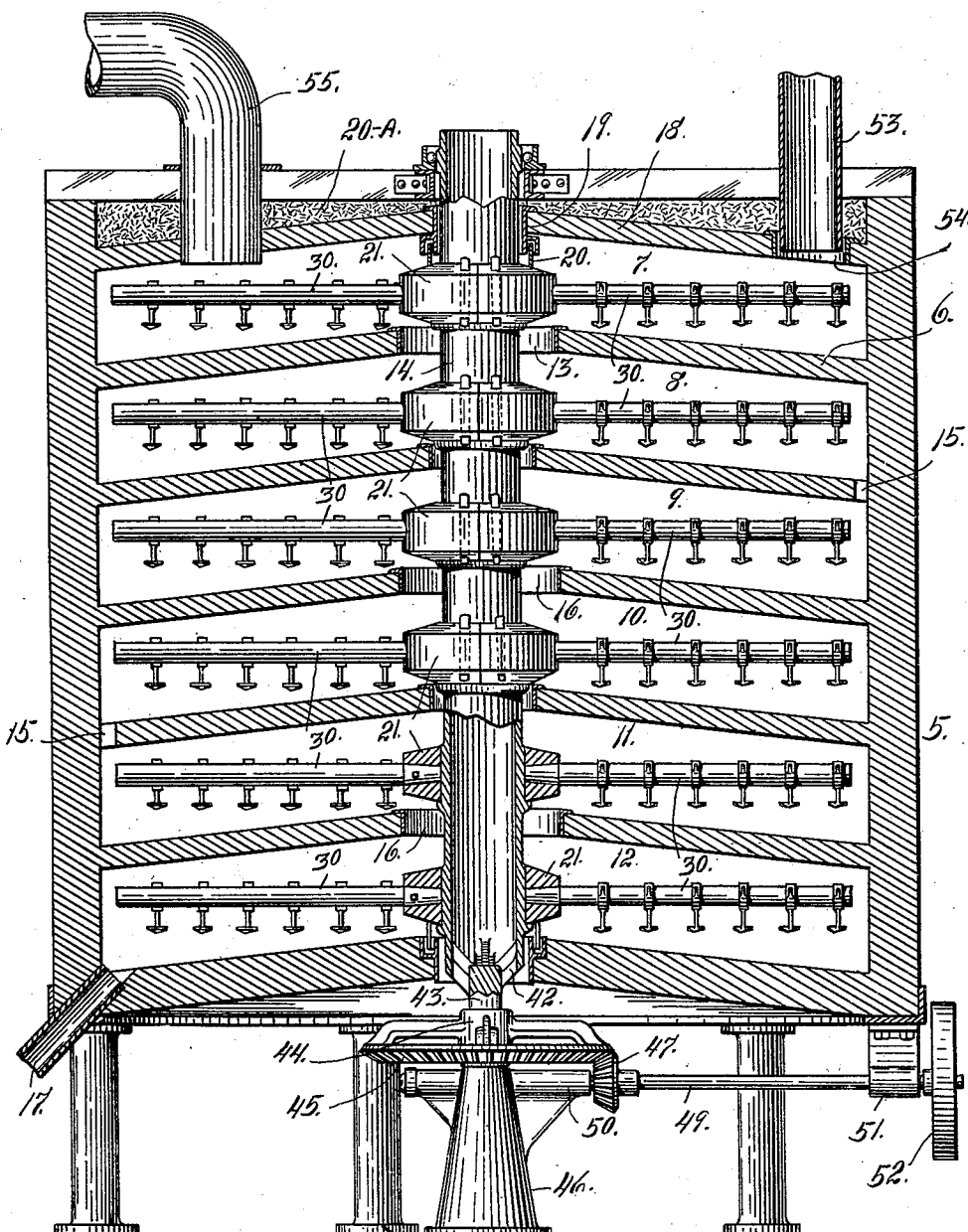


C. E. DEWEY.
ROASTING FURNACE.
APPLICATION FILED MAR. 25, 1910.

992,407.

Patented May 16, 1911.

3 SHEETS—SHEET 1.



Witnesses

Otto E. Hoddick
J. D. Thornburgh.

Fig. 1

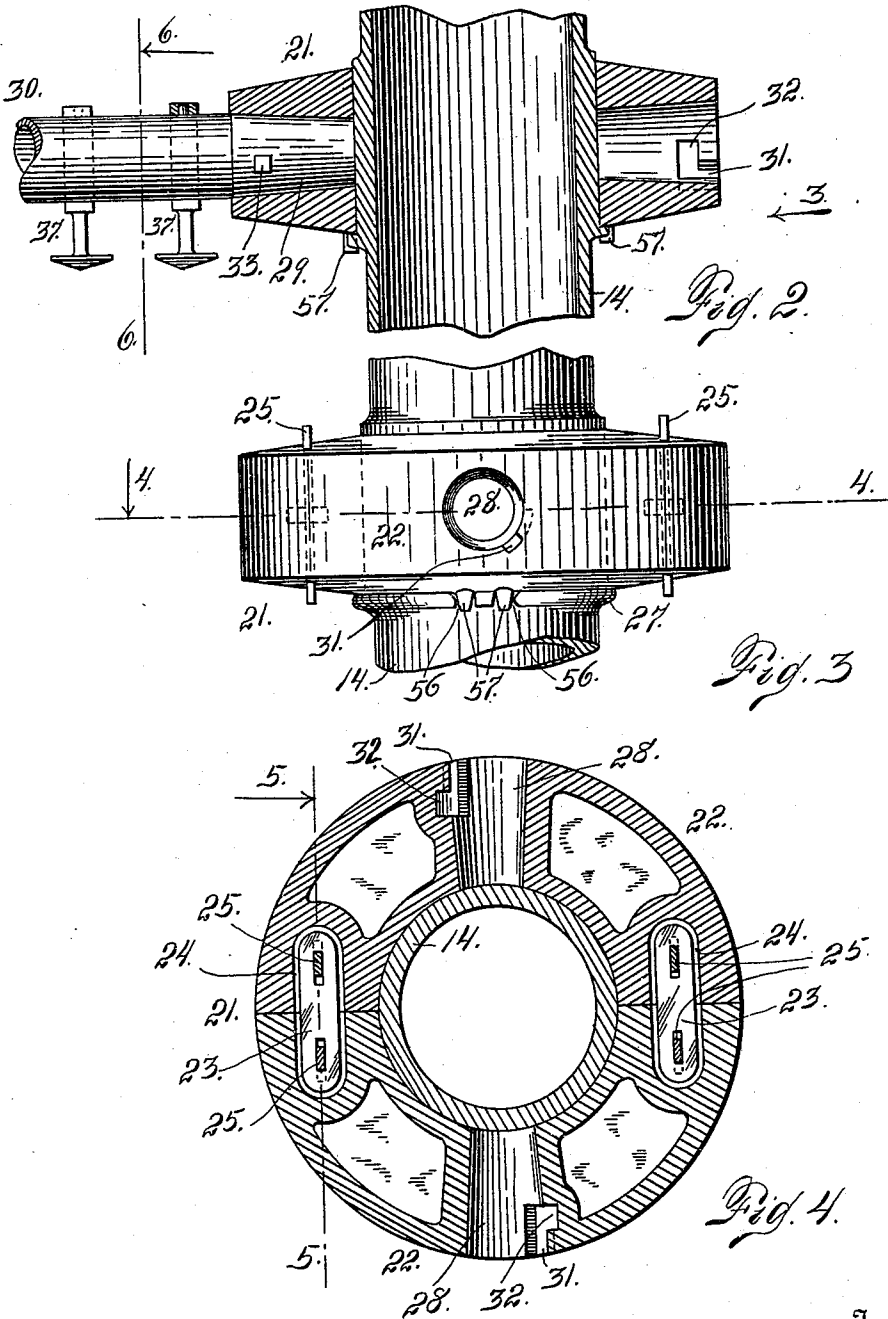
Inventor
Chauncey E. Dewey.
By C. J. O'Brien.
Attorney

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3 SHEETS—SHEET 2.



Witnesses
Otto E. Huddick.
J. D. Thornburgh.

Inventor
Chauncey E. Dewey.
By *R. O.'Brien*.
Attorney

C. E. DEWEY.
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3 SHEETS—SHEET 3.

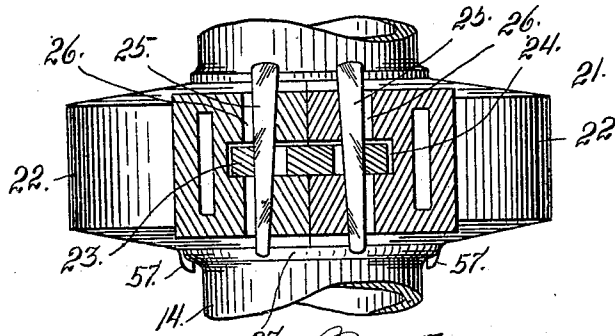


Fig. 5.

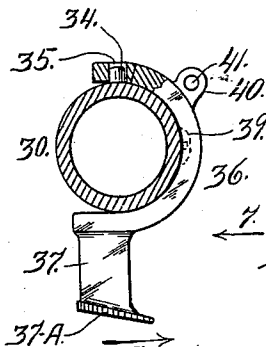


Fig. 6.

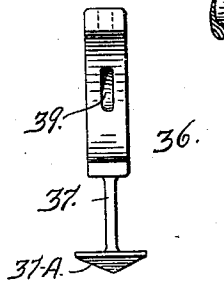


Fig. 8.

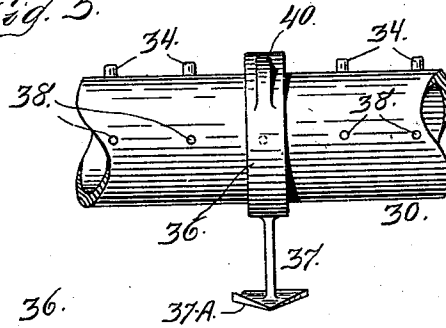


Fig. 7.

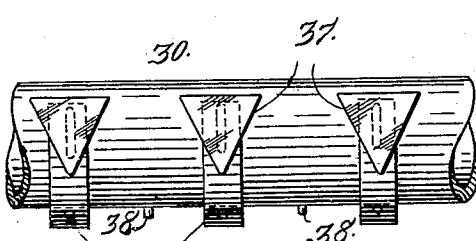


Fig. 9.

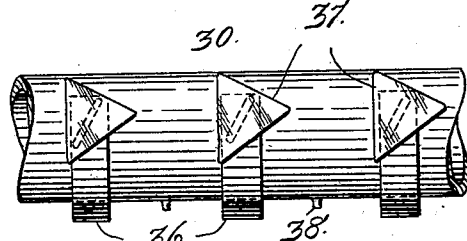


Fig. 10.

Witnesses

Otto E. Hoddick.
J. D. Thornburgh.

Inventor

Chauncey E. Dewey.
By A. J. O'Brien.
Attorney

UNITED STATES PATENT OFFICE

CHAUNCEY E. DEWEY, OF DENVER, COLORADO.

ROASTING-FURNACE.

992,407.

Specification of Letters Patent.

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Application filed March 25, 1910. Serial No. 551,578.

To all whom it may concern:

Be it known that I, CHAUNCEY E. DEWEY, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Roasting-Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in roasting furnaces adapted for roasting ores for the purpose of removing certain impurities or elements which render the ore refractory and difficult to treat, such as sulfur, arsenic, etc.

My present improvements relate to special means for connecting the rabble arms with a hollow upright shaft, whereby the said arms may be readily connected therewith or detached therefrom as may be desired.

As shown in the drawing, the furnace consists of an upright casing equipped with shelves through which passes a hollow central shaft, upon which are mounted hubs to which the rabble arms are secured. This shaft is mounted to rotate and the rabble arms, which are equipped with plows, travel therewith and act upon the ore upon the shelves to stir the latter and at the same time cause it to gradually work downwardly from one shelf to another until it reaches the lowermost shelf where it is discharged completely roasted. In other words, the impurities, as sulfur, have been removed sufficiently to permit the advantageous treatment of the ore for the purpose of saving the precious-metal values contained therein.

The shelves are connected with and supported by the casing, and are alternately provided with openings at their inner and outer edges, whereby the ore is gradually fed from one shelf to another, the plows of the rabble arms being so set for instance that the ore upon the uppermost shelf is caused to travel toward the shaft and pass downwardly through an opening of the shelf surrounding the shaft, to the shelf next below. The plows located in the lower compartment and acting upon the ore of the next shelf below, cause the material to travel outwardly whereby it is discharged through

openings at the outer edge of the shaft, causing it to fall to the shelf next below, and so on, until the ore has traveled from the top shelf to the bottom of the furnace, where it is discharged as heretofore explained.

The hubs with which the rabble arms are connected, each consists of two members suitably connected and locked upon the shaft, the latter being provided with shoulders forming supports for the hubs. These hubs are provided with sockets of special construction for the reception of the rabble arms, each arm being provided with a lug adapted to enter a slot or groove formed in the outer wall of the socket and terminating in a slot extending at right angles to the first named slot, whereby by giving the rabble arm a partial turn after inserting it in the socket, the lug will be carried into the inner member of the slot where it will be prevented from outward movement until turned to the proper position. The plows of the rabble arms are so connected that the resistance offered by the ore during the travel of these arms over the various shelves, is such that there is a tendency to impart rotary movement to the arms, whereby the lugs upon their inner extremities are held in the locked position when the shaft is in motion.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a vertical section taken through a roasting furnace, equipped with my improvement. Fig. 2 is a fragmentary sectional view showing the hollow shaft, one of the hubs with which it is equipped, together with a rabble arm. Fig. 3 is an elevation looking in the direction of arrow 3, Fig. 2. Fig. 4 is a horizontal section taken on the line 4—4, Fig. 3. Fig. 5 is a vertical section taken on the line 5—5, Fig. 4. Fig. 6 is a cross section of one of the rabble arms taken on the line 6—6, Fig. 2. Fig. 7 is a fragmentary elevation of one of the rabble arms looking in the direction of arrow 7, Fig. 6. Fig. 8 is a detail view showing one of the rabble arm plows. Fig. 9 is a fragmentary underneath view of one of the rabble arms. Fig. 10 is a similar view showing the plows in a different position.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a cylindrical casing equipped with shelves 6 which separate the roasting chamber into compartments 7, 8, 9, 10, 11 and 12, the said compartments being numbered from the top downwardly. These shelves are stationary, the uppermost shelf having a central opening 13 surrounding a hollow rotary shaft 14. The shelf next below is equipped with openings 15 at its outer edge, while the next shelf is equipped at its inner edge with an opening 16, and so on, until the bottom of the furnace is reached. The ore is discharged in the roasted condition from the bottom compartment 12 through a spout 17.

The shaft 14 is hollow and open at both ends to allow the air to circulate freely therethrough for cooling purposes. The inner edge of the top 18 of the casing is provided with a collar 19 whose lower portion extends into the compartment 7 and has an angular groove adapted to receive a flange 20, forming a tight joint to prevent the possible escape of the fumes around the shaft. The upper portion of the roaster above the top 18 is filled with a suitable packing material 20^a which insulates the furnace, so to speak, and aids in maintaining the necessary degree of heat for roasting purposes.

As each hub 21 is substantially the same as every other hub of the rotary shaft 14, the description of one of these hubs will be sufficient for all. Each hub is composed of two substantially twin members 22 which are connected together by locking plates 23 located in recesses 24 formed in the members 22 and registering with each other when the two members are placed together. Before bringing the two members together the plates 23 are inserted in the recesses 24 of one member, after which the other member is applied, the protruding portions of the plates 23 entering the recesses of the companion member. When this is done, wedge-shaped locking keys 25 are inserted in vertical openings 26 formed in the members 22 and extending through the same and intersecting the recesses 24, the plates 23 being also apertured to receive the locking keys 25. By virtue of this construction, the members 22 are locked securely in place upon the shaft, the latter being equipped with supporting collars 27 upon which the hubs rest.

Each hub, as illustrated in the drawing, is equipped with a number of sockets 28 adapted to receive the inner cone-shaped extremities 29 of the rabble arms 30. The body portions of these rabble arms are cylindrical, as illustrated in the drawing, while their inner extremities are tapered to fit the sockets of the hubs. Each hub is provided with a slot or groove 31 which extends into the hub a short distance, and terminates in a groove 32 extending at right angles to the groove 31 and adapted to receive a lug 33

which is shaped to enter the slot 31, after which the arm is given a partial turn, causing the lug 33 to enter the locking portion 32 of the slot, forming a sort of bayonet joint connection between the hub and the rabble arms.

As shown in the drawing, each rabble arm 30 is provided with a series of pins or lugs 34, adapted to enter perforations 35 formed in the upper extremities of curved members 36 arranged to partially surround the rabble arms. By referring to Fig. 6 of the drawing, it will be understood that as these arms travel in the direction of the arrow A of said figure, the force acting upon the plows 37 has a tendency to impart a partial rotary movement to the rabble arms, whereby the plows are held securely in place upon the rabble arms, and the latter securely locked upon the hubs of the various shafts. Each rabble arm is further provided with relatively small pins 38 adapted to enter small recesses 39 also formed in the curved members 36, thus locking the plows upon the rabble arms whereby they are secured in place.

It will be understood from an inspection of the drawing, that while the plows are locked in place upon the rabble arms when the latter are in motion for ore-roasting purposes, these plows are readily removable from the arms by lifting thereon and to this end each curved spanner member of the plow is provided with a lug 40 having a perforation 41 adapted to receive a tool (not shown), which may be inserted into the furnace for the purpose of lifting the plows from the rabble arms when for any reason it may be necessary so to do.

The lower extremity of the hollow shaft 14 is connected by means of separated webs 42 with the upper extremity of a shaft 43 secured to the hub 44 of a bevel gear 45 mounted upon a stationary support 46. The gear 45 meshes with an operating pinion 47 mounted on a shaft 49, one extremity of which is journaled in a bearing 50 formed integral with the base 46. The outer extremity of the shaft 49 is journaled in a depending bearing 51. Connected with the outer extremity of this shaft is a pulley 52 which may be connected with any desired power for operating purposes.

When the roaster is in operation, the material to be treated is fed to the upper shelf of the roaster through a conduit 53 whose lower extremity enters an opening 54 in the top 18 of the structure. Communicating with the uppermost compartment 7 of the structure is a pipe 55 for carrying off the fumes and delivering them to a smoke stack (not shown). The combustible material, as sulfur, contained in the ore is ignited as the material is discharged into the furnace, any suitable provision being made for this pur-

pose. The shaft 14, carrying the rabble arms, is rotated whereby the said arms are made to travel around in their respective compartments, the plows of the arms acting upon the ore to cause the same to travel in a zigzag course through the furnace from top to bottom. For instance, the ore in the uppermost compartment is gradually worked toward the center by the action of the plows carried by the rabble arms whereby it is discharged through the central opening 13 to the compartment 8 next below. In this last named compartment, the plows of the rabble arms are so arranged that the ore is caused to travel outwardly upon the shelf and gradually pass downwardly through openings 15 at the outer edge of the shelf or hearth, and thence into the compartment 9. From this last named compartment it is discharged through a central opening 16 into the compartment 10, and so on, until it reaches the lowermost compartment 12 of the furnace, whence it is carried out of the furnace through a discharge pipe 17 completely roasted. In order to cause the ore to travel in opposite directions upon the different hearths or shelves during the operation of the apparatus, the rabble arms are equipped with suitable plows. The distinction between the plows upon the two arms is illustrated in Figs. 9 and 10. In Fig. 9 the plows being shown straight with the spanner arms which support them, while in Fig. 10 the plows are set at an angle to the arms whereby the material is caused to travel in the desired direction. As shown in the drawing the plow members or the lower extremities of the plows are formed integral with the spanner arms and shanks. In this event the devices are cast or constructed with the plow members differently arranged with reference to the spanner arms, and the rabble arms are equipped with plows of such construction as to give the desired result in the handling of the ore upon the various hearths of the furnace. In Fig. 1 of the drawing no attempt has been made to show the plows occupying different positions, owing to the small scale of the drawing in this view.

The peculiar shape of the lower extremity 37^a of each plow is worthy of mention. This portion, or the plow proper, occupies an inclined position, its forward extremity being lowermost, while the plow is upwardly inclined therefrom. By virtue of this construction the plow has a tendency to lift the ore as it passes therethrough since the ore is compelled to travel upwardly from the point of the plow until it escapes or leaves the rear end thereof. This is important since it maintains the ore to be roasted in a loose condition, whereby it may be more advantageously acted upon by the heat whose function is the burning out of

the sulfur and other impurities which when in a raw state render the ore refractory or difficult to treat, as heretofore explained.

It will be understood that the hubs 21 must be locked to rotate with the shaft 14. As shown in the drawing this is accomplished by forming recesses 56 in the collar 27 of the shaft, adapted to receive depending lugs or teeth 57 formed on the hub. It is evident that several sets of locking devices of this character may be provided for locking each hub upon the shaft to rotate therewith. By virtue of this construction the hubs are securely locked upon the shaft and at the same time are readily detachable as will be understood from the foregoing explanation.

Having thus described my invention what I claim is:

1. In a roasting furnace, the combination with a rotatable hollow shaft, of rabble arms connected with the said shaft which is equipped with exterior hubs having tapering sockets to receive the inner extremities of the arms the said sockets terminating outside of the hollow of the shaft, the arms having lugs adapted to enter angle-shaped slots formed in the hub, and plows connected with the rabble arms and having a tendency to impart rotary movement to the said arms, whereby the lugs of the arms are held in the locked relation with the hub, for the purpose set forth.

2. In a roasting furnace, comprising a casing, an upright rotatable hollow shaft equipped with exterior hubs having sockets terminating on the outside of the hollow of the shaft, rabble arms whose inner extremities are adapted to enter the sockets of the hubs, the latter having angle slots and the rabble arms lugs to engage said slots in interlocking relation, and plows mounted on the rabble arms and arranged to exert a rotative force upon the rabble arms whereby the latter are held securely locked in the hubs during the rotation of the shaft.

3. A roasting furnace, comprising a chamber, a centrally located upright hollow shaft equipped with rabble arms, the shaft having exterior hubs provided with tapering sockets terminating on the outside of the hollow of the shaft, the said hubs having angle-shaped grooves formed in the walls of the sockets, the inner extremities of the rabble arms being equipped with lugs to enter said grooves, and plows arranged upon the rabble arms to impart a rotative force upon the said arms whereby the latter are held in operative relation with the hubs during the rotation of the shaft.

4. A roasting furnace provided with a vertically arranged rotatable hollow shaft, equipped with exterior hubs having sockets terminating on the outside of the hollow of the shaft, grooves formed in the sockets,

each groove having an inwardly directed straight portion and a portion extending at right angles to the straight portion, and rabble arms whose inner extremities are adapted to enter the said sockets and equipped with lugs adapted to enter the angle-grooves of the sockets, the inner portion of each groove extending rearwardly with reference to the travel of the rabble arms whereby the resistance offered to such travel by the ore imparts a rotative force to the rabble arms, whereby their lugs are caused to engage the inwardly located and rearwardly directed grooved portions of the hubs, substantially as described.

5. In apparatus of the class described, the combination of a vertically arranged hollow shaft mounted to rotate, an exterior hub mounted on the shaft and having sockets terminating on the outside of the hollow of the shaft and equipped with grooves having portions extending inwardly from the outer extremities of the sockets and interior portions extending at an angle to the first named portions, and rabble arms having extremities adapted to enter the sockets and equipped with lugs adapted to enter the grooves of the hub, the interior portions of the said grooves extending rearwardly with reference to the travel of the rabble arms whereby a rotative force is imparted to the said arms, substantially as described.

6. An upright hollow shaft equipped with

exterior hubs arranged one above another, each hub consisting of two members recessed to receive interlocking apertured plates, the hub members having apertures communicating with the plate apertures, and wedge-shaped keys inserted in the apertures of the hubs and plates for interlocking purposes, the said hubs also having sockets terminating on the outside of the hollow of the shaft, and rabble arms adapted to enter the said sockets, substantially as described.

7. A roasting furnace equipped with a vertical hollow shaft provided with exterior hubs arranged one above another, each hub having a socket terminating on the outside of the hollow of the shaft and provided with an angle groove formed in its wall, the said groove extending inwardly from the extremity of the socket and having an interior member at an angle to the first named member, and a rabble arm having a lug adapted to enter the groove of the socket, the shaft being mounted to rotate, and the interior groove member of the hub being rearwardly directed with reference to the travel of the rabble arm, for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHAUNCEY E. DEWEY.

Witnesses:

ELIZABETH BOWEN,
A. EBERT O'BRIEN.