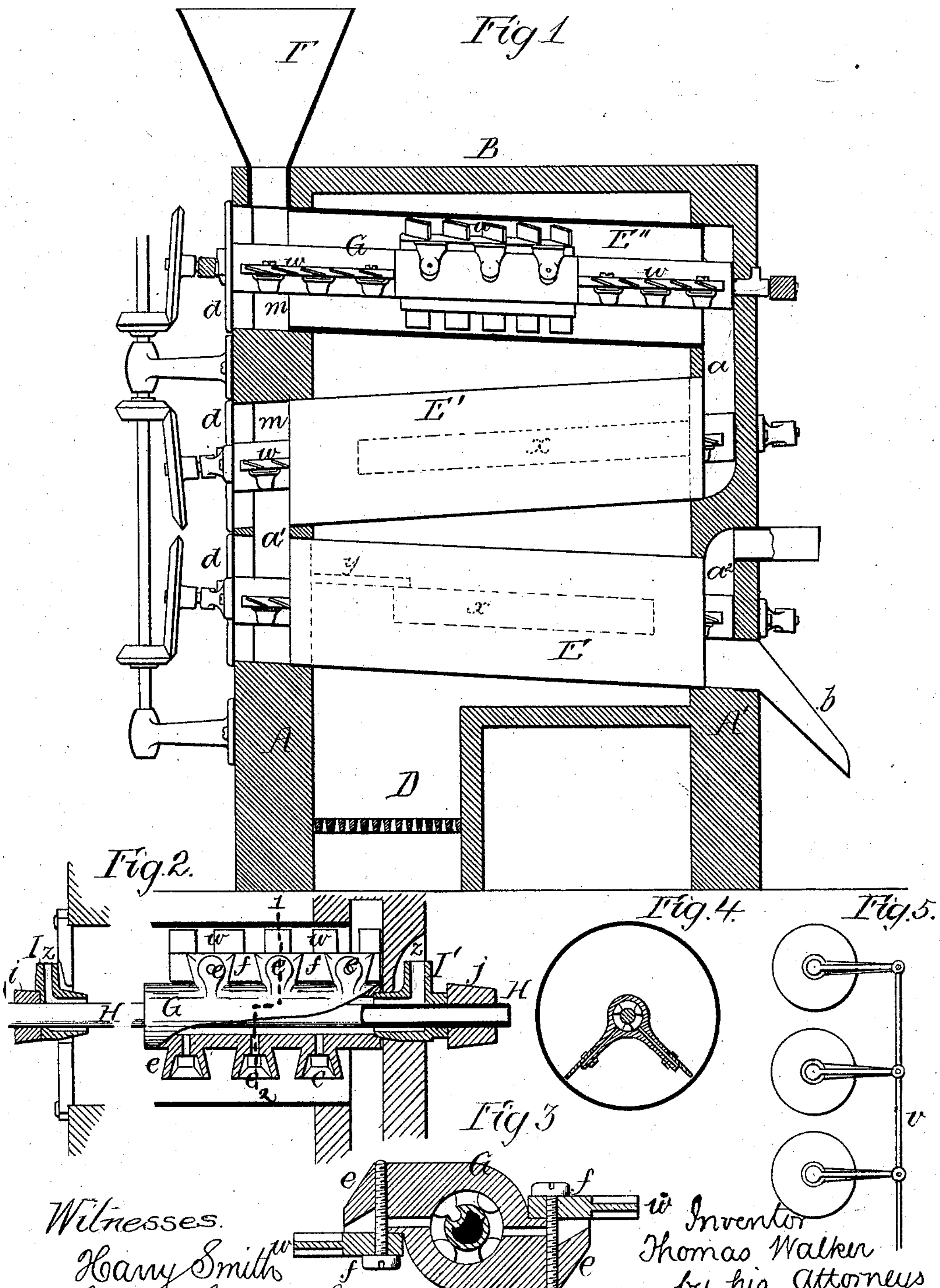
T. WALKER.
Revolving Ore-Roaster.

No. 203,800. Patented May 14, 1878.



Witnesses.
Harry Smith
Henry Howson Jr

Inventor
Thomas Walker
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

THOMAS WALKER, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN REVOLVING ORE-ROASTERS.

Specification forming part of Letters Patent No. **203,800**, dated May 14, 1878; application filed October 8, 1877.

To all whom it may concern:

Be it known that I, THOMAS WALKER, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Ore Roasters and Desulphurizers, of which the following is a specification:

My invention relates to improvements in apparatus for roasting pulverized ores; and the main objects of my improvement are to facilitate the operation of roasting, and at the same time to desulphurize, the ore, and oxidize the base metals in the same, by subjecting the said ore, while agitated, to jets of air, as described hereinafter.

In the accompanying drawing, Figure 1 is a vertical section of my improved ore-roasting apparatus; Fig. 2, a view, partly in section, and drawn to an enlarged scale, of part of the apparatus; Fig. 3, a transverse section on the line 1 2, Fig. 2; Fig. 4, a view illustrating a modification of my invention; and Fig. 5, a diagram appertaining to the modification shown in Fig. 4.

A and A′ are the front and rear walls of a furnace, of which B is the roof and D the fire-place. Within the furnace are the hollow cylinders E, E′, and E″, (three in number in the present instance,) arranged above each other and inclined as shown, the ends of the cylinders fitting into the walls of the furnace.

Each cylinder is introduced into its place in the furnace through an opening, *m*, in the front wall, and each opening is closed by a cover-plate, *d*. Partitions *x* are arranged within the furnace, as shown by dotted lines in Fig. 1, so that the products of combustion, in passing from the fire-place to the chimney, are caused to take a zigzag course and act with reverberatory effect on the cylinders. The front end of the lowermost of these partitions should have formed in it an opening provided with a suitable damper, *y*, by opening which the products of combustion may be allowed to take a more direct course to the chimney, in order to more rapidly heat the top cylinder at the commencement of the operation.

A hopper, F, at the top of the furnace, communicates with the highest end of the uppermost cylinder E″, a passage, *a*, in the wall A′ forming a communication between the lower end of the cylinder and the highest end of the middle cylinder, and a passage, *a′*, in the wall A, forming a communication between the middle cylinder E′ and the lowest cylinder E. Within each of these cylinders is a rotating shaft, G, carrying a series of inclined vanes, referred to hereinafter.

The pulverized ore is placed in the hopper F, and is caused to traverse the uppermost cylinder E″ by the vaned shaft. The ore, falling onto the bottom of the passage *a*, where it is brought under the influence of the vaned shaft of the middle cylinder, is directed through the latter into the bottom of the passage *a″* in the wall A, whence it is directed into the third and lowermost cylinder, E, from which it is directed by a spout, *b*, into any suitable receptacle.

During the passage of the ore through the cylinders it is subjected to the action of a number of jets of air, in the manner which will be best understood by referring to the enlarged views, Figs. 2 and 3.

Each shaft G contains an inner shaft, H, and between the two shafts, which are secured together, is a passage or passages for air under pressure. Each hollow shaft extends from the inside of the cover-plate *d* of the opening *m* in the front wall to the rear wall; but the inner shaft H passes at one end through the said cover-plate, through a short tube, I, and through a bearing, *i*, secured to the front wall, and at the opposite end through a similar short tube, I′, and through a bearing, *j*, attached to the same. The short tube I′, which has a branch, *z*, communicating with suitable air forcing or blowing apparatus, fits snugly in the end of the hollow shaft G, its interior forming a chamber, closed at the outer end by the inner shaft H, but having free communication with the interior of the outer shaft G.

The short tube I is similarly adapted to the opposite end of the hollow shaft G, and forms a chamber communicating with the interior of the said shaft, while its branch *z* also communicates with a blowing apparatus, so that the air enters at both ends of the shaft. The short tubes are fixed, while the shafts G H are arranged to revolve together in the bearings *i* and *j*.

A series of recessed lips, *e*, project from opposite sides of the hollow shaft, and to each

row of lips is secured a plate, *f*, having a series of oblique vanes, *w*, the recesses of the lips covered by the plates forming passages through which air introduced into the hollow shaft may escape into the cylinder in the form of jets.

The hollow shaft is preferably made in sections, (three in the present instance,) and the vanes of the middle sections may be at right angles to those of the other sections, the shafts being revolved by suitable gearing.

As the pulverized ore traverses slowly through the cylinders it is agitated by the vanes, at the bases of which air escapes in jets, so that there must necessarily be intimate contact of air under pressure with the ore while the latter is in a state of agitation.

The chamber *a''* at the end of the lowest cylinder communicates with an exhaust-fan or other exhausting device, so that the noxious gases from the cylinders may be carried off to any distant point.

The central shaft H is, by preference, made hollow, so that a stream of water may be caused to pass constantly through the same, thereby preventing the undue heating of this shaft or of the outer shaft G in case the supply of air is cut off from the space between the two shafts.

Although I have shown but one set of cylinders in the furnace, the latter may be large enough to contain three or four sets.

It is not essential that the cylinders should contain rotating stirring-vanes. Thus in the modification, Fig. 4, the shaft is arranged to vibrate, and is provided with two rows of vanes, while jets of air escape into the pulverized ore at and near the vanes, as described above.

The three shafts of the three cylinders may be caused to vibrate simultaneously by connecting a reciprocating rod, *v*, to arms in the shaft, as illustrated by the diagram, Fig. 5.

I claim as my invention—

1. A cylinder through which the ore is caused to pass, in combination with a hollow shaft having vanes or stirrers and orifices for the escape of air from the shaft in jets near the vanes, all substantially as set forth.

2. The combination of the hollow shaft G, the inner shaft H, recessed lips *e*, and vaned plates *f*.

3. The combination of the inner shaft, adapted to bearings, and the outer hollow shaft, having air-orifices, with a short fixed tube at one or both ends of the shaft.

4. The combination of the cylinders E, E′, and E″ with the passages *a a′ a″* and an exhaust-pipe through which to carry off the noxious gases, as specified.

5. The hollow shaft G, carrying the vanes or stirrers and communicating with an air-blast, in combination with the hollow internal shaft H, communicating with a supply of water, as and for the purpose set forth.

6. The combination of a furnace and a series of retorts with the lower partition *x*, leaving an opening at the end farthest from the fire-place, and provided with an opening and damper, *y*, at the opposite end, as and for the purpose set forth.

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

THOS. WALKER.

Witnesses:

HERMANN MOESSNER,

HARRY SMITH.

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