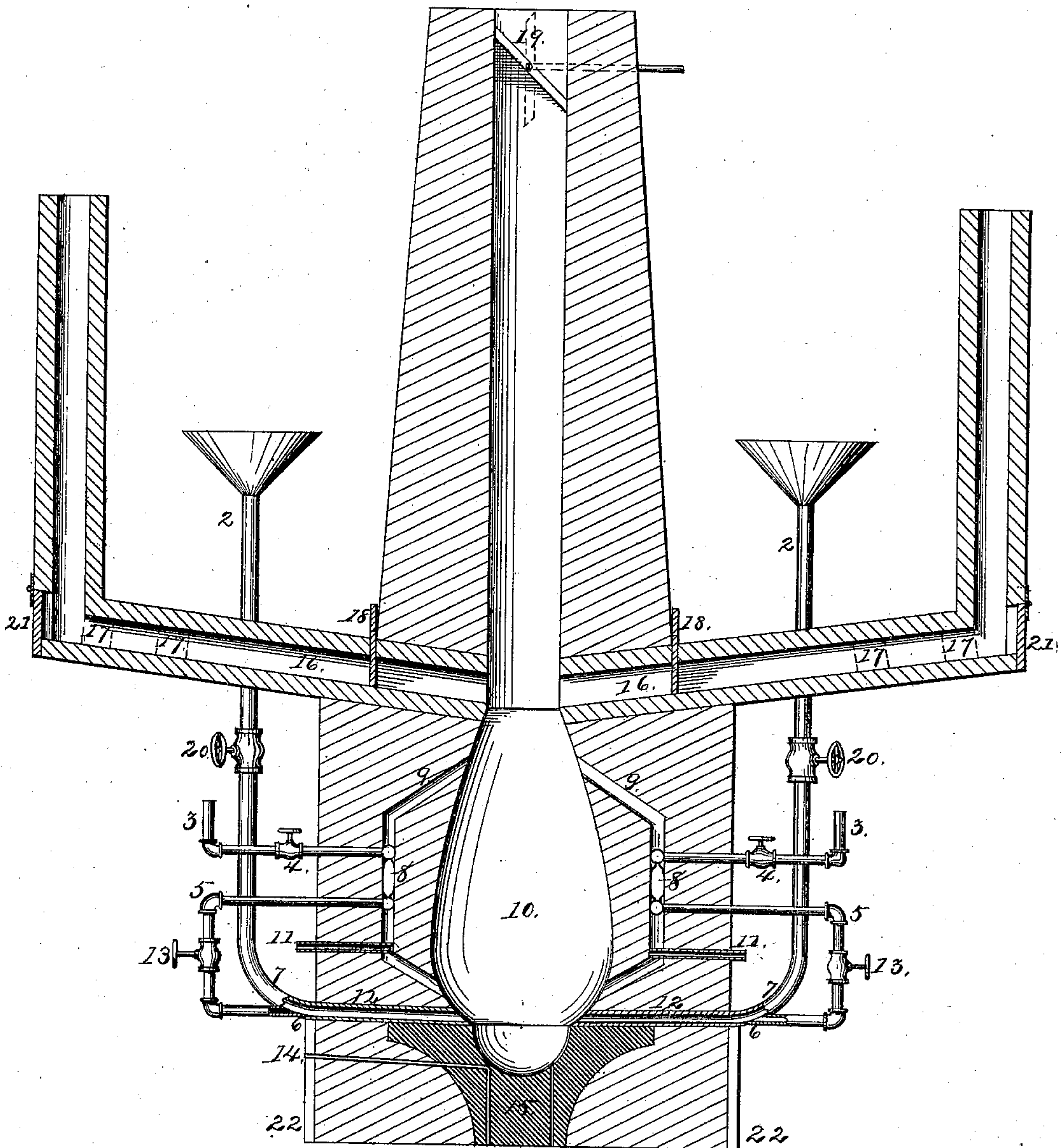


J. H. RAWLINGS & L. IRELAN.

BLAST-FURNACE.

No. 174,380.

Patented March 7, 1876.



Witnesses
D. M. Martin
S. S. Summons

Inventor
John H. Rawlings,
Lambert Ireland

UNITED STATES PATENT OFFICE.

JOHN H. RAWLINGS AND LAMBERT IRELAN, OF WATSONVILLE,
CALIFORNIA.

IMPROVEMENT IN BLAST-FURNACES.

Specification forming part of Letters Patent No. **174,380**, dated March 7, 1876; application filed
February 13, 1874.

To all whom it may concern:

Be it known that we, JOHN H. RAWLINGS and LAMBERT IRELAN, of Watsonville, county of Santa Cruz and State of California, have invented certain new and useful Improvements in Upright Furnaces, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, making a part of this description, in which the figure represents a vertical section of our improved furnace.

Our improvement relates to furnaces for the smelting and reduction of ores and metals; and it consists in the combination of devices, as hereinafter explained and claimed.

To enable others skilled in the art to make and use our furnace, we will proceed to describe the manner of its construction.

In the drawing, 10 represents an egg-shaped smelting-chamber. A short distance above, or at the top of the smelting-chamber, we place a bench of roasting-hearths or preparing-hearths, one, two, or more, as may be desired, for the purpose of heating and preparing large amounts of ore with the waste heat that would otherwise pass up the chimney and be lost, thus enabling our furnace to do a much larger amount of work than furnaces without such preparatory hearths can do. These hearths are constructed to hold nearly one ton each of ore at a single charge, and by closing the damper 19, at the top of main upper chimney, they will completely desulphurize and heat each ton of ore to a red heat every two hours, thereby enabling us to drop from one bench of four hearths four tons of ore every two hours into the smelting-chamber, and not retard the ordinary work in the least. These preparing-hearths may be placed every eight or ten feet for the entire length of the chimney, and thus utilize every particle of the escaping or waste heat.

The hearths should be made about thirty inches wide and seven inches deep, and are provided with port-holes 17, for introducing the ore upon the hearths, and through which the ore may be stirred while prepar-

ing them for the reduction or smelting chamber 10.

On each hearth is placed a damper, 18, by which to regulate the heat on the hearth. At the outer end of each hearth is a trap, 21, through which to insert a pushing-rod to push the ore from the hearth into the smelting-chamber.

The curved metal induction-pipe 2 is provided with an expanded top for gathering and conducting the atmospheric air into the pipe, (one or more of such induction-pipes may be used,) thus avoiding the use of a fan or other blower. The nozzle or lower end of the pipe 2 is adjusted to the tuyere, and is provided with a valve, 20, to regulate the amount of air admitted to the furnace, and thus prevent a too speedy oxidation of the fuel.

The steam-pipe 3 extends from a boiler to the superheater, and is provided with the valve 4, to regulate the amount of steam admitted.

The superheated-steam pipe 5 leads from the superheater into the air-pipe 2, at or near the point 6, and thus creates a vacuum above that point at 7, which causes the air to rush into and through the pipe 2 with great velocity until it is caught by the superheated-steam jet and carried into the furnace, where it commingles with the carbon and produces complete combustion.

The superheater 8 is in position in the flue 9, which connects at both ends with the smelting-chamber for conducting the heat to the superheater, and which is provided with the damper 11, for regulating the heat passing through the flue.

The tuyeres 12 are of the ordinary kind, and such as are in common use on the Pacific coast.

The valve 13 determines and regulates the amount of pressure in the superheater.

The metal siphon 14 is similar to those now in common use. The metal pot 15 is also of the ordinary kind, and 22 is the iron binding for same.

Having thus described our invention, what we claim as new is—

1. The preparing-hearths 16, provided with the ports 17, dampers 18, and trap 21, in combination with the smelting-chamber 10, substantially as and for the purpose set forth.

2. The preparing-hearths 16, provided with the ports 17, dampers 18, and traps 21, in combination with the smelting-chamber 10, air-pipes 2, provided with the valve 20, super-

heater 8, and steam-pipe 3, all constructed to operate substantially as and for the purpose set forth.

JOHN H. RAWLINGS.
LAMBERT IRELAN.

Witnesses:

ED. MARTIN,
S. S. SIMMINS.