

UNITED STATES PATENT OFFICE.

ISAAC E. CRAIG, OF CAMDEN, OHIO.

MANUFACTURE OF SHEET-IRON.

SPECIFICATION forming part of Letters Patent No. 379,370, dated March 13, 1888.

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To all whom it may concern:

Be it known that I, ISAAC E. CRAIG, a citizen of the United States, residing at Camden, in the county of Preble and State of Ohio, have invented certain new and useful Improvements in the Manufacture of Polished Sheet-Iron; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Heretofore the sheets of iron and sheets of mild steel, to which the invention equally applies, intended for the purpose of afterward being polished, have been rolled in plain and smoothly-dressed rolls or otherwise in chill or soft cast rolls whose surfaces have been allowed to become somewhat mottled or pitted, as a natural incident and result of considerable use in drawing bars and slabs down to sheet while at a red heat.

The object of the first step of my invention herein described is to produce sheets having such a mottle or irregularity of surface as renders them more easily polished under the action of the hammer used for that purpose. It has also heretofore been practiced to polish such sheets by hammering them for a considerable time under hammers having their operative faces plain or marked into a surface of an irregular mottle, and the second step of the method herein described is such a modification of the face of the dies of the hammer as renders their action in producing a luster more rapid and reliable, without the need of striking blows so heavy as to be rapidly destructive of the hammer itself.

To carry my invention into effect I choose rolls cast with either a very mild chill, or those known as "sand rolls," having no chill, and after they are turned to the proper form for the rolling they are intended to perform I have their surfaces mottled by hammering in the following manner: I first prepare hammers of good steel weighing about one pound each and having small oval faces at each end of a diameter of from one-eighth of an inch to one-fourth of an inch, the smaller dimension being preferable. Workmen then go over the entire surface of each roll with these hammers, or the same purpose may, with less beneficial result, be produced by marking but one of the

rolls, and so hammer them that the marks of the small oval faces will be made from one-fiftieth to one-hundredth part of an inch in depth, or of a depth from one half the thickness of twenty-six-gage sheet-iron to that of the entire thickness of this gage. The marks should approach each other so nearly as to be at no place more than one fourth of an inch apart; but regularity is not necessary, and an ordinary workman can make the marks with sufficient accuracy, striking from one hundred to one hundred and fifty blows per minute. This will ordinarily require the work of one man for six or seven days on a pair of rolls twenty-one inches in diameter and thirty-six inches long. The rolls so marked are then used in the usual manner of hot-finishing rolls; or, as I much prefer, on account of durability of the marks and character of the work done, may be used, if originally turned with their faces straight, so as to be parallel in the housings, as cold rolls, and have the sheets passed between them one, or at any rate not more than two, at a time.

For the most beneficial effect on the after working of the sheets they should, after being drawn in the hot rolling to approximately the gage desired, be cleaned, either by the pickling process with acid or by reviving the scale by the method of heating for several hours in contact with some solid or gaseous deoxidizing agent, as is understood in the art, and then passed singly between the marked cold rolls, the upper one of which is so screwed down as to produce on each surface of the sheet a roughness or mottle plainly perceptible to the touch of an ordinarily-sensitive finger; but this depth of mottle may be varied by the amount of pressure or screw used to suit the taste of the manufacturer. After which, and irrespective of the intermediate treatment to which the sheets may be subjected when they come to the hammering operation, I find great benefit to result from having the otherwise plain or mottled surface of one or both dies of the hammer divided into comparatively narrow and parallel strips or facets. The hammers ordinarily used for this carry dies having faces eighteen inches square, and strike a blow of from five thousand to fifteen thousand foot pounds on packages ranging from sixty to one hundred and twenty sheets which have been

heated to low redness. I have found in practice that, owing to the large area of the operating-surfaces and the low heat of the sheets being acted on, by much the larger part of the force of these blows is transmitted through the anvil-block to the foundations below, and that to greatly reduce the width of the faces of the dies by inviting the upper die to rock or tilt injures the work, and is also injurious to the durability of the hammer, all of which difficulties I am enabled to overcome by dividing the face of one or both dies into narrow parallel faces, and for this purpose prefer and find it best to limit the division of face to the upper or active die. This I accomplish by dressing the die with planer or cold chisel, so that about one-half of its surface will be removed in grooves from one inch to three inches wide and about one-twentieth of an inch in depth. The width of the grooves and also of the remaining faces or facets may be varied within wide limits; but for a hammer of six thousand or seven thousand pounds head I prefer that they should be about two inches wide. Substantially the same purpose is accomplished by fitting the face of the upper die with a hood or false face consisting of a piece of eighteen or twenty gage sheet of mild steel cut into grate form, having spaces of two-inches width remaining as bars and two-inch spaces removed, with edges dressed oval. In operating the hammer so faced it is necessary that the package should be slowly drawn over the anvil and have a motion not exceeding one-fourth of an inch between blows of the hammer. This I accomplish by means of a capstan, windlass, or equivalent mechanical means, using a pair of strong tongs with extremities of handles linked together for the grip. I also find it beneficial on the third or last hammering to use a hammer having wider facets than two inches, as above described, or otherwise to change the mask or hood on the die of same hammer for one of wider bars, and for this purpose I recommend but two bars—one at each side of the die—five inches in width. The

direction of these parallel faces should always be such that their length lies crosswise with the sheets worked under them.

By means of the joint benefits of the above-described changes—namely, the mottling of the sheets and subdivision of the operating-face of the hammer—I am enabled to reduce the height of blow required from three-fourths to five-sixths, and more than proportionately reduce the hammer breakage, which in this class of work is a large element of expense, and at the same time somewhat increase the amount of luster obtained on the sheets.

I am aware that the artificially-marked rolls used for this purpose are referred to in Letters Patent No. 364,568, issued to Joseph G. Beale, June 7, 1887, although not therein claimed as his invention; and I say that the first knowledge of said Beale concerning the same was communicated to him in December, 1886, and January, 1887, by me, and their operation and benefits, under the direction of myself then witnessed by the said Beale.

Having fully explained my invention, what I desire to claim and secure by Letters Patent is—

1. As an improvement in the manufacture of polished sheet-iron, passing the sheets between hot or cold rolls artificially marked, as described, preliminary to polishing in packages under the hammer.

2. Polishing sheet iron by the action of a hammer or hammers on packages of sheets, with the operating-faces of one or both dies of the hammer subdivided into parallel lines, as described.

3. A process of manufacture of polished sheet-iron, consisting, first, in marking the sheets with artificially-mottled rolls, and, secondly, irrespective of intermediate steps, polishing by hammers having their die-faces divided into parallel lines, as described.

ISAAC E. CRAIG.

Witnesses:

W. F. ROSS,
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