2 Sheets—Sheet 1.

G. WEBB.

Hardening the Heads of Rails.

No. 223,564. **Patented Jan. 13, 1880.**

FIG. 2.

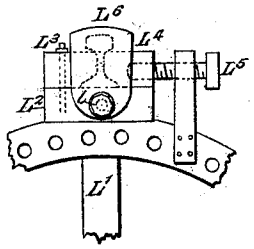
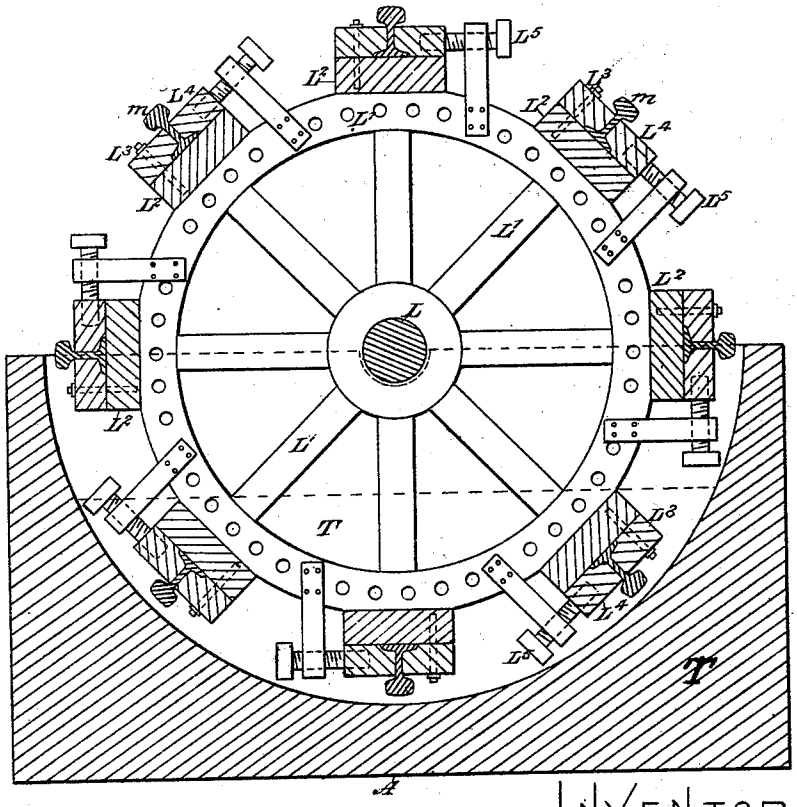


FIG. 1.



INVENTOR:

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by his attorney E. B. Bolton

WITNESSES:

E. B. Bolton
Charles C. Stetson

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2 Sheets—Sheet 2.

G. WEBB.

Hardening the Heads of Rails.

No. 223,564. **Patented Jan. 13, 1880.**

FIG. 3.

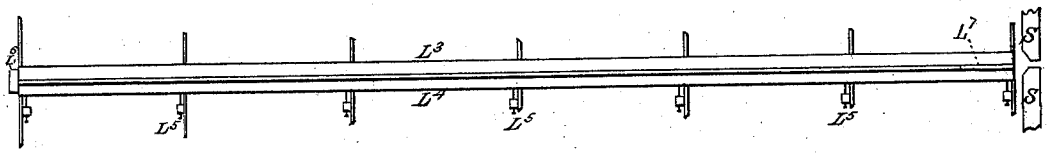


FIG. 4.

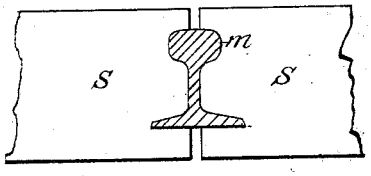
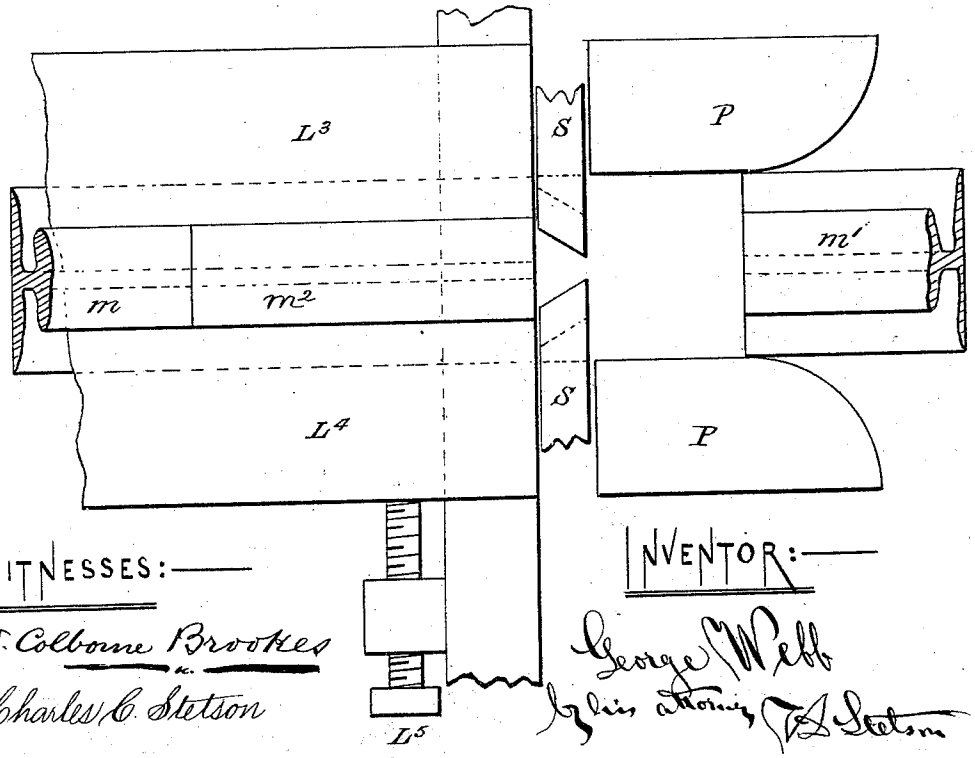


FIG. 5.



WITNESSES:—

W. Colborne Brookes

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UNITED STATES PATENT OFFICE.

GEORGE WEBB, OF JOHNSTOWN, PENNSYLVANIA.

HARDENING THE HEADS OF RAILS.

SPECIFICATION forming part of Letters Patent No. 223,564, dated January 13, 1880.

Application filed June 26, 1879.

To all whom it may concern:

Be it known that I, GEORGE WEBB, of Johnstown, Cambria county, in the State of Pennsylvania, have invented certain new and useful Improvements relating to Railroad-Rails, of which the following is a specification.

The invention is applicable more particularly to steel rails, though some portion of the benefit may be realized in the treatment of iron rails.

In the manufacture of rails for railroad-tracks one of the greatest difficulties is to have them perfectly straight. I attain this and also avoid the injury to the structure of the metal due to the ordinary plan of straightening cold.

The latter operation by the gag-press, as heretofore practiced, is objectionable, because by its great force applied on a small surface after the rail is cold it compresses the metal on one side, while it stretches it on the opposite side. Both changes injure the structure of the metal.

I clean the rail-surface mechanically, and immediately receive it in stout clamps capable of resisting any tendency of the rail to curve during the cooling. The clamps cover only the thin portions, leaving the upper portion of the head exposed. The rail thus held during the entire cooling process remains straight afterward. The clamps are carried in a revolving frame turning on a horizontal axis over a tank of water. The surface of the water must be high enough to immerse the head of the rail as it passes the lowest point. If it is higher and immerses the whole, it will not harden the other parts of the rail, because of their being protected by the clamps.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a cross-section through the main portion of the apparatus. Fig. 2 is an end view of a portion. Fig. 3 is a top view of a portion on a smaller scale. Fig. 4 is a face view of the working ends of the scrapers which act on the surfaces of the rail as it is forced into the frame. Fig. 5 is a plan view of a portion of the same parts, showing their relation to the clamps and to the guides which are employed in connection.

Similar letters of reference indicate like parts in all the figures.

The mechanism here represented is intended to make the rails nearly or quite straight by holding each while cooling either exactly in a right line or with such slight curvature as shall be found by trial to be required for any given pattern to insure a straight condition of the rail on its final cooling. It excludes the surrounding air from those thin parts which, when fully exposed, cool quickest, and it exposes the heavier part, (the head,) which retains heat the longest. The effect is to protect the thin parts from the influence of the air, and to expose the head to the full refrigerating influence thereof, which latter may be increased by agitation by a blower or other means, if desired. The result is a practically uniform temperature of all the parts during the cooling process. This is the treatment proper for iron rails.

In treating rails of steel or of such iron as will, like steel, greatly harden by sudden cooling, I attain a further end—the hardening of the exposed surface while protecting the remainder and keeping it in its natural condition of soft or untempered steel. To attain this end I employ a tank filled with water, oil, or other cooling-fluid, and revolve the clamps or the frame containing them and their contents, so as to expose the tread of the rail to the rapid cooling necessary to induce the hardened condition. The drawings represent the apparatus as thus worked.

A is a fixed frame-work. L is a shaft mounted in bearings on the supporting-frame. On it are keyed spiders L′ L′, and on the rims of those spiders or open wheels are fixed, parallel to the shaft and equidistant from it, eight or more heavy longitudinal cast-iron plates, L^2, longer than the rail, *m*, to be treated. On the exterior of the plates L^2 are clamps L^3 L^4, formed to match the sides of the rail.

Both clamps may be removable to allow of treating different patterns of rails.

For any given pattern and size of rail the

clamp L^3 of each pair is fixed firmly to the plate L^2; but the other clamp, L^4, is movable and controlled by operating mechanism of any suitable character by which to open and close the clamps. I have represented simply screws L^5.

The apparatus being mounted in a convenient relation to the other parts of the mill, as soon as the rail is cut off at the saws (not represented) it is seized by feed-rollers or other suitable appliance (not shown) and fed past scrapers S, to remove the saw-fins and roll-scales. It is then fed directly into the space between the clamps L^3 and L^4. The movable clamp L^4 is then set tight by its screws or devices L^5 for that purpose.

P P are guides, mounted either rigidly or with capacity for very slight yielding. They stand close to the point where the rails are received. Their function is to insure that the rails shall be correctly guided to the scrapers S S, and thence between the clamps L^3 and L^4.

So soon as the clamps are properly closed on the rail the entire frame L L′ L^2 L^3 L^4 L^5 L^6 L^7, with its rail *m*, is partially rotated, so as to immerse the rail, or more especially the exposed tread thereof, and to bring the next set of clamps in proper position for receiving its rail. Holes are provided to allow this movement to be effected by simply inserting levers or bars in these holes and turning by hand.

The level of the fluid in the tank is not essential. It may be just sufficient to immerse the tread only of the rail, or from one-fourth to one-half of the revolving frame may be submerged in the oil or water in the tank T. The exposed portion of each rail, on being immersed therein at the proper heat, assumes the hard or tempered condition; but the other parts of each rail, being enveloped by the clamps L^3 L^4, will be cooled more slowly, and will retain their normal condition.

It is important that not only the large surface at the sides, but also the small surfaces at each end of each rail, be kept soft, except at and near the top.

I esteem it important that the top or tread be as hard as is practicable, but that this condition shall extend only a little down into the rail. It is important to protect the ends of the hot rails from the contact of the cold water when the frame revolves and its contents are immersed.

I attain this by the employment of removable pieces at each end. At the end of the frame from which the rail is delivered I mount a close-fitting button, L^6, mounted on a center, *l′*, so that it is capable of being revolved. It moves close to the end of the clamps L^3 L^4. When turned in one position, it applies against the ends of the clamps, and covers the hot end of the rail. When the rail is introduced into the open clamps it is moved therein until the rail abuts closely against the button L^6. The clamps being always longer than the rail, there is an unfilled space at the other end—the receiving end of the clamps. This I stop by the introduction of a short length of rail, L^7, of similar section, introduced by hand or automatically. Thus conditioned, the clamps close, and the hot rail with its protecting-clamps is revolved into the water.

Each button L^6 is turned out of contact with the rail after the further revolution of the frame has lifted the rail out of the water, so that it offers no obstruction to the rail being drawn out, and is turned again into position to cover the end of the next rail which is received in that part of the apparatus.

The rail may be removed at whatever point in the rotation may be most convenient.

The rails may be inserted when the respective clamps are in the highest part of their revolution, in which case they will be a considerable time in descending to the tank T, if each pair of clamps is filled; or the rails may be inserted at any desired lower position, care being taken, of course, to turn them into the corresponding position. They may be each introduced in the last position above the surface of the water. In such case they may be immersed immediately that the clamps are closed, and that without removing the last immersed rail from the water.

When hardening is not practiced, but only the clamping and holding for uniform cooling, the frame may be inclosed, so as to constitute a cylinder, and if it shall be found that with any given size or style of rail the proper balance of temperature is not attained, hot or cold air, whichever may be needed, may be introduced through an orifice in or near the shaft and circulated through the cylinder.

Modifications may be made in the details without departing from the principle or sacrificing the advantages of the invention.

Where water is employed as the cooling-fluid, if salted or otherwise specially prepared, mechanical means may be provided for causing it to circulate actively. If fresh water is used, a liberal stream may be supplied to change it and to maintain its low temperature.

I claim as my invention and desire to secure by Letters Patent—

1. The clamps L^3 L^4 and operating means L^5, mounted in the revolving frame L L′, in combination with the tank T of cooling-fluid, and adapted to receive and hold a rail and to expose the tread only to the cooling-fluid, while the other portions are protected, as herein specified.

2. In combination with a movable frame carrying clamps L^3 L^4, and operating means, the removable end piece, adapted to protect the ends of the rail during their immersion in cooling-fluid, as herein specified.

3. The scrapers S S, arranged as shown relatively to a series of clamps mounted on a

revolving frame, adapted to serve as and for the purposes herein specified.

4. The scrapers S S, clamps L^3 L^4, revolving frame L L′ L^2, and tank T, combined and adapted to serve as herein specified.

5. The combination of tank T, revolving frame L L′ L^2, carrying the series of clamps L^3 L^4, with operating means L^5, end pieces L^6 L^7, and scrapers S S, as herein specified.

In testimony whereof I have hereunto set my hand this 5th day of June, 1879, in the presence of two subscribing witnesses.

GEO. WEBB.

Witnesses:
A. MONTGOMERY,
DAVID MCABEE.