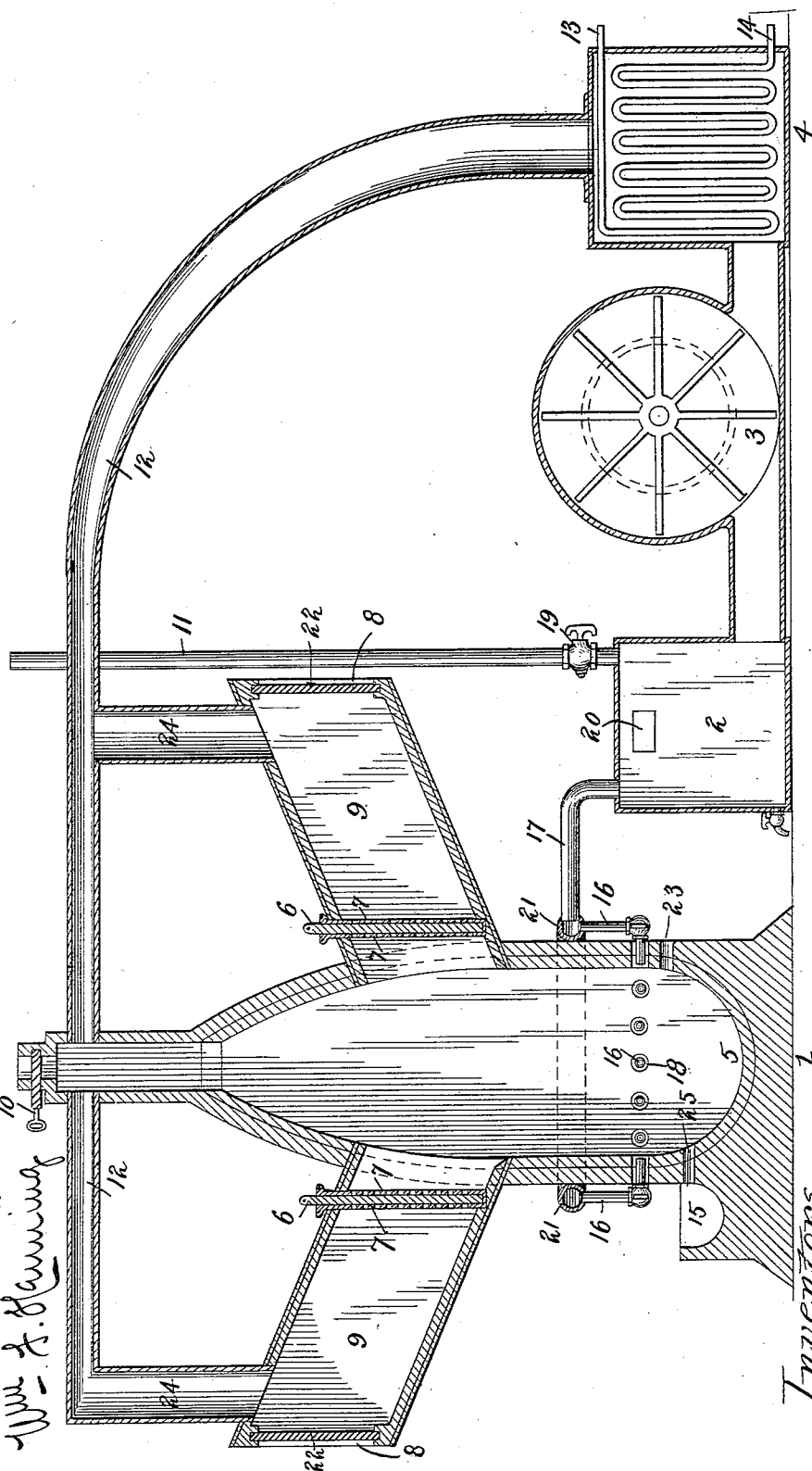


(No Model.)

C. J. BEST & A. E. MEANOR.
COMBINED CALCINER AND SMELTER.

No. 569,537.

Patented Oct. 13, 1896.



Witnesses.

Wm. M. Rhau.

Wm. F. Hanning

Inventors
Charles J. Best
Alison E. Meanor

UNITED STATES PATENT OFFICE.

CHARLES J. BEST AND ANSON E. MEANOR, OF CHICAGO, ILLINOIS.

COMBINED CALCINER AND SMELTER.

SPECIFICATION forming part of Letters Patent No. 569,537, dated October 13, 1896.

Application filed November 21, 1895. Serial No. 569,839. (No model.)

To all whom it may concern:

Be it known that we, CHARLES J. BEST and ANSON E. MEANOR, citizens of the United States, residing at the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Smelting Device or Furnace, which are fully set forth in the following specification, reference being had to the accompanying drawings.

Our invention relates to improvements in smelters or furnaces for the smelting and extraction of all kinds of metals from base or refractory ores, the preliminary treatment of the same, and the preparation of raw fuel for smelting purposes.

The objects of our improvements are the elimination of the gas containing said volatile metals, being drawn by suction and delivered by blast in the said tank where precipitation occurs, and the use of the gas for fuel when desired, which has been generated in the heating process in the calcining-spaces and drawn therefrom by suction and blast into the said tank, as above set forth, by conveying the said gas from the said precipitating-tank by pipes into the twyer-holes in the smelting-furnace proper. We attain these objects by the mechanism illustrated in the accompanying drawings, in which is shown a vertical cross-section of the entire machine as it appears, in which—

Figure 1 is the foundation of the smelter. Fig. 2 is the precipitating-tank. Fig. 3 is the suction-blower. Fig. 4 is the tank containing cooling-coils for cooling the gases and protecting the blower from heat. Fig. 5 is the bottom or sump of the smelter. Fig. 6 is a solid slide-door contained in the double perforated door, both of which can be lowered or raised by lever from the outside; Fig. 7, out-casing to the solid door. Fig. 8 is the charge-door to calcining-spaces. Fig. 9 is the calcining-space, which can be round or square, built of iron, and lined with fire-brick. Fig. 10 is the opening to the main stack to allow of escape of gases when the calcining of ores or preparation of fuel is not required or in case of blowing out the furnace, but is closed at all other times. Fig. 11 is the escape-pipe to allow of the discharge of gases which would not be beneficial in the smelting of

certain kinds of ores. Fig. 12 is the suction-pipe leading from the furnace or smelter to the cooling-tank. Fig. 13 is the top or place of inlet of cold water to the cooling-coil in the cooling-tank. Fig. 14 is the outlet of water from the cooling-coil. Fig. 15 is the lead-well or place where the molten metal flows in from the smelter for the purpose of ladling or molding into bullion bars. Fig. 16 is the twyer-pipe. Fig. 17 is the pipe for the purpose of conducting combustible gas from the precipitating-tank to the twyer-pipe to be used when desired. Fig. 18 is the outside casing of the intake of air for the purpose of combustion, the gas-pipe being in the center of this casing. Fig. 19 is the gas-gate or valve to the escape-pipe. Fig. 20 is the manhole of the precipitating-tank. Fig. 21 is the return gas-pipe from the precipitating-tank to the twyer-holes of the smelter; Fig. 22, charge end of the calcining-space or place for introducing the charges of raw fuel and ores. Fig. 23 is the tap-hole for removal of the slag. Fig. 24 shows the suction-pipes from calcining-spaces to the main suction-pipe. Fig. 25 is the metal tap-hole.

To operate the smelter and start it on a campaign we put in a charge of fuel until the interior and bottom of the furnace is at a white heat, when the charges of ores, fluxes, and fuel are made up in the usual manner, and the preparation of the ores for smelting is done as follows: The doors 6 and 7 of one of the calcining-spaces are closed and the ore and raw fuel put into said space. Then the door 8 is closed and the solid door of 6 is opened, leaving the perforated door 7 down, thus holding ores and fuels in said calcining-space 9 until they are prepared and ready to go into the furnace. The blower is started at the same time and by suction draws the heat from the main part of the smelter through the perforated doors 7 into such calcining-space 9, and thence through the pipe 24 to the main suction-pipe 12, into the cooling coil-tank 4, through the blower 3 to the precipitating-tank 2, where the gases can be sent to pipe 17, thence into the twyer-pipe 16, or if, as is the case in some ores, the gas is found to be of no value, allowed to escape by opening the valve or gas-gate at No. 19. Thus by this operation the volatile metals are precipi-

tated in the tank 2. Said tank 2 contains water to sufficiently cause precipitation of the volatile metals by change of temperature. We do not confine ourselves to one calcining-space, but by using two or more such calcining-spaces in charging one of such spaces with a charge the others can be in operation preparing charcoal from wood or coke from coal, or we can, if we choose, use any one of said spaces for that purpose alone.

We are aware that prior to our invention smelters have been made with a downtake for waste heat and gases. We therefore do not claim the smelting of ores broadly, but What we do claim as our invention, and desire to secure by Letters Patent, is—

1. In a smelting device, a smelter or furnace, 1, the calcining-chambers, 9, leading from the smelter proper and inclined downward toward the said smelter the solid slide-door, 6, and the double perforated door, 7, both located at the end of calcining-chambers nearest to and abutting the smelter proper, which confine the ores and other materials in the calcining-chambers, and prevent the said materials from dropping into the smelter until desired, all for the purpose specified.

2. In a smelting device or furnace the combination with the smelter proper, 1, of the calcining-chambers, 9, 9, located about midway between the twyer-holes and the top of smelting-furnace proper, and inclined downward, toward, and opening and leading into the smelter proper, the solid slide-door, 6, located between the halves of the double perforated door, the double perforated door, 7, both located at the end of the calcining-chambers nearest to and abutting the smelter proper, which confine the ores, fluxes and fuel in the calcining-chambers and prevent the said materials from dropping into the smelter until desired, the pipes, 24, entering the top of the calcining-chambers, the pipe, 12, leading from the top of pipe, 24, to the cooling-coils; the cooling-coils, 13, 14, located at the terminus of pipe, 12, fan 3, located between the cooling-coils 13, 14, and the precipitating-tank 2 and connected therewith by suitable ducts and apertures, by means of which gases are drawn from the calcining-chambers, and the tank 2, wherein the volatile metals are precipitated, thus saving a fair percentage of actual metal which usually escapes with the gas, all for the purpose specified.

3. In a smelting device or furnace the combination of the furnace or smelter proper, 1, calcining-chambers, 9, 9, entering the side thereof about midway between the twyer-holes and the top of the furnace wherein the ores, flux, fuel &c. are primarily placed, hav-

ing a solid slide-door, 6, which slides between the halves of the double perforated door 7, the double perforated door, 7, said doors being at the end of the calcining-chambers, 9, 9, nearest to and abutting the smelter proper, the said calcining-chambers having a suitable opening at the top, the pipe, 24, leading from said opening and forming a suitable passage therefrom, the pipe 12, proceeding in a curvilinear line from the top of pipe 24, and extending to the cooling-coils, 13 and 14, all forming suitable ducts and passages communicating with each other, and the fan, 3, suitably located for creating a suction or draft from the said coils 13 and 14, with communications leading from the coils on one side, and to a precipitating-tank, 2, on the other, all for the purpose specified.

4. In a smelting device an attachment and combination for the preliminary treatment of ores and carbonizing of fuel, consisting of a combination of the smelter or furnace, the calcining-chambers, 9, 9, the pipe, 24, proceeding from a suitable aperture at the top of the calcining-chambers, 9, 9, the pipe, 12, proceeding from the top of pipe, 24, in a curvilinear line to the cooling-coils, 13 and 14; cooling-coils 13, 14, forming together with pipes 24 and 12 suitable ports and passages, fan 3, located between the cooling-coils, 13, 14, and the precipitating-tank 2, and connected therewith by suitable ducts and apertures, suitably located for creating a suction or draft from the coils, the ducts or passages leading from and connecting the cooling-coils with the said fan, for forcing the same by blast into a precipitating-tank, the precipitating-tank 2, and the pipes 11 and 17, leading therefrom, all for the purpose specified.

5. In a smelting device or furnace the combination with the furnace proper having calcining-chambers at suitable places on the sides thereof, said calcining-chambers having an opening or aperture at a desirable place on the upper side, of a pipe entering said calcining-chambers at the aperture, and another pipe proceeding from the top of said first pipe in a curvilinear line downward, and connecting with certain cooling-coils the cooling-coils communicating by suitable passages with a fan for suction and exhaustion from the cooling-coils and adjacent passages; a longitudinal duct communicating, on the other side of said fan, with a precipitating-tank and suitable pipes leading therefrom, as and for the purpose specified.

CHARLES J. BEST.
ANSON E. MEANOR.

Witnesses:

DAVID S. GEER,
E. A. EULASS.