

U. WEDGE.
METALLURGICAL FURNACE.

APPLICATION FILED OCT. 22, 1913. RENEWED JULY 1, 1915.

1,162,534.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.

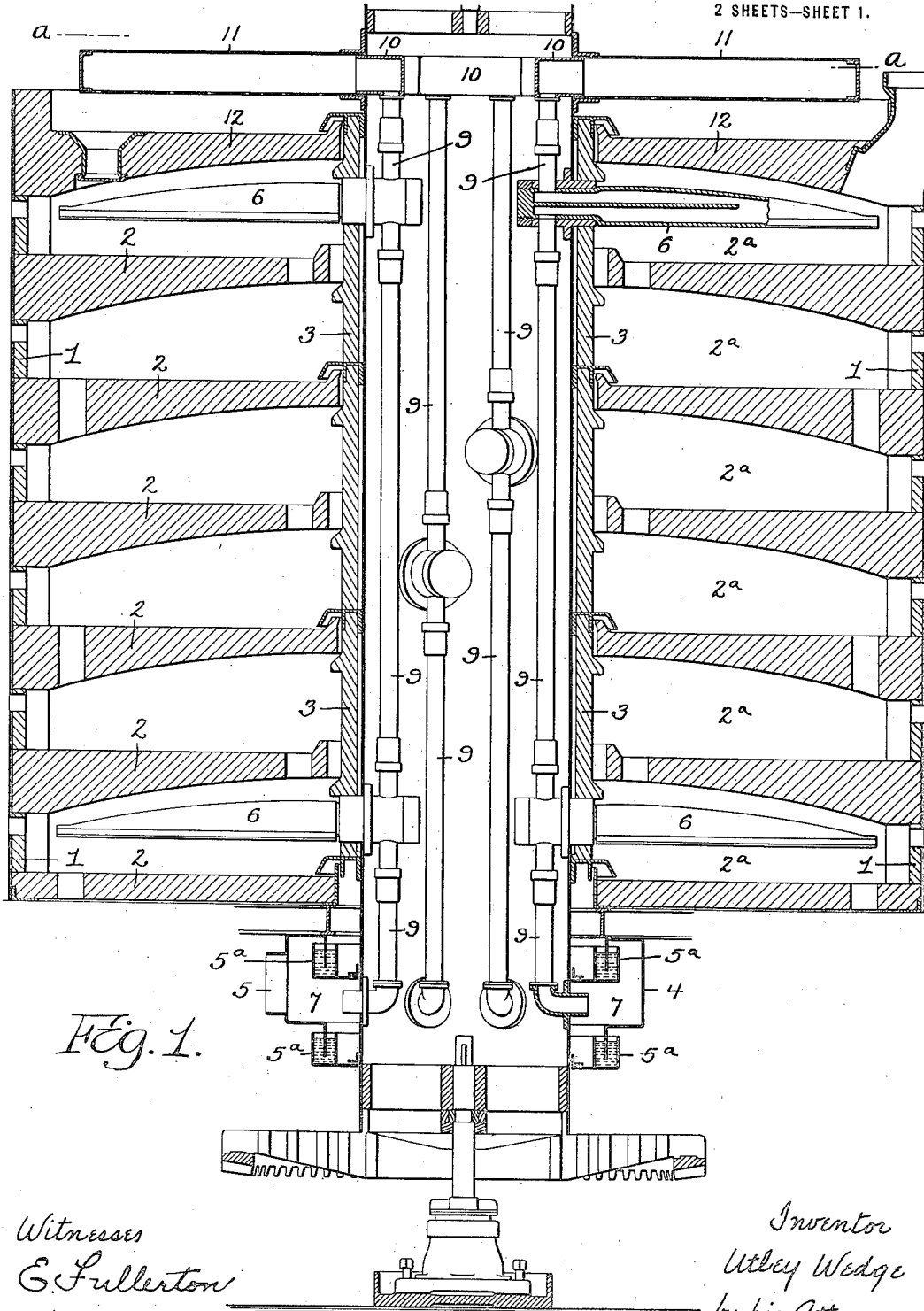


Fig. 1.

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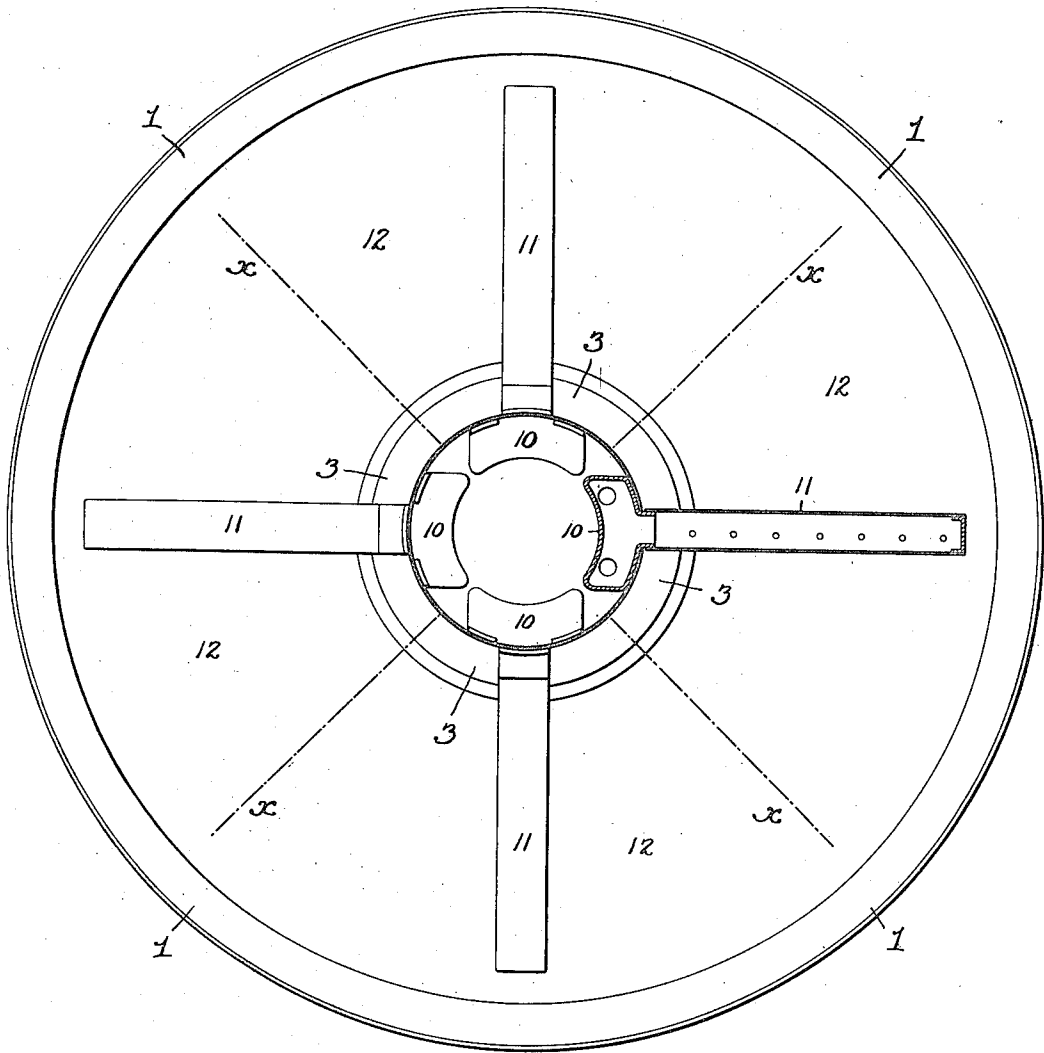
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

UTLEY WEDGE, OF ARDMORE, PENNSYLVANIA.

METALLURGICAL FURNACE.

1,162,534.

Specification of Letters Patent.

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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.

The object of my invention is to provide for the effective and economical drying of ore or other material in powdered, granular,
10 or lumpy form (hereinafter, for convenience, referred to simply as "ore") before feeding the same into the initial working chamber of a roasting or other metallurgical furnace. This object I attain in the manner herein-
15 after set forth, reference being had to the accompanying drawing which illustrates the application of my invention to a well known type of furnace, Figure 1 being a vertical section of sufficient of the furnace to illustrate the application of my invention there-
20 to, and Fig. 2 being a horizontal section on the line *a-a*, Fig. 1.

In the drawing, 1 represents the outer casing of the furnace, 2 the successive hearths
25 thereof, and 2^a the successive working chambers, six of the latter being shown in the present instance, although the furnace may be provided with more or less than this number if desired. The furnace has a central
30 rotating shaft 3 suitably mounted below the furnace and provided at that point with means for rotating it, which means it will not be necessary to show or describe as they may be similar to those commonly employed
35 in furnaces of this type.

Surrounding a portion of the shaft 3 which projects below the bottom of the furnace is a fixed casing 4 having an inlet
40 for the admission of air either by natural or forced draft to the chamber 7 within the casing, suitable traps 5^a preventing escape of this air except through its intended channels, while still permitting free rotation of the shaft. Air is supplied by the chamber
45 7 to rabble arms 6 contained in the various working chambers of the furnace and is circulated through said arms so as to prevent overheating of the same. The drawing shows these rabble arms in the top and
50 bottom chambers of the furnace and also shows the inner ends of rabble arms in a couple of the intermediate chambers, the rabble arms being omitted from the remaining chambers in order to simplify the illustration. Any desired means for effecting
55 circulation of the air through the rabble

arms may be employed, the means adopted in the present instance being a horizontal longitudinal partition extending part way
60 throughout the length of the arm and serving to divide the chamber within the latter into upper and lower passages communicating with each other at the outer portion of the arm, the inner end of the lower passage
65 receiving the air and the inner end of the upper passage discharging it. That portion of the shaft 3 which projects above the top of the furnace is provided with a number of projecting arms 11 communicating at their
70 inner ends with segmental boxes 10 on the inner side of the shaft, these boxes 10 being in communication with the air supply chamber 7 through pipes 9 each of which also serves to direct the air in its flow from the chamber 7 to the box 10 through one or more
75 of the rabble arms 6, both of these methods of construction being illustrated in Fig. 1 and either or both of them being employed in practice as may be found most desirable. The arms 11 are located above the drying
80 floor 12 on the roof of the furnace and, if desired, either or all of said arms may be provided with rabbles or other means for stirring the ore as they travel over said floor. Each arm is provided with suitable means,
85 preferably perforations in its under side, through which air can escape so as to be projected downwardly toward the drying floor. In passing through the rabble arms in the working chambers of the furnace the air
90 becomes highly heated and consequently, when it is discharged downwardly from the arms 11 onto the wet or green ore lying upon the drying hearth 12 at the top of the furnace, it will have the effect of rapidly
95 drying said ore and thereby insuring the free feeding of the ore over the drying hearth, a result which is difficult of accomplishment when the ore is wet, as for instance when it has been subjected to a wet
100 concentration or washing operation before being fed to the furnace. The action of the heated air upon the ore may also be sufficient to preheat said ore to any desired degree before the introduction of the ore into the
105 furnace.

Although I prefer, in carrying out my invention, that the hollow air-supplying arms 11 shall also constitute rabble arms for stirring and feeding the ore upon the drying
110 hearth said rabble arms may, if desired, alternate with the arms 11 around the shaft

3, as for instance in the positions indicated by the dotted lines x in Fig. 2, and although I prefer to heat the air supply for the arms 11 by first passing it through rabble arms 5 contained in working chambers of the furnace other means for heating the air may be adopted without departing from the main feature of my invention.

The drying hearth 12 may be located in 10 any desired position at the top of the furnace although I prefer to locate it on the roof of the uppermost working chamber 2^a, since, in that case the ore is heated not only 15 from above, by the hot air from the arms 12, but also from below by the heat of said roof.

I claim:

1. The combination of the drying hearth of a metallurgical furnace with a rotatable shaft provided with a hollow arm projecting over said hearth and having downwardly discharging openings therein, means for heating air in the furnace, and means for conveying the air thus heated to said arm 20 and delivering it through said openings toward the ore on the drying hearth.

2. The combination of a metallurgical furnace having a series of working chambers therein and a drying hearth at the top, a 30 rotatable shaft having hollow rabble arms in said working chambers, and a projecting hollow arm above the drying hearth, means for supplying air to and circulating it through the hollow rabble arms of the working chambers, means for conveying the air 35 thus heated in its passage through said rabble arms to the hollow arm above the drying hearth, and means for discharging said heated air from said hollow arm downwardly into contact with the ore on the drying hearth. 40

3. The combination of a metallurgical furnace having a series of working chambers therein and a drying hearth at the top, a 45 central shaft having hollow rabble arms contained in said working chambers, and a hollow arm projecting above the drying hearth and having downwardly discharging openings therein, a casing carried by the

shaft and containing a chamber which communicates with the hollow arm above the drying hearth, separate communications between said chamber and the hollow rabble arms, and means for causing a flow of air through said rabble arms and their separate 55 communications to the hollow arm above the drying hearth and downwardly from said arms into the mass of ore on the drying hearth.

4. The combination of a metallurgical furnace having a series of working chambers therein, and drying hearth at the top, a rotatable shaft having hollow rabble arms in said working chambers, and a hollow arm projecting over the drying hearth and having 65 openings in its under side, a fixed casing surrounding the lower portion of the rotating shaft and sealed against the escape of air between the same and said rotating shaft, means for introducing air into said casing, and means for conveying said air to and through the hollow rabble arms, and thence to the hollow arm above the drying hearth.

5. The combination of a metallurgical furnace having a series of working chambers therein and a drying hearth at the top, a rotatable shaft in said furnace provided with projecting hollow rabble arms in said working chambers, and a hollow arm above 80 the drying hearth, said latter arm having openings in the bottom of the same, ducts carried by the rotating shaft and communicating with the hollow rabble arms, a fixed casing surrounding the lower portion 85 of the shaft and containing a chamber which is in communication with said ducts, means for introducing air into said casing, and traps for preventing escape of the air from the casing except through said ducts. 90

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.