No. 674,222. Patented May 14, 1901.

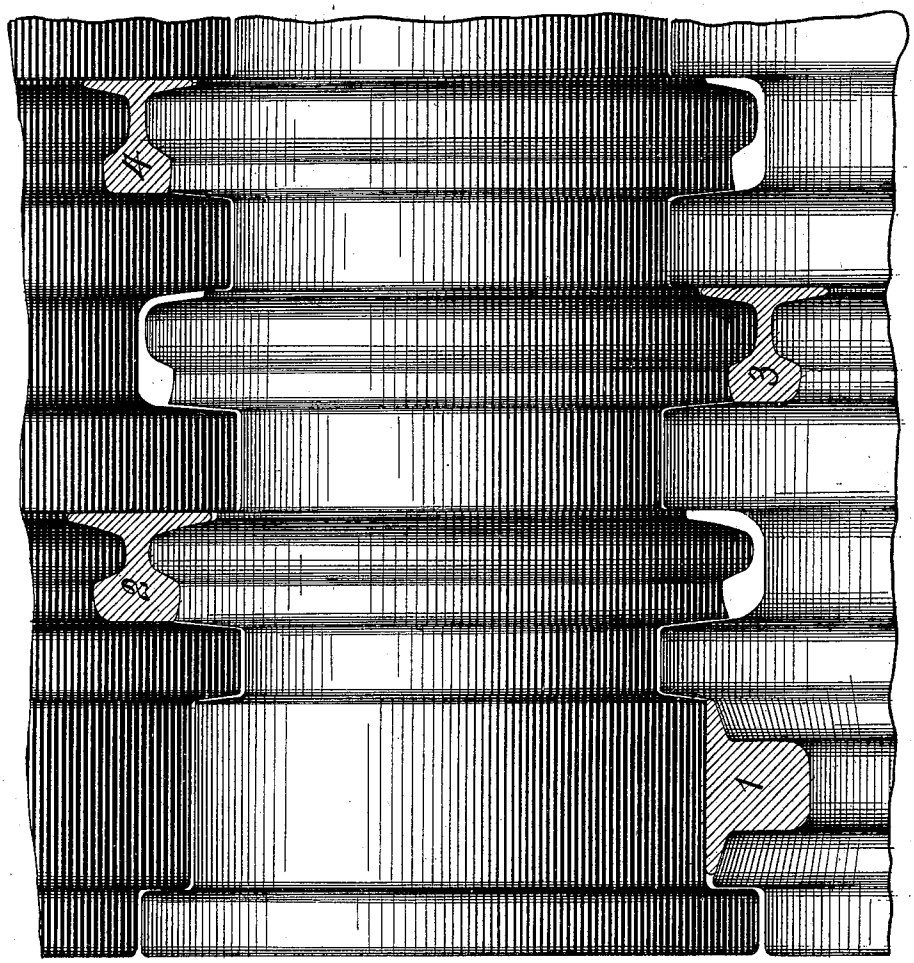
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ROLLS FOR THE MANUFACTURE OF RAILS.

(Application filed Mar. 13, 1901.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



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FIG. 3.

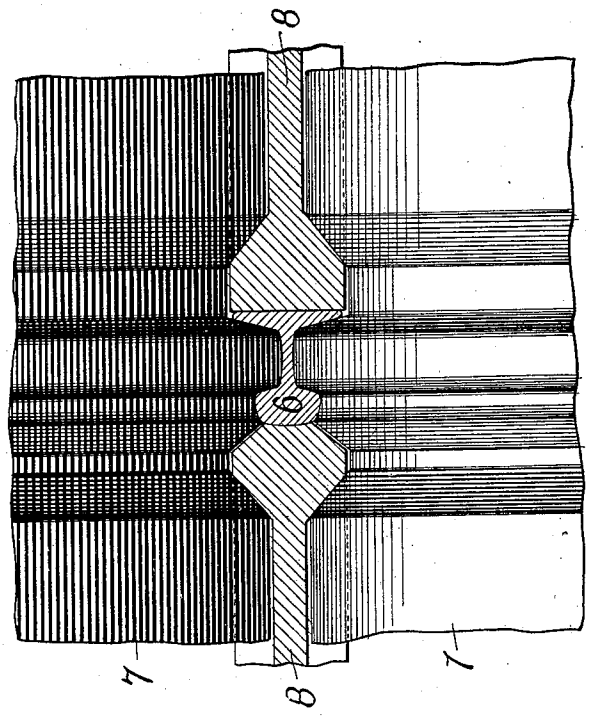
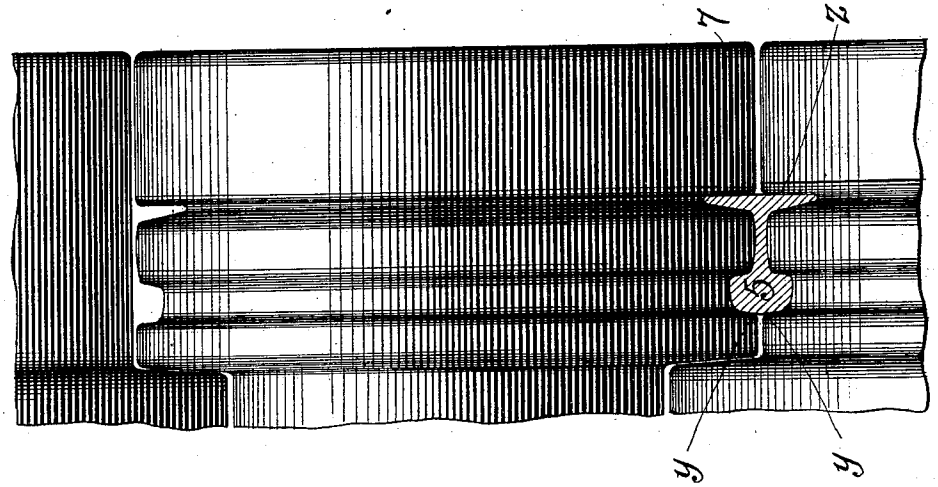


FIG. 2.



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FIG. 5.

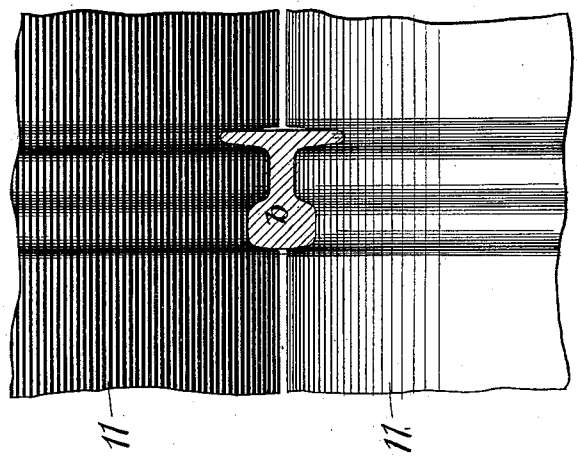
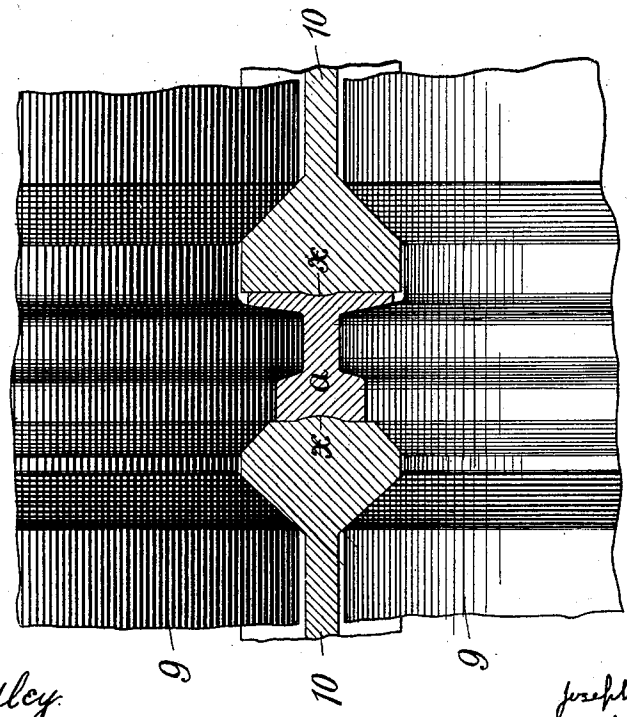


FIG. 4.



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(No Model.) 4 Sheets—Sheet 4.

FIG. 8.

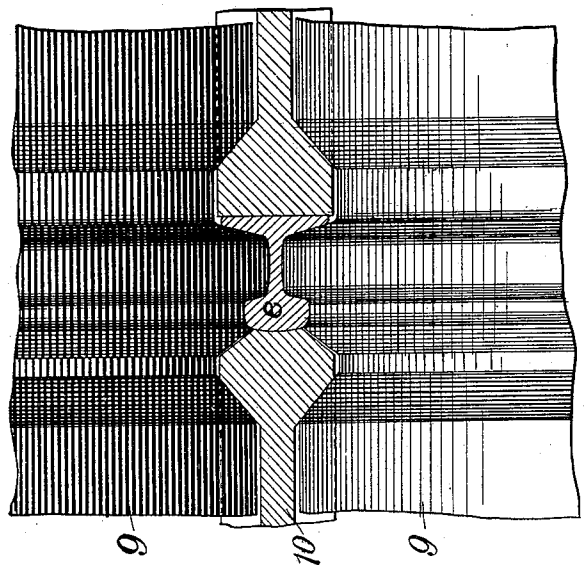


FIG. 7.

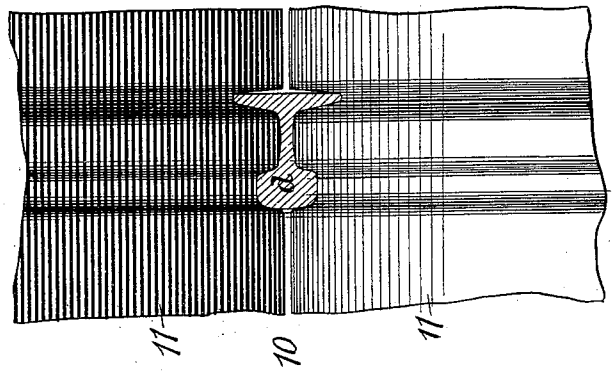
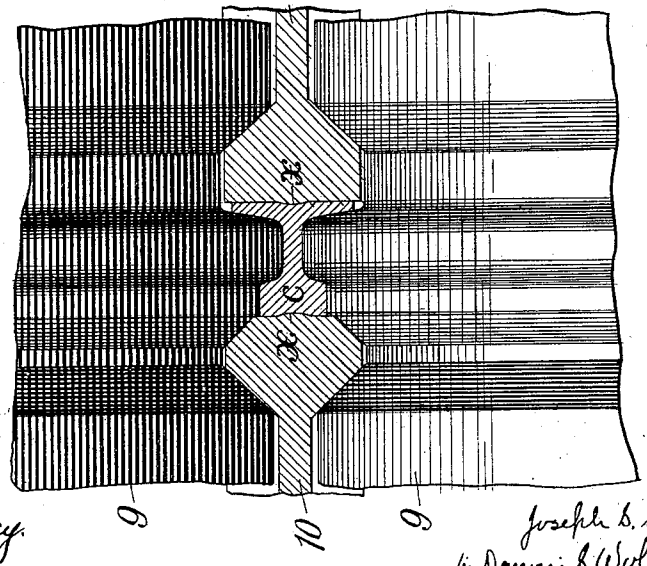


FIG. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH S. SEAMAN, OF PITTSBURG, PENNSYLVANIA.

ROLLS FOR THE MANUFACTURE OF RAILS.

SPECIFICATION forming part of Letters Patent No. 674,222, dated May 14, 1901.

Application filed March 13, 1901. Serial No. 50,904. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH S. SEAMAN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Rolls for the Manufacture of Rails, of which improvements the following is a specification.

The invention described herein relates to certain improvements in the manufacture of rails, &c., and has for its object the reduction of ingots, &c., to rail or other angular forms without subjecting the metal in the head and flange portions to the excessive strains incident to the present practice, and also to provide for a more thorough working of the metal of the head, especially on the tread-surface thereof, thereby rendering such portions more durable in service.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming part of the specification, Figures 1, 2, and 3 are views illustrating the forms or shapes of the finishing-passes of a rail-mill, and Figs. 4, 5, 6, 7, and 8 are views illustrating modifications in the finishing-passes.

In the practice of my invention the mill is constructed as regards the passes up to the dummy pass 1 in the usual or any suitable manner. It has heretofore been the practice to construct the finishing-mill with a dummy pass, two or more edging-passes, a leading-pass, and a finishing-pass. All of these passes consist of suitably-shaped grooves in the upper and lower rolls and tongues on the middle roll extending into said grooves. These grooves and tongues are so constructed and proportioned that the faces of the grooves operate on three sides of the rail and the face of the tongue operates on one side. In other words, the bottom of the groove operates on one side of the rail, and the sides of the groove form the shaping-faces for the tread and outer face of the flange. By reason of this construction portions of the working faces, especially those operative on the head and flange, move at a higher speed than other portions, thereby subjecting the metal to a tearing action. Although this differential action is objectionable at all times, it is especially so when the metal is reduced in temperature, and will not therefore flow as readily. In order to avoid this objectionable feature, I substitute a boxing-pass 5 for the leading-pass heretofore employed and finish the rail in a universal mill. As will be seen by reference to Fig. 1, the dummy pass 1 and edging-passes 2, 3, and 4 are of the usual shape and construction. The boxing-pass 5 is formed by suitably-shaped and similar grooves in the middle and one of the outside rolls. As will be seen by reference to Fig. 2, the faces *y* of this boxing-pass are made of a depth not exceeding half the width of the tread of the rail and the faces *z* of a depth not exceeding half the width of the outer face of the flange of the rail, thereby minimizing any tendency to tearing action on the metal of the rail. The finishing-pass 6 is formed in the horizontal and vertical rolls 7 and 8 of a universal mill, preferably of the type or construction shown and described in Letters Patent No. 318,513, granted to me March 26, 1885. By properly proportioning the passes the head of the rail as it leaves the boxing can be made sufficiently larger than desired in the finished head to insure a considerable reduction and consequent working of the metal of the head in the universal mill. It is preferred that the rail should be comparatively cold during the last pass, so as to obtain a cold-rolling action on the metal.

While the mill having the described passes will produce rails far superior in quality to those rolled in mills having the usual style of passes, it is preferred to employ passes so formed that the differential action of the rolls on the metal will be reduced to a minimum. As the metal during at least a portion of the passes subsequent to the dummy pass is sufficiently hot and plastic to permit of its finning out between the rolls if boxing-passes were employed for all the finishing-passes, I employ universal rolls and rolls having boxing-passes alternately, as shown in Figs. 4, 5, 6, 7, and 8, so that any fin or ridge which may be formed along the head and flange in a boxing-pass is rolled in by the action of the vertical rolls in the universal mills.

It will be understood that the several passes are formed in separate mills, which may be arranged in tandem or in any other

suitable or convenient relation to each other. In lieu of feeding the article through a dummy pass as it comes from the roughing-mill it is fed into a pass *a*, formed by the vertical and horizontal rolls 9 and 10 of a universal mill. This pass is so constructed as to effect an approximate shaping of the head and web portions, as well as the flange portion. It is preferred that the vertical rolls should be so shaped as to impart a concavity or groove along the faces of the head and flange of the rail in a plane corresponding to the pitch-lines of the rolls 11, having the boxing-pass. These grooves or concavities, which can be formed by a bulge *x* on the vertical rolls, are so proportioned as regards the lateral displacement of metal in the boxing-pass that such displaced metal will about fill out the grooves or concavities, thereby avoiding the formation of fins. The next pass *b* is a boxing-pass formed in the rolls 11 of a two-high mill. This pass is constructed, as hereinbefore described, to insure a minimum of differential action of its working surfaces on the metal of the rail. The succeeding passes *c d e*, &c., to the number desired, are formed alternately in universal and two-high mills and are suitably constructed and proportioned in accordance with rules known in the art for the progressive reduction of the metal to the form and size desired. So long as the metal is sufficiently soft and plastic as to render probable a finning out between the rolls having the boxing-pass the vertical rolls in the universal mills are preferably formed with bulges, as described, to form grooves or concavities. The finishing-pass is formed in a universal mill, and the metal is preferably comparatively cold when fed through such mill, so as to obtain a cold-rolling action, as stated.

According to the present practice the flanges of the rail are formed and the edges of the flanges reduced to the desired thickness in the dummy pass, so that in the subsequent edging, leading, and finishing passes there is comparatively little working and reduction of the flanges and none at all of the edges thereof. Hence the edges of the flanges must be elongated by stretching in the passes subsequent to the dummy pass. As will be readily understood, this method subjects the metal, particularly in the flanges, to excessive and injurious strains. In the arrangement shown in Figs. 4 to 8, where the first pass in the finishing-mill is formed by universally-arranged rolls, this pass is so constructed that no part of the flanges is entirely finished or brought to gage; but the flanges are made thicker and wider than desired in the finishing-rail, so that some reduction will be effected in each subsequent pass, which are properly proportioned to that end. In other words, in each of the passes *b*, *c*, *d*, and *e* of the universally-arranged rolls flanges are reduced. In the passes *c* and *e* of the universally-arranged rolls reduction is made in the thickness of the flange portion from edge to edge, and in the boxing-passes reduction is principally in the width of the flange portions. Thus elongation is at all times the result of reduction and not of stretching.

I claim herein as my invention—

1. In a mill for finishing rails rolls provided with passes for the progressive reduction of an article toward a rail shape in combination with rolls having a boxing-pass for the further reduction of the article, and a universal mill having a rail-finishing pass, substantially as set forth.

2. In a mill for finishing rails, a series of two or more stands of universally-arranged rolls, having passes suitably shaped and proportioned for the progressive reduction of an article to rail shape, two or more stands of horizontally-arranged rolls, alternating with the other stands and having boxing-passes suitably shaped and proportioned for the progressive reduction of an article to rail shape, in combination with a stand of universally-arranged rolls having a rail-finishing pass, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOSEPH S. SEAMAN.

Witnesses:
F. E. GAITHER,
DARWIN S. WOLCOTT.