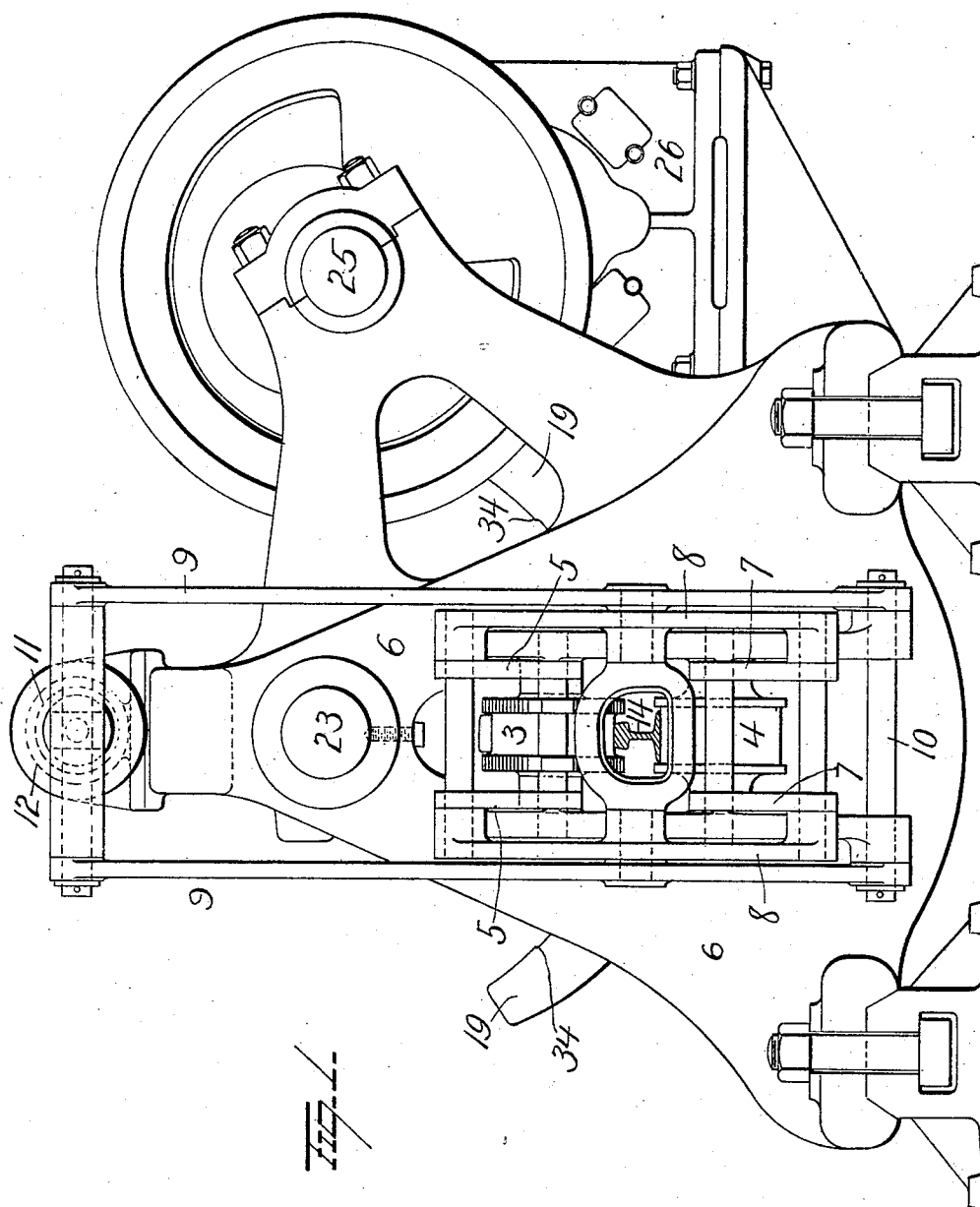


W. H. MORGAN.
 APPARATUS FOR MAKING RAILROAD TIES FROM STEEL RAILS.
 APPLICATION FILED OCT. 4, 1909. Patented Aug. 30, 1910.
 968,872. 4 SHEETS—SHEET 1.



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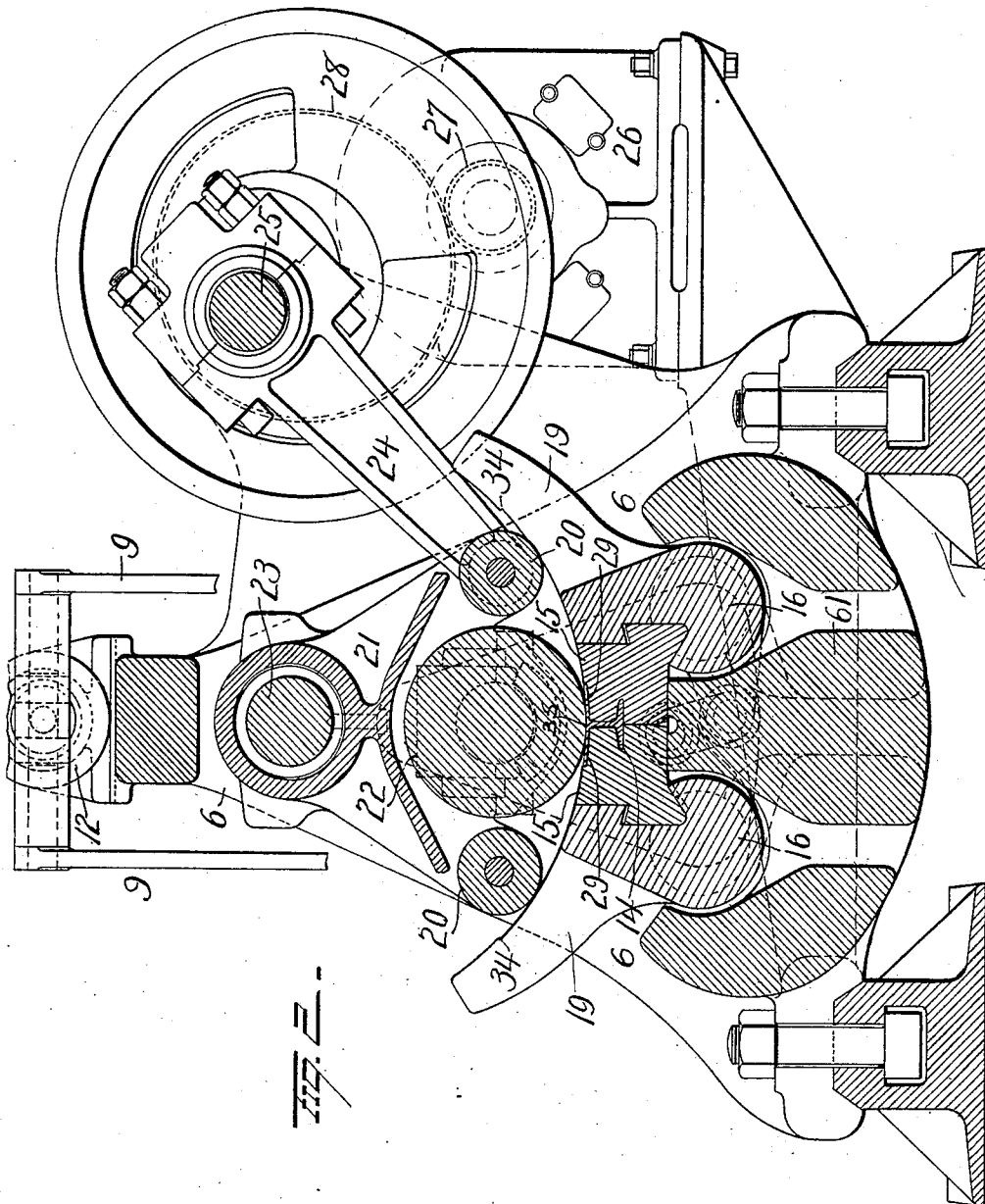
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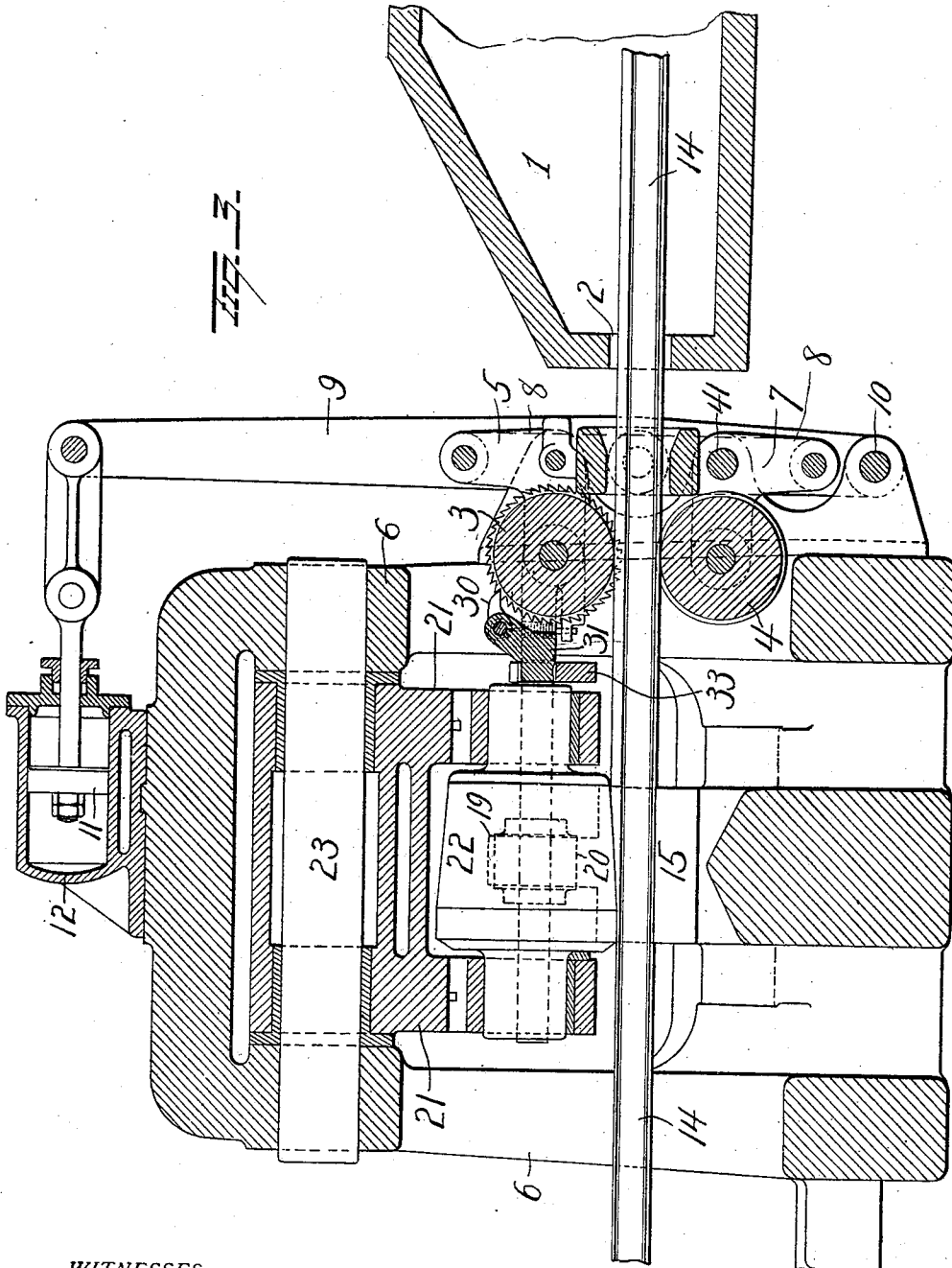
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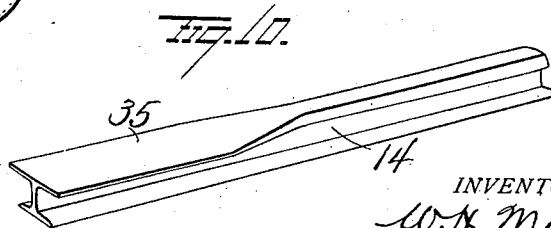
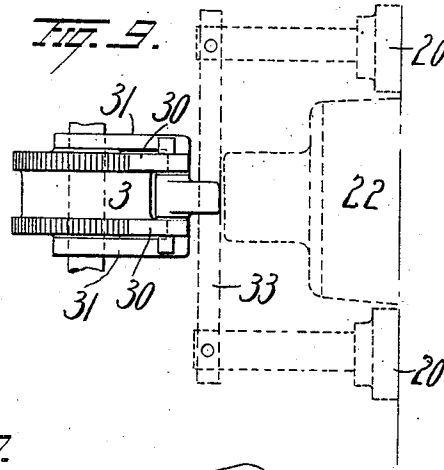
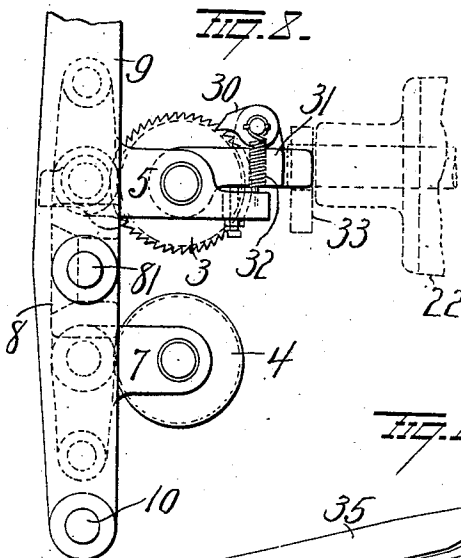
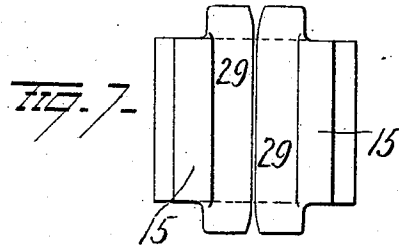
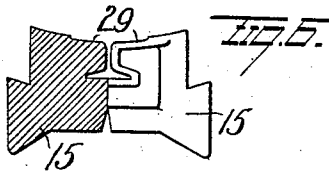
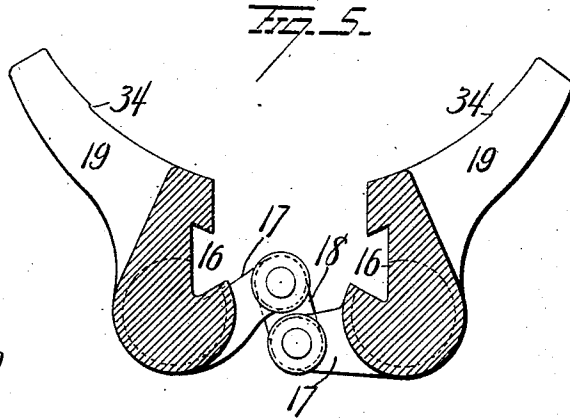
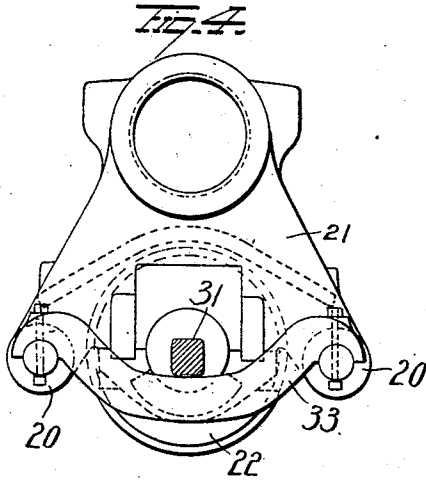
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4 SHEETS—SHEET 4



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING RAILROAD-TIES FROM STEEL RAILS.

968,872.

Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed October 4, 1909. Serial No. 520,857.

To all whom it may concern:

Be it known that I, WILLIAM H. MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Apparatus for Making Railroad-Ties from Steel Rails; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in apparatus for making railroad ties from steel rails, the object being to provide means for progressively withdrawing the rail section from a furnace and expanding the head of the rail laterally as it is withdrawn and while it is at a temperature for working, whereby the said rail head will be transformed into a wide flange which will constitute the base of the tie.

With this and other objects in view my invention consists broadly in heating a rail, and feeding it under an expanding device moving in a direction at right angles to the movement of the rail, whereby the head of the rail will be swaged or expanded laterally on both sides of the web.

My invention further consists in means for feeding the rail step by step forwardly under the swaging or expanding means, and means for clamping the rail while the expanding means are in contact with the rail.

My invention further consists in a movable frame carrying a swaging device adapted to laterally expand the head of a rail section, and rail feeding and clamping devices controlled and actuated by said movable frame.

My invention further consists in a furnace for heating the rail sections, means for transforming the head of the rail into a wide flange, means for progressively withdrawing the rail from the furnace and feeding it while hot to the transformer, and means for supporting the rail while the latter is being operated upon by the expanding tool.

My invention further consists in the parts and combination of parts as will be more fully explained and pointed out in the claims.

In the accompanying drawings; Figure 1 is a view in end elevation of my improved apparatus showing the rail in section. Fig. 2 is a view in transverse vertical section.

Fig. 3 is a view in longitudinal vertical section showing the rail being swaged, partly in the furnace. Fig. 4 is a view in side elevation of the expander carrier showing the double cam for actuating the feed rollers. Fig. 5 is a view in section of the die holders the dies being removed. Fig. 6 a view of the dies, one being shown in end elevation and the other in section. Fig. 7 is a plan view of the dies. Fig. 8 is a view in side elevation of the feed rolls and means for rotating the same. Fig. 9 is a plan view of same, and Fig. 10 is a view in perspective showing a rail partly expanded.

1 represents a furnace of any approved form, having an opening 2 in line with the feed rolls 3 and 4. The roll 3 is journaled at each side in a bell crank lever 5, mounted on fixed bearing carried by the housing 6, and roll 4 is likewise journaled at each side, as at 41, in a bell crank lever 7 mounted on a bearing carried by the housing 6. The two sets of bell crank levers 5 and 7, are pivotally connected to the ends of connecting members 8, as clearly shown in Fig. 1, each of which is pivotally mounted at its center 81, on a lever 9 fulcrumed on fixed bearing 10, the two levers 9 being connected at the opposite ends to the piston 11 of the hydraulic cylinder 12. As the piston is forced inwardly the bell cranks 5 and 7 will be turned on their bearings, thus forcing the feed wheels into contact with the rail section 14.

The upper roll 3 is positively actuated as will be hereinafter described, to feed the rail section 14 progressively, or step by step into or between the dies 15 mounted in the die carriers 16. These die carriers are mounted to rock in the housing 6, and each is provided with an inwardly projecting arm 17 shown in Fig. 5, connected by a link 18, whereby they are caused to rock in unison, and each is also provided with an upwardly and outwardly projecting horn 19 which is engaged by rollers 20 on the tool carrier 21 for rocking the die holders and the dies 15 carried by the holders. These holders are slotted to receive the dies 15, and the two dies are each shaped to receive the lower flange and the web of the rail 14 as clearly shown in Figs. 2 and 6. When the dies 15 are closed onto the rail, they rest on the anvil 61, and are supported thereby, while the swaging or expanding tool 22 is moving in contact with the head of the hot

rail. These dies therefore have parts or elements which engage side portions of the work piece below its exposed edge for supporting the work piece during the flanging operation, and parts or members (in the present instance the top faces of the dies) which oppose the thrust of the expanding means in the formation of the flange.

The rail is forced or fed from the furnace 1, into engagement with the feed rolls 3 and 4, and is fed by the latter progressively or step by step, (for instance half inch at each movement) into and through the dies, and under and into a position where the head or tread of the hot rail will be acted upon by the oscillating expanding tool 22. This oscillating tool or expander is of truncated conical form and is journaled in the carrier 21, as shown in Figs. 2 and 3 and is located with its axis parallel to the direction of movement of the rail 14 being operated upon, and with its smaller end toward the feed rolls 3 and 4.

The carrier 21, carrying the swaging or expanding tool 22 and the roller 20, is journaled on the shaft 23 secured or mounted at its ends in the housing 6, and is connected by the pitmen 24 with the crank shaft 25 actuated by the motor 26 and gearing 27 and 28.

It will, from the foregoing, be seen that as the crank shaft 25 is rotated, the carrier 21 will be rocked or oscillated, and at each oscillation will carry the swaging or expanding tool directly over and in contact with the hot rail or section of rail clamped between the dies 15. As the end of the rail 14 approaches the tool 22, the conical end of the latter engaging the exposed head of the rail as shown in Fig. 3, swages or expands the latter laterally, the oscillating movement in one direction, causing the metal to flow laterally in one direction and the return movement of the tool causing it to flow in the opposite direction, thus forming a comparatively wide flange which, as the section of the rail being acted upon reaches the rear cylindrical end of the tool 22, conforms in shape and size to the recessed faces 29 in the tops of the dies 15. This movement of the rail through the dies is a progressive or step by step movement, the feed being first against the conical face of the tool which gradually reduces the head of the rail to a wide flange projecting laterally on both sides of the web of the rail, and then to the rear end or cylindrical section of the oscillating expander or tool which gives it its final shape.

The feed roll 3 is provided with a toothed periphery which is engaged by a pawl 30 pivotally supported on the lever 31. This lever is mounted on the feed wheel shaft and is held downwardly by the spring 32. The outer end of the lever 31 projects into the

path of a double cam 33 carried by the carrier 21 and once at each stroke, or twice at each complete oscillation of the carrier 21 and expanding tool 22, the cam 33 engages lever 31 and lifts same thus causing the pawl 30 to turn the feed wheel 3 in a direction to feed the rail 14 forwardly a predetermined distance, which may be regulated. The feeding movement of the rail occurs when the carrier 21 and its expanding tool 22 are near each extreme of its oscillating movement, and after the tool 22 has passed over and is out of contact with the rail.

The horn 19 of each die carrier is provided near its outer free end with a shoulder 34, with which the rolls 20 make contact just before the finish of each oscillatory stroke of the carrier 21. As the approaching roller 20 contacts with its shoulder 34, it depresses the horn 19 thus turning the die carrier on its axis, and as the two die carriers are connected, as previously explained, they are both simultaneously turned in a direction to release the rail, which remains free throughout the movement of the roll 20 beyond the shoulder 34, until it leaves the shoulder on the return movement. It is during this period, while the rail is freed from the dies, that the rail is fed forwardly parallel with the axis of the swaging or expanding tool, and the rail is fed forwardly at each half stroke of the tool 22.

With this apparatus, I take old worn rails, heat them and by expanding the head laterally so as to form side flanges, I produce a tie which is structurally as strong as the rail from which it was made.

In use, the expanded head 35 of the rail becomes the base or bottom of the tie, and if desired I can provide those portions of the dies under the cylindrical portion of the tool 22, with ribs which will produce corrugations in the top face of the bottom of the tie, or I can provide the cylindrical portion of the tool 22 with ribs which will produce corrugations in the bottom face of the tie, or I can rib both the dies and the tool and thus produce corrugations in both faces of the base of the tie. These ribs in the base flange of the tie are designed to prevent the tie from creeping endwise.

With this apparatus the clamping dies and expanding tool are short as compared with the rail, and as the rail is fed lengthwise under the tool parallel with the axis of the latter, it will be seen that any length of rail can be reworked in my apparatus thus producing ties of any length, without any changes or adjustment. Again, as the expander is adjacent to the furnace, the rail being reworked may be partly in the furnace until the major part of the rail has been acted upon by the expander, hence I have no difficulty in keeping the rail suffi-

ciently hot to be readily worked, and by my apparatus and method of reworking, rails which are subsequently cut into ties of any length, come out perfectly straight thus avoiding the necessity of straightening the rails or ties after the flanging operation.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention; hence I would have it understood that I do not desire to confine myself to the exact construction and arrangement of parts shown and described, but—
Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In an apparatus for forging an elongated section having a web and an enlarged portion, the combination with supporting means adapted to engage the opposite side of the workpiece in rear of the enlarged portion, a device adapted to move toward and away from the enlarged portion and arranged to engage the outer surface of the latter when said enlarged portion is supported for laterally expanding the same, and means for feeding the work piece to the expanding device.

2. In an apparatus for forging an elongated section having a web and an enlarged portion, the combination with supporting means adapted to engage the opposite sides of the work piece in rear of the enlarged portion, a device adapted to move laterally with respect to the enlarged portion and arranged to engage the outer portion thereof when said enlarged portion is supported for laterally expanding the same, and means for feeding the work piece to the expanding device.

3. In an apparatus for forging an elongated section having a web and an enlarged portion, the combination with means adapted to engage and support the opposite sides of the work piece, and permitting the enlarged portion to project therefrom, means for intermittently feeding the work piece, and means in a plane above the holding means for successively subjecting said enlarged portion immediately above the supporting means to traverse expanding pressure, the construction of the apparatus being such that a work piece considerably longer than the supporting dies, and also of greater length than the distance between supports for the swaging means, can be operated upon in the apparatus.

4. Means for supporting the opposite sides of an elongated section and permitting a portion to project therefrom, means intermittently engaging said projecting portion while thus supported and operating to expand same laterally, and means adapted to feed the section intermediate the periods the

latter is engaged by the expanding device, the said feeding means adapted to feed in a step by step movement, maintaining the same relation to the work during the expanding operation.

5. In an apparatus for making rail road ties from rails, the combination with a frame, a carrier mounted to swing therein, means carried by said carrier for swaging or laterally expanding the head of the rail, and means for supporting and holding the rail while the expanding device is operating thereon, of means for feeding the rail longitudinally in the direction of the axis of the carrier.

6. In an apparatus for flanging an elongated work piece having an enlarged portion and a web, the combination with a carrier mounted to move, means carried by said carrier for swaging or laterally expanding said enlarged portion, dies for supporting the work piece and engaging the side portions thereof, and feeding means adapted to feed the work piece in the path of movement of the expanding mechanism, the construction of the apparatus being such that a work piece considerably longer than the supporting dies, and also of greater length than the distance between supports for the swaging means, can be operated upon in the apparatus.

7. In an apparatus for flanging an elongated work piece, the combination of a carrier mounted to move, a pair of dies for supporting the work piece and permitting a portion to project therefrom, means carried by the carrier and adapted to engage the projecting portion of the work piece for laterally expanding same, means for progressively feeding the work piece to and across the path of movement of the expanding mechanism, and means for actuating the dies to release and clamp the work piece intermediate the feeding periods.

8. In an apparatus for flanging an elongated work piece, the combination of a laterally movable frame, swaging or expanding means carried by said frame, a pair of dies for supporting the work piece and permitting one edge thereof to project therefrom, means for feeding the work piece in a step by step movement through the dies, in a direction at right angles to the direction of movement of the swaging means and across the path of movement of the latter, and means for actuating the dies to release and clamp the work piece intermediate the feeding periods.

9. In apparatus for flanging an elongated work piece, the combination of a laterally movable frame, swaging or expanding means carried by said frame, a pair of dies for supporting the work piece and permitting one edge thereof to project therefrom, means for feeding the work piece in a step

by step movement through or between the dies, in a direction at right angles to the direction of movement of the swaging means and across the path of movement of the latter, means for actuating the dies to release and clamp the work piece intermediate the feeding periods, and an anvil on which the dies are supported when closed against the work piece.

10. An apparatus for flanging metal shapes, comprising means for clamping the shape to be flanged, a laterally movable frame, a swaging device having a conical swaging surface, carried by said frame and means whereby an edge of the metal shape is progressively expanded laterally by the swaging device.

11. An apparatus for flanging metal shapes comprising means for clamping the shape to be flanged, a frame movable laterally with relation to the frame, a conical expanding device carried by said frame, and means for feeding the shape to be flanged toward the smaller end of the said expanding device.

12. An apparatus for flanging metal shapes comprising dies for clamping the shape to be flanged, means for feeding the shape longitudinally, a conical expanding device mounted to move in a direction at right angles to the direction of feed of the shape, and means for opening and closing the dies.

13. An apparatus for flanging metal shapes, comprising dies means for opening and closing the latter, means for intermittently feeding the shape, and a conical expanding device mounted to travel in a direction at right angles to the direction of feed, the die opening and closing means and the feeding means being operated at each lateral stroke of the expanding device.

14. An apparatus for flanging metal shapes comprising dies, and feeding means, of carrier mounted to move laterally, means for opening and closing the dies and for actuating the feeding devices and a conical expanding device carried by said carrier and adapted to be moved laterally over the dies to laterally expand the exposed edge of the shape held by the clamps.

15. In apparatus for flanging metal shapes of greater length than the supporting and flanging means, the combination of means for supporting the shapes to be flanged and constructed to engage the sides of the transverse portion of the work piece

that is engaged by the flanging means, a movable carrier, flanging means carried by said carrier, and intermittently engaging the portion of the shape to be flanged, and means for intermittently feeding the shape longitudinally intermediate the movements of the flanging means, while the latter is out of contact with the shape.

16. In apparatus for flanging metal shapes of greater length than the supporting means, the combination of supporting means for the shape adapted to engage side portions of the work piece the said means permitting a portion of the shape to project therefrom, a carrier moving in a direction at right angles to the length of the shape, means carried by said carrier and engaging the projecting portion of the shape for flanging same and means for feeding the shape in a step by step movement longitudinally across the path of movement of the flanging means.

17. In apparatus for forming flanges on metal shapes, the combination with means for feeding a metal shape longitudinally in a step by step movement, of a conical expanding device located with its axis parallel to the longitudinal movement of the shape for laterally expanding a flange thereon.

18. In an apparatus for flanging an elongated work piece, the combination of means adapted to flange by a step by step movement, a projecting portion of the work piece which is held in a supporting means, said supporting means comprising elements adapted to engage side portion of the work piece, and elements adapted to oppose the thrust of the expanding means in the formation of the flange.

19. In an apparatus for flanging an elongated work piece, of means adapted to feed the work piece in a step by step movement, means adapted to flange a projecting portion of the work piece which is held in a supporting means, said supporting means comprising elements adapted to engage side portions of the work piece, and elements adapted to oppose the thrust of the expanding means in the formation of the flange.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

WILLIAM H. MORGAN.

Witnesses:

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A. W. BRIGHT.