W. H. MORGAN.

METHOD OF MAKING RAILROAD TIES FROM STEEL RAILS.

APPLICATION FILED OCT. 8, 1909.

968,873.

Patented Aug. 30, 1910.

3 SHEETS—SHEET 1.

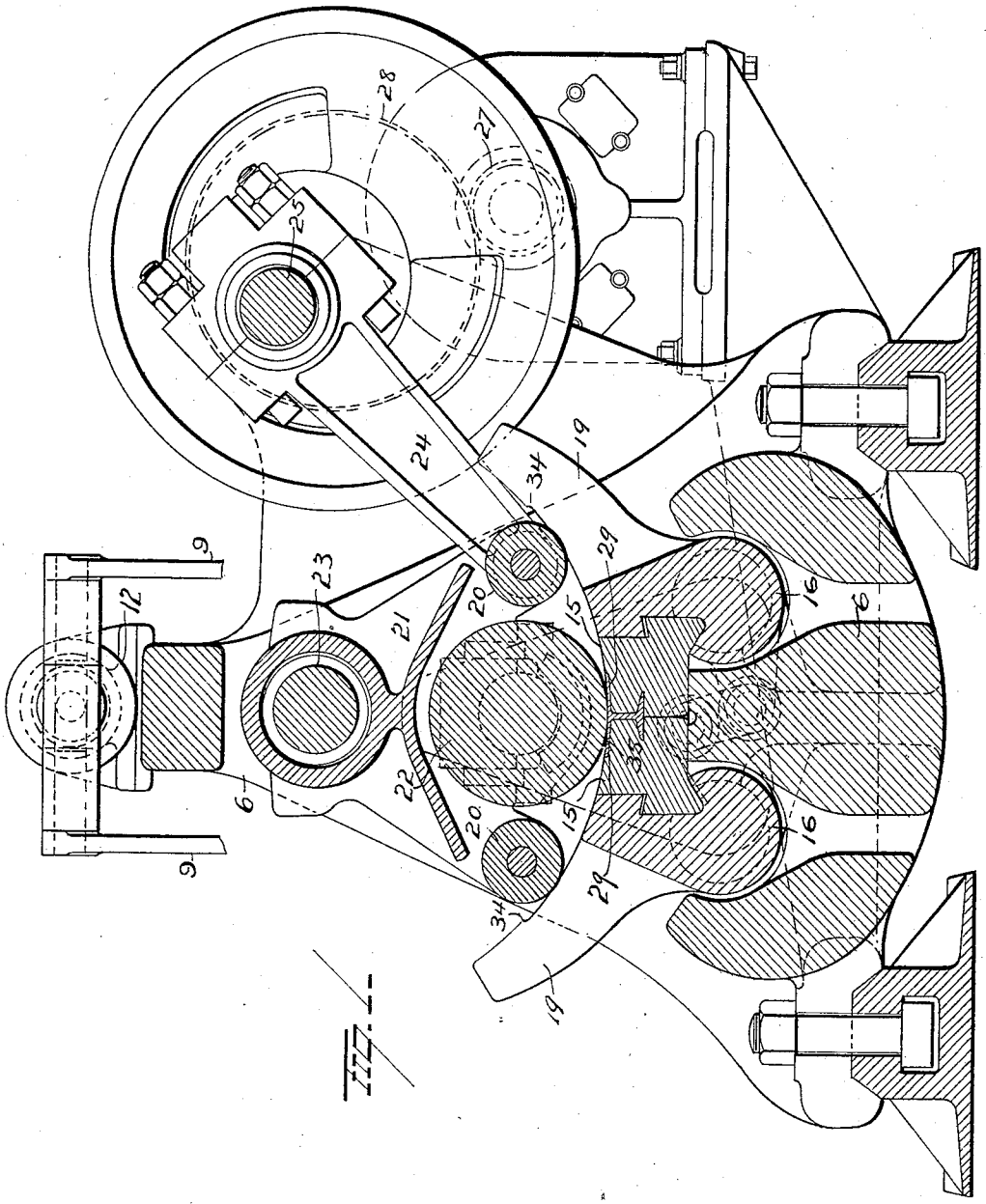

FIG. 1.

WITNESSES

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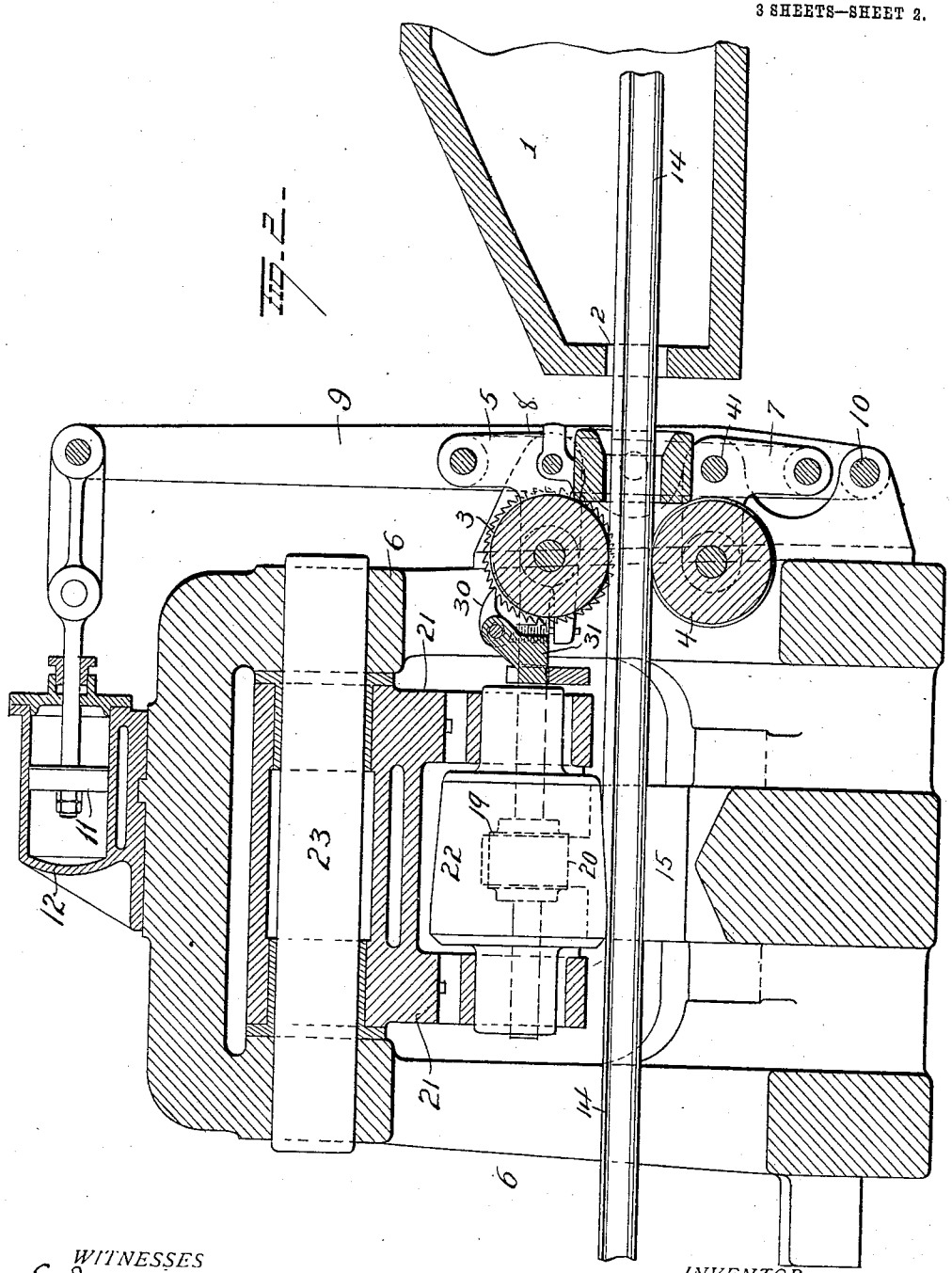
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

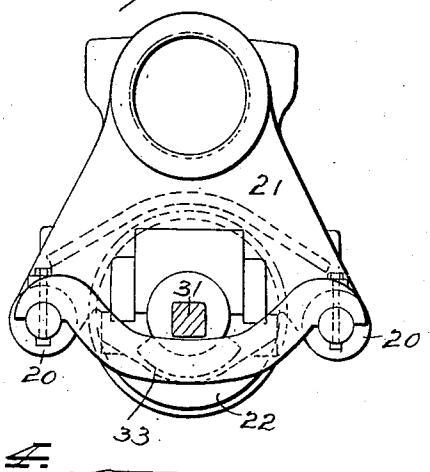

Fig. 4.

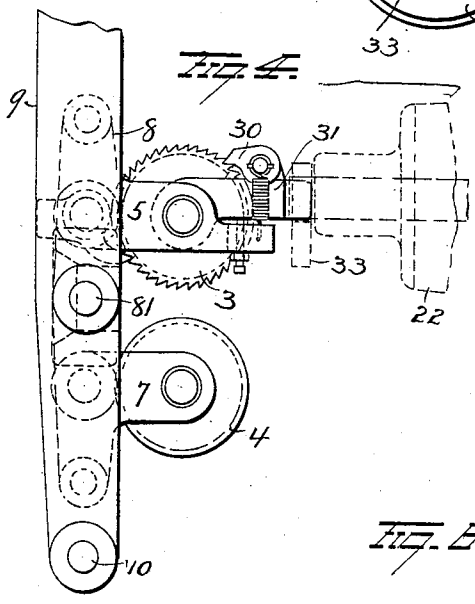

Fig. 5.

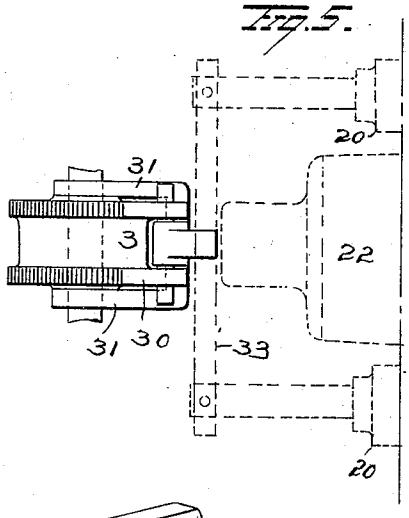

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM H. MORGAN, OF ALLIANCE, OHIO.

METHOD OF MAKING RAILROAD-TIES FROM STEEL RAILS.

968,873. Specification of Letters Patent. **Patented Aug. 30, 1910.**

Application filed October 8, 1909. Serial No. 521,722.

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 Methods of 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 the method of making rail road ties from steel rails and it consists in intermittingly feeding the rail longitudinally, and laterally expanding the head thereof by means moving in a direction at right angles to the direction of feed of the rail.

It further consists in intermittingly feeding the rail and laterally expanding the head thereof during the periods of rest between the feeding movements.

It further consists in heating the rail, feeding it longitudinally and expanding the head of the rail laterally by means moving at right angles to the direction of the length of the rail.

My invention further consists in certain other steps and operations as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in transverse vertical section of one form of apparatus for carrying out my improved method. Fig. 2 is a view in longitudinal section the swaging tool being shown in elevation. Fig. 3 is a view in elevation of the swaging tool carrier and the cam for actuating the feed pawls. Fig. 4 is a view in side elevation of the feed wheels and means for actuating same. Fig. 5 is a plan view of one feed wheel and its pawls showing the cam in dotted lines, and Fig. 6 is a view in perspective of a section of a rail partly swaged.

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 one side on a bell crank-lever 5 mounted at its elbow in fixed bearing carried by the housing 6 and the roll 4 is likewise journaled at one side on a bell crank lever 7 mounted in a fixed bearing carried by the housing 6. The two bell crank levers 5 and 7 at each side of the feed rolls, are pivotally connected to the ends of connecting bar 8, shown in dotted lines in Fig. 4, each connecting bar 8 being pivotally mounted at its center at 81 on a lever 9 mounted at one end on fixed bearing 10, and connected at its opposite end to the piston 11 of the hydraulic cylinder 12. As the piston 11 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 connected by a link as shown in dotted lines in Fig. 2, 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 roll 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 Fig. 1. 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.

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 tool 22. This oscillating tool or expander is of truncated form and is journaled in the carrier 21, as shown in Fig. 1, 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 rollers 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. 2, 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 roll 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 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. This feeding movement of the rail occurs when the carrier 21 and its 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 rolls 20 beyond the shoulder 4, 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 method I can convert worn rails into ties, by first heating them, and expanding the heads laterally while in a heated condition by an expanding device moving at right angles to the direction of the length of the rail, and produce a tie which will be structurally as strong as the rail from which it was made. Again I can make ties of various lengths in the same apparatus without any alteration or adjustment. This is due to the fact that the rail is fed through the dies and the swaging or expanding action is progressive longitudinally of the rail and lateral with respect to the length of the rail.

I make no claim in this application to the apparatus for transforming the head of the rail into lateral flanges as the same forms the subject matter of an application No. 520,857, filed by me October 4th, 1909.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. The method of forging elongated articles having a web and enlarged portion extending along the web, which consists in subjecting the enlarged portion to a step by step swaging action of forging elements so applied and with sufficient force as to laterally expand said enlarged portion.

2. The method of forging elongated articles having a web and enlarged portion extending along the web, which consists in subjecting the enlarged portion to a step by step transverse swaging pressure sufficient to laterally expand said enlarged portion.

3. The method of forging elongated articles having a web and an enlarged portion extending along the web, which consists in feeding the work piece in a step by step movement over a supporting device, and subjecting the enlarged portion of said work piece immediately over said supporting device, to a transverse swaging pressure during the intervals between the feeding movements of the work piece.

4. The method of forging elongated articles, consisting in alternately feeding the

article longitudinally and then clamping it against movement between the feeding movements, and subjecting a portion thereof immediately adjacent the clamped section to the action of a lateral swaging tool, during the periods the article is clamped.

5. The method of making rail road ties from rails consisting in progressively feeding the rail longitudinally and then clamping it between dies between each progressive movement and subjecting a portion of the head which is over the dies to the action of a lateral swaging action, during the interval when the rail is clamped.

6. The method of making rail road ties from rails consisting in feeding the rail in a step by step movement, clamping a section of the rail between each movement of the latter and subjecting that portion of the head of the rail above the clamps to the action of a lateral swaging device.

7. The method of making railroad ties from rails, consisting in feeding the rail longitudinally in a step by step movement, clamping the section of the rail between each movement of the latter, and subjecting the portion of the rail immediately over the clamps to the action of a swaging device moving at right angles to the direction of movement of rail and engaging the rail, while the latter is clamped.

8. The method of making rail road ties from rails consisting in moving the rail longitudinally, in a step by step movement, into the path of a laterally moving swaging tool.

9. The method of making rail road ties from rails consisting in moving the rail longitudinally in a step by step movement, and subjecting a longitudinal portion of said rail to a step by step transverse swaging pressure sufficient to laterally expand the same.

10. The method of forging a work piece comprising a thin elongated longitudinally extending portion, which consists in subjecting one edge of the work piece to a step by step swaging pressure which forces the metal laterally with respect to the thin portion, and in such manner that a broad flange will be expanded on the work piece, and a web portion will project therefrom, which web comprises material not acted upon by the swaging pressure.

11. The method of expanding an elongated flanged article consisting in successively subjecting portions of the flange to transverse expanding pressure.

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

WILLIAM H. MORGAN.

Witnesses:
WILBUR ZIMMERMAN,
A. W. BRIGHT.