(No Model.)

3 Sheets—Sheet 1.

J. G. LAURIE.

ROLLING MILL.

No. 513,332. Patented Jan. 23, 1894.

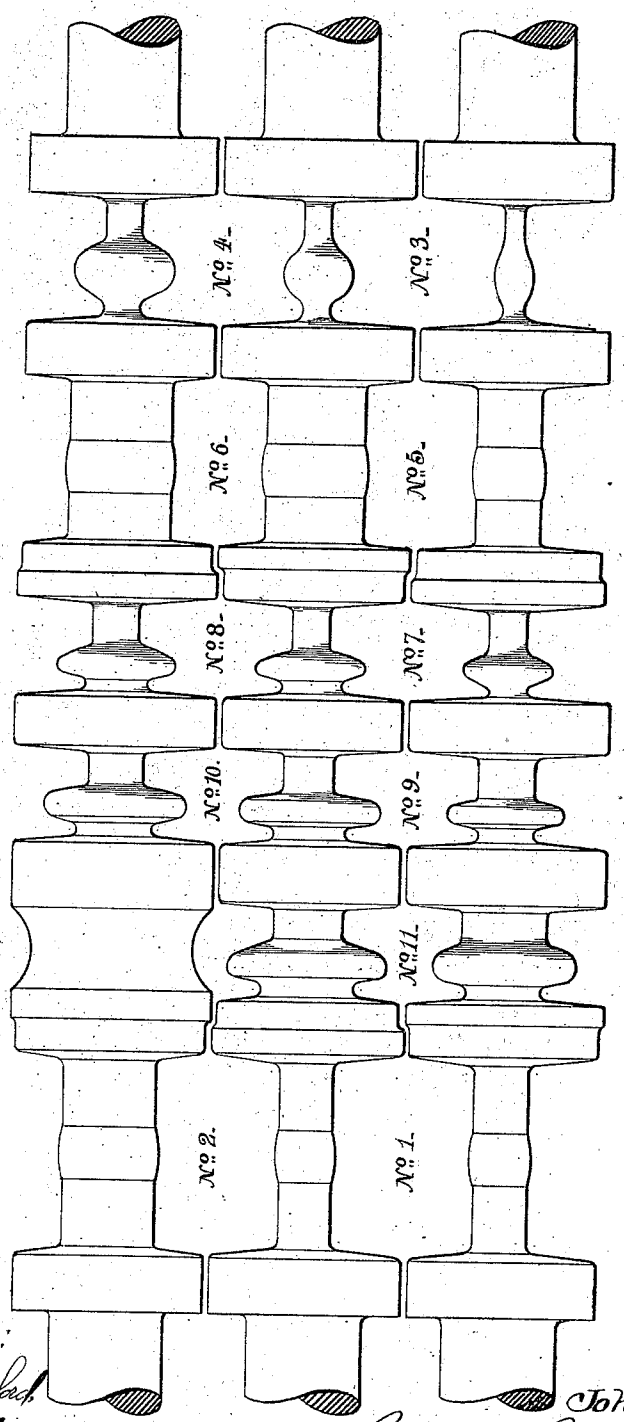

Fig. 1.

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WASHINGTON, D. C.

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Fig. 3.

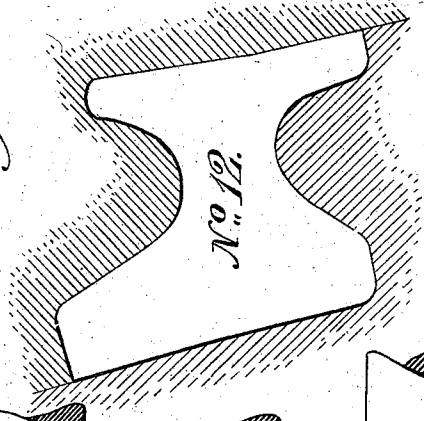
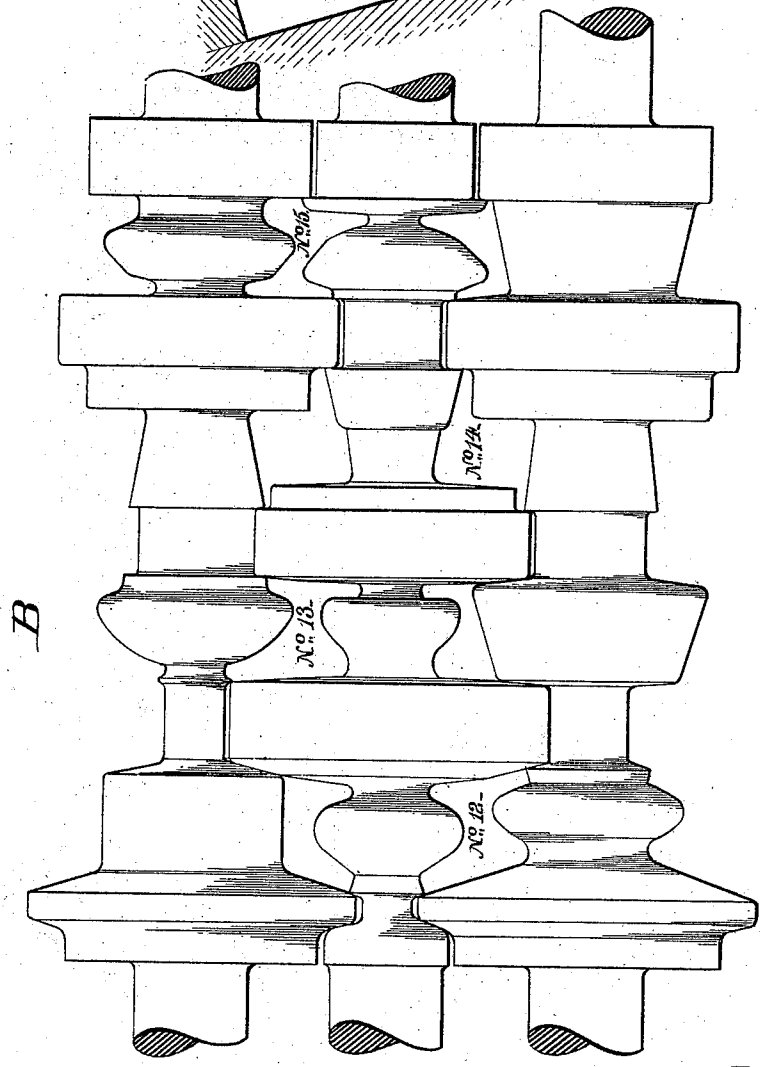


Fig. 2.



B

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J. G. LAURIE.

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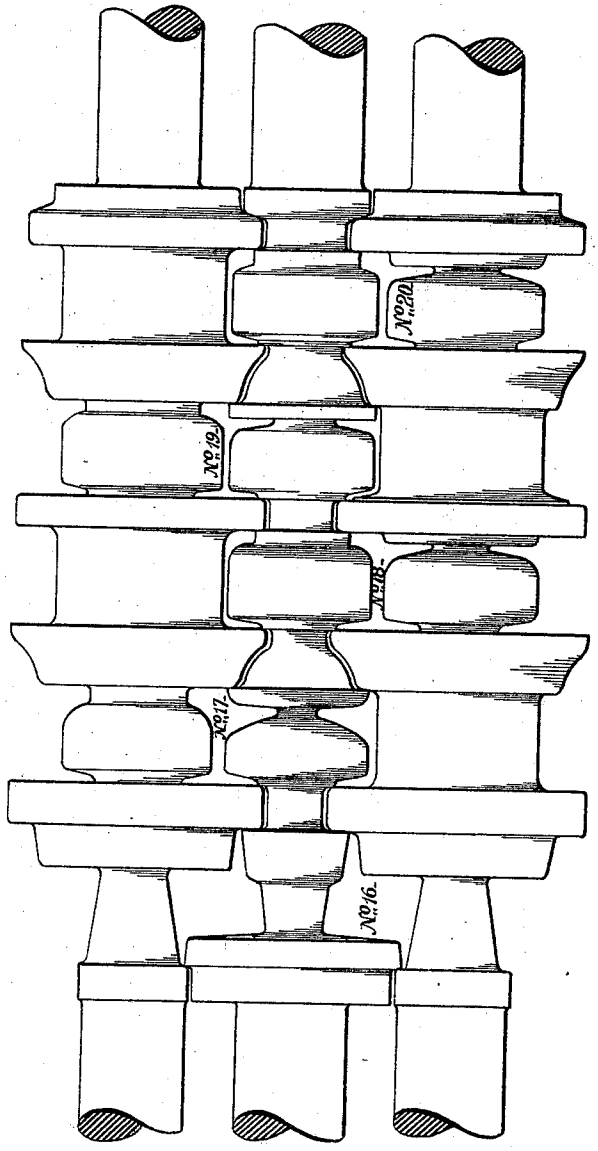

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN G. LAURIE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ILLINOIS STEEL COMPANY, OF SAME PLACE.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 513,332, dated January 23, 1894.

Application filed July 10, 1893. Serial No. 480,028. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. LAURIE, of Chicago, Illinois, have invented certain new and useful Improvements in Rolling-Mills, of which the following is a specification.

The object of my invention is to provide a simple, economical and efficient mechanism by which ingots may be reduced rapidly and efficiently so as to form finished rails; and it consists in the details, combinations and arrangements hereinafter described and claimed.

In the drawings, Figure 1 is an elevation of the rolls forming the bloom train; Fig. 2 an elevation of the rolls forming the roughing or billet train; Fig. 3 a sectional diagram showing the shape of one pass (No. 12) of the billet train; and Fig. 4 an elevation of the rolls forming the finishing train.

In constructing my improved rolling mill, I prefer to arrange and divide it preferably into three trains, of which A is the train to reduce the ingot to the shape of a bloom; B the train which reduces the bloom or roughens it down to a billet, and which may be composed of one or more stands of rolls, though I prefer to illustrate it in one; and C the train which reduces the billet to form a finished girder or rail.

In the drawings I have shown my improved mill so constructed and arranged that ingots are reduced by passing them through twenty successive passes in these three trains to form a finished side-bearing girder rail. The rolls forming the bloom train are so constructed that the edges of one roll do not overlap the other. The rolls forming the billet train are so constructed that the adjacent sides of one roll slightly overlap the edges of the other roll, so that there is no space whatever between the adjacent sides. The latter is true of the rolls forming the finished train.

In reducing the ingot to the desired form of the rail, it is desirable to form the same as rapidly and as economically as possible. In order to do this, several of the passes are what is termed "T passes"—that is, passes to give a desired shape to the metal during the rolling; while several of the passes are what are termed "dummy passes"—that is, passes which do not give any shape to the metal while it is being acted on, but reduce the height of the same, due to the action of the side pressure on the metal while it is being passed through the T passes; and there is at least one pass in this train—No. 12—which partakes of the functions of both the T and dummy passes—that is to say, the sides of the rolls forming this pass are preferably inclined at an angle to the axis of the rolls, so that all the sides of the metal are acted on while the shape is being given to the metal as it is rolled through the pass, the height being also slightly reduced.

In my improved construction, as illustrated by the drawings, passes Nos. 1, 2, 5 and 6 are flat passes, while passes Nos. 3, 4, 7, 8, 9, 10 and 11 of the bloom train are edging passes. Referring to the billet train, pass No. 14 is a dummy pass, and Nos. 13 and 15 T passes, while No. 12 is a combination pass partaking of the functions of both the T and dummy passes—that is, reduces the metal on all sides as it is rolled through the pass.

Referring to the finishing train, passes Nos. 17, 18, 19 and 20 are T passes, while pass No. 16 is a dummy pass. These passes are arranged in such order with relation to each other that they rapidly and economically reduce the ingot to the shape of the desired rail.

In operation, the billet is first passed through the bloom train pass No. 1, thence returned to No. 2, when it is turned over on its edge, and by being passed through passes 3 and 4 is given a rough shape and reduced partially to the desired form. It is then reversed and reduced by passing through the flat passes 5 and 6, when it is again turned on its edge and passed through the T passes Nos. 7, 8, 9, 10 and 11, which have thus reduced the ingot to the form of a bloom. The bloom is then passed forward to the billet train, where it is first passed through dummy pass No. 12, which reduces it on all sides, that is, it is operated upon both to partially reduce it to the desired shape and reduced slightly in its height. It is then passed through the T pass 13, then turned over on its edge and passed through dummy pass No. 14, thus slightly reducing its height, thence through T pass 15, which still further reduces it to the desired shape and forms what is known

as a billet. The billet is then passed through the finishing train by first being passed through the dummy pass No. 16, and successively through the T passes Nos. 17, 18, 19 and 20, each pass partially reducing it until it comes out of pass No. 20 as a finished side beam girder rail.

As above described, the construction and arrangement of the rolls and passes in my improved rolling mill, and the order in which I successively reduce the ingot to a bloom and the bloom to a billet, and from a billet to a finished side beam girder rail, are such that it can be done rapidly, economically and efficiently.

I claim—

1. A rolling mill comprising three trains, *i. e.;* a bloom train, a billet train, and a finishing train, provided with passes numbered 1 to 20, several of which are T passes, so arranged as to give the desired shape to the metal as it is passed through them, several dummy passes so constructed and arranged in relation to the T passes as to reduce the height of the metal acted on and one combination pass between the initial and finishing passes so constructed that it acts to compress the metal on all sides as it is passed through it, the series of passes so arranged as to reduce an ingot passed through them to a finished rail, substantially as described.

2. A rolling mill comprising three trains, *i. e.;* a bloom train, a billet, and a finishing train, provided with passes numbered 1 to 20 so constructed and arranged with regard to each other that while the heated metal is passed through them the dummy passes 1, 2, 5, 6, 14, and 16 reducing the height of the metal only, a combination pass 12 acting to compress the metal on all sides, T passes 3, 4, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18 and 19 acting to give a portion of the desired shape to the metal as it is passed through them, and pass 20 acting to give the finished shape to the rail, substantially as described.

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