

U. WEDGE.
METALLURGICAL FURNACE.
APPLICATION FILED DEC. 2, 1915.

1,237,129.

Patented Aug. 14, 1917.
2 SHEETS—SHEET 1.

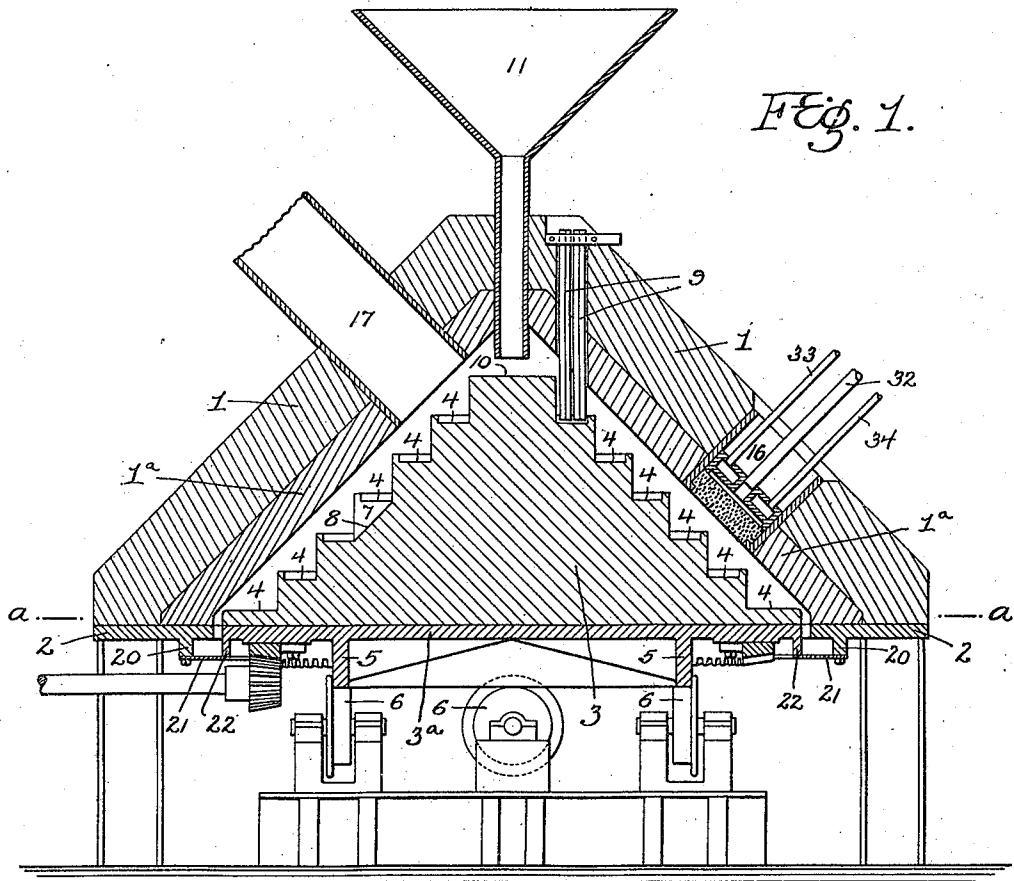


Fig. 1.

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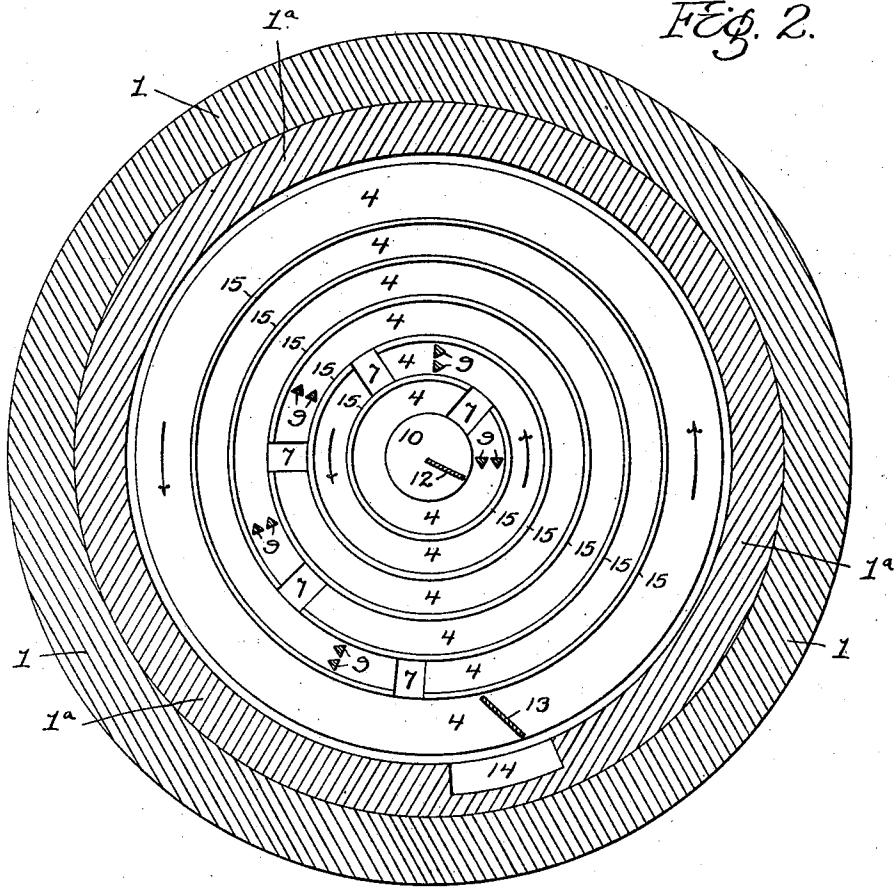


FIG. 2.

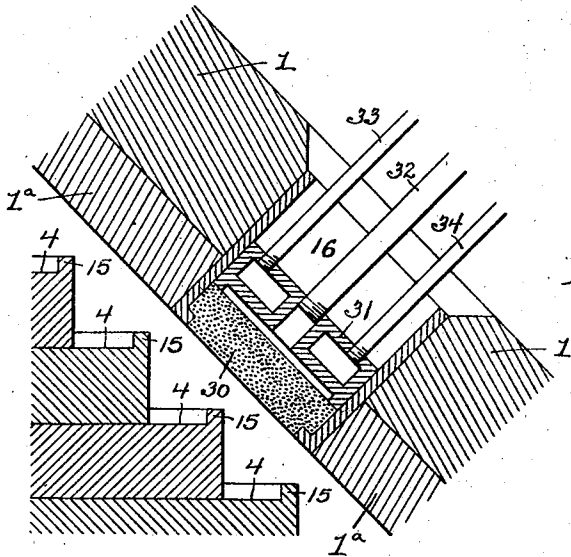


FIG. 3.

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UNITED STATES PATENT OFFICE.

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METALLURGICAL FURNACE.

1,237,129.

Specification of Letters Patent. Patented Aug. 14, 1917.

Application filed December 2, 1915. Serial No. 64,644.

To all whom it may concern:

Be it known that I, UTLEY WEDGE, a citizen of the United States, residing in Ardmore, Pennsylvania, have invented certain
5 Improvements in Metallurgical Furnaces, of which the following is a specification.

My invention consists of a metallurgical furnace designed for the attainment of the following objects, first, effective heating of
10 the material under treatment without obstructing the heating chamber space by the introduction of heating devices into the same, and second, extended travel of said material over the hearth structure and
15 correspondingly long subjection of it to the heat of the furnace.

These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

20 Figure 1 represents a vertical section of a furnace constructed in accordance with my invention;

Fig. 2 represents a horizontal section of the furnace casing on the line *a-a*, Fig. 1, a top view of the hearth structure, and horizontal sections of the rakes whereby
25 movement of the material under treatment over said hearth structure is effected, and

Fig. 3 represents an enlarged vertical section of part of the furnace illustrating also a modification of the hearth structure.

In the drawing, 1 represents a hollow conical hood or roof of any suitable material provided with a refractory lining 1^a, this hood being open at the bottom and supported above a suitable annular bed or platform 2.

Within the roof 1 is disposed a hearth structure 3 of general conical form but having an upper surface of steplike configuration, whereby it presents a series of annular shelves or hearths 4 in different vertical planes, each of these annular hearths being of greater diameter than the hearth above
40 it, as shown in Fig. 1. The hearth structure 3 has a base 3^a with depending annular flange 5 mounted upon rollers 6 and said hearth is rotated in the direction of the arrows, Fig. 2, by any suitable mechanism, such, for instance, as the bevel gearing shown.

Each of the hearths 4 has therein a gap 7 with inclined bottom 8, these gaps being in different radial planes, that is to
55 say, the gap in the second hearth is some

distance in advance of the gap in the first or topmost hearth, the gap in the third hearth is in advance of that in the second, and so on throughout the series of hearths, and in correspondingly different radial and
60 circumferential planes are disposed rakes or pushers 9, the lower end of each of said rakes extending closely to the surface of the hearth above which it is disposed, and said rakes 9 being mounted in the fixed roof 1 of
65 the furnace.

The material to be treated is deposited upon the top surface 10 of the hearth structure from the spout of a hopper 11, and, as the hearth structure rotates, in the direction of the arrows, is discharged from
70 said surface, by means of an inclined scraper 12, onto the topmost hearth 4 in front of the rake 9 which acts on the material on said hearth, said material being thereby
75 pushed backwardly over the hearth until finally discharged through the gap 7 therein onto the hearth below, the rake 9 cooperating with said hearth, pushing the material backwardly thereon until it is finally
80 discharged through the gap 7 of said hearth onto the hearth below, and so on throughout the entire series of hearths, the material finally reaching the lowermost hearth from which it is discharged by means of an inclined
85 blade 13 through a discharge passage 14 in the casing 1 of the furnace.

Each of the annular hearths, except the lowermost, has at its outer edge an upstanding rim 15, as shown in Fig. 3, whereby the
90 material under treatment is prevented from discharging over the edge of the hearth and is caused to travel the entire length of the hearth from the point at which it is deposited thereon to the discharge gap therein,
95 whereby, in a furnace of given size, a maximum length of travel of the material in its passage through the furnace is insured with corresponding maximum length of time during which the material is subjected to the
100 heat of the furnace.

When such extended travel and length of treatment is not essential, the hearths 4 may each have two or more gaps therein, and a corresponding number of rakes or pushers 9,
105 in which case the material under treatment will be separated into two or more bodies, each traversing a proportionate extent of the hearth.

The heating of the furnace is effected by 110

means of burners 16 in the roof 1, any desired number of these burners, appropriately disposed in said roof, being employed. As the roof is close to the hearths 4 effective heating of the material on said hearths is insured, and the obstruction of the heating chamber by the introduction therinto of special heating devices is prevented. Any desired form of burner may be employed, the type shown in the drawing having a porous block 30 at its front end and a cooling member 31 behind the same, gaseous or liquid fuel being fed to the intervening chamber by a pipe 32, and the cooling agent being conveyed to and from the member 31 by pipes 33 and 34, as shown in Fig. 3. The products of combustion finally escape from the furnace through the pipe or flue 17.

If it is desired to prevent admission of air between the hearth structure and the casing at the bottom of the furnace, or escape of products of combustion at that point, this can readily be effected by mounting upon a depending annular rim 20 on the bottom of the casing an annular plate 21 for bearing upon an annular rim 22 depending from the bottom of the hearth structure, as shown in Fig. 1.

In Fig. 1, I have shown the hearth structure 3 as a unitary body but the same may, if desired, be composed of separate circular slabs, of different diameters, mounted one upon another, as shown for instance in Fig. 3, and, instead of the furnace presenting a rotating hearth structure and a fixed or non-rotating hood or roof above the same, the conditions may be reversed, if desired, that is to say, the hearth structure may be non-rotating and the hood or roof and the parts carried thereby may have imparted to them rotating motion about the axis of the furnace.

The hearth structure may also, if desired, be in the form of an inverted hollow cone with shelves on its inner surface, and roof at the top, the successive hearths in this case decreasing in diameter from top to bottom.

The construction shown, however, is preferred.

I claim:

1. A metallurgical furnace having a shelf-like hearth structure presenting a series of hearths at different levels, each of said hearths, except the topmost, projecting beyond the hearth above it and each projecting hearth having means for preventing the discharge of material over its outer edge and having in it a gap through which material can be discharged onto the hearth below, in combination with means for moving the material forwardly over the hearths toward said gaps.

2. A metallurgical furnace having a shelf-like hearth structure presenting a series of hearths at different levels, each of said hearths, except the topmost, projecting beyond the hearth above it and each projecting hearth having means for preventing the discharge of material over its outer edge and having in it a gap with inclined bottom over which the material can be discharged onto the hearth below, in combination with means for moving material forwardly over the projecting hearths toward said gaps.

3. A metallurgical furnace having a shelf-like hearth structure presenting a series of hearths at different levels and each, excepting the topmost, projecting beyond the hearth above it, said projecting hearths having upstanding edge rims whereby the escape of material over the edges of the hearths is prevented, and having gaps through which the material can be discharged onto the hearths below, in combination with means for moving material forwardly over the hearths and toward the gaps therein.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

UTLEY WEDGE.

Witnesses:

KATE A. BEADLE,
HAMILTON D. TURNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."