

(No Model.)

2 Sheets—Sheet 1.

A. J. MOXHAM.

ROLLS FOR ROLLING GROOVED GIRDER RAILS FOR STREET CARS.

No. 355,777.

Patented Jan. 11, 1887.

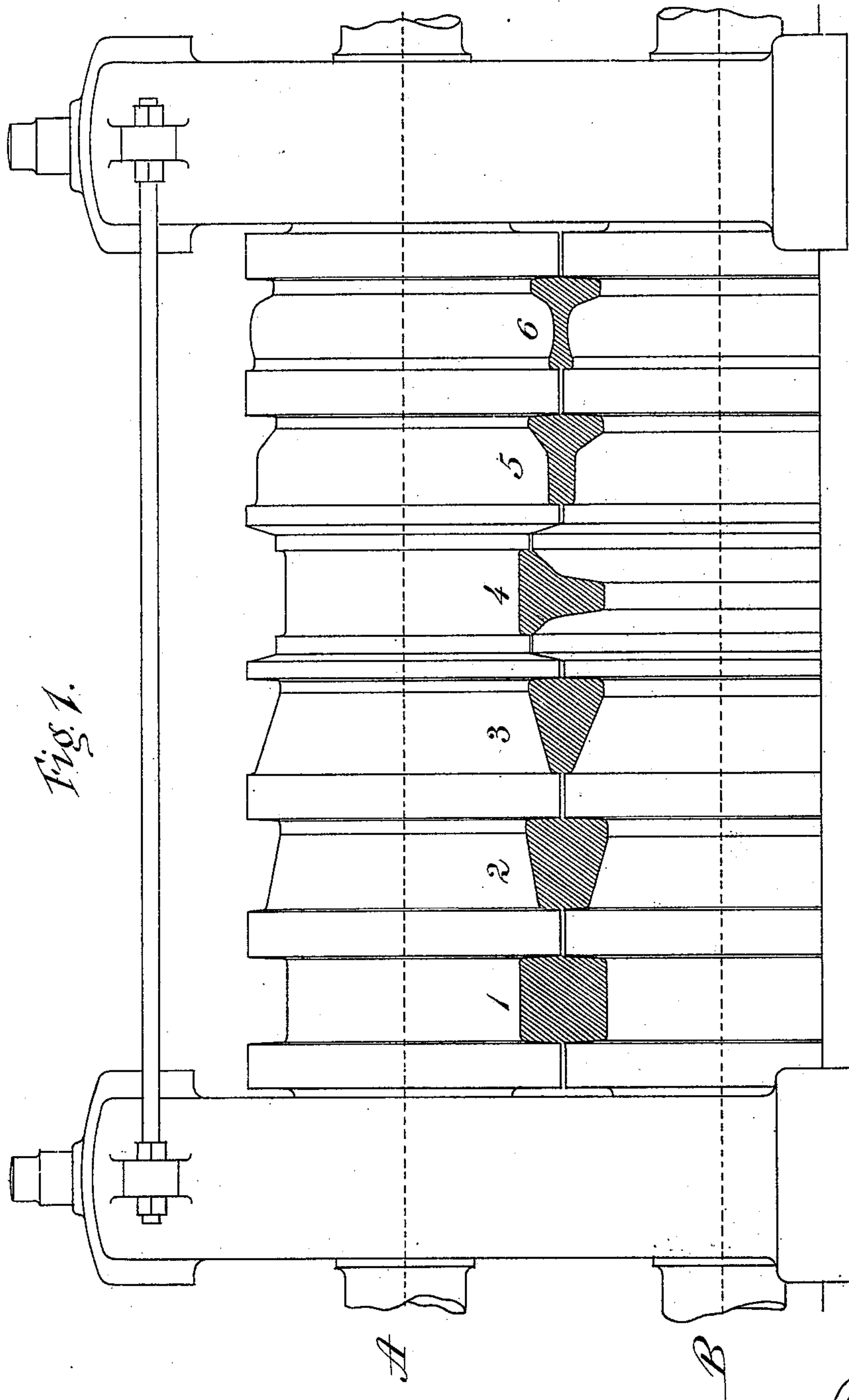


Fig. 1.

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(No Model.)

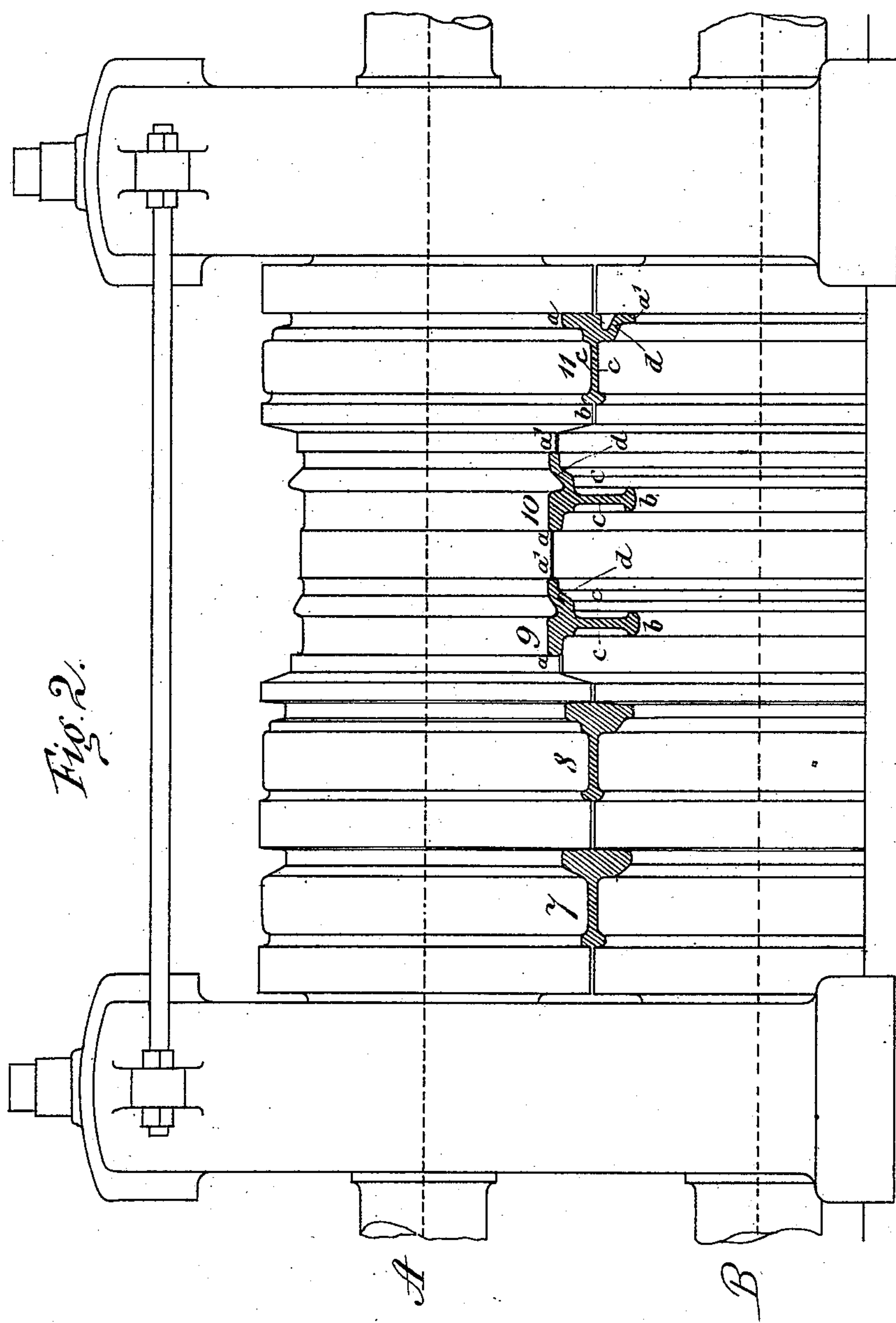
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ROLLS FOR ROLLING GROOVED GIRDER RAILS FOR STREET CARS.

No. 355,777.

Patented Jan. 11, 1887.



Witnesses:
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UNITED STATES PATENT OFFICE.

ARTHUR J. MOXHAM, OF JOHNSTOWN, PENNSYLVANIA.

ROLLS FOR ROLLING GROOVED GIRDER-RAILS FOR STREET-CARS.

SPECIFICATION forming part of Letters Patent No. 355,777, dated January 11, 1887.

Application filed December 9, 1885. Serial No. 185,116. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MOXHAM, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Rolls for Rolling Grooved Girder-Rails for Street-Cars, which invention or improvement is fully set forth and illustrated in the following specification and accompanying drawings.

10 The object of this invention is to provide a set of rolls for rolling grooved girder-rails with grooving passes in regular course of rolling to finished form, thereby avoiding special rolling devices.

15 The invention will first be particularly described, and then specially set forth in the claims.

20 In the accompanying drawings, Figure 1 is a front elevation of a set of roughing-rolls, and Fig. 2 a front elevation of a set of finishing-rolls, in which figure alone the invention now to be described is embodied.

25 In said figures the passes in the rolls are numbered from 1 to 11, inclusive, and the several parts indicated, respectively, by letters as follows: Pass No. 4 is a dummy pass. Nos. 9 and 10 are dummy grooving passes. All the remaining passes are edging passes. The shape of the bloom, its several changes effected, and the shape of the finished rail are indicated by section-lines filling up the contour of the several passes like templates. These section-lines indicate, therefore, the shape of the mass of metal as it leaves each of the respective passes, not as it enters the same. The hot bloom is first run into and through pass No. 1; thence, without turning, successively through Nos. 2 and 3; thence turned on the flat and run through the dummy pass No. 4; thence on edge again successively through Nos. 5, 6, 7, and 8; thence on the flat successively through the dummy grooving passes Nos. 9 and 10, and thence on edge through the final finishing pass No. 11.

35 In the said passes the operations performed upon the metal are as follows: In the roughing passes Nos. 1 to 6, inclusive, the several shapes of the passes so distribute the draft upon the metal as to quickly roll out and reduce the web and its stub end, while leaving a sufficient mass of metal to form the upper portion or head of the rail. In the first two

finishing passes, Nos. 7 and 8, the web and under part of the head of the rail are virtually completed, No. 8, however, excessively reducing the thickness of the web, as will be hereinafter more particularly described. In the dummy grooving passes Nos. 9 and 10, the latter, being next to the last, technically known as a "leading pass," the groove is put in the head of the rail, and at the same time said passes reduce to finished proportion that part of the head marked *d* therein, as will be hereinafter more particularly described. Pass No. 11 finishes the rail complete, as will be herein-
after more particularly described.

65 The passes Nos. 1 to 7, inclusive, need no further description, the same being illustrated as of good design for passes preliminary to those in which the invention herein claimed is carried out; but said preliminary passes form no part of my said invention.

70 It may be proper here to state, though well known to those skilled in rolling-mill practice, that the term "dummy pass" is applied to such passes as cause a flow of metal across them, (that is, longitudinally of the rolls,) instead of the metal being rolled out and elongated in the direction of the rolls' rotation—that is, transversely to their axes. This widening action is generally local, parts of the mass of metal being thus widened, while the remainder is subject to such amount of elongation only as will prevent distortion during the passage of the mass of metal through the pass.

75 In pass No. 9 the groove to be put in the head of the rail is first started. In order to prevent distortion in the partly-formed rail and to secure an even flow of metal, space is left for spread of the head at the points *a a'* and work or draft is put upon the point *b*. The vertical draft thus put upon the point *b* tends to enlarge or upset the web *c c*; hence the equalizing-draft put upon the various points is no greater than will suffice to prevent distortion during the grooving of the head of the rail. Greater speed, however, is provided for on the side *a'* than on the side *a*, as, the beveled side of the groove tending more that way, the spreading tendency is more concentrated on that side.

80 100 In pass No. 10 the action is but a continuation of that in pass No. 9; the head of the rail

being further widened by the spreading of the groove, and the groove as such finished. Pass No. 10, as the "leading pass," thus furnishes to pass No. 11, the final finishing pass, a rail showing in cross-section a groove of greater width than is required for the finished rail, and a web also of some excess of thickness, but having that part of the head marked *d* reduced to finished size required, and the parts *a a'* of the head only large enough to provide sufficient metal to receive the necessary truing-up draft in said final pass. Thus is furnished to the final finishing pass by the dummy grooving passes a section of metal which must receive work or draft over its whole exterior or contour to a sufficient extent to obviate all twisting or distortion when bringing the rail true to the required finished shape.

It will be observed that the necessary action of the dummy grooving passes Nos. 9 and 10 is to "upset" or thicken the web *c c* of the rail, as has been above referred to, and, as has also been mentioned above, that said web had previously been rolled sufficiently thin when the rail left pass No. 8. As, in order to accomplish the other operations desired in passes Nos. 9 and 10, it is necessary to upset the web *c c* therein, the provision of rolling down the web so as to leave pass No. 8 sufficiently thin causes the upsetting in passes Nos. 9 and 10, to restore said web to only the thickness required for truing-up the same in the final finishing pass No. 11.

In consequence of the dummy grooving passes Nos. 9 and 10 thus delivering to the final finishing pass, as above mentioned, a section of metal having a groove therein wider than is required in the head of the finished rail, two advantages are obtained: First, the metal is worked down at the points *d* in said grooving passes to practically the required finished size; and, second, provision is made for edge or side draft in the final finishing pass, which action and "truing-up" only are required to completely finish the rail. The effect of such side draft on the part *d* of the rail in the final pass No. 11 is, therefore, not to entirely elongate or draw out said part, but, while closing it in, to thus narrow to accurate gage the groove in the head of the rail, the parts *a a'* of said head and the web *c c* being at the same time "trued up" by being elongated or drawn out sufficient only to prevent distortion by the operation of so closing said groove.

I advisedly use the term "dummy grooving" as applied to passes Nos. 9 and 10, in contradistinction to the ordinary arrangement of passes for effecting the grooving of rails, wherein a side flange is first rolled out straight in one set of passes and then turned up in another pass or passes to form a grooved head.

It has heretofore been the custom to treat the grooving of girder-rails separately from their rolling, either by first rolling out a side

flange or tram and then turning up the same, as above mentioned, in separate shaping-grooves, or by providing a special pair of tongue-rolls for this purpose, generally placed immediately in front of the final pass, or else the whole mass of metal is acted on at once by "quartering"—that is, it is rolled between two vertical and two horizontal rolls at the same time, thus securing simultaneous spread in two planes.

By the invention herein described and claimed the grooving is effected in a regular course or manner, without special side apparatus or manipulation, by passing the metal through rolls provided with passes so shaped and adjusted, as described, to each other that an earlier pass anticipates by an excess of work the work to be performed in a succeeding pass or passes, wherein a restoration of form is effected by a readjustment of such excess while performing other shaping operations. In considering this method of grooving a girder-rail it must be borne in mind that a broad distinction exists between such method and the ordinary method of grooving a flat rail. In grooving a flat rail the whole shape and body of the rail are brought within the zone of action of the plane in which the rolls revolve, and the rail can be finished without turning; but in rolling a deep girder-rail roll action in both planes is necessary; hence the rail, in order to be rolled, must be turned in the rolls, and such twofold rolling operation must be provided for. In such twofold operation the invention herein described has been embodied and adapted thereto in the manner above set forth.

The rolls illustrated in Figs. 1 and 2 are shown two-high; but they may be made three-high, if preferred. I do not limit myself to the exact shape of head and stub-ended web of rail shown, as it is evident that the exact contour of said parts is not necessary to the principle or to the actual operation of my invention.

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

1. A set of rolls for rolling grooved girder-rails, provided with one or more dummy grooving passes, as 9 and 10, conformed to the general shape of the finished rail desired, and having each a tongue shaped substantially as described, whereby an excess of spread and a larger groove are imparted to the head of the partly-finished rail than is required when finished, while substantially finished thickness is imparted to the other parts of the rail, substantially as and for the purposes set forth.

2. A set of rolls for rolling grooved girder-rails, provided with a preparatory edging pass, as 8, for excessively reducing the thickness of the web of the rail, and with one or more succeeding dummy grooving passes, as 9 and 10, for imparting excessive spread of head and size of groove therein, whereby the upsetting action of said succeeding passes upon said web is caused to restore only the necessary thick-

ness of web, substantially as and for the purposes set forth.

5 3. A set of rolls for rolling grooved girder-rails, provided with one or more dummy grooving passes, as 9 and 10, having each a tongue shaped substantially as described, to excessively spread and groove the head of the rail, and with a finishing pass, as 11, of the true

shape of rail required, whereby said excess of spread and groove are corrected and the finished rail delivered free from distortion, substantially as and for the purposes set forth.

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