

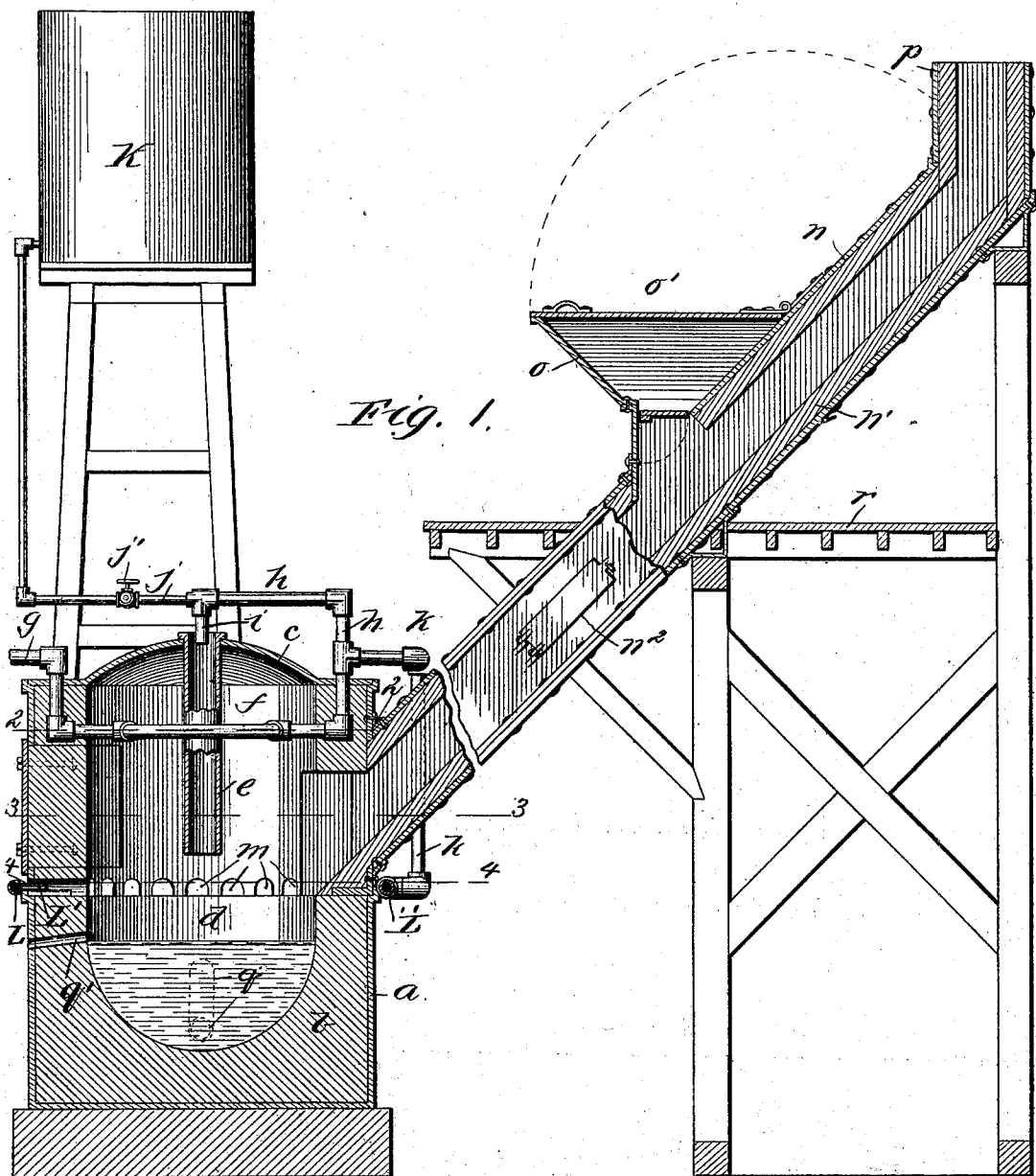
(No Model.)

2 Sheets—Sheet 1.

O. LUDWIG.
SMELTING FURNACE.

No. 505,112.

Patented Sept. 19, 1893.



Witnesses.

Fredk. A. Mills
T. S. E. Dixon

Inventor

Oscar Ludwig

By Walter H. Chamberlin
Atty.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

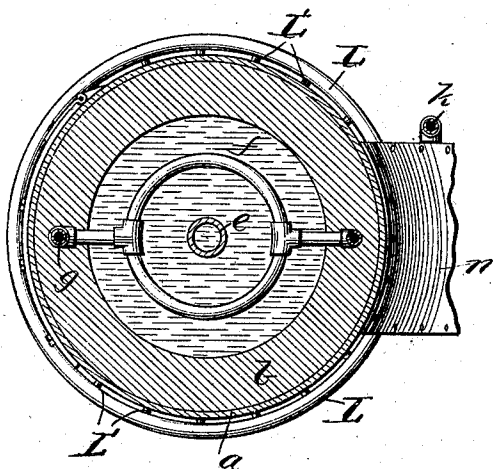


Fig. 3.

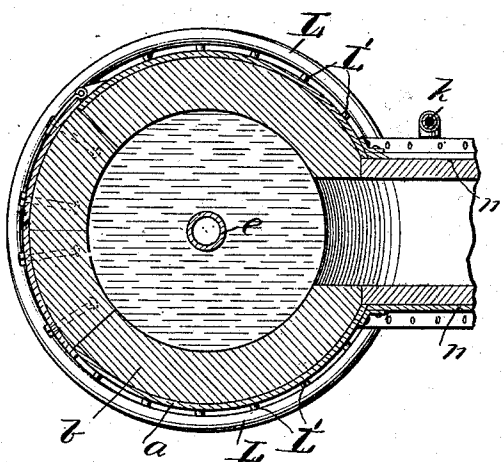
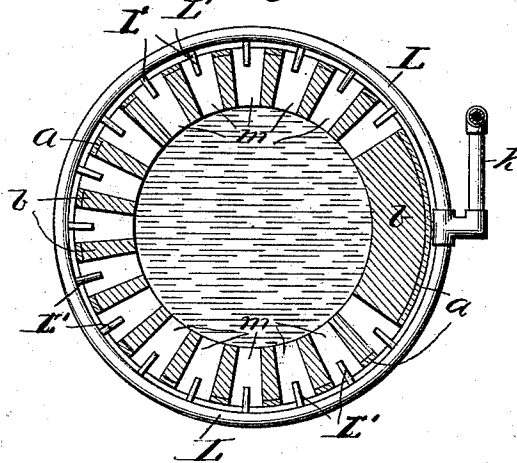


Fig. 4.



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UNITED STATES PATENT OFFICE.

OSCAR LUDWIG, OF CHICAGO, ILLINOIS, ASSIGNOR OF THREE-FOURTHS TO JAMES L. BOARD, ROBERT D. WARDWELL, AND ELLSWORTH M. BOARD, TRUSTEE, OF SAME PLACE.

SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 505,112, dated September 19, 1893.

Application filed August 4, 1892. Serial No. 442,100. (No model.)

To all whom it may concern:

Be it known that I, OSCAR LUDWIG, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Smelting-Furnaces; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is to provide a smelting furnace more particularly adapted for the smelting of lead ore which shall be so constructed that the ore while entering said furnace and before it is reduced, may be thoroughly dried and roasted and the deleterious gases driven therefrom.

A further object is to so construct said furnace that it may be rendered portable and driven at a moderate cost. Moreover I desire to adapt the same to the use of hydrocarbon or other oil as a fuel.

To these ends my invention consists in the combination of elements hereinafter described and claimed.

In the drawings: Figure 1 represents a side elevation partly in section of a smelting furnace embodying my invention. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1. Fig. 3 is a similar section on the line 3—3 of Fig. 1. Fig. 4 is a similar section on the line 4—4 of Fig. 1.

In carrying out my invention *a* represents the body of my improved furnace, which consists preferably of a cylindrical wrought iron shell lined with fire brick *b*. The top is covered by a removable metal dome *c* while in the bottom is formed a well *d*. The dome *c* is provided with a central opening through which is inserted a cast iron pipe *e* which is open at both ends. Surrounding the pipe *e* in the upper part of the furnace is a steam pipe *f* (Figs. 1 and 2) which is arranged in the form of a ring and connected by unions with an induction *g* communicating with a source of steam supply and upon the opposite side with an eduction pipe *h* leading upwardly from the top of said furnace. A steam

jet *i* is arranged over and communicates with the pipe *e* while an oil pipe *j* (Fig. 1) also in communication with said jet *i* is arranged to connect with an oil tank *K*. A valve *j'* serves to regulate the flow of oil to the jet. Branching from the steam pipe *h* is a secondary pipe *k* which is extended downwardly and connected with a bent pipe or "bustle" *L* which is provided with a series of jets *L'* which are projected respectively into openings *m* leading into the furnace immediately above the well *d* as shown in Figs. 1 and 4. While I have herein shown these jets *L'*, yet I would have it understood that I might dispense with them if desired as they simply aid the combustion and are not essential to the operativeness of the furnace. So also the steam might be supplied at this point through orifices in the pipe *L* instead of through the nipples *L'*.

Communicating with an opening in the side of the furnace and below the mouth of the pipe *e* is a hollow chute *n* preferably made of boiler iron and inclined upwardly at such an angle that will readily cause the ore placed therein to be readily fed to the furnace. Said chute is lined with fire-brick *n'*, is provided with a hopper *o* for the supply of ore thereto, and with an upward extension or chimney *p*. The hopper is closed by means of a lid *o'* which prevents the escape of fumes therefrom. A series of doors *n²* only one of which is shown is arranged in the side of the chute, to enable it to be cleared from stoppage. The usual inclined passage *q* communicating with the bottom of the well enables the metal to be withdrawn therefrom. The usual ore-dump *r* serves as a support for the inclined chute.

The operation is as follows: The heating chamber and the parts therein are first thoroughly heated in any desired way preferably by allowing oil to run into the well and on being ignited the flames will soon heat the pipes. Steam entering the pipe *f* will be superheated and passing through the pipe *h* will pass into the siphon *i* and spray the oil which has been admitted through the pipe *j*, down into the pipe *e*, the combustion taking place at the mouth of the pipe *e*. A portion

of the superheated steam is also carried down through the pipe *k* to the pipe *L* from whence it is injected through the various jets *L'* into the furnace, carrying therewith jets of air, which jets of air and steam converge at a central point over the well where they are met by the downwardly projected flame of burning oil and decomposed steam from the pipe *e*. The heat therefore immediately over the well has reached its maximum intensity and readily reduces the ore entering from the chute *n*. As the ore passes down the chute, it is met by the highly heated products of combustion and is dried and roasted and readily gives off its fumes which escape through the chimney *p*. The molten ore as fast as reduced is drawn off through the pipe *q* while the slag is drawn off through the opening *q'* in the side of the furnace.

The advantages of my furnace are: that where oil is used as a fuel the ore can be easily and quickly reduced without danger of putting out the flame since the ore is admitted below the flame; that by directing the flame upon the ore as it passes into the well it is melted with great rapidity and sinking immediately into the well beneath the slag is saved from volatilization and loss; that the furnace is easily and cheaply constructed and that because of its simplicity, it is portable.

While I have herein shown and described my furnace as particularly applicable as an ore smelter, yet it is obvious that it might be employed for smelting, roasting, or burning a large variety of substances. It is perhaps particularly applicable for use as a garbage burning furnace, and I would have it understood that I contemplate its use for the burning of any article desired.

What I claim is—

1. A furnace consisting of a converter having a heating chamber, an oil admission pipe leading into the heating chamber and adapted to discharge a flame downward and a supply chute leading into said chamber below the flame port, substantially as described.

2. A smelting furnace consisting of a converter having a well *d*, a heating chamber above the well, steam and oil pipes leading into the heating chamber and adapted to discharge a flame downward and a chute leading into said chamber below the flame port and above the well substantially as described.

3. A smelting furnace consisting of a con-

verter having a well and a heating chamber above the well, a steam pipe leading into said chamber and having its discharge adjacent to the top thereof, an oil supply joining the steam supply before the discharge, a depending pipe extending from the oil and steam discharge into the heating chamber, and an ore supply chute joining the heating chamber between the end of the depending pipe and the well substantially as described.

4. A smelting furnace consisting of a converter having a well and a heating chamber above the well, steam and oil pipes leading into the heating chamber and adapted to discharge a flame downward, means for introducing air at the side of the furnace and above the well and a chute leading into said chamber below the flame port and above the well substantially as described.

5. A smelting furnace consisting of a converter having a well and a heating chamber above the well, a steam pipe arranged to pass through the chamber, a discharge jet communicating with said steam pipe, a source of oil supply operatively connected with said discharge jet, an enlarged depending pipe leading into said furnace and in operative proximity to said discharge jet and a chute leading into said converter, said chute having a chimney opening at the top, substantially as described.

6. A smelting furnace consisting of a hollow chambered receptacle lined with refractory material, an inclined chute communicating with the side thereof, a depending pipe open at both ends, leading into said chamber from the top and means for introducing a jet of oil and superheated steam into said pipe whereby the flame may be directed upon the top of the material to be burned substantially as described.

7. In a smelting furnace the combination of an oil burner arranged immediately above the well of the furnace, means for commingling superheated steam and air with the oil at the point of combustion, and a combined feeding chute and chimney leading directly to the well substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

OSCAR LUDWIG.

Witnesses:

FREDK. H. MILLS,

WALTER H. CHAMBERLIN.