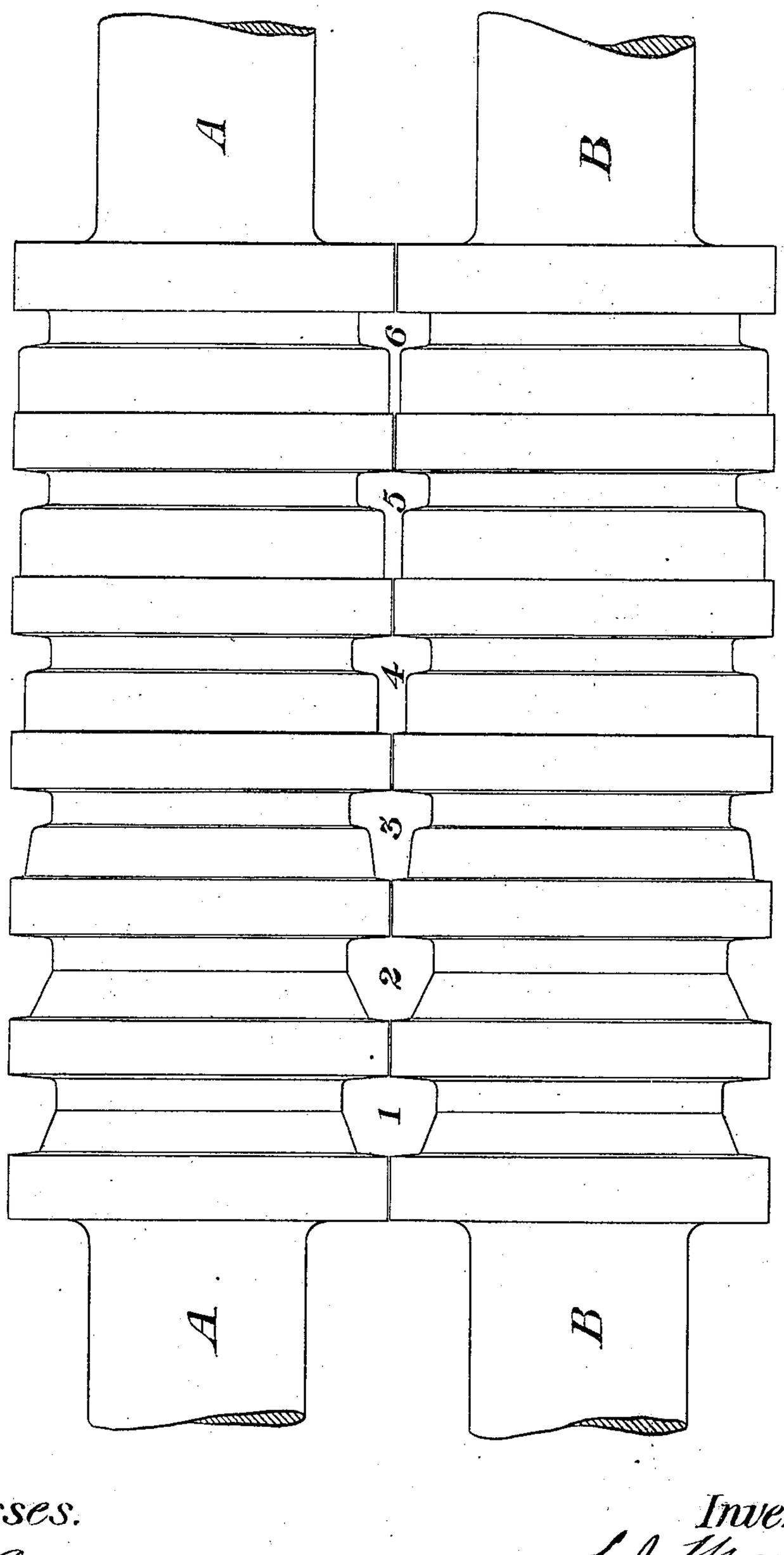
(No Model.) 3 Sheets—Sheet 1.

A. J. MOXHAM.

ROLLING MILL FOR RAILS.

No. 312,213. Patented Feb. 10, 1885.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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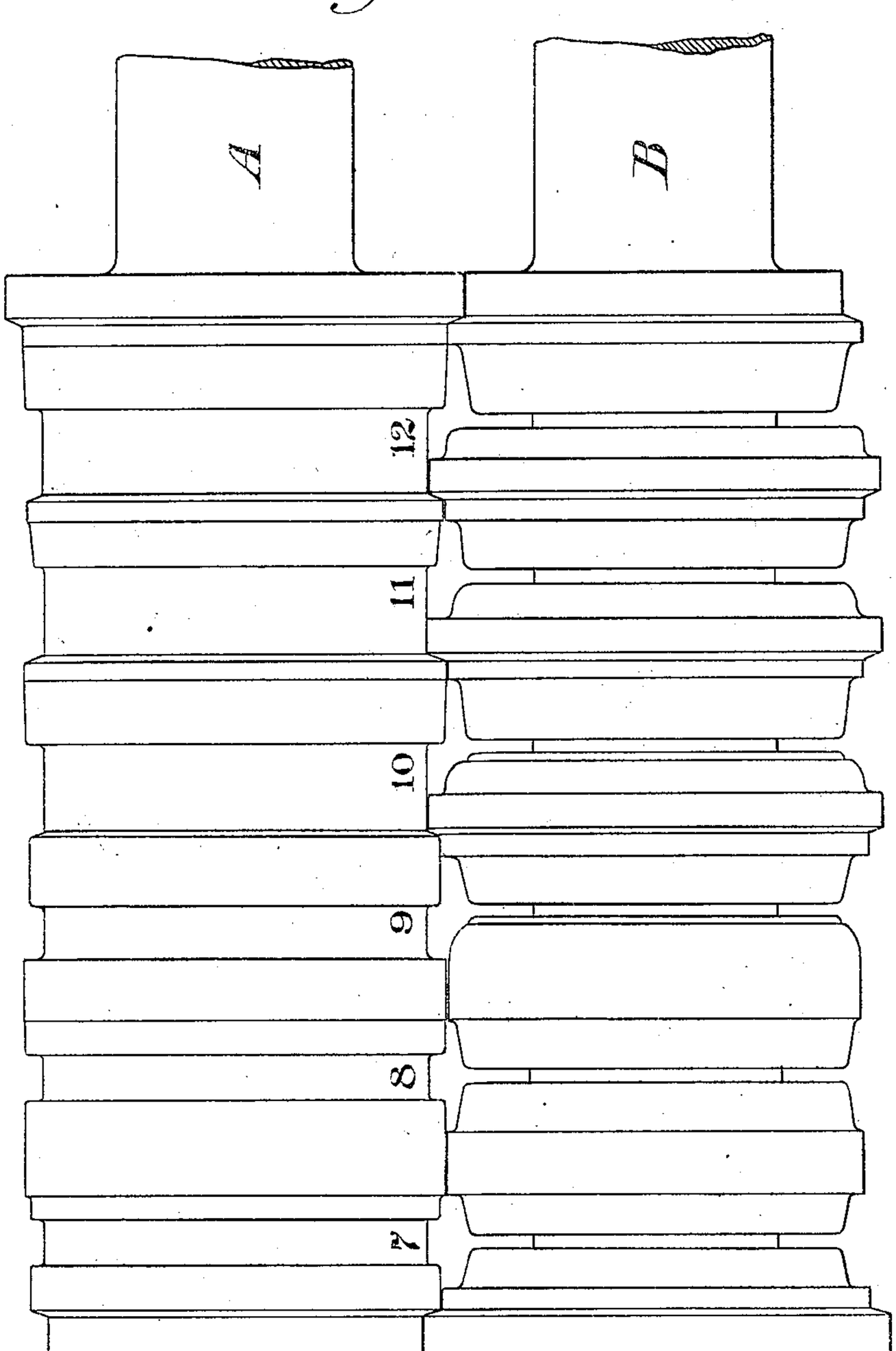
ROLLING MILL FOR RAILS.

No. 312,213. Patented Feb. 10, 1885.

Fig. 2.



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(No Model.)

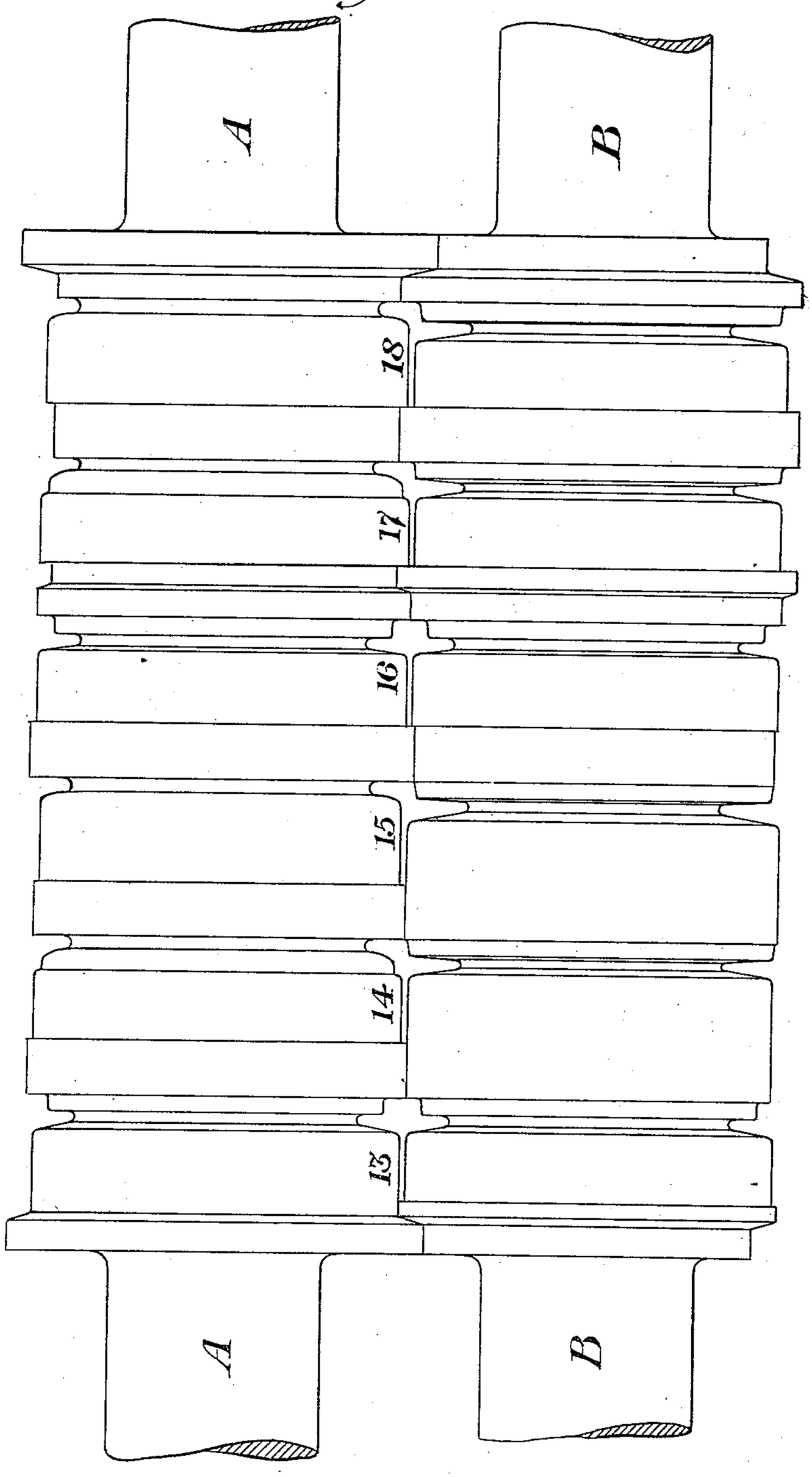
3 Sheets—Sheet 3.

A. J. MOXHAM.

ROLLING MILL FOR RAILS.

No. 312,213. Patented Feb. 10, 1885.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ARTHUR J. MOXHAM, OF JOHNSTOWN, PENNSYLVANIA.

ROLLING-MILL FOR RAILS.

SPECIFICATION forming part of Letters Patent No. 312,213, dated February 10, 1885.

Application filed August 16, 1884. (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 Rolling Girder-Rails for Street-Railways, which invention or improvement is fully set forth and illustrated in the following specification and accompanying drawings.

The primary object of this invention is to provide a small number of sets of rolls, not exceeding three sets in train, capable of rolling at least three different forms of girder-rails, and thus to either greatly reduce the number of roll changes or to avoid entirely any change of rolls, whether all or any of said rails be rolled.

The invention, in its broadest features, consists in certain groupings of passes in the several series of rolls, so that the metal for different forms of rails, after being first put through a number of the same passes to form a bar of primary shape common to all the different forms to be rolled, is finally put through other and different special passes, according to the special form of rail desired.

In the accompanying drawings, Figure 1 illustrates the first set of roughing-rolls, and Fig. 2 a second set of roughing-rolls. Fig. 3 illustrates the finishing-rolls, making the third set of rolls in the roll-train.

Fig. 1 contains six passes, numbered from 1 to 6, inclusive, all side passes. Fig. 2 contains six passes, numbered from 7 to 12, inclusive, all dummy-passes. Fig. 3 contains six passes, numbered from 13 to 18, inclusive, all side passes. The rolls A and B, respectively, the upper and lower rolls of the train, (shown in the drawings,) are "two-high" rolls, but in practice may be made "three-high."

The operation of putting the metal into and through these rolls is as follows: Suppose it is desired to roll a girder-rail having the shape or form of cross-section indicated by pass No. 16, the hot-metal bloom, either of iron or steel, is first run through pass No. 1, then through each succeeding pass up to No. 6, inclusive, the bar thus formed being rolled upon its side in all of said passes; thence it is put upon edge into and through pass No. 7, (a dummy-pass,) then on edge again, into and through pass No. 8, also a dummy-pass, then on its side into the "leading pass" No. 13, and thence on its side again into and through its finishing pass No. 16.

If it be desired to roll a girder-rail having the shape or form of cross-section indicated by pass No. 17, the bloom is first run, as before, through the first six passes in regular succession. The bar thus formed is then run on edge into and through pass No. 9; then on edge again into and through pass No. 10; then on edge again into and through the leading pass No. 14, and thence on its side again into and through its finishing pass No. 17.

If it be desired to roll a girder-rail having the shape or form of cross-section indicated by pass No. 18, the bloom is first run, as before, through the first six passes in regular succession. The bar thus formed is then run on edge into and through pass No. 11; then on edge again into and through pass No. 12; then on edge again into and through the leading pass No. 15, and thence into and through its finishing pass No. 18.

It will be observed that all the finishing passes are congregated together, so as to form the last three passes. The advantage of having all the finishing passes thus together is that all the finished rails may thus be conveniently delivered to the hot bed or cambering mechanism.

In all of the rails having the above-described forms of cross-sections it will be observed that the webs are identical, or nearly so, the only changes wrought being made in the heads. It will be also observed that no very great difference of sectional area of head—that is, the whole upper part, as distinguished from the web—exists. Such being the case, the metal is first put through the first six consecutive passes to give it a first shape, having sufficient material in its head part from which the different heads required may each be made together, with a form proper for the web common to or similar in all. In the dummy-passes' Nos. 7 to 12, inclusive, the quickest changes of location and shape of mass of material take place, such passes being more effective for such purposes than side passes; hence their interposition (in the second set of roughing-rolls) between the two groups of side passes, the one group in the first set of roughing-

rolls and the other in the finishing-rolls. The finishing passes Nos. 13 to 18, inclusive, are made side passes, for the reason that side passes give greater nicety of finish than dummy-passes. Each one of the leading passes Nos. 13, 14, and 15 is a close approximation to its finishing or final pass, and is so shaped in order to give the last pass nothing to do but the truing up and perfect finishing of the final shape to be imparted to the rail.

From the explanations above set forth the advantage can now be readily understood of making no changes of rolls in the course of rolling rails of different shapes, particularly when it is considered that in the making of steel rails large and heavy trains of rolls are of necessity required.

As a rule, each peculiar or different section of rail—such as herein illustrated—demands by the ordinary method of rolling a complete set of nine rolls to roll it; hence all the rolls in the whole train must be changed whenever each different section of said rails is demanded. Such changes are not only costly, in view of the labor involved in making them, but they are still more costly in the loss of time necessarily involved in effecting them.

By arranging and combining the side and dummy passes to the very great advantage herein described and shown the number of passes is not only reduced by working from a primary bar of shape common to all forms required, but any change of rolls may be entirely obviated. It is obvious, however, that if it be preferred to put fewer passes in the whole of one train the first and second set of roughing-rolls, instead of having each as many passes as are shown in Figs. 1 and 2, may have such fewer number as may be preferred, and the remainder of the roughing passes may then be put in the third set of rolls, together with the leading and finishing passes of but one of the forms of rails to be rolled. By this distribution of passes there would be two sets of roughing-rolls common to all three forms of finished rails, and not requiring any change of rolls in making any of said three forms and a third set of finishing-rolls. This would necessitate but a single change of rolls for rolling the other two forms of rails by the substitution in place of the third set, above mentioned, of a set containing the respective leading and finishing passes of the other two forms of rails. Thus, for instance, if but ten passes in place of twelve were put in the two roughing-rolls, Figs. 1 and 2, Fig. 3 could have Nos. 11, 12, 13, and 16, and whenever it was desired to roll forms like Nos. 17 and 18 the rolls in Fig. 3 could be taken down and rolls containing passes 14, 15, 17, and 18 substituted. This would involve but one change of rolls, which would require much less labor and loss of time than changing all three sets of rolls for every change in form of rail required. It is evident that this modified distribution of passes makes no departure from the principle underlying this invention.

I do not confine myself to the precise forms or numbers of passes shown prior to passes Nos. 13, 14, and 15, for it is evident that any suitably-shaped passes may be employed to approximate a bloom or bar to the shape of either of said passes preparatory to finishing in either of the final passes Nos. 16, 17, and 18.

Having thus fully described my said improvement in rolling girder-rails as of my invention, I claim—

1. As an improvement in the art of rolling railroad-rails, the method or process of rolling girder-rails of different forms in the same roll-train, consisting in first rolling the hot blooms through the same series of passes to form a bar of primary shape common for all the subsequently finished forms, and then rolling said bar in specially-grouped passes to form the finished shape of rail desired, whereby the labor and loss of time consequent upon change of rolls for rolling each several form of finished rail is avoided, while the several forms of rails may be delivered in close proximity to the hot bed or cambering mechanism, all substantially as and for the purposes set forth.

2. In the art of rolling girder-rails, a series of two or more rolls provided with finishing passes of the respective conformations shown at Nos. 16, 17, and 18, one or all, and with a series of leading passes therefor, shaped as shown at Nos. 13, 14, and 15, one or all, respectively, in combination with rolls provided with passes for suitably shaping the metal to enter either of said leading passes, whereby the rolling of either of three several forms of finished rails is provided for from the same bloom or bar, substantially as and for the purposes set forth.

A. J. MOXHAM.

Witnesses:
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A. MONTGOMERY.