R. A. LEWIS & W. J. THOMAS.

APPARATUS FOR TREATING STEEL RAILS.

APPLICATION FILED MAY 15, 1915.

1,285,750.

Patented Nov. 26, 1918.

4 SHEETS—SHEET 1.

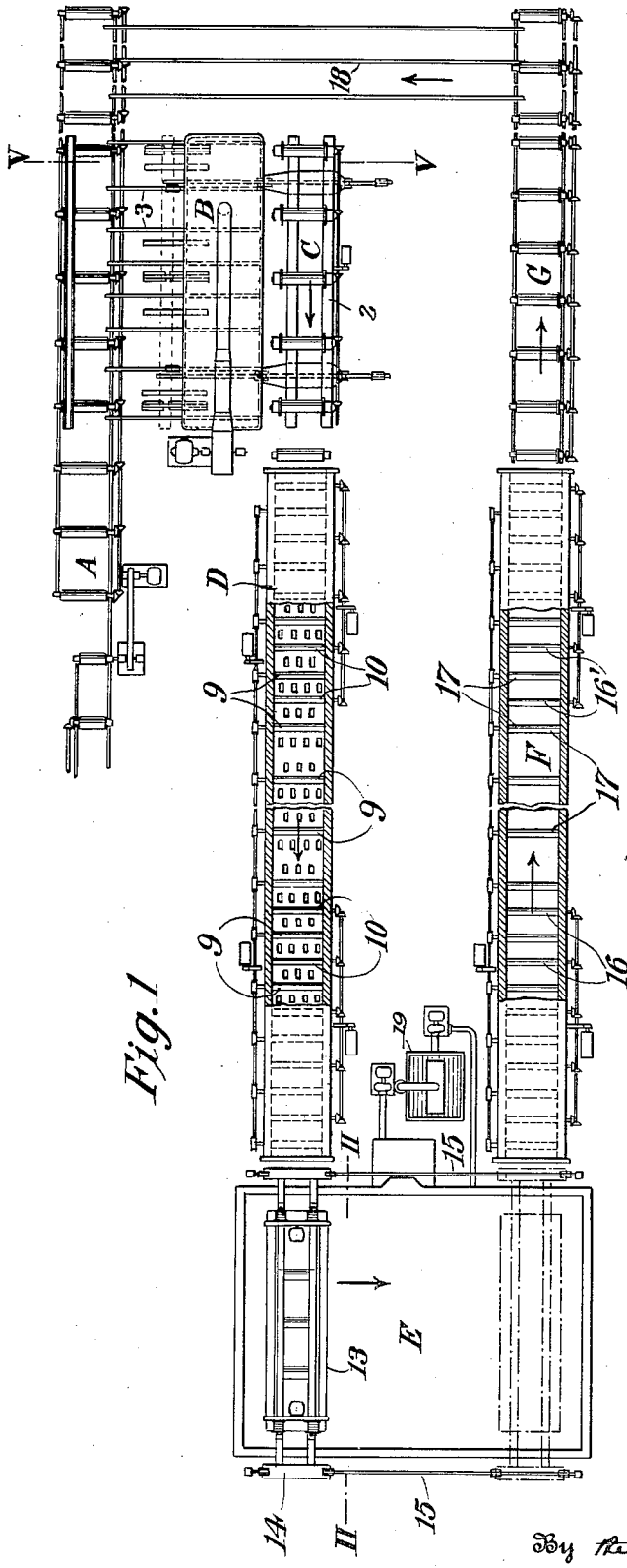


Fig. 1

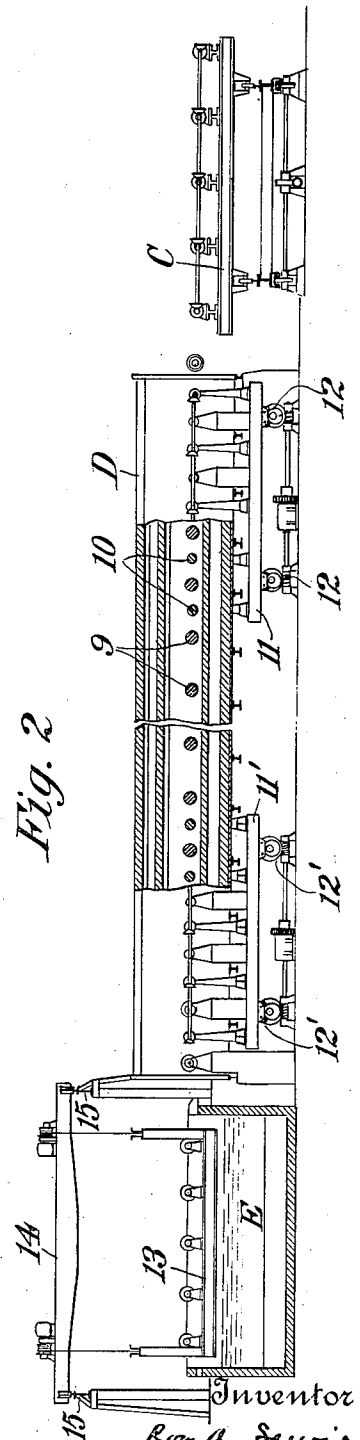


Fig. 2

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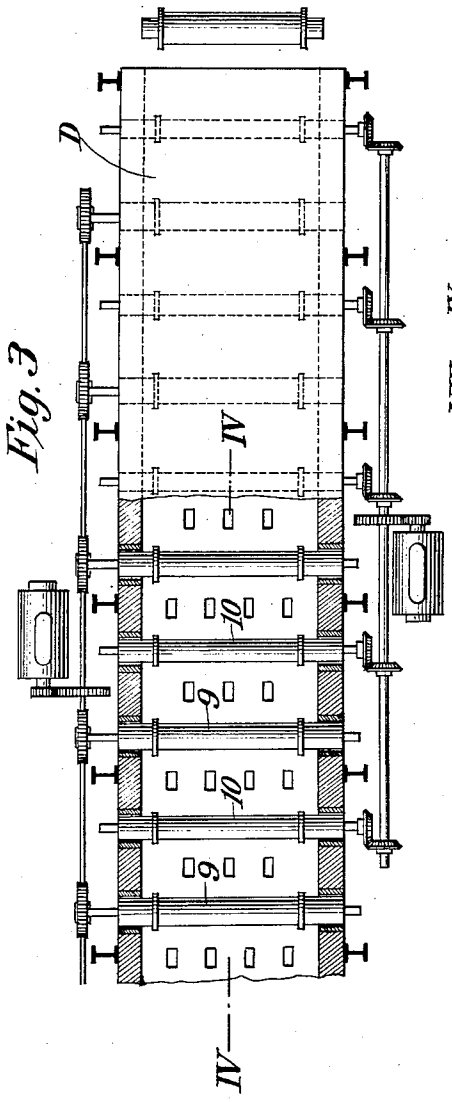


Fig. 3

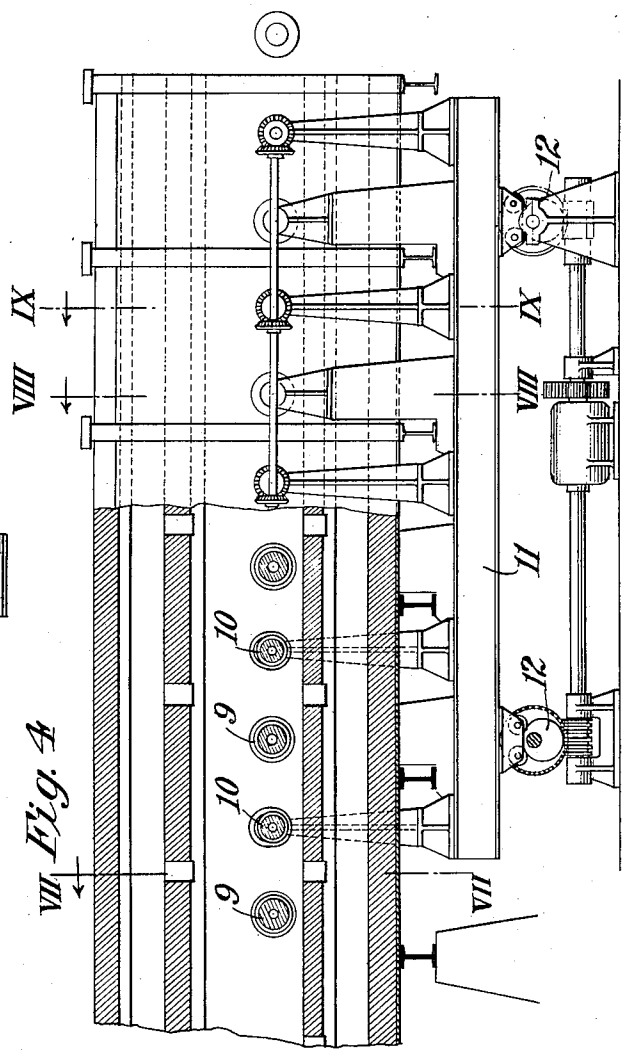


Fig. 4

Witnesses:

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4 SHEETS—SHEET 3.

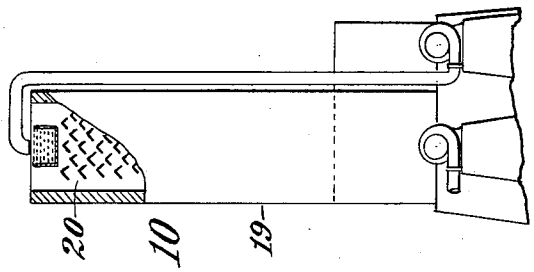


Fig. 10

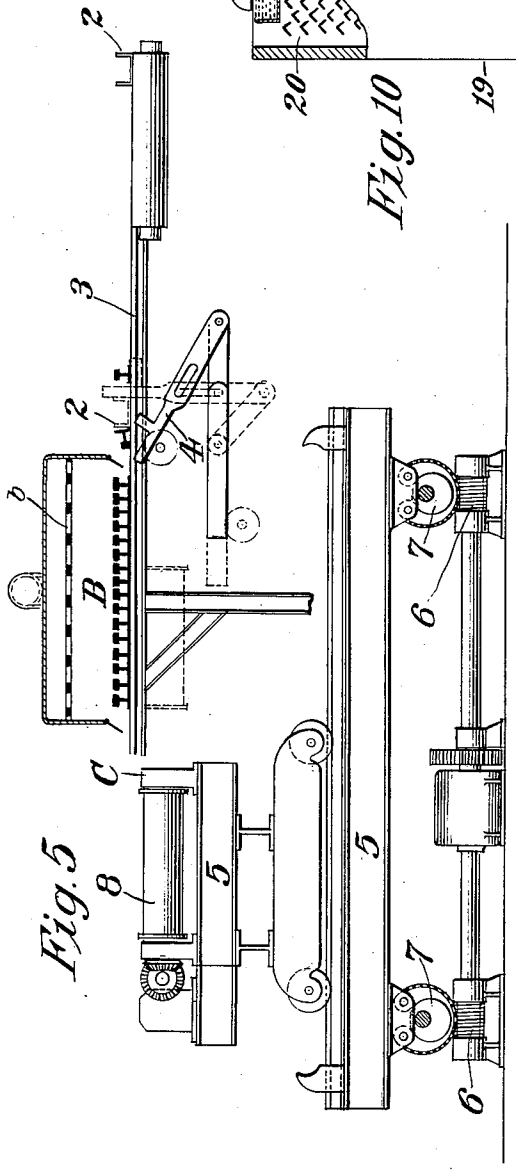


Fig. 5

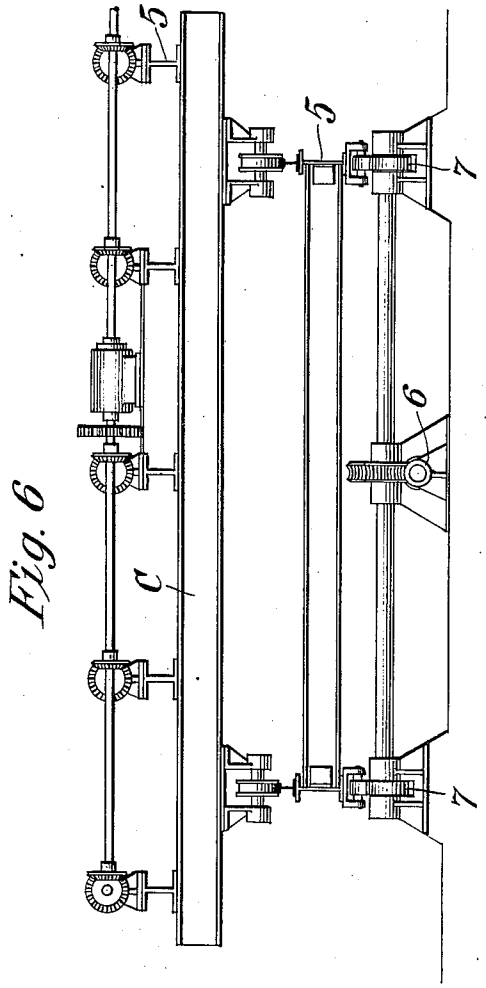


Fig. 6

Witnesses:

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4 SHEETS—SHEET 4.

Fig. 9

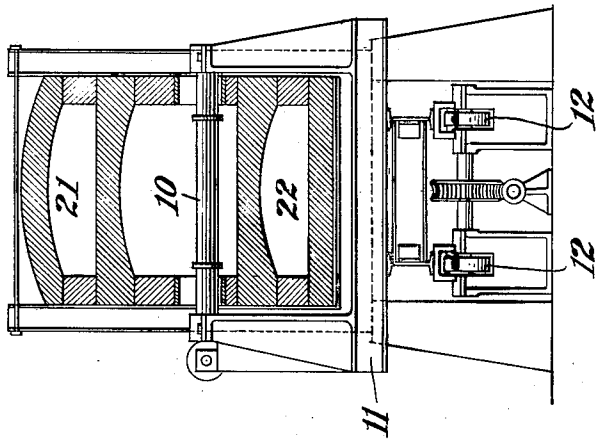


Fig. 8

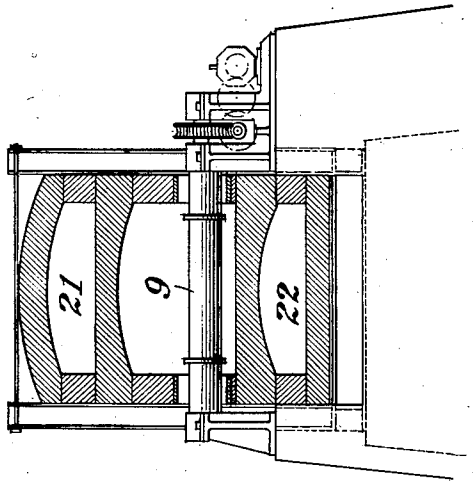
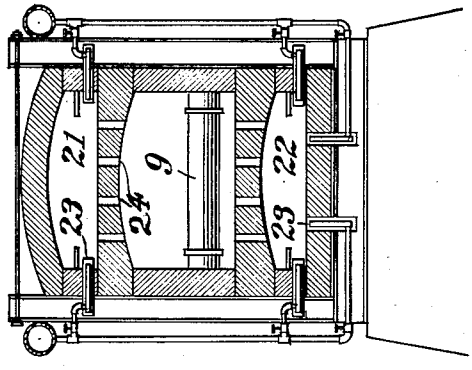


Fig. 7



Witnesses:

Inventors
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UNITED STATES PATENT OFFICE.

ROY A. LEWIS AND WILLIAM J. THOMAS, OF BETHLEHEM, PENNSYLVANIA, ASSIGNORS TO BETHLEHEM STEEL COMPANY, OF SOUTH BETHLEHEM, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR TREATING STEEL RAILS.

1,285,750. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed May 15, 1915. Serial No. 28,283.

To all whom it may concern:

Be it known that we, ROY A. LEWIS and WILLIAM J. THOMAS, both citizens of the United States, and residents of Bethlehem, Northampton county, Pennsylvania, have jointly invented new and useful Improvements in Apparatus for Treating Steel Rails, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan of apparatus, partly broken away, showing an embodiment of our invention; Fig. 2 is an elevation of a portion thereof, partly in section, on lines II—II of Fig. 1; Fig. 3 is a detail plan of the receiving end of the heating furnace, partly in section; Fig. 4 is a section on lines IV—IV of Fig. 3, partly in elevation; Fig. 5 is a section on lines V—V of Fig. 1, and shows mechanism for cooling rails; Fig. 6 is an end elevation of apparatus for transferring the rails from the cooling table to the heating furnace; Fig. 7 is a section on lines VII—VII of Fig. 4; Fig. 8 is a section on lines VIII—VIII of Fig. 4; Fig. 9 is a section on lines IX—IX of Fig. 4, and Fig. 10 is an elevation, partly in section, of the cooling apparatus used in connection with the bath between the heating furnaces.

Our invention relates to apparatus for treating rails and consists particularly in providing mechanism by which the rails may be taken as they come from the last forming operation and be passed endwise through a longitudinally-extending furnace or furnaces in large batches, so that the rails may be heat treated commercially on a large scale. Our invention also consists in the construction, arrangement and coöperation of parts which we shall hereinafter describe and claim.

Referring to the drawings, A indicates a conveying table which transfers the rails from the hot saw (not shown); B a cooling table; C the transfer mechanism from the cooling table to the heating furnace D; E indicates a bath of oil or other cooling liquid; F an annealing furnace, and G a table by which the rails may be conveyed away to a cooling bed or other suitable place for storage.

The rail, as it comes from the finishing rolls, rests on its head and one of its flanges, and is advanced by the conveying table A until it is opposite the cooling table B. It is then skidded sidewise by the channel 2 along the skid rails 3, but before it enters the cooling chamber B, it is turned over upon its base by the lever arm 4, as is shown in Fig. 5, and the rail is then advanced within the cooling chamber B, in which the rails are sprayed with air from the spraying element *b* to reduce their temperature below the critical or calescence point. When the rails have been sufficiently cooled the table C is run under the skid rails 3 and its supporting frame 5 is lifted by means of the worm gears 6 and cams 7, so that the rails farthest advanced in the cooling chamber B will be lifted and supported by the rollers 8 on the transfer table C. The table C is then returned to its initial position in line with the mouth of the furnace D, and the rollers 8 are actuated in a forward direction at a comparatively high speed, and thus advance the cooled rails rapidly into the mouth of the furnace D.

The furnace D has three sets of rollers 9 and 10, 10′, arranged with their axes at right angles to the length of the furnace, one set—the rollers 9—being arranged to travel at a slow rate of speed, and the other two sets—the rollers 10, 10′—being arranged to travel at a highter rate of speed. The rollers 10 are arranged at the receiving end of the furnace, the rollers 10′ are arranged at the discharge end of the furnace, and the rollers 9 are arranged at equal distances throughout the length of the furnace. The rollers 10 and 10′ are mounted on frames 11, 11′, adapted to be lifted by worm and cam gears 12, 12′, so that, as the rails enter the furnace, they are moved rapidly along by the rollers 10, and when the rails have advanced completely into the furnace the worm and cam gears 12 lower the frame, and the rails will come into contact with and will be advanced by the rollers 9. The travel of the rollers 9 is so timed that the rails will remain in the furnace for a considerable period of time, preferably between forty-five minutes and an hour, and the furnaces may be of any desired length, depending on the rapidity with which it is desired to turn out the product.

As the rails approach the discharge end of the furnace D, the operation of the gears 12′ is so timed that they will elevate the

frame 11′ and with it the rollers 10′ thereby lifting the rails from the rollers 9 and accelerating their discharge from the furnace on to a table 13 suspended from a traveling crane 14 which operates on a track 15, by which the table 13 bearing the rails is lowered rapidly into a bath of oil or other cooling medium, in which it is preferred the rails shall remain from three to four minutes. The rails are carried down through the bath E by the table 13 and up into alinement with the receiving end of an annealing furnace F.

The rails are then advanced into the annealing furnace F, which is of the same character and construction as the furnace D, at a rapid rate by the rollers 16, are taken up by the slower moving rollers 17 and, when they have reached the discharge end of the furnace after a period which is preferably from forty-five minutes to an hour, they are again discharged rapidly from the furnace by the rollers 16′ on to a conveying table G, and are carried away by suitable mechanisms, such as skids 18, to suitable cooling beds or other storage places.

We have shown in Figs. 1 and 10 a cooling tank 19, into which the oil from the bath E is pumped, passed over baffles 20, air cooled and returned to the bath, so as to prevent the temperature of the bath from being raised above the flash point of the oil. As is shown in Figs. 7, 8, and 9, each furnace is heated by two longitudinally extending heating chambers 21, 22, into which the heating medium is admitted through the burners 23 and the heat circulates into furnace through the ports 24.

By constructing the furnace of a length of approximately between 100 and 500 feet we are enable to treat a number of batches of rails in a furnace at one time, thus enabling the treatment to be carried on commercially on a large scale. We are also able to produce a uniform product since uniform heating of the rails is accomplished. In heating furnaces of the usual type the product rests on skid bars which cause cold or unequally heated spots on the article and results in defects therein. In treating rails in the type of furnace described above, the rail is heated uniformly and no such spots can occur as the rail is not supported at any one particular spot since the rolls feed it forward and permit its base to be heated uniformly as well as its other parts.

The rolls 9 and 17 employed in the furnaces D and F, are preferably comprised of refractory shells, composed of asbestos, carborundum or other suitable refractory material, mounted on water cooled metal cores. The shells insulate the cores from the heat of the furnace and prevent undue heating of the cores and at the same time the surfaces of the rolls as they are insulated by the refractory material of the shells, are not affected to any appreciable extent by the cooling liquid in the cores. The rolls 10, 10′ and 16, 16′ at the ends of the furnaces D and F are preferably water cooled metal rolls of the usual character.

The terms and expressions which we have employed are used as terms of description and not of limitation, and we have no intention in the use of such terms and expressions of excluding any mechanical equivalent for the features shown and described, but recognize that various structural modifications are possible within the scope of the invention claimed.

What we claim is:

1. In apparatus for treating rails, a heating furnace having a longitudinally-extending heating chamber adapted to contain wholly and at one time a plurality of batches of rails, the rails of each batch being arranged endwise of the rails of the other batches, means for feeding a plurality of batches of rails through the furnace, the rails of each batch being maintained in parallel and the batches in succession, said means consisting of a set of rollers arranged transversely of the furnace for constantly advancing the batches of rails successively through the heating chamber in the direction of its length and each roller having only a momentary and shifting contact with each rail, and a set of rollers arranged at the receiving end of the furnace, the second mentioned set of rollers being rotated at a higher rate of speed than the first mentioned set, the second mentioned set of rollers being capable of assuming a receiving and a discharging position, the receiving position being above the position of the first-mentioned set of rollers, and the discharging position being on substantially the same level as the level of the first-mentioned set of rollers, whereby the speed of each batch of rails is accelerated as it enters the furnace and is transferred to the slower moving set of rollers after it enters the furnace.

2. In apparatus for treating rails, a heating furnace having a longitudinally-extending heating chamber adapted to contain a plurality of batches of rails, the rails of each batch being arranged endwise of the rails of the other batches, a set of rapidly driven rollers, arranged to advance each batch of rails at a rapid rate into said chamber, a second set of rollers driven at a slower rate than the first-mentioned set arranged at intervals throughout the chamber, and a third set of rollers being arranged to advance each batch of rails at a rapid rate out of the said chamber, the second-mentioned set of rollers being adapted to advance each batch of rails at a slower rate through the intermediate part of the chamber, the first and third mentioned sets of rollers being ar-

ranged to occupy an elevated position when advancing the batches of rails into or discharging them from the chamber, and occupying a depressed position when out of engagement with the batches of rails.

3. In apparatus for treating rails, a heating furnace having a longitudinally-extending heating chamber adapted to contain a plurality of batches of rails arranged endwise to each other, a set of rollers for advancing the rails through the furnace, other sets of rollers at the receiving and discharging ends of the furnace, the second-mentioned rollers being movable vertically to deposit the rails upon and lift the rails from, respectively, the first-mentioned set of rollers.

4. In apparatus for treating rails, a heating furnace having a longitudinally-extending heating chamber adapted to contain a plurality of batches of rails, the rails of each batch being aranged endwise of the rails of the other batches, means within the furnace for moving the batches of rails successively through the furnace, said means consisting of a set of driven rollers arranged at intervals throughout the furnace to support and move the rails lengthwise of the furnace, and another set of rollers actuated independently of the first set, arranged at one end of the furnace and adapted to advance the rails at a more rapid rate of travel than when on the first-mentioned set, said second mentioned set of rollers being arranged to occupy two positions, one above and the other at least as low as the first mentioned set.

5. In apparatus for treating rails, a heating furnace having a longitudinally-extending heating chamber adapted to contain a plurality of batches of rails arranged endwise to each other, a plurality of sets of independently-actuated rollers arranged within the furnace adapted to support and advance a plurality of batches of rails, the rails of each batch being arranged in parallel longitudinally of the furnace and the batches in succession therein, one of said sets of rollers being adapted to advance the rails through the intermediate portion of the furnace, a second set of rollers adapted to advance the rails into the furnace at a more rapid rate of travel than the rate of travel of the first-mentioned set, and a third set of rollers adapted to discharge the rails from the furnace at a more rapid rate of travel than the rate of travel of the first-mentioned set, the second and third sets of rollers being capable of supporting the batches of rails above the first mentioned set and of depositing them upon and elevating them from, respectively, the first mentioned set.

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