

No. 140,140.

WITNESSES:

INVENTOR:

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UNITED STATES PATENT OFFICE.

CHARLES JONES, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN PUDDLING-FURNACES.

Specification forming part of Letters Patent No. 140,140, dated June 24, 1873; application filed February 12, 1873.

To all whom it may concern:

Be it known that I, CHARLES JONES, of St. Louis, in the county of St. Louis and State of Missouri, have invented a certain Improved Puddling-Furnace, of which the following is a specification:

It is well known that puddling consists of a process of purifying from pig metal its extraneous substances, as carbon, silica, &c., by means of the intense heat of the furnace, and the active stirring and working of the smelting mass under said heat till the iron comes to nature, or is converted into wrought or malleable iron. To obtain this object more practically, efficiently, with less labor, and more economically, is the purpose of this invention.

The improvements here presented relate: First, in providing the bottom or cooling device with water-cups to act as receivers of water and exhausters of steam, the latter cooling the upper part of bottom and protecting same from oxidation. Secondly, to the peculiar combination, with smelting-chamber, of bottom having water-cups, and, relatively arranged therewith, water-boshes, to facilitate the operation of cooling the bottom and protecting the sides and top of same from the effects of oxidation. Thirdly, to the peculiar manner of supporting the bottom on lines of rollers set in bearings, and the connection to power-source of said bottom, so as to impart to same an oscillating motion. Fourthly, to certain detail construction of parts, all of which will now more fully appear.

Of the drawing, Figure 1 is a top plan with roof removed; Fig. 2, a longitudinal sectional elevation; Fig. 3, a transverse sectional elevation.

A is the grate or furnace; *a*, the fire-hole or grate-door. Next to grate is smelting-chamber A¹; *a*¹, its door to charge. A² are the bearings or brick support; *a*², air openings or chambers between bearings; A³, chimney. In the smelting-chamber, and between the outer end bearings A², I provide the respective water-receivers B B'. (See Fig. 2.) Each water bosh or receiver B B' is fed with water in any usual way, the object being to store water in said water-boshes for purpose of effecting the cooling operation. The interior of the smelting-

chamber and top of bearings A² I give a concave form, to adapt said parts to support and conform to my improved bottom. C represents my movable cast-iron bottom. This is formed of a concave shape, and consists of an upper and lower or true and false bottoms, *c c*¹, with sides *c*² *c*³. (See Figs. 2 and 3.) The flanges of the top edges of the bottoms *c c*¹ are properly joined, and otherwise there is bolted over top edges fire-brick for protection from oxidation. Thus forming the bottom proper I achieve a cooling-chamber, D. Forming part of the bottom *c*¹, and communicating with chamber D, are water-cups *d d'*, that of *d* having its opening reversely positioned to that of *d'*. (See Fig. 2.)

The arrangement and operation of the bottom C, to achieve a continuous agitating and working action of the smelting mass, are as follows: The bottom C is supported on a line of rollers, *c*⁴, respectively set in each bearing A² below, as shown in Figs. 2 and 3. With the rollers as its bearing, and by virtue of its concave form, the bottom C is to be oscillated. Hence, I further provide the bottom (forming part of its false bottom *c*¹) with arms *c*⁵, to which are coupled the side pitmen E. These, in turn, extend outwardly to connect to a suitable crank or cam attachment, E¹, to which the motive power is applied. From power-source there is thus imparted to the bottom C proper the required oscillating motion to accomplish the stirring, working, and mixing action, (usually done by hand.) By the motion or action of the bottom C the water-cup *d* raises a measured quantity of water on the lower bottom *c*¹, which water, being evaporated to steam, cools the upper bottom *c* less than the under one. Also, it will be noticed that each reverse motion of bottom C causes one of the water-cups to act as a receiver, the other as an exhauster. The cooling-process here achieved is most equally distributed under the bottom part *c*, and, further, the steam escaping around and above or over causes a more regular, uniform, and better draft. In the bottom C a pot is fixed in the usual way with crushed or broken ore, scrap, &c. As soon as the metal or pig melts the bottom C is started to have a continuous and active operation. While this operation continues

the operator can readily examine the condition of the pot (its contents) through the door, and thus add all necessary (cinder and water) for mixing and thickening at any period. The cinder or overflow occurring flows or passes off at tap-hole *f*, Fig. 1, into cinder-spout *f'*, at regular intervals, till the iron comes to nature. At this stage, the bottom, if necessary, can be stopped, and the process of balling by hand, if small blooms are required, can be done as ordinary, or said bottom can be continued to run, and the balling operation can be done by cutting or separating the young blooms till the required size is obtained. The simplicity of operation, cheapness of construction, and various advantages of my said improvements are readily apparent.

Having thus fully described my said invention, what I claim is—

1. The water-cups *d* *d'*, acting as receivers and exhausters, in combination with chamber *D*, as and for the purpose set forth.

2. In combination with smelting-chamber of furnace, the bottom *C* having water-cups *d* *d'*, and, arranged relatively therewith, the water-boshes *B* *B'*, substantially as specified.

3. The combination of the bottom *C*, rollers *c*⁴, arms *c*⁵, side pitmen *E*, and crank attachment *E'*, as and for the purpose set forth.

In testimony of said invention I have hereunto set my hand.

Witnesses:

CHAS. JONES.

WILLIAM STANDING,

WILLIAM W. HERTHEL.