H. GREER.

MACHINE FOR RE-ROLLING AND REDUCING OLD RAILS.

No. 187,224. Patented Feb. 13, 1877.

Fig. 1

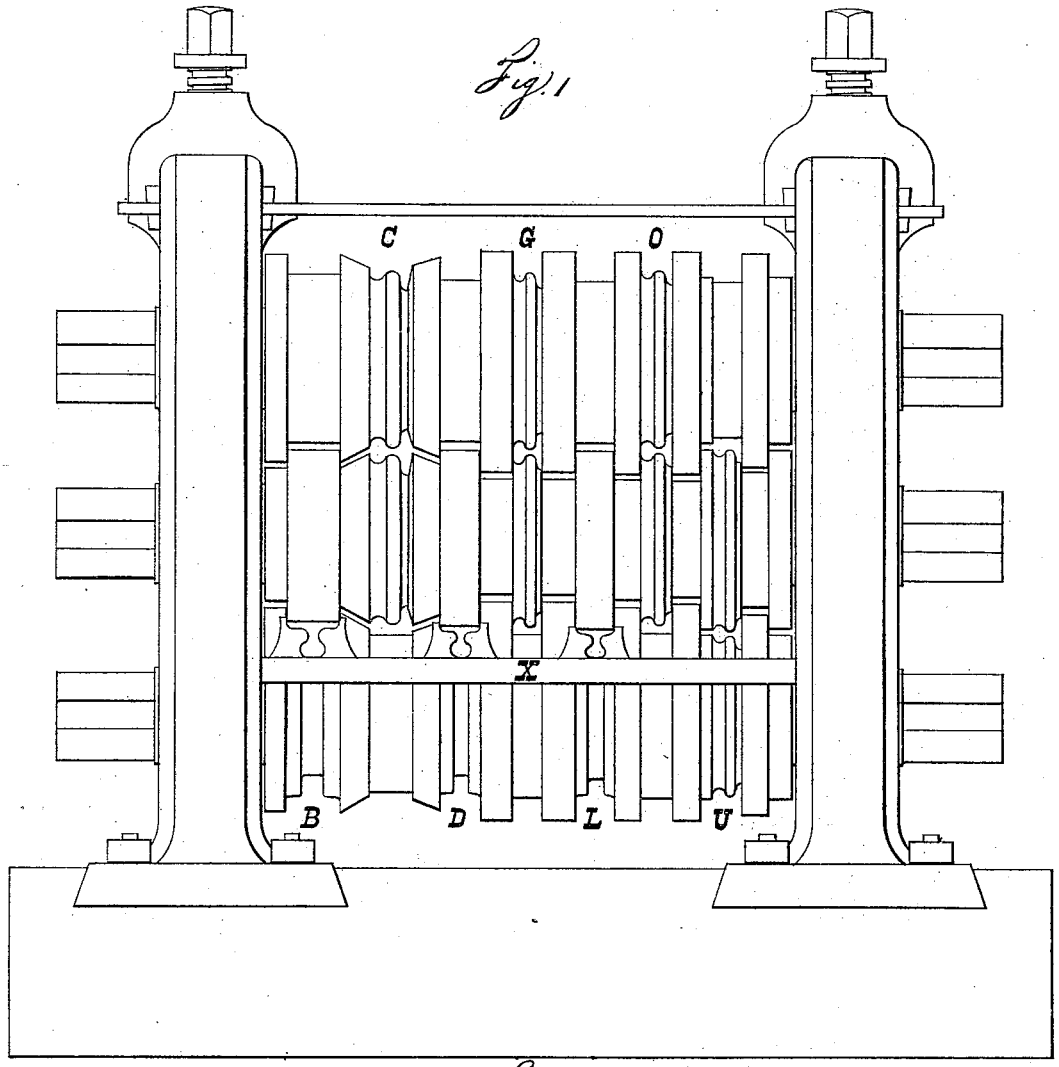


Fig. 2.

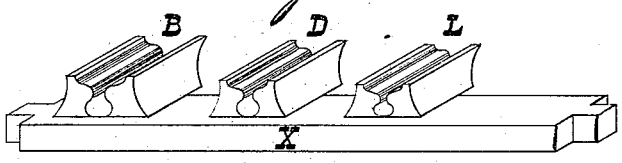
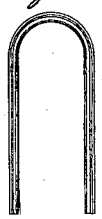


Fig. 3.



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IMPROVEMENT IN MACHINES FOR REROLLING AND REDUCING OLD RAILS.

Specification forming part of Letters Patent No. **187,224**, dated February 13, 1877; application filed August 7, 1876.

To all whom it may concern:

Be it known that I, HOWARD GREER, of Harmar, in the county of Washington and State of Ohio, have invented a new and useful Improvement in Iron and Steel Rolling Machinery, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to reduce old iron and steel railway-bars and similar shapes to smaller cross-sections, of either the same or any desired shape, and of marketable length of finished bar, at a low heat, without turning, folding, or lapping one part of the surface of same upon another, thereby obviating and rendering unnecessary welds and welding heats by such an arrangement of grooves or passes in either a two or three high system of rollers as to gradually change the old form of rail into the new shape by mild compression in each successive pass or groove till the desired result is attained, the pressure being applied alternately at right angles, as shown in the front elevation, Figure 1, of accompanying drawings.

The invention consists in arranging the passes or grooves through which the iron is drawn or rolled alternately flat and edge so that a vertical line drawn through the rail, when inverted, will be perpendicular to the axes of the rollers, and parallel thereto when turned one-quarter, and so alternately—*i. e.*, the first groove or pass B, Fig. 1, being formed to receive the old rail in an inverted position, so that the breadth of the flange or base of the said rail will be parallel with the axis of the roll. The next groove C, Fig. 1, is turned one-quarter, with the head toward the groove B, and the breadth of flange or base of rail at right angles to the axis of the roll.

Also, in the shape of the groove C, Fig. 1, formed by upper and middle rolls, the flange side of which is so flared—*i. e.*, formed at an oblique angle to the axis of the roller—that the part where the rail first enters is somewhat larger than the inner part, in consequence of which the rail will be compressed and reduced in the direction of its natural height, while the vertical pressure reduces the breadth thereof.

Also, in making the head side or portion of the first four passes or grooves of nearly a uniform size, and as large as the head of the old section used will allow, with a view to improve the quality of the product or finished bars. In shaping-rolls iron or steel will run or be forced into that part of the groove on which the least pressure falls. On this principle I make the first three or four grooves of nearly uniform size in the head portions or openings of the same, so that when pressure is brought upon the other parts of the section, a portion of the material contained in said other parts—*i. e.*, flange and web—will be forced into the part or side which forms the head, thereby giving that part the greatest available quantity of material, or largest practicable cross-section, in order that a maximum pressure may be brought upon the head of the section in the remaining grooves, thus producing a head of great solidity. The desideratum in a railway-bar is fine grain in, and solidity of, head, both of which are accomplished by the above method.

Also, in the guide-plate X, Figs. 1 and 2, Fig. 2 being a perspective view, fully showing the shape and arrangement of the guiding channels or holes, which conform to the shape of the rail and support the same in its passage through the rollers, keeping the thin web erect, and preventing buckling of the same to a great extent, while the piece or old section passes through the broad grooves B, D, and L, whose sides cannot be made to fit the web of rail, since these grooves must be cut wide enough to admit the head of the old section. X, Fig. 1, represents the guide-plate in position, plainly showing the roll-grooves, to which its rail-shaped channels guide, each being placed directly opposite the groove to which it leads.

The operation is performed as follows: A single piece of straight or folded old rail-section, (when folded in the shape of the letter **L**, **V**, or **U**, Fig. 3, it must be somewhat straightened by pulling the ends apart before entering the rolls,) being brought to a soft working heat, is inserted into the groove B, Fig. 1, formed by the middle and bottom rollers, through the rail-shaped opening in the guide-plate X, Fig. 1, opposite and leading to the said roll-groove B, in the position plainly in-

dicated by the shape of the aforesaid opening in the guide-plate, the side of the guide-channel holding the rail erect during its passage through the rolls. Portions of the grooves B, D, and L are concealed by the guide-plate X, Fig. 1, which stands directly in front of these grooves; but the shape of the concealed portions can be easily understood, since the lower parts of these grooves, in which the letters B, D, and L lie, are the exact counterparts of the concealed portions. Groove B, Fig. 1, reduces the height of the old section about one-fifth, increases the head proportionately, and the web slightly. After passing through B the piece is turned one-quarter, so that the position of the flange of the old rail will correspond to the flange side of the groove C, Fig. 1, formed by the upper and middle rollers, through which groove it is then returned, and by which it is reduced in the breadth of the flange by the vertical pressure, and also in the direction of the height of the rail by the horizontal pressure caused by the flared shape of the flange side of the said pass or groove, while merely sufficient vertical pressure is brought upon the web and head to keep the same from buckling, and make the rail deliver comparatively straight. The object in thickening the head and web is to give sufficient material to these parts to obtain the proper draw or reduction for the last pass, to give solidity of head and symmetry of form to the finished product. Coming from C, Fig. 1, it is turned one-quarter—*i. e.*, till it assumes an inverted position corresponding to the channel or hole in the guide-plate X, Fig. 1, opposite and leading to the groove D, formed by the bottom and middle rolls, through which it is now passed. The sides of the said guide-plate, holding the rail erect as it passes through the rolls D, reduce the height and thicken the web and head. From D, being turned one-quarter, as before, it is returned, through G, Fig. 1, between the top and middle rolls, which reduces the breadth of flange, and straightens any buckling D may have given to the web or head. It is now turned a quarter and passed through L, being held erect by the guide-plate X, Fig. 1, as in B and D. Receiving its final flattening in this pass or groove, it is again turned a quarter, and, being threaded through O, Fig. 1, is returned, through U, a finished rail or other section, as the case may be.

It is evident the same result may be attained by cutting the head parts of the grooves B, D, and L in the middle instead of the bottom roller; also, as the main object of B, D, and L is to reduce the height of the section and increase the size of the head, the number of such grooves or passes may be increased or diminished to suit the old section used and new one desired. Less than two will never be found sufficient, and more than four rarely, if ever, required. Three will suffice for all usual sizes and conditions.

If it is desired to reduce the height of the old rail more rapidly than by the foregoing system, the groove G may be made flaring on the flange side, the same as groove C.

The above arrangement and shape of passes or grooves may be made on two rollers instead of three, and the same result obtained thereby, but with loss of both time and power.

I claim as my invention—

1. The series of roller-grooves B, C, D, G, and L, comprehending the particular shape described of the flange side of groove C, such groove graduated in dimensions relatively to the others, and the series presenting alternating upright and flatwise passes to the rail, substantially as described.

2. The series of roller-grooves B C D G, presenting alternating upright and flatwise passes for the rail, so graduated in dimensions as to gradually reduce the breadth of the flange and of the web, but leave the head or tread of the rail unaltered, substantially as described.

3. In combination with one or more roller-grooves for reducing the dimensions of a railway-rail, or butt of same, one or more guiding-grooves conformable to an inverted railway-rail, for accurately presenting the rail to the upright passes, substantially as described, and for the purposes set forth.

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