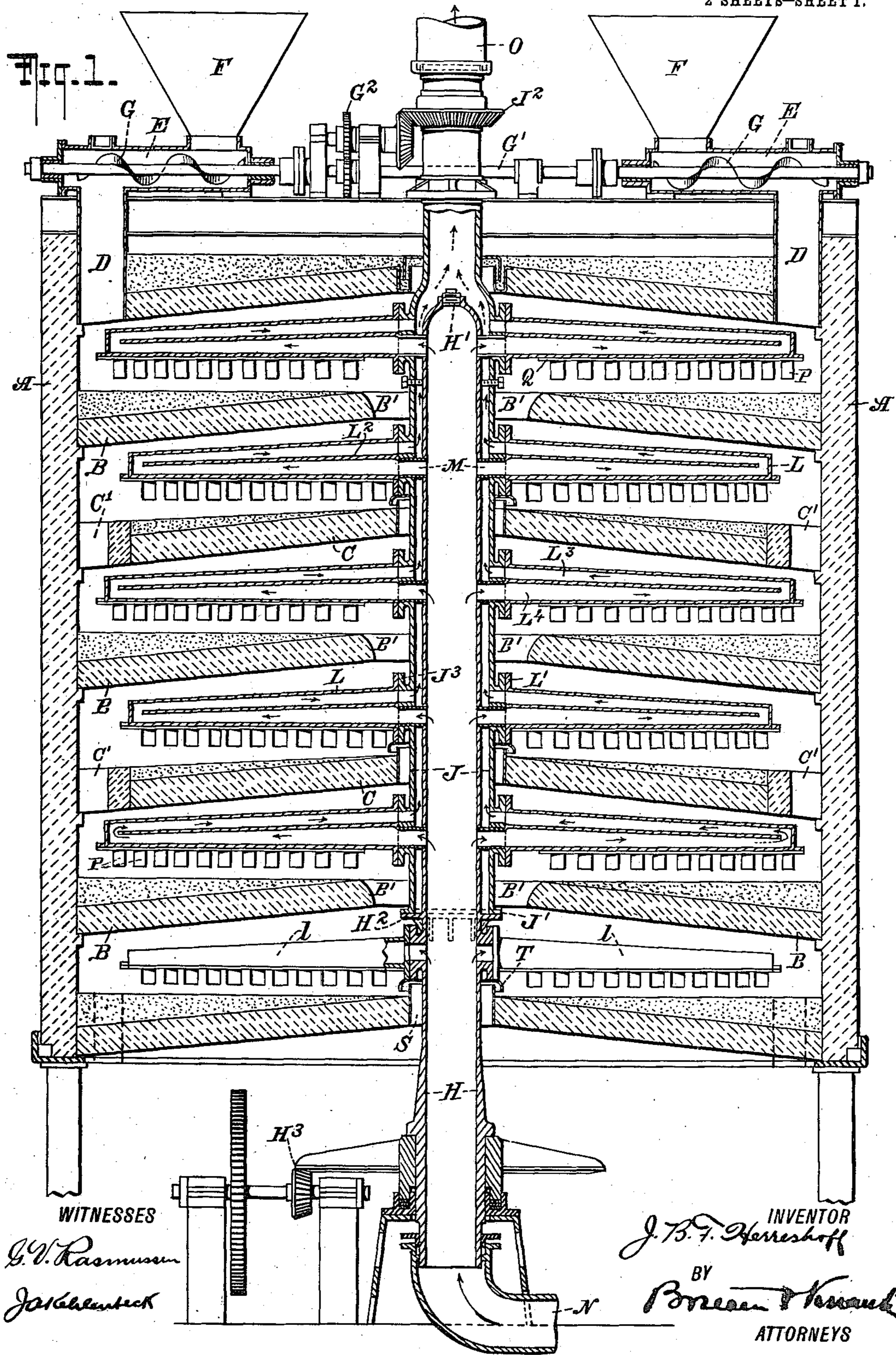


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 ORE ROASTING FURNACE.  
 APPLICATION FILED JULY 20, 1908.

976,175.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

JOHN B. F. HERRESHOFF, OF NEW YORK, N. Y., ASSIGNOR TO NICHOLS COPPER CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## ORE-ROASTING FURNACE.

976,175.

Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed July 20, 1909. Serial No. 508,598.

*To all whom it may concern:*

Be it known that I, JOHN B. FRANCIS HERRESHOFF, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Ore-Roasting Furnaces, of which the following is a specification.

My invention relates to furnaces for roasting fine ores and has for its object to improve the construction of a type disclosed in patents previously granted to me, particularly as to means for increasing the life and efficiency of the apparatus by proper cooling arrangements.

A specific embodiment of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of an ore roasting furnace containing my improvements; Fig. 2 is a vertical section drawn upon an enlarged scale showing one of the stirrer or rabble arms; Fig. 3 is a horizontal section on line 3—3 of Fig. 2; Fig. 4 is a horizontal section on line 4—4 of Fig. 2 and Figs. 5 and 6 are views taken substantially on lines 5—5 and 6—6 of Fig. 2.

The body or frame A of the furnace is provided with a series of superposed floors B—C, which are provided laterally with central openings B' and peripheral openings C'. The ore is delivered to the uppermost floor B through chutes D leading from cylindrical chambers E receiving a supply from hoppers F. The ore is fed in the chambers E by means of screw conveyers G, mounted upon a shaft G', which is driven by means of gearing G<sup>2</sup>. By means of rabble arms of a type now well-known in the art, the ore is crowded laterally inward to the openings B' and outward to the openings C' and travels downward while the roasting gases travel upward. Centrally within the structure extends a hollow vertical shaft H closed at the top by a plug H'. With this shaft is connected rigidly a sleeve J. For instance the bottom of the sleeve may have a flange J' bolted to a corresponding flange H<sup>2</sup> of the shaft, the upper end of the sleeve J and the lower end of the shaft H are driven by suitable mechanism such as the gearing H<sup>3</sup>. A gear J<sup>2</sup> is connected with the upper portion of the sleeve J and serves through the medium of the gear G<sup>2</sup> to op-

erate the screw conveyers G. To the sleeve J are secured as by means of bolts and nuts K the rabble arms L. Each of these arms is preferably provided at its inner end with a flange L', fitted against a corresponding flange J<sup>3</sup> of the sleeve J, and furthermore the rabble arm is divided internally by a partition L<sup>2</sup> into two channels, of which the upper channel L<sup>3</sup> communicates with the interior of the sleeve J by means of an aperture J<sup>4</sup> while the lower channel L<sup>4</sup> communicates with the interior of the shaft H by means of a nipple or tube M inserted into a suitable aperture of the shaft and extending therefrom outwardly through a suitable aperture of a sleeve to form a tight joint with the inner surface of the rabble arm. Air is supplied by means of a blower or other suitable device through a pipe N connected with the lower end of the shaft H and this air passes through the several nipples M to the channels L<sup>4</sup> and L<sup>3</sup>, cooling the rabble arms and the shaft and finally escapes through the sleeve J and the stationary pipe O connected with the upper end thereof. As shown in the drawings, the lowermost rabble arms l need not be provided with the air circulating means described above.

The projections P carried by the rabble arms are inclined alternately to the left and to the right in adjacent arms so as to alternately force the ore inward and outward on the several floors in the well-known manner. I prefer to attach these rabble arms to movable sections Q, each carrying three or four such projections and provided with suitable means for temporary attachment such as the overlapping hooks Q' shown in Figs. 3 and 5. These hooks fit over flanges L<sup>5</sup> of the rabble arms and each section Q may therefore be slid lengthwise of the rabble arm, thus facilitating the insertion and removal of the sections carrying the projections P. Nuts and bolts, as indicated at R, or any other suitable means may be employed for preventing accidental movement of the sections Q during the normal operation of the furnace. I have also indicated in Fig. 1 pipe sections S arranged at the center of the floors C, which pipe sections are overlapped by inverted cups T shown also in Figs. 2 and 3. These parts of the furnace are provided for the passage of air through it at the beginning of the operation, but as soon as the ore

descends to the successive floors C, it rises above the level of the inverted cups T and forms a seal therefor.

I claim as my invention:

5 1. An ore-roasting furnace comprising a casing with superposed floors, a hollow upright shaft in said casing, a sleeve surrounding said shaft and connected therewith, and rabble arms held to rotate with said shaft  
10 and located entirely exteriorly thereof, said rabble arms being provided with interior channels communicating with the interior of the shaft and sleeve respectively.

15 2. In a furnace the combination of the casing, a hollow shaft therein, a sleeve connected with the shaft and a rabble arm held to turn with the shaft and located entirely exteriorly thereof, said rabble arms being provided with an internal cooling channel  
20 one end of which communicates with the interior of the shaft while its other end communicates with the interior of the sleeve.

25 3. In a furnace the combination of the body or casing mechanism for feeding material to the furnace, a hollow shaft extending therein and projecting at one end, a sleeve connected with the shaft and projecting

through the body at the end opposite to the shaft, driving means connected with the projecting portion of the shaft driven mechanism connected with the projecting portion  
30 of the sleeve for operating said feeding mechanism, and rabble arms provided with internal cooling channels connected at one end with the interior of the shaft and at  
35 the other end with the interior of the sleeve.

4. The combination of the body or casing, the hollow shaft extending therein, the sleeve connected with the shaft and rabble arms mounted to turn with the shaft and  
40 located entirely exteriorly thereof, said rabble arms being provided with superposed channels, communicating with each other at their outer ends, the inner ends of said channels communicating respectively with the in-  
45 terior of the shaft and with the interior of the sleeve.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

J. B. F. HERRESHOFF.

Witnesses:

JOHN A. KEHLENBECK,  
FRITZ ZIEGLER, JR.