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END HARDENING OF RAILS

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3 Sheets-Sheet 2

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This invention relates generally to apparatus for heat treating rails and more particularly to apparatus for heat treating the ends of the tread surfaces of rails.

During service in railway tracks, the ends of the rail tread surfaces are subjected to a greater amount of wear than the remainder of the tread surfaces due to the impact of the rolling stock in passing over the joint from one end of one rail onto the end of an adjacent rail.

We are aware that the tread surfaces at the ends of rails have been hardened by locally heating only the portion to be hardened to a temperature at or above the critical range by means of a high temperature heating flame or electrically by induction or by passing an electric arc over the surface portion to be hardened and then quenching the heated portion by a liquid or air quench.

This is usually accomplished by heating the tread portion at each end of the rail separately to a high temperature in a single operation and then quenching each end separately.

Among such methods is that commonly known as "flame hardening" wherein the upper surface of the rail end is rapidly heated in one operation by means of an oxyacetylene flame or the like and then quenched in air or water. This treatment produces a hard case upon the upper surface of the rail without affecting the toughness and shock-resisting ability of the core. The rapid heating of a cold rail followed by the quenching of a small area of the rail head tends to promote cracking of the treated portion. It is also extremely difficult to produce uniform results by said method. Heating by means of the oxyacetylene torch is an extremely rapid operation and accordingly small variations in the length of heating will produce appreciable variations in the depth of penetration of the heat, with corresponding variations in the depth of the finished case. The quenching operation is likewise difficult since small variations in the duration of the quench operation will produce appreciable variations in the hardness of the case. Accordingly, uniformity of results in flame hardening as above described can be obtained only with difficulty.

We have found that by slowly preheating the end of the cold rail and then subjecting it to a high flame prior to locally hardening the heated surface of the rail head lessens the tendency of the rail to crack as a result of the local application of the intense heat of the torch followed by the quenching of the heated portion.

The end tread surfaces of rails have been hardened by first heating the rails in a furnace and when discharged therefrom the end tread portions have been quenched.

Rail ends have also been surface hardened after being laid in the track but such a procedure usually necessitates the use of a wheeled carriage adapted to roll along the track, and having a considerable amount of apparatus mounted thereon for accomplishing the heating and quenching operation. Much time is consumed in rolling the carriage up and down the track, in adjusting the apparatus for each particular joint, and in removing the apparatus from the track upon the approach and passage of a train or other equipment using the track.

One object of this invention is to provide apparatus adapted to heat treat the ends of rails prior to their installation in the track, and more particularly at a place at which a considerable number of such rails are stored such as on storage beds or the like at steel mills.

Another object of this invention relates to advancing a plurality of rails laterally in a step by step movement and subjecting the end tread surface of each rail to a plurality of preheat burners, then to a high heat burner where the temperature is raised to a point above the critical range, then quenching the heated ends of each rail to a point below the critical range and then advancing the rails to a cooling bed for air cooling.

Another object of this invention relates to advancing a plurality of rails laterally intermittently in a step by step movement and subjecting the end tread surface of each rail to a plurality of preheat burners, then to a high heat burner where the temperature is raised to at least 1450° F, then to a high heat burner where the temperature is raised to at least 1000° F, then subjecting the heated portion of each rail to an air blast to quench it to 300° F and finally advancing the rails to a cooling bed for air cooling.

Another object of the invention relates to initially taking cold rails advancing a plurality of the rails laterally intermittently in a step by step
movement and subjecting both ends of the tread surfaces of each rail simultaneously to a plurality of preheater burners to slowly raise the temperature to substantially 1000° F., then to a high heat burner where the temperature is raised to at least 1450° F. or to a hardening temperature, then subjecting both heat end portions of each rail to an air blast to quench the ends of the rails to substantially 900° F. and finally advancing the rails to a cooling bed for air cooling.

The usual rail work normally requires only the application of an air quench in order to produce the desired hardness and this invention will be explained with reference to air quenching, but it will be understood that liquid cooling might be employed without departing from the spirit of our invention.

Some rail steels have a critical temperature of about 1350° F., but this may vary somewhat with different steels and steel alloys. We have found that 1450° F. is desirable for our purpose, although in some cases it may be desirable to raise the temperature as high as 1500° F. before quenching for hardening and we do not limit the heating to 1450° F. as it may be slightly greater or less without departing from the spirit of our invention.

Other objects of the invention are to provide apparatus for rapidly effecting and uniformly heat treating surfaces of metal bodies and more particularly the tread ends of rails; to provide such apparatus which is adapted to be utilized in heat treating both ends of a plurality of rails simultaneously with a minimum of time and effort; to provide such apparatus which need be adjusted only for the first of a plurality of similar rails; to provide such apparatus which will be simple and economical in operation; and to provide such apparatus which is substantially automatic in operation.

With the foregoing and other purposes in view which will become more fully apparent as the nature of the invention is more fully described, this invention consists in the novel features of construction and arrangement which will be hereinafter more fully described and illustrated in the accompanying drawings and defined in the appended claims.

Referring now to the eight sheets of drawings forming a part of this specification in which like characters of reference indicate like parts.

Fig. 1 is a perspective view of an apparatus for heat treating one end of a plurality of rails embodying our invention.

Fig. 2 is a perspective view of an apparatus similar to Fig. 1 for simultaneously heat treating the opposite ends of the same plurality of rails.

Fig. 3 is a top plan view of the general arrangement of the end hardening equipment shown in Fig. 2.

Fig. 4 is a vertical transverse section taken on the line 4—4 of Fig. 3, and showing the relative position of the shock absorbing device in dotted lines.

Fig. 5 is a detail view drawn on a larger scale of one of the high heat "Selas" burners and the general arrangement of support therefor showing parts in section to more clearly show the construction.

Fig. 6 is a detail view drawn on a larger scale of one of the air quench devices and the general arrangement of the air quench support with parts in section.

Fig. 7 is a detail section taken on the line 1—7 of Fig. 8, showing the general arrangement of one of the shock absorbers in the act of turning one of the rails after they have been advanced down a skirt from the drilling machines to the reciprocating slide bar having dogs pivoted thereto.

Fig. 8 is a top plan view of a portion of the shock absorber shown in Fig. 7.

Fig. 9 is a top plan view of one of the shock absorbers showing its connection to one of the slides carrying the dogs.

Fig. 10 is a section through one of the slides carrying the dogs taken on the line 10—10 of Fig. 11 showing how the pivoted dogs pass under the rails during the return stroke of the slide, and Fig. 11 is a transverse section through one of the slides taken on the line 11—11 of Fig. 10.

In the manufacture of rails, after the rolling operation the rails are hot-sawed into lengths, they are then cooled on a cooling bed. After the rails are cooled on the cooling bed both ends of the rails are treated simultaneously by duplicate machines.

The rails are first advanced sidewise to a pair of milling machines for removing the burr from the ends of the rails caused by hot sawing, then advanced to the drilling machines and holes drilled in the web of the rails adjacent to each rail. These operations are well known in this art.

Referring now to the characters of reference on the drawings, the numeral 1 indicates the skid upon which the rails 2 are received after the drilling operation and upon which they are advanced downwardly by gravity to a pair of shock-absorbing devices 3 which feed the rails to the apparatus for heat treating. Both ends of the rails are heat treated simultaneously by duplicate apparatus and a detailed description of one will apply to both. The shock absorbing devices 3 are disposed between the heat treating apparatus and adjacent thereto as indicated in Fig. 9, the construction of which is more clearly shown in Figs. 7 and 8. The shock absorbing devices 3 are each mounted in frame 4, adapted to form a part of the skid 1, which is supported at an intermediate point near one end by means of a pin 5 on a bearing 6 and at the other end by means of a post 7 which is pivoted at the upper end to frame 4 by means of a pin 9 and pivoted at the lower end to bracket 8 as at 10.

The shock absorbing devices are each provided with a rocking lever 11 having a hub 12 at an intermediate point for receiving a shaft 13 which has its ends supported in the frame 4. Spaced side plates 14 are attached at their upper ends by means of shafts 16 and 16 for supporting the operating mechanism for the rocking lever 11.

The rocking lever 11 is resiliently held at one end which is attached thereto by means of a pin 17 to the clevis end 18 of a bolt 19. The shank 20 of the bolt 19 is provided near its upper end with a washer 21 having trunnion projections 22 pivoted at 23 in the spaced side plates 14. The lower end of the shank 20 is provided with a washer 24 and interposed between the washers 21 and 24 is a helical spring 25. The lower end of the bolt is threaded to receive nuts 26 to give greater or less tension to the spring 25.

The opposite end of the rocking lever 11 to that resiliently held is provided with an abutment shoulder 27 adapted to engage and support the base of the rails 2 during the manipulation of them through an arc of substantially 90° thereby turning the webs of the rails from a
horizontal to a vertical position. Pivotally attached to the rocking lever 11 as at 20 adjacent to the abutment shoulder 21 is a clevis member 23 controllably connected at 30 to a piston rod 31 working in a fluid pressure cylinder 32 pivoted at its lower end by means of a pin 35 to the lower ends of the two slide plates 14. This fluid pressure cylinder acts as a dash pot and is supplied with liquid such as oil or the like from a reservoir or tank 34 which is connected to the upper end of the cylinder by means of a pipe 35. When the liquid in the cylinder is compressed it flows through the connection 36 at the lower end of the cylinder through check valve 37 and pipe 38 and is returned to the reservoir and the top end of the cylinder.

A shaft 39 is also mounted in the frame 4 of each of the shock absorbers 3 adjacent to the shaft 13 and has mounted thereon, at one end a cam plate 40 to which the bifurcated end 41 of a connecting rod 42 is pivoted as at 43. The opposite end of this connecting rod 42 is also bifurcated and is pivoted by means of a pin 44 to a crank arm 45 which is mounted at an intermediate point on the shock absorber 3 which is mounted in bearings 47. As it is sometimes necessary to adjust the length of the connecting rod 42 the central portion is provided with a sleeve nut 48.

A crank arm 49 is keyed to each end of the rocking shaft 46 each having their outer ends pivoted as at 50 to one end of a pinion rod 51 which have their opposite ends connected to one of the slide bars 52 which are reciprocated in slideways 53 by means of pressure cylinder 54, and form means for conveying the rails interminably. The slideways 53 are formed of two rails spaced apart forming a table for receiving the rails between which the slide bar 52 is adapted to reciprocate and are mounted by means of brackets 55 on a truck frame 56 provided with rollers 57 engaging rails 58 mounted in a base frame 59 whereon the truck may be adjusted for different lengths of rails. The reciprocating slide bars 52 have side walls 60 connected by vertical transversely extending ribs 61 and a bottom wall 62 with openings 63 therein each adapted to normal or slightly elongated and in the case of one of the rails 58 which is pivoted on a shaft 64 supported by the side walls 60. Each dog is provided with a toe 67 adapted to engage during the forward stroke of the slide bar 52 the base flanges of the rails under heat treatment and to advance all the said rails one step and on the return movement of the slide bar 52 to rotate and slide under the base flanges of the rails 2 as indicated in Fig. 10.

The fluid pressure cylinder 54 for actuating the slide bar is mounted on the truck frame 56 and has the outer end of the piston rod 65 working therein pivotally connected at 69 to an ear 70 extending downwardly from the bottom wall 62 of the slide bar 52. As the toe 67 of the dogs 66 have to clear the base flanges of the rails 2 under heat treatment, the reciprocating stroke of the slide bar has to be slightly greater than the step movement of the rails 2 treated so that at the end of the return stroke of the slide bar the toe 67 of the dogs will be spaced from the edges of the base flanges of the rails 2 as clearly shown in Figs. 1 and 2. As it is necessary to limit the forward stroke of the slide bar 52 the piston rod 65 is provided with a stop 71 pivotally connected at 72 to the truck frame 56 adapted to engage the shoulder 73 on the inner face of the rear end of the slide bar. It is sometimes necessary to release the toes 75 of the dogs 66 from the base flanges of the rails or to back the slide bars 52 slightly and for this purpose a push type solenoid 73 is mounted on the bottom of the rear end of the said slide bar with its magnet 74 pivotally connected by means of a link 75 to the weighted end 64 of the rear end 66.

The rails 2 are advanced sidewise in a step by step movement at minute and one-half intervals during each reciprocation of the slide bars 52 and both ends of the rails are heat treated simultaneously. For illustration the ends of six rails are shown being treated but this number could be varied, without departing from the spirit of our invention. As shown the rails are first advanced to four "Selas" preheater burners 75 each connected to a branch pipe 77 of a main fuel supply pipe 78 which has adjustable supports 79. The branch pipes 77 are each provided with a valve 80 for controlling the supply of gas for each of the "Selas" preheater burners. During the preheating operation the temperature of the top end of the rails are raised to substantially 1000°F. The forward rail is then advanced to the high heat "Selas" burner 81 whereafter the temperature of the rails at the ends of the rail are raised substantially 1450°F. The rail is then advanced to the air nozzles 82 for the air quench. After it is air quenched the temperature at the ends of the rail is reduced to substantially 900° F., after which it is advanced a a slight way where the rail is deposited on a cooling bed (not shown) for final air cooling. As shown in Fig. 5, the high heat "Selas" burner 81 is adjustable mounted in a support 84 and is provided with a gas supply pipe 85 and is water cooled having inlet and outlet pipes 86 and 87 respectively.

The outlet pipe 87 discharges into an overflow pipe 88.

The support 84 has its lower bearing surface 89 slidably and resiliently mounted in a base plate 90 having at its outer end an upwardly extending flange 91 for receiving an adjustable bolt 92 which is threaded as at 93 at its outer end to receive nuts 94.

The base portion of the support 84 is recessed as at 95 and is provided at an intermediate point with a downwardly extending flange 96 which is perforated at 97 for the passage of the bolt 92 to pass through. A spring 98 is mounted on the bolt 92 interposed between the flanges 91 and 96 having its ends engaging washers 99 and 100. An adjustable gage arm 101 is secured to the lower portion of the base portion of the support 84 by means of set bolts 102 and is provided with a cylindrical threaded portion 103 at one end extending through a hole 104 in the flange 96 and is clamped thereto for adjustment by means of nuts 105. The opposite end of the gage arm 101 is provided with a rotating gage wheel 106 for engaging the ends of the rails 2. The gage wheel 106 is attached to the end of the gage arm 101 by means of a bolt 107 and has an asbestos board 108 of disk shape mounted thereon to protect it from the flame of the high heat burner 81.

The support 109 for the air nozzle 82 shown in detail in Fig. 6 is similar to that for the high heat "Selas" burner 81 shown in Fig. 5.

The air nozzle 82 is slidably mounted in a support 109 and is provided with an air supply pipe 110 controlled by a solenoid operated valve 111. The support 109 has its lower bearing surface 112 slidably and resiliently mounted in a base plate 113 having at its upper end an upwardly extend-
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The operation above described is repeated at minute and one-half intervals for each step by step movement of the rails during the heat treating operation. After leaving the "Selsa" preheater burner ends of the track for each rail the temperature is raised to 1000° F. The high heat "Selsa" burner then raises the temperature to substantially 1450° F. and the air quench of the nozzles 82 then reduces the temperature to substantially 900° F. The rails are then conveyed to a cooling bed and air cooled.

Although we have described and illustrated our invention in considerable detail, this should not be construed to be limited to the exact and specific details thereof, as shown and described, but may use such modifications in substitutions for, or equivalents thereof, as are embraced within the scope of our invention, or as are pointed out in the claims.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. Apparatus for heat treating the tread surfaces at the ends of a plurality of rails arranged side by side in spaced relation and adapted to be advanced side by side with their ends in parallel alignment, a table for receiving the rails, preheating devices and quenching nozzles mounted adjacent to and above the ends of a plurality of the rails, said heat treating devices including preheater burners for preheating both ends of a plurality of rails simultaneously, high heat burners for completing the heat operation, quenching nozzles for directing a cooling medium against the heated surfaces after the heat treating operation, reciprocating slide bars having dogs pivoted thereto for engaging the rails, and fluid pressure means for intermittently reciprocating the slide bars for advancing the plurality of rails in step by step movements in succession during the heat treating and quenching operations.

2. Apparatus for heat treating the tread surfaces at the ends of a plurality of rails in succession, a table for receiving the rails, reciprocating slide bars having dogs pivoted thereto for engaging the rails and for advancing the rails side by side on the table in step by step movements with their webs vertically disposed and their ends in transverse alignment, a preheater burner mounted directly above the tread surfaces of the end of each plurality of rails, fluid pressure means for reciprocating the slide bars for advancing the rails after the preheating operation to a high heat burner, said reciprocating slide bars advancing each rail after the heating operation and subjecting the rail to an initial quenching operation, and finally for advancing the rail after the initial quenching operation for air cooling.

3. Apparatus for heat treating the tread surfaces at the ends of a plurality of rails in succession, a table for receiving the rails, reciprocating slide bars having dogs pivoted thereto for engaging the rails and for advancing the rails side by side on the table in step by step movements with their ends in transverse alignment, burners for preheating the end surface of each plurality of rails simultaneously, a high heat burner for completing the heat operation, fluid pressure means for reciprocating the slide bars for advancing the rails on a nozzle for directing a cooling medium against the heated surface after the heat operation, and finally for advancing the rail for air cooling.

4. Apparatus for heat treating the tread surfaces at both ends of a plurality of rails in succession, a table for receiving the rails, recipro-
gating slide bars having dogs pivoted thereto for engaging the rails and for advancing the rails sidewise on the table in step by step movements with their webs vertically disposed and their ends in transverse alignment, heat treating devices and quenching nozzles mounted adjacent to and above the ends of a plurality of the rails, said heat treating devices comprising a preheater burner mounted directly above the tread surfaces of the ends of each of a plurality of the rails, fluid pressure means for reciprocating the slide bars for advancing the rails after the preheating operation to a high heat burner, then for advancing each rail and subjecting both ends of the rail to an initial quenching operation, and finally for advancing the rail after the initial quenching operation for air cooling.

5. Apparatus for heating the tread surfaces at both ends of a plurality of rails in succession, a table for receiving the rails, reciprocating slide bars having dogs pivoted thereto for engaging the rails and for advancing the rails sidewise on the table in step by step movements with their ends in transverse alignment, heat treating devices and quenching nozzles mounted adjacent to and above the ends of a plurality of the rails, said heat treating devices comprising burners for preheating both ends of each of the rails on the table for completing the heating operation, then for advancing the rail to nozzles for directing a cooling medium against the heated surfaces after the heating operation, and finally for advancing the rail for air cooling.

6. Apparatus for heat treating the ends of a plurality of rails arranged side by side in parallel alignment, a skid upon which the rails are received on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid for limiting the forward movement of the rails, a table for receiving the rails from the skid, fluid pressure means for actuating the shock absorbing devices for transferring the rails in succession from the skid to the table, heat treating apparatus mounted above and adjacent to both ends of each of the rails on the table, and reciprocating slide bars having dogs pivoted thereto and engaging the rails for simultaneously advancing the rails on the table in step by step movements during the heat treating operations.

7. Apparatus for heat treating simultaneously the end tread portions of a plurality of rails arranged side by side parallel to each other with their ends in transverse alignment, a skid upon which the rails are received on their sides and fed forward sidewise by gravity, a table for receiving the rails from the skid, shock absorbing devices disposed adjacent to the lower ends of the skid for normally limiting the forward movement of the rails and to rotate the rails 90° and transfer them from the skid to the table, fluid pressure means for actuating the shock absorbing devices, reciprocating slide bars having dogs pivoted thereto and engaging the rails for advancing the rails on the table in step by step movements, preheater burners for preheating both ends of the tread surfaces of a plurality of rails simultaneously, fluid pressure means for reciprocating the slide bars for advancing the rails after preheating to a high heat burner disposed above and adjacent to each end of the rail for completing the heating operation, then for advancing the rail to air nozzles for directing a jet of air against the heated surfaces of the rails for the heating operation, and finally for advancing the rail for air cooling.

8. Apparatus for heat treating the tread surfaces of both ends of a plurality of rails simultaneously in succession, a table for receiving the rails seated on their base flanges with their webs vertically disposed and their ends in transverse alignment, reciprocating slide bars having dogs pivoted thereto each adapted to engage a base flange of one of the rails, fluid pressure means for reciprocating the slide bars for advancing the rails sidewise on the table in step by step movements, a preheater burner mounted directly above the tread surfaces of the ends of a plurality of the rails for initially heating the ends of each rail in succession, said reciprocating slide bars advancing a rail after the preheating operation to a high heat burner mounted above the tread surface of the ends of a rail, and then for advancing the heated rail and subjecting the heated portion of the rail to an initial quenching operation, and finally advancing the rail after the initial quenching operation for air cooling.

9. Apparatus for heat treating the tread surfaces of both ends of a plurality of rails simultaneously in succession, a table for receiving the rails seated on their base flanges with their webs vertically disposed and their ends in transverse alignment, heat treating devices and quenching nozzles mounted adjacent to and above the ends of a plurality of the rails, said heat treating devices comprising a preheater burner mounted directly above the tread surfaces of both ends of each of a plurality of rails for initially heating the tread surface of the ends of each rail in succession, a high heat burner for completing the heating operation, for each rail, nozzles for directing a jet of air upon the heated ends of the rails, reciprocating slide bars having dogs pivoted thereto each provided with a toe adapted to engage a base flange of one of the rails, and fluid pressure means for reciprocating the slide bars for advancing the rails sidewise on the table in step by step movements during the heat treating and quenching operations.

10. Apparatus for heat treating the tread surfaces of both ends of a plurality of rails simultaneously in succession, said rails arranged side by side in spaced relation with their ends in
transverse alignment, a table for receiving the rails, heat treating devices mounted above and adjacent to both ends of the rails, said heat treating devices including a preheater burner disposed at each end of a plurality of rails, a high heat burner at both ends of the rail for completing the heat treating operation, nozzles for directing a jet of air on the heated ends of each rail for initially quenching the heated ends of the rails, slide bars having dogs pivoted thereto, each adapted to engage one of the rails, and fluid pressure means for reciprocating the slide bars for advancing the rails on the table in step by step movements for each heat treating operation and for final air cooling.

12. Apparatus for heat treating both ends of a plurality of rails arranged side by side in parallel alignment with their ends in transverse alignment, a table for receiving the rails, a skid upon which the rails are received on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid for limiting the forward movement of the rails, slide bars having dogs pivoted thereto each adapted to engage a rail on the table, heat treating devices mounted above and adjacent to both ends of the rails on the table, and fluid pressure means for reciprocating the slide bars to advance the rails in step by step movements for the heat treating operation and for actuating the shock absorbing devices for simultaneously transferring the rails in succession to the table.

13. Apparatus for heat treating simultaneously the end tread portions of a plurality of rails arranged side by side parallel to each other with their ends in transverse alignment, a skid upon which the rails are received on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid each having a stop and a rocking lever with an abutment shoulder for engaging the base of the rails to limit their forward movement on the skid, a cam plate carried by each shock absorber adapted to rotate for one end to engage the side of a rail and depress the abutment shoulder and turn the rail 90°, a table for receiving the rails from the skid transferred by the shock absorbers in succession, heat treating apparatus mounted above and adjacent to both ends of each of the rails on the table, slide bars mounted on the table having dogs pivoted thereto, each adapted to engage a rail on the table for simultaneously advancing the rails on the table in step by step movements during the heat treating operations, and fluid pressure means for reciprocating the slide bars and actuating the shock absorbing devices simultaneously.

14. Apparatus for heat treating simultaneously the end tread portions of a plurality of rails arranged side by side parallel to each other with their ends in transverse alignment, a skid upon which the rails are received on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid each having a stop and a rocking lever with an abutment shoulder for engaging the base of the rails to limit their forward movement on the skid, fluid pressure means attached to the opposite end of the rocking lever, a cam plate carried by each shock absorber adapted to rotate for one end to engage the side of a rail and depress the abutment shoulder and actuate the fluid pressure retarding means attached to that end of the rocking lever thereby turning the rail 90°, said resilient tension means attached to the abutment shoulder to its normal position after the turning operation, a table for receiving the rails from the skid transferred by the shock absorbers in succession, heat treating apparatus mounted above and adjacent to both ends of each of the rails on the table, slide bars having dogs pivoted thereto each adapted to engage a rail on the table for simultaneously advancing the rails on the table in step by step movements during the heat treating operation, a connection between the slide bars and the cam plate, and fluid pressure means for reciprocating the slide bars and actuating the shock absorbing devices simultaneously.

15. Apparatus for heat treating the tread surfaces at both ends of a plurality of rails arranged side by side in spaced relation and adapted to be advanced sidewise with their ends in parallel alignment, a table for receiving the rails, a burner at each end of a plurality of rails for preheating the ends tread surfaces, a high heat burner at the end of each rail for completing the heat treating operation, a nozzle at each end of the rail adapted to jet a chilling medium upon the heated surface, after the heating operation and reciprocating slide bars having dogs pivoted thereto for engaging the rails and for advancing the rails in step by step movements for each heat treating operation.

16. Apparatus for heat treating the tread surfaces at both ends simultaneously of a plurality of rails arranged side by side and adapted to be advanced sidewise with their ends in transverse parallel alignment, a table for receiving and supporting the rails, a burner at each end of a plurality of rails for preheating the end tread surfaces, a high heat burner at the end of each rail for completing the heating operation, a nozzle at each end of the rail adapted to jet a chilling medium upon the heated surfaces after the heating operations, slide bars mounted on the table having dogs adapted to engage a rail, and fluid pressure means for reciprocating the slide bars intermittently for the does to engage and advance the plurality of rails for each heat treating operation for each forward stroke of the slide bars.

17. Apparatus for heat treating the tread surfaces at the ends of a plurality of rails arranged side by side in spaced relation and adapted to be advanced sidewise parallel to each other with their ends in transverse alignment, a table for receiving the rails, heat treating and quenching nozzles mounted adjacent to and above the ends of the plurality of rails, said heat treating devices comprising burners for preheating both ends of a plurality of rails simultaneously in succession, high heat burners for completing the heating operation, quenching nozzles for directing a cooling medium against the heated tread surfaces at each end of the rails, slide bars having dogs pivoted thereto for simultaneously engaging the plurality of rails, and fluid pressure means for reciprocating the slide bars to intermittently advance the plurality of rails in step by step movements during the heat treating and quenching operations.

18. Apparatus for heat treating the ends of a plurality of rails arranged side by side parallel to each other with their ends in transverse alignment, a skid upon which the rails are received
on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid for limiting the forward movement of the rails, a table for receiving the rails from the skid, fluid pressure means for actuating the shock absorbing devices for transferring the rails in succession from the skid to the table, heat treating devices and quenching nozzles mounted above and adjacent to both ends of the rails, said heat treating devices comprising a preheater burner disposed at each end of a plurality of rails, a high heat burner at both ends of the rail for completing the heat treating operation, nozzles for directing a jet of air on the heated ends of each rail for initially quenching the heated ends of the rails, slide bars having dogs pivoted thereto each adapted to engage one of the rails, and fluid pressure means for reciprocating the slide bars for advancing the rails on the table in step by step movements for each heat treating and quenching operation and for final air cooling.

19. Apparatus for heat treating simultaneously the end treads portions of a plurality of rails arranged side by side parallel to each other with their ends in transverse alignment, a skid upon which the rails are received on their sides and fed forward laterally sidewise by gravity, shock absorbing devices disposed adjacent to the lower ends of the skid each having a stop and a rocking lever with an abutment shoulder for engaging the base of the rails to limit their forward movement on the skid, a cam plate carried by each shock absorber adapted to rotate for one end to engage the side of a rail and depress the abutment shoulder and turn the rail 90°, a table for receiving the rails from the skid transferred by the shock absorbers in succession, heat treating devices and quenching nozzles mounted above and adjacent to both ends of the rails, said heat treating devices including a preheater burner disposed at each end of a plurality of rails, a high heat burner at both ends of the rail for completing the heat treating operation, nozzles for directing a jet of air on the heated ends of each rail for initially quenching the heated ends of the rails, slide bars having dogs pivoted thereto each adapted to engage one of the rails, and fluid pressure means for reciprocating the slide bars for advancing the rails on the table in step by step movements for each heat treating and quenching operation and for actuating the shock absorbing devices simultaneously.

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