACTURING RAILS.

939,320.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed September 29, 1908. Serial No. 455,284.

To all whom it may concern:

Be it known that I, NORMAN RENDLEMAN, residing at Knoxville, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Methods of Manufacturing Rails, of which improvement the following is a specification.

In the present practice of rolling rails the metal is shaped in passes formed in horizontal rolls and on account of the shape of the article, all the work on the metal is effected by pressure applied to all parts, *i. e.*, web, flange and head and at right angles to the plane of the web, except in one or two upsetting passes occurring before the shaping of the head has commenced. When rolled in this manner the metal will be caused to stratify following the well known law that ductile materials when subjected to pressure will stratify more or less in planes at right angles to the direction of applied pressure. As in the manufacture of rails, the metal while in a highly ductile condition is subjected to pressure as above stated, there is a stratification in planes parallel to the direction in which load is applied to the rail when in use. In other words a rail when in use has its strata all on edge and when subjected to heavy loads applied to the edges of the strata, portion of the head outside of the planes of the web will split off, and at times the split will pass through the head and web. In addition to the stratification due to pressure, a further stratification is produced due to entrained slag etc., gas pockets etc. In rolling, the pockets containing the slag etc., are flattened, the walls of the pockets being extended in directions at right angles to applied pressure, thus producing a further stratification in planes parallel with the direction in which the load is applied to the rail when in use.

The invention described herein has for its object in the reduction of an ingot or bloom to a finished rail, the application of reducing pressures, in such manner that the stratification of the head and flange whether due to pressure alone or to the closure of pockets in the metal, will occur in planes at right angles to the direction loads are applied to the rail when in use.

The invention is hereinafter described and claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is an elevation of portions of rolls having passes suitable for roughing down the bloom or ingot to "shape" or "form," Fig. 2 is an elevation showing the arrangement of rolls for the finishing mills, Figs. 3, 4, 5 and 6 are enlarged views showing suitable constructions of passes in the several finishing mills, Fig. 7 is an end elevation of the "shape" or "form" and Fig. 8 is a similar view of the completed rail.

In the practice of the invention, the bloom or ingot is reduced in passes *a, b, c*, and *d* four or more in number and preferably formed in horizontal rolls of a two or three high mill. In these passes the ingot or bloom is "shaped" and in subsequent passes hereinafter described this "shape" or "form" is reduced to final dimensions. The roughing passes *a, b, c* etc. are so constructed as to produce by their successive operations a "form" or "shape" 1, see Fig. 7, having a height considerably greater than the height of the rail to be formed and having the flange and head portions 2 and 3 of widths but little greater than those of the corresponding parts of the rail. The web portion 4 is made of such a thickness relative to this finished web and the reduction desired in the finishing passes that there will not be any material internal flow of metal to or from the web in reducing the "shape" to a rail. The subsequent reduction of the "shape" is effected in a universal mill having horizontal and vertical rolls 5 and 6 which have their operative faces constructed to form passes *f, g, h* and *j* in which the "shape" or "form" is brought to final dimensions. It will be observed that on account of the contour of the "shape", substantially all of the reduction is effected by the vertical rolls 4 and 5, and that the reduction effected by the horizontal rolls is small in each pass except where they operate on the web portion of the "shape".

It will be observed that in my improved method, substantially the entire reduction of the head and flange is by pressure applied in directions substantially at right angles to the direction of pressure in the old method, and as stratification occurs in planes at right angles to the pressure, the stratification produced in my method is at right angles to that produced in former methods. In other

words the stratification in the rail produced by my method will be at right angles to the direction in which the head is applied to the rail.

5 I claim herein as my invention:

1. As an improvement in the art of manufacturing rails, the method herein described which consists in subjecting the metal which is being rolled to reducing pressure applied
10 in directions substantially parallel with the web or the direction in which loads are normally applied to the finished rail.

2. As an improvement in the art of manufacturing rails the method herein described
15 which consists in causing a stratification of the metal of the head and flange portions in planes at an angle to the web or the direction in which loads are to be applied to the finished rail by reducing pressure applied in
20 directions substantially at right angles to

the planes in which it is desired the strata should extend.

3. As an improvement in the art of manufacturing rails, the method herein described which consists in reducing an ingot or bloom 25 to a "shape" or "form" of a height greater than that of the rails to be formed, reducing the head, flange and web portions the reducing pressure applied to the head and flange portion being at or approximately at 30 right angles to the direction in which reducing pressure is applied to the web portion of the shape.

In testimony whereof, I have hereunto set my hand.

NORMAN RENDLEMAN.

Witnesses:

CHARLES BARNETT,
FRANCIS J. TOMASSON.