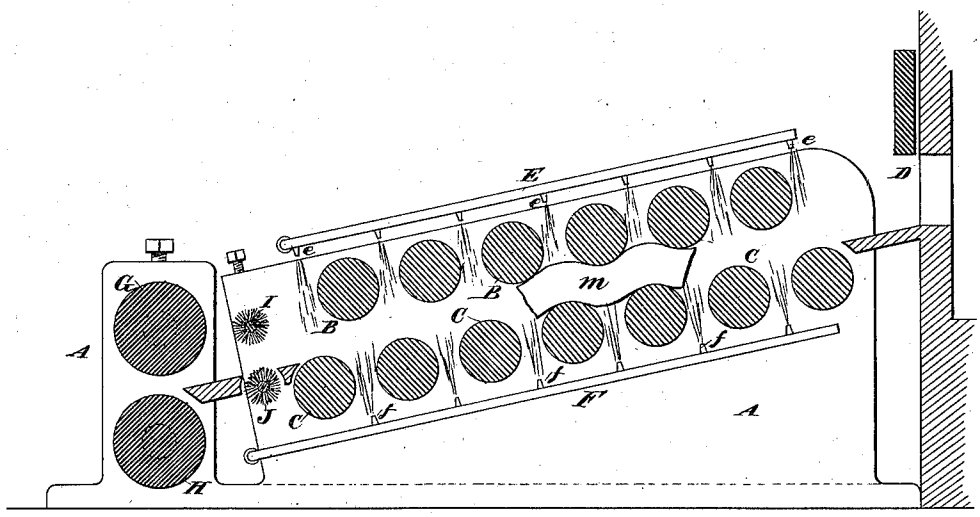
(No Model.)

L. D. YORK.

MODE OF AND MECHANISM FOR PRODUCING SURFACES ON IRON OR STEEL.

No. 295,217. Patented Mar. 18, 1884.



WITNESSES

Charles R. Searle.

N. C. Dey

INVENTOR

Levi D. York

by his attorney

Thomas L. Stetson.

UNITED STATES PATENT OFFICE.

LEVI D. YORK, OF PORTSMOUTH, OHIO.

MODE OF AND MECHANISM FOR PRODUCING SURFACES ON IRON OR STEEL.

SPECIFICATION forming part of Letters Patent No. 295,217, dated March 18, 1884

Application filed June 13, 1883. (No model.)

To all whom it may concern:

Be it known that I, LEVI D. YORK, of Portsmouth, Scioto county, in the State of Ohio, have invented certain new and useful Improvements in the Mode of and Mechanism for Producing Surfaces on Iron or Steel, of which the following is a specification.

I subject a loop or thick mass of iron or steel at a high temperature to a rapid succession of alternate bendings in opposite directions by passing it through rollers arranged to induce that effect. Simultaneously with this bending I throw streams of water upon the surfaces, and immediately after this treatment I subject it to the action of reducing-rolls, which rapidly reduce the thickness and draw out the loop to the extent required. The chilling effect of the water does not extend to any considerable depth, but it effects the thin coat of oxide on the surface, and the metal being bent while thus subjected to water, the scale is detached very cleanly. By then subjecting the metal immediately to the action of the reducing-rolls and following up the action with the required rapidity, the reduction in thickness and in temperature follow so rapidly that further oxidation does not occur, and by the action of smooth rollers for the reducing-rolls surfaces are produced on the finished metal which are unusually perfect. The surfaces produced by my treatment are less liable to subsequent oxidation than those produced by planing or abrasion, while they are almost entirely clear of the common black oxide which is present on iron and steel as ordinarily rolled.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification, and is a central longitudinal section.

Referring to the drawing, A is the fixed framing; B B, a series of upper rolls, and C C a series of lower rollers geared together and turned by suitable power, and arranged, as shown, so as to subject the metal to alternate bendings in opposite directions in passing between them.

D is a furnace, favorably located to allow the metal to be introduced at its highest temperature into the alternate bending-rolls.

E and F are pipes receiving water from an elevated reservoir or other source, (not represented,) and provided with nozzles *e f*, arranged to throw streams of water upon the upper and lower surfaces of the metal. The rolls should be driven at a quick speed, so that the metal in going through may receive liberal streams of water without being cooled, except on the immediate surface.

G H are reducing-rolls, favorably located to receive the loop of metal *m* directly from the bending-rolls B C, and to reduce its thickness under the same conditions as ordinarily obtain, except that while the interior of the loop *m* is at its original high temperature the exterior on both faces is unusually free from oxide and at a considerably lower temperature than the main body of the mass. The several treatments by the reducing-rolls should follow each other so rapidly that the exterior still remains at a considerably lower temperature than the interior.

I and J are cylindrical wire brushes revolved by belts or other suitable means in contact with the surfaces, respectively, of the bent and surface-cooled metal. These brushes vigorously act on the hot metal, and remove the particles of scale which tend to still remain on the cleaned and thinly-cooled surfaces. The adjustment should be such that the loop is bent vigorously in the alternate directions, but not to so great extent as to deflect the forward end of the loop so much out of its path as to prevent its certain and prompt passage through the machine.

For treating wide loops, there may be two or more of the nozzles *e f* at each of the points represented, or the one nozzle may be so shaped as to eject a broad and fan-like sheet of water.

Modifications may be made in the forms and proportions of the details. The reducing-rolls may be three-high and the metal subjected to alternate passages in the opposite directions, as will be understood. The metal may be turned over and turned entirely around, half around, or a quarter around, as in other rolling.

I have in my experiments treated by this apparatus what is known as "soft-center steel," the loop being formed with a mass of soft iron or low steel in the center, and a mass of Bessemer steel or very high steel on each side thereof. In such loops the increased softness of the inner portion relatively to the outer

portion, due not only to the greater heat, but also to the difference in the character of the metal, may be supposed to induce mischief, if such would ever occur in drawing with the surfaces materially cooler than the middle; but I have experienced no serious difficulty. I draw loops down from three inches thickness to about the three-eighths of an inch required for plowshares, and even to the less thickness required for cultivator-teeth, with the surfaces white and smooth.

In treating ordinary iron or soft steel which is to be rolled down to about a quarter of an inch, I prefer to roll it at a previous heat down to about five-eighths of an inch in thickness, giving it in the previous rolling about the width required, so that the subsequent rolling will require to increase its dimensions lengthwise only. When the metal is very refractory, the brushes should be worked very efficiently, and the metal may be scaled before it is rolled down so much. I prefer seven-eighths of an inch for the thickness at which the previous rolling is stopped, and the fresh heat taken for the cleaning and subsequent rapid reduction.

I claim as my invention—

1. The method of treating iron or steel—to wit, subjecting a highly-heated mass of metal to streams of water and simultaneously bending said mass alternately in opposite directions, and then immediately reducing the thickness by reducing-rolls, as herein specified.

2. The two series of bending-rolls B C, and the two series of water-pipes E F, with their nozzles *e f*, combined and arranged to serve as herein specified.

3. The furnace D, bending-rolls B C, water pipes and nozzles E *e* F *f*, and reducing-rollers G H, combined and arranged to serve as herein specified.

4. The revolving brushes I J, in combination with the bending-rollers B C, water pipes and nozzles E *e* F *f*, and reducing-rollers G H, substantially as herein specified.

In testimony whereof I have hereunto set my hand, at Portsmouth, Ohio, this 8th day of June, 1883, in the presence of two subscribing witnesses.

LEVI D. YORK.

Witnesses:
WM. B. GRICE,
I. W. SMITH.