W. METCALF.

Metallurgic Furnace.

No. 227,120. Patented May 4, 1880.

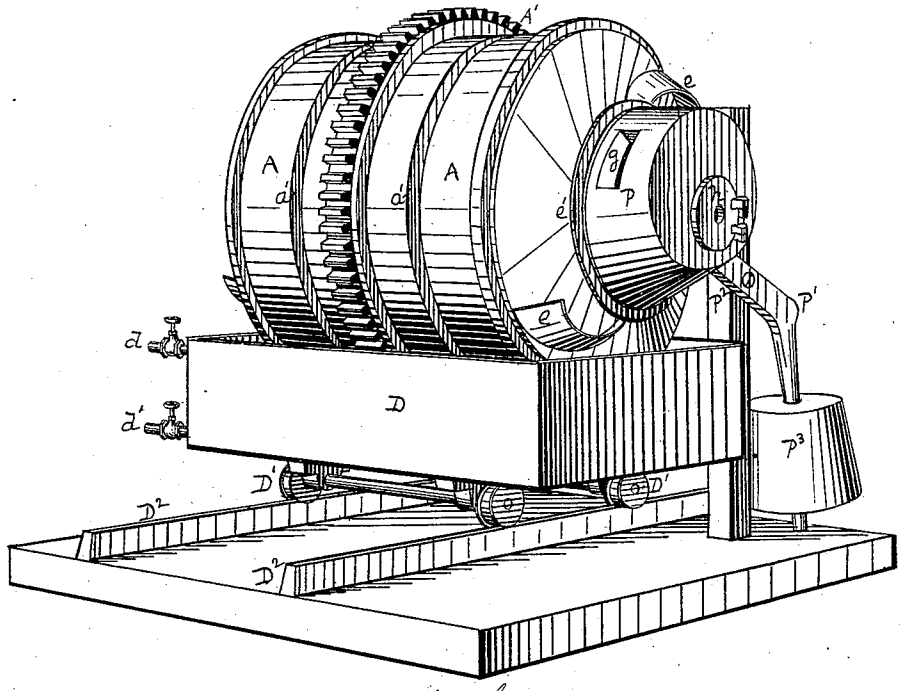


Fig. 1.

Fig 2

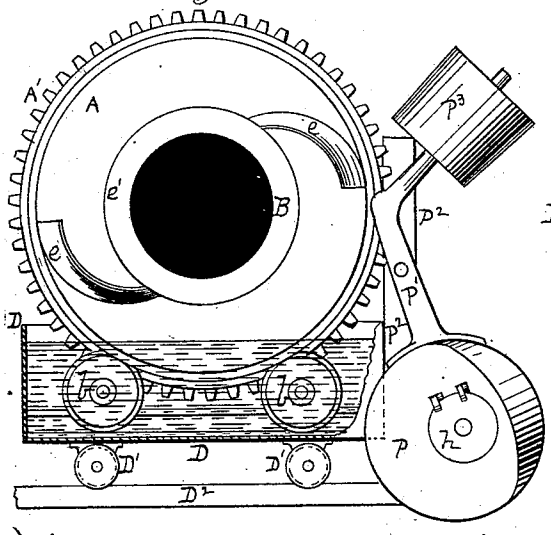
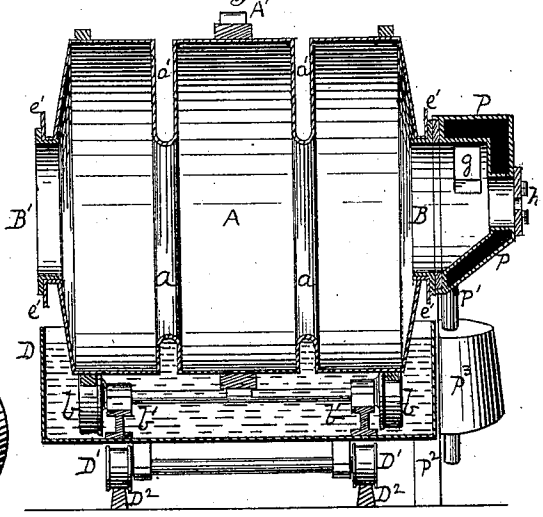


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM METCALF, OF PITTSBURG, PENNSYLVANIA.

METALLURGIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 227,120, dated May 4, 1880.

Application filed July 12, 1879.

To all whom it may concern:

Be it known that I, WILLIAM METCALF, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Metallurgic Furnaces; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a view, in perspective, of so much of a rotary furnace as is necessary to illustrate the features of construction and operation which constitute my present invention. Fig. 2 shows an end view of the furnace-chamber and a sectional view of the water-tank, but with the counterweighted door which opens and closes the neck at the exit swung out of position to enable the workmen to get access to the working-chamber; and Fig. 3 is a longitudinal vertical section of the apparatus as shown in Fig. 1.

My invention relates to an improved door applicable to the working-chambers of the class of furnaces commonly known as "rotary or oscillatory furnaces," and used for puddling, purifying, and converting metals, as well understood in the art. The shell of such working-chamber is represented at A. This shell is usually made of iron plates bent to form, angle-iron, &c., and is to be lined in any known way preliminary to use. A rotary or oscillatory motion may be imparted to it from any desired motive power through gearing A′, or in other convenient way. One neck, B, leads to the exit-flues. The other neck, B′, receives the working heat, flame, or gases from any suitable heat-generating apparatus, either directly or through interposed conduits.

The parts thus far designated differ in no material respect from what is already known in the art, and the construction of such parts may be varied at pleasure within the limits of the art; and other devices such as are usually employed in connection with such apparatus or are necessary or desirable to its success are to be added to what is shown.

I also make use of knives or dividing annular ribs *a*, one or more in number, (preferably two,) the function of which is to divide up or separate the mass of puddled iron into two or more puddle-balls, each of convenient size and weight to be readily removed by the workmen from the working-chamber through the neck B, when opened for the purpose, as presently to be explained. These knives or dividing-ribs are made hollow, as shown, and the U shape or open part *a′* of the shell extends entirely around, and each rib on the inside also extends entirely around, the inside of the working-chamber, and when properly lined also extends above the level of the lining on either side of it. This construction not only facilitates the division of the mass of puddled iron into balls, but also insures a uniform elongation and shortening of the shell on all sides under the effect of varying temperature, since when thus made the length of metal subject to longitudinal expansion and contraction will be the same all around, and the result on expansion and contraction of the presence of the U-shaped re-entrant ribs will be the same at all points.

I also employ improved means for keeping the working-chamber cool or at the proper temperature while in use. To this end I support it on roller-bearings *b b*, as is usual; but instead of making these roller-bearings open, as heretofore, I arrange them in a tank, D, on any suitable supporting frame-work *b′*. The sides of the tank are high enough, so that when water is supplied thereto the lower side of the shell as it revolves will be immersed in the water, as clearly shown in Figs. 2 and 3. This tank is, by preference, mounted on a truck, D′, of suitable construction, which latter rests on track-rails D^2, so that when it is necessary to repair the working-chamber or any part of the apparatus connected therewith it can be run out to one side, clear of its end connections, and when repaired can readily be run back to position.

The partial immersion of working-chamber in the water, as described, is for the purpose of preventing an undue and destructive elevation of its temperature when in use. A continuous flow or supply of water should be kept up through any suitable pipe, *d*, or other source of supply. The excess of water (if any) may be carried off by overflow or by any de-

sired waste-passage. A pipe and cock, d', may be added for the purpose of emptying the tank when necessary.

In order to provide for keeping the necks cool and so much of the heads as are not immersed, I provide on each end one or more spiral-shaped scoops or buckets, *e e*, substantially as shown in Figs. 1 and 2. These buckets in the section of their radii form each an acute angle with the adjacent head, but may have an equivalent trough form, and they are so disposed that their outer open ends, as the working-chamber revolves, will scoop or dip up water out of the tank, which, as rotation continues, will run along back the spiral trough, and be poured over the heads and onto the necks; and the better to insure its action on the necks I make flanges e' at or near the outer ends of the necks, and so form an annular trough around each neck.

In connection with a furnace of the revolving class referred to I employ an improved movable door, by means of which one neck is opened to enable the workman to charge the working-chamber and to remove the puddle-balls, or do other work requiring access to the inside. Such a door is shown at P, and is applied to the exit-neck B. This door is made of a double shell, as is usual in the art, and contains one or more lateral flue-holes, *g*, through which smoke, gases, surplus heat, &c., pass to the stack through suitable flues properly built for the purpose, either directly or through regenerator flues or passages, as may be desired. This door P is hung to one end of an arm, P′, pivoted to any suitable support, P^2, and a counter-weight, P^3, is secured adjustably or fixedly to the other end of the arm.

The arm P′ is bent somewhat, so that the supporting-post P^2 may stand to one side of the neck-opening, and also so that when the door is swung away, as in Fig. 2, it shall be out of the way of the workman when engaged in charging the working-chamber, removing the puddle-balls, or doing other work therein.

A sight-hole, closed by a small door, *h*, or equivalent slide, is made in the main door for the usual purposes.

I claim herein as my invention—

A movable door and counter-weight connected by a bent arm and supported to one side of the neck-opening, in combination with a rotary or oscillatory metal-working chamber, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM METCALF.

Witnesses:

R. H. WHITTLESEY,

JOHN SMITH.