

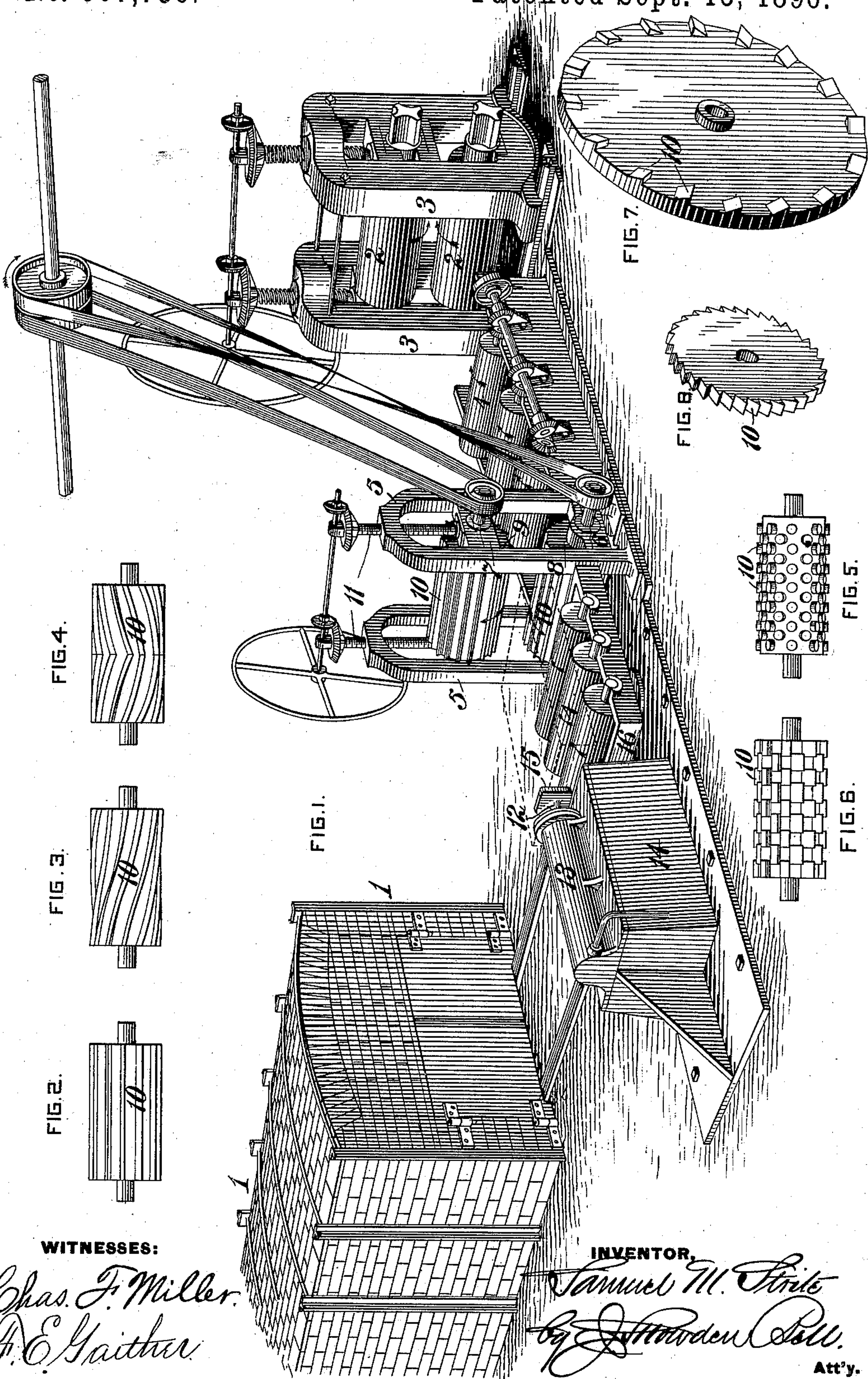
(No Model.)

S. M. STRITE.

APPARATUS FOR MANUFACTURING ROLLED METAL PLATES, &c.

No. 567,756.

Patented Sept. 15, 1896.



UNITED STATES PATENT OFFICE.

SAMUEL M. STRITE, OF THE UNITED STATES NAVY, ASSIGNOR OF ONE-HALF
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APPARATUS FOR MANUFACTURING ROLLED METAL PLATES, &c.

SPECIFICATION forming part of Letters Patent No. 567,756, dated September 15, 1896.

Application filed July 31, 1895. Serial No. 557,674. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. STRITE, an
ensign in the United States Navy, a citizen
of the United States, temporarily residing at
5 Pittsburg, in the county of Allegheny and
State of Pennsylvania, have invented or dis-
covered a certain new and useful Improve-
ment in Apparatus for the Manufacture of
Rolled Metal Plates, &c., of which improve-
10 ment the following is a specification.

My improvement more particularly relates
to the manufacture of armor-plates, deck or
boiler plates, sheets, shapes, &c., from in-
gots or slabs of nickel-steel, but is also ap-
15 plicable to the treatment of steel of other
character and of iron, and its object is to pro-
vide effective and desirable means for pro-
ducing rolled sheets, plates, or shapes which
shall be free from the objections and imper-
20 fections due to the adherence of scale to the
surfaces of the ingot or slab when presented
to and acted upon by the rolls, by which it is
reduced to desired thickness or form.

To this end my invention, generally stated,
25 consists in the combination of a reheating-fur-
nace, a planing or milling cutter, and reduc-
ing-rolls.

The improvement claimed is hereinafter
fully set forth.

30 It is well known to those skilled in the art
that much difficulty is experienced in the
rolling of plates or sheets of steel and iron,
by reason of the adherence to the blooms or
slabs of scale formed by the action of the air
35 upon the blooms or slabs while being heated
to a temperature proper for rolling and be-
fore being subjected to the action of the rolls.
The surface-scale thus formed is forced into
the body of the metal by the pressure of the
40 rolls, impairing its quality and merchantable
value, and it is therefore necessary that the
scale should be removed as fully as possible
before the slabs or blooms are rolled. Vari-
ous expedients have been employed for this
45 purpose without perfectly accomplishing it,
owing to the difficulty of detaching the scale,
which adheres strongly to the metal, by the
means heretofore adopted. My invention is
designed to effect the thorough removal of
50 the scale without involving any delay in the
passage of the slab or bloom to the rolls and

without interference with its presentation
thereto in the usual manner.

In the accompanying drawings, Figure 1 is
a view in perspective of an apparatus adapted 55
to the practice of my invention; and Figs. 2
to 8, inclusive, views illustrating different
forms of scaling-cutters applicable in connec-
tion therewith.

In the practice of my invention the ingot, 60
slab, or bloom from which a plate, sheet, or
shape is to be made is placed in a suitable
reheating-furnace and raised to a proper roll-
ing heat. It is then removed from the fur-
nace, and, while heated, is subjected on either, 65
but, preferably, on each, of its surfaces that
are to be acted on by rolls to the action of a
rapidly-moving scaling cutter or cutters, the
teeth or cutting edges of which plane or mill
off the scale from the surface to which they 70
are applied. The scaling operation is per-
formed while the heated ingot, slab, or bloom
is being traversed toward a pair or set of suit-
able reducing-rolls, by which it is finally acted
upon and reduced, in the ordinary manner, 75
to desired thickness or form immediately
upon the completion of the scaling operation,
and practically in what would be its ordinary
period of traverse from the reheating-furnace
to the rolls, thus obviating liability to the 80
undue cooling of the ingot, slab, or bloom
before being presented to the rolls.

The traverse of the heated ingot, slab, or
bloom from the reheating-furnace to the rolls
may be effected by any suitable and preferred 85
means, and the scaling cutter or cutters is,
or are, preferably, of the rotary type, in or-
der to minimize, as far as possible, the period
in which the scaling operation shall be thor-
oughly performed, as well as to admit of the 90
most effective action of the cutting blades or
teeth upon the surface or surfaces of the in-
got, slab, or bloom. While it will be obvi-
ously more desirable in the manufacture of
plates that both the upper and the lower sur- 95
face of the ingot, slab, or bloom shall be sub-
jected to the scaling operation above de-
scribed, the same may, if preferred, be per-
formed on the lower surface only, and the
scale may be removed from the upper sur- 100
face, which is more accessible, in some other
manner as by the ordinary method of ex-

plosion, and that on the lower surface planed or milled off, as described, such operation embodying the essential feature of my invention, and its adoption being a matter within the discretion of the skilled operator.

Referring to the drawings, which illustrate the essential elements of an apparatus adapted to the practice of my invention as applied in the manufacture of plates, a reheating-furnace 1, of any suitable and preferred construction, is located conveniently adjacent to an apparatus for traversing or conveying an ingot, slab, or bloom from the reheating-furnace to a pair or set of reducing-rolls 2, which rolls are mounted in bearings in housings 3 and adjusted and driven in the ordinary manner. The traversing mechanism herein selected for illustration consists of a plurality of feed-rollers 4, journaled side by side in proper bearings, with their axes at right angles to the line of traverse of the ingot, slab, or bloom. Standards or housings 5 are fixed to a bed-plate or foundation on opposite sides of the line of feed-rollers 4 and support the bearings 6 and 7 of a pair or set of disks or cylinders, in this case a pair 8 and 9, upon the periphery of each of which is formed or secured a set of scaling cutters, blades, or teeth 10, of such character and form as to act, in the manner of the cutters of a milling-machine, upon material which is brought into contact with them. Where two sets of scaling-cutters, one for the upper and the other for the lower surface of the ingot, slab, or bloom, are employed, as in the instance illustrated, the bearings 6 of the cylinder 8 of the lower set of cutters may be fixed in the housings 5 and the bearings 7 of the upper cylinder 9 be made adjustable thereon to conform to the thickness of the ingot, slab, or bloom operated upon. The required adjustment of the upper bearings may be effected positively, as by adjusting-screws 11, connected thereto and engaging internal threads in the housings, and the adjustment of the bearings to conform to irregularities in the ingot, slab, or bloom be effected by the pressure of springs acting on the bearings. The cutter-cylinders 8 and 9 are rotated rapidly in the directions indicated by the arrows, that is to say, in opposite directions to the line of traverse of the ingot, slab, or bloom, by power applied from any suitable prime-mover, and the housings of the cutter-cylinders are located at such distance from the reheating-furnace 1 as to admit of the employment of a sufficient number of feed-rollers between the furnace and said housings to support an ingot, slab, or bloom of the maximum length desired. Cranes or other known devices for handling the ingot, slab, or bloom may, if preferred, be substituted for the rollers shown.

The specific number and form of the cutter cylinders or disks and of the cutters, teeth, or blades thereon is not an essential of my invention, and numerous modifications therein may be made by the constructor without de-

parture from the feature of my invention for which they are provided. As shown in Figs. 1 and 2, the scaling cutters or blades are formed longitudinally on the peripheries of cylinders provided with suitable end journals. In Fig. 3 they extend helically along the periphery of the cylinder, and in Fig. 4 they also extend helically, but lead in opposite directions from a transverse central plane. Figs. 5 and 6 show cutters in the form of detached teeth or projections, which are staggered or so relatively disposed on the peripheries of the cylinders as to act upon the entire surface of the ingot, slab, or bloom which is presented to them. Fig. 7 shows a cylinder or disk having side scaling-cutters, two of which disks may be secured upon a single shaft and the ingot, slab, or bloom passed between them. Fig. 8 shows the cutters as formed in the manner of saw-teeth upon the periphery of a comparatively-thin cylinder, a series of which may be built up or secured side by side upon a common shaft. It will be obvious that in the application of my invention in the manufacture of rolled shapes two or more scaling-cylinders, carrying cutters shaped to conform to the surfaces of the shape to be rolled, are to be employed, their bearings being journaled in proper relation to the line of traverse of the central plane of the ingot, slab, or bloom.

Inasmuch as the action of the scaling-cutters upon the surfaces of the ingot, slab, or bloom opposes resistance to its forward movement, means for positively traversing it toward and between the cutter-cylinders is provided. In the instance shown a ram or plunger 12 is fitted in a cylinder 13, which is secured to a suitable bed-plate 14 in, or about in, the vertical longitudinal central plane of the set of feed-rollers, the ram 13 carrying a head or pusher 15, which abuts against the rear end of the ingot, slab, or bloom (indicated in dotted lines in Fig. 1) when the slab is brought from the reheating-furnace and laid upon the feed-rollers. The cylinder 13 is provided with suitable inlet and exhaust pipes and valves, by which motive fluid, as steam or air or water under pressure, may be caused to effect the forward movement of the ram 12, by which the ingot, slab, or bloom is pushed to and between the scaling-cutters, and to retract it to normal position after the ingot, slab, or bloom has passed beyond them. A powerful screw or other device for positively moving the ingot, slab, or bloom to and past the cutters may, if preferred, be employed in lieu of the means above described. The feed-rollers on the opposite side of the housings 5 are rotated to effect the continued traverse of the ingot, slab, or bloom in the usual or in any approved manner.

The reducing-rolls 2 may be of any suitable and preferred construction, and as they are not in and of themselves claimed as of my present invention they will not be at length described.

It will be obvious to those skilled in the art that various structural modifications may be made in the mechanism above described without departure from the operative principle or essential features of my invention, and I do not therefore desire to limit myself, in an apparatus for its practice, to the specific details of the several essential elements hereinbefore set forth.

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

1. In an apparatus for the manufacture of rolled metal plates, &c., the combination, substantially as set forth, of a reheating-furnace, reducing-rolls, and a scaling-cutter arranged to operate on an ingot, slab, or bloom during the traverse thereof from the furnace to the rolls.

2. In an apparatus for the manufacture of rolled metal plates, &c., the combination, substantially as set forth, of a reheating-furnace, a scaling-cutter, reducing-rolls, and mechanism for traversing an ingot, slab or bloom to the scaling-cutter and thence to the reducing-rolls.

3. In an apparatus for the manufacture of rolled metal plates, &c., the combination, substantially as set forth, of a reheating-furnace, reducing-rolls, mechanism for traversing an ingot, slab, or bloom from the furnace to the rolls, and a rotary scaling-cutter journaled, between the furnace and the rolls, in a plane

adjacent to the line of traverse of the ingot, slab or bloom.

4. In an apparatus for the manufacture of rolled metal plates, &c., the combination, substantially as set forth, of a reheating-furnace, reducing-rolls, mechanism for transferring an ingot, slab, or bloom from the furnace to the rolls, a cylinder or disk provided with peripheral scaling-cutters, blades or teeth, and journaled, between the furnace and the rolls, in a plane adjacent to the line of traverse of the ingot, slab, or bloom, and means for rotating the cutter-cylinder in direction opposite to that of the traverse of the ingot, slab, or bloom.

5. In an apparatus for the manufacture of rolled metal plates, &c., the combination, substantially as set forth, of a reheating-furnace, reducing-rolls, a plurality of feed-rollers between the furnace and the rolls, a rotary scaling-cutter, journaled between the furnace and the rolls in a plane adjacent to the plane of the feed-rollers, and means for positively advancing an ingot, slab, or bloom, over the peripheries of the feed-rollers, to and past the scaling-cutter.

In testimony whereof I have hereunto set my hand.

SAMUEL M. STRITE.

Witnesses:

J. SNOWDEN BELL,
J. P. S. LAWRENCE.