

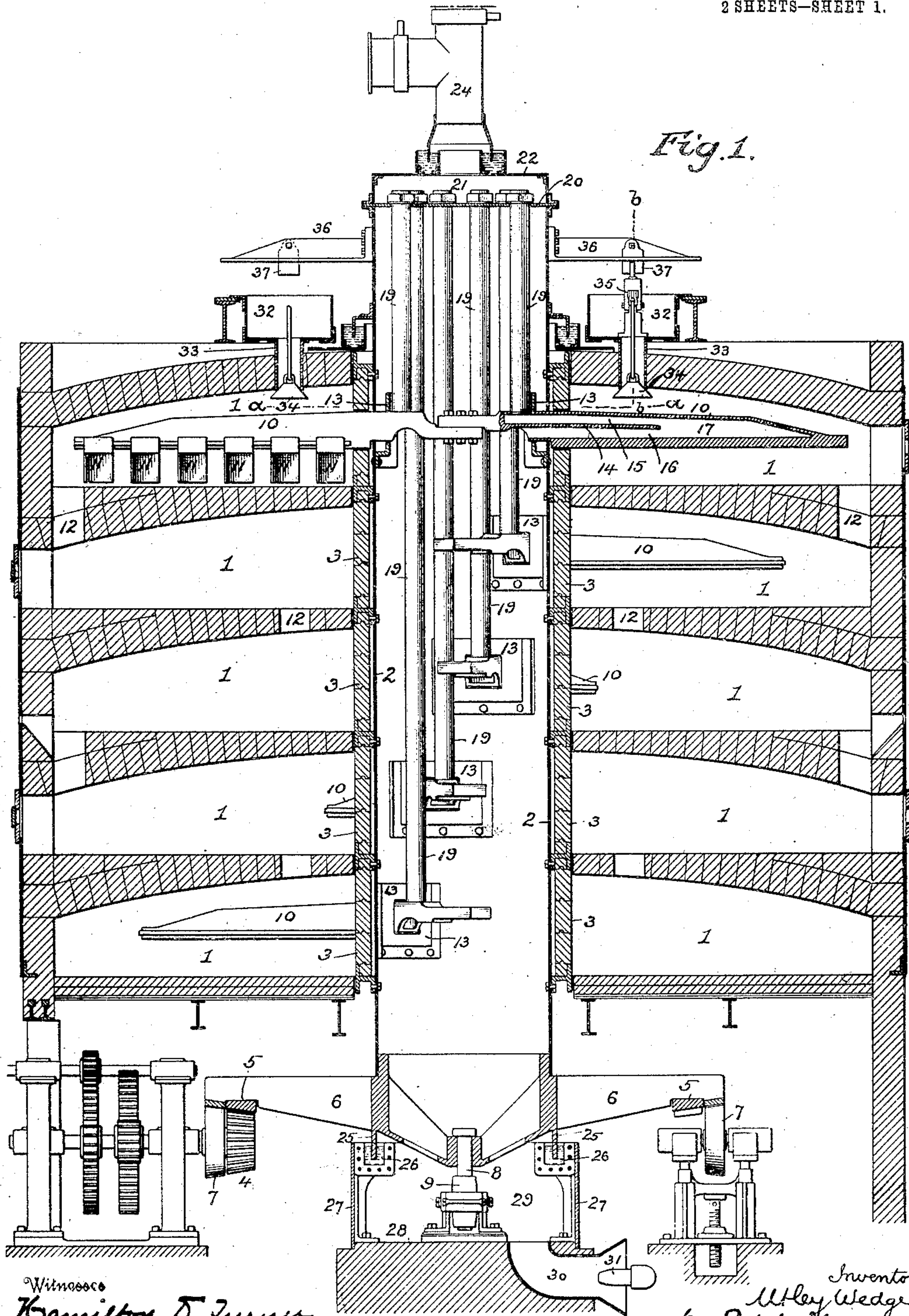
U. WEDGE.
FURNACE.

APPLICATION FILED OCT. 24, 1906.

916,234.

Patented Mar. 23, 1909.

2 SHEETS—SHEET 1.



Witnesses
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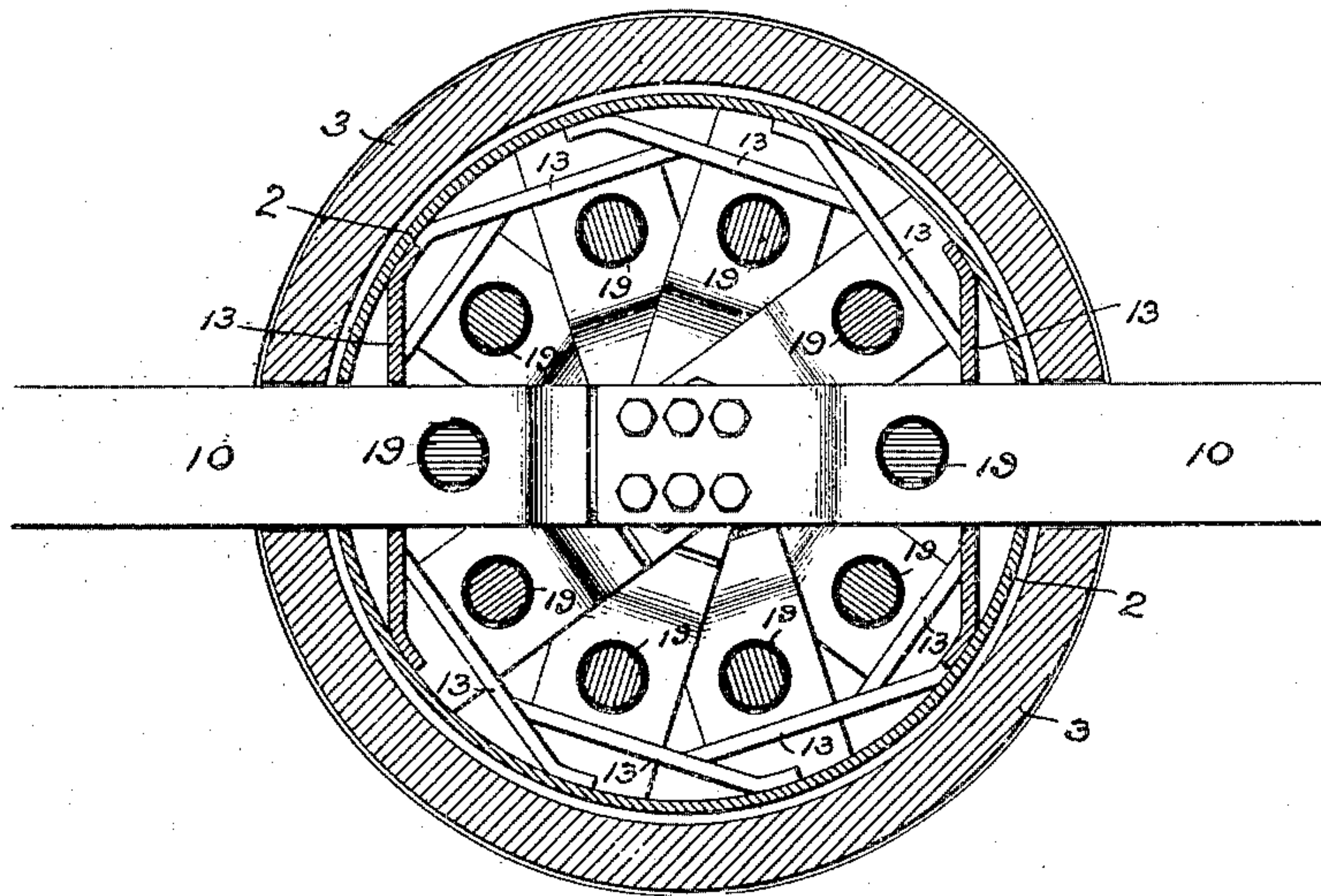
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

UTLEY WEDGE, OF ARDMORE, PENNSYLVANIA.

FURNACE.

No. 916,234

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 Furnaces, of which the following is a specification.

The object of my invention is to so construct a roasting furnace as to provide for the effective cooling of the stirrer arm or arms in
10 the roasting chamber or chambers and the uniform feed to the upper floor of the furnace of the material to be roasted. This object I attain in the manner hereinafter set forth, reference being had to the accompanying
15 drawings, in which—

Figure 1 is a vertical sectional view of a roasting furnace provided with feeding and cooling devices in accordance with my invention; and Fig. 2 is a sectional plan view on an
20 enlarged scale on the line *a-a*, Fig. 1.

In its general structure the furnace may be similar to those in common use, that shown in the drawings being a five-floor furnace having annular roasting chambers 1 surrounding
25 a central shaft 2 of relatively large diameter sheathed or incased with blocks 3 of refractory material, rotary motion being imparted to this shaft in any desirable way, as, for instance, by means of a bevel pinion 4 meshing
30 with an annular rack 5 on a frame 6 projecting from the shaft and mounted upon anti-friction rollers 7, said frame also having an axial spindle 8 adapted to a suitable bearing 9.

Although I have shown my invention as applied to a five-floor furnace, it can be applied with equally good results to furnaces having a greater or less number of floors, or even to furnaces having but a single floor.

In each of the roasting chambers 1 of the furnace are a pair of stirrer arms 10, to which are attached, in any suitable manner, depending vanes, blades or rabblers 11, one pair of arms being shown as thus equipped, and
45 these depending blades are preferably such that the material under treatment is fed outwardly in one roasting chamber, and inwardly in the next, in case the furnace has more than one chamber, so that it may pass
50 from chamber to chamber, from top to bottom of the furnace through the passages 12 in the furnace floors. The stirrer arms 10 pass through the metallic shell and sheathing of the hollow shaft 2, and are supported upon
55 stuffing boxes 13 bolted, riveted, or otherwise rigidly secured to the inner face of said

hollow shaft, the inboard portion of each arm extending to and beyond the axis of the shaft, and there overlapping or underlapping the corresponding portion of the opposite
60 arm, these lapping portions being bolted or otherwise rigidly secured together, so that each pair of arms constitutes practically a unit and the sagging of the outboard portions of the arms due to their preponderance of
65 weight is prevented. Each of the arms 10 is hollow and has a longitudinal partition 14 extending part way through it in order to form passages 15 and 16 which communicate with each other through a common
70 chamber 17 at the outer end of the arm. Both of the passages are continued into that portion of the arm which projects into the hollow shaft 2, the passage 16 being in free communication with the interior of said
75 shaft, and the passage 15 communicating with a vertical pipe 19 which extends to and through a diaphragm 20 located below the top of the shaft 2, the pipe of each arm therefore discharging into a chamber 21 contained
80 within a casing 22 at the top of the shaft, this chamber discharging through a suitably sealed neck into a take-off pipe or stack 24.

The annular portion of the frame 6, whereby rotative movement is imparted to the
85 lower end of the shaft 2, has a depending flange 25, which enters a sealing trough 26, surrounding the upper end of the casing 27, the latter, in connection with the pedestal 28, forming a chamber 29 at the bottom of the
90 shaft, and with this chamber communicates a pipe 30, through which a flow of air is induced by means of a steam jet 31 an air blower, or equivalent means. A constant supply of air is thus maintained within the
95 hollow shaft 2, which air can be maintained under light pressure if desired. The air has free access to the inner ends of the passages 16 of the various stirrer arms, but can only escape from the passage 15 of each arm
100 through its corresponding pipe 19, consequently the circulation through each arm is entirely independent of the circulation through any other arm of the series, and is maintained under the same conditions as to
105 all of the arms, so that the circulation must necessarily be uniform throughout the entire series of arms.

When air is used as a cooling agent, the heated air may be conveyed from the top of
110 the shaft to a point where it can be utilized; for instance, to a device for drying green ore

or other raw material before the latter is fed to the uppermost or primary roasting chamber of the furnace. Draft-inducing means may also be applied to the take-off pipe 24 at the top of the shaft, or in place of the latter a draft stack may be employed, in which case the use of a closed chamber and air blast devices at the bottom of the shaft will not be necessary; or, instead of using air as a cooling agent, water or other liquid may be employed, as, for instance, by feeding the same into the chamber 21, and permitting it to flow by gravity through the pipes 19, and through the passages of the arms, the water being discharged from the passages 16 either directly into the hollow shaft 2 and thence into a collecting trough at the bottom of the same, or through pipes similar to the pipes 19.

Above the roof of the furnace is an annular trough 32 which receives the material to be fed to the furnace, this trough having, at any desired points, depending necks 33 which are normally closed at the bottom by means of cone valves 34, but which, when said valves are open, discharge into the uppermost or primary chamber of the furnace. Each valve 34 is suspended from a lever 35, suitably mounted in the trough 32, the preponderance of weight on this lever tending to maintain the valve in the closed position, but projecting arms 36 on the upper portion of the shaft 22 have depending lugs 37, which, by contact with the lever 35, depress the same and temporarily open the valves 34.

When either of the stirrer arms is detached from its pipe 19 and from the opposite stirrer arm, it can be readily removed through a suitable opening in the outer wall of the roasting chamber.

It will be evident that my invention can be adopted in furnaces of the muffle type, such for instance as shown in my Letters Patent, No. 654,335, dated July 24, 1900, with the same advantages as when it is applied to a furnace of the type shown in the drawing.

1. A furnace having one or more chambers therein, one or more stirrer arms in each chamber, each stirrer arm having communicating flow passages therein, a hollow arm-carrying shaft having inlet and outlet without direct connection between them, and means whereby one of the passages of each arm communicates with the inlet of said shaft and the other passage communicates independently of any of the other arms with the outlet of the shaft.

2. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each arm having communicating flow passages therein, a hollow arm-carrying shaft having inlet and outlet without direct connection between them, direct communication between one set of flow passages

and the inlet of said shaft and independent connection between each of the other flow passages and the outlet of the shaft.

3. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each stirrer arm having flow passages therein, an arm-carrying shaft having inlet and outlet without direct connection between them, and a pipe leading from the inner end of one of the flow passages of each stirrer arm to the outlet of said shaft:

4. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each stirrer arm having flow passages therein, a hollow arm-carrying shaft having inlet and outlet without direct connection between them, direct communication between one of the flow passages of each arm and the interior of the hollow shaft, and separate communication between the other flow passage of each arm and the shaft outlet.

5. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each stirrer arm having communicating flow passages, a hollow arm-carrying shaft having inlet and outlet without direct connection between them, communication between one of the flow passages of each arm and the inlet of said shaft, independent communication between the flow passage of each arm and the outlet of the shaft, and means for inducing a flow of air into the shaft inlet.

6. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each arm having communicating flow passages, a hollow arm-carrying shaft, a diaphragm whereby said shaft is closed at one end and direct connection between the shaft inlet and outlet thus prevented, and pipes, one for each stirrer arm, leading from one of the flow passages of said arm to and through said diaphragm.

7. The combination, in a furnace, of one or more chambers, one or more stirrer arms in each chamber, each stirrer arm having communicating flow passages, a hollow arm-carrying shaft having at one end an outlet chamber which does not communicate with the interior of the shaft, and pipe connections between said chamber and one of the flow passages of each stirrer arm.

8. The combination, in a furnace, of a central hollow shaft, and stirrer arms supported upon but not otherwise connected to said shaft, each arm having an outboard portion projecting into a chamber of the furnace, and an inboard portion projecting into the hollow shaft and connected to the inboard portion of an opposite arm.

9. The combination, in a furnace, of a central hollow shaft having stuffing boxes secured to the inner face of the same, stirrer

arms, supported upon said shaft and its stuffing boxes but otherwise unsecured thereto, each stirrer arm having an inboard portion projecting onto the hollow shaft and secured
5 to the corresponding portion of an opposite arm.

In testimony whereof, I have signed my

name to this specification, in the presence of two subscribing witnesses.

UTLEY WEDGE.

Witnesses:

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