

(No Model.)

J. L. GIROUX FURNACE.

No. 499,188.

Patented June 6, 1893.

Fig. 1.

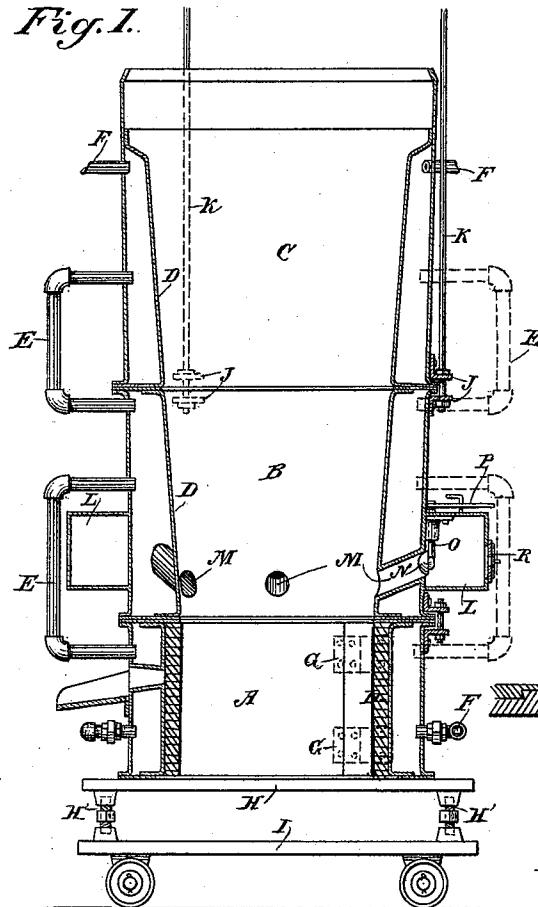


Fig. 4.

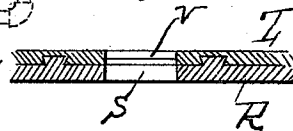


Fig. 3.

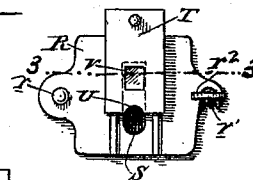
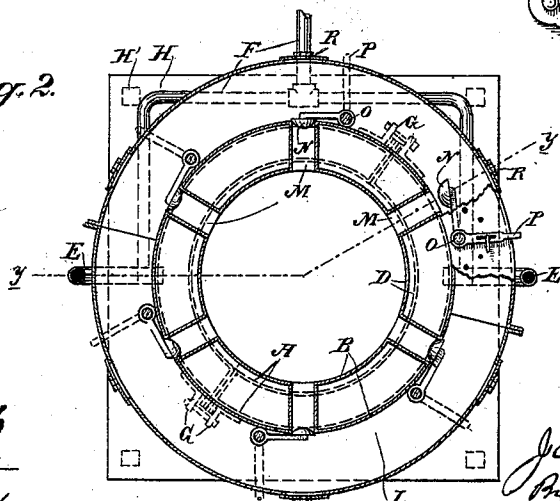


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOSEPH L. GIROUX, OF JEROME, ARIZONA TERRITORY.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 499,188, dated June 6, 1893.

Application filed October 13, 1892. Serial No. 448,772. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. GIROUX, a citizen of the United States, residing at Jerome, Yavapai county, Territory of Arizona, have invented an Improvement in Furnaces; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in smelting furnaces.

It consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1. is a vertical section taken through the line *yy* of Fig. 2. Fig. 2. is a horizontal cross section through my furnace taken through the tuyeres. Fig. 3. is a detail view of one of the tuyere doors. Fig. 4. is a sectional view of the same on line 3—3.

The object of my invention is to provide certain improvements in the construction of furnaces of this class, by which I am enabled to extend the life of the furnace; to make it easy to remove and repair any portion which may have become worn out or destroyed; to remove the lower section or crucible from the remainder of the furnace for the purpose of discharging its contents and cleaning without disturbing the upper portion of the furnace.

My furnace is made in three sections A, B and C, of any suitable diameter and height, these sections being bolted or otherwise secured together at their meeting edges. The outer portion of each section is made of iron or steel, and each section has a lining D made of iron, steel or copper. The latter is preferable, because many of the ores which are worked in such furnaces contain a great deal of sulphur which forms sulphurous gas and sulphuric acid which rapidly attack steel or iron, but have very much less effect upon the copper, so that when copper is used these linings will last for years while iron would be destroyed by about three months' work. The copper is preferably made about the thickness of ordinary boiler iron and forms independent annular chambers around the interior of each section. These chambers are connected together by pipes E as shown. Water is admitted into the lower chamber through

a suitable supply pipe F, and filling this chamber, it passes through the first of the connecting pipes E into the middle chamber B which it fills, and thence rises and passes through the second of the series of pipes E into the upper chamber which is also filled, thence it passes out through the overflow pipes F' at the top, thus keeping up a complete circulation of water around the furnace and keeping the parts sufficiently cool to prevent their rapid destruction by the intense heat which is applied.

The bottom section A forms a crucible which may either have the water jacket surrounding it, or may be made with fire brick lining. This crucible is made in two halves, as shown in the plan view, these halves being secured by bolts passing through lugs G formed with or attached to each of the half sections. The crucible rests upon a cast iron plate H which is about six feet square, and one and one half inches thick. Beneath this plate are four adjustable screws H'. In the present case I have shown these screws as right and left hand, and having their adjacent ends entering a nut which, when turned, lengthens or shortens the screws and this raises or lowers the crucible. The lower ends of these screws are supported upon a car I which, when in place beneath the furnace, sustains the crucible in contact with the two upper sections of the furnace, and thus remains while work is going on in the furnace.

The upper sections are provided with lugs J through which pass rods K extending upward so as to suspend the furnace from any suitable support situated above it. The upper two sections being thus suspended, it will be seen that the crucible portion of the furnace is independent, and may be lowered and drawn away on the car, whenever it is necessary to do so, without in any way interfering with the two upper sections.

A wind-box L surrounds the lower part of the middle section of the furnace and has the tuyere openings M leading from it into the furnace so as to furnish a supply of air for proper combustion and work. These tuyeres have each a plug N fitting the outer ends and attached to a shaft O which extends up-

ward out of the wind-box L, and having a lever arm or handle P by which it is turned. The faces of the plugs are made spherical. When the shafts are rotated they turn out of the mouths of the tuyeres to allow air to enter or are turned so as to fill the mouths of the tuyeres, and stop the supply of air through any one or more as may be desired. This enables me to control the blast within the furnace without using a gate on the blast apparatus.

The tuyere doors R are fitted over openings in the outer sides of the wind-box and in line with the tuyere openings of the inner side. The doors R have pivot pins r at one side about which they may be turned to disclose the full opening, or to close it at will. Upon the opposite edge of each door is a notch r' which acts as a latch closing down over a thumb screw r^2 and this screw is turned to lock the door when closed, or to release it when it is desired to open it. In the center of the door is an oblong opening S with its greatest length in a vertical direction, and the lower edge made semicircular as shown. Over this opening is fitted a slide T which is movable up and down in grooves or channels in the main door. The bottom of this slide has a semicircular concave depression U made in it, which, when the slide is closed down, is below the bottom of the opening S, but when the slide is raised, the curved depression U, and the opposite curvature of the bottom of the opening S form an approximately round hole through which, and the inner tuyere opening when opened, a bar may be introduced to stir up the contents of the furnace while the exterior opening is of such shape and fits around the bar in such a manner that it prevents any important escape of wind at this point while the bar is being used. The slide T has an opening made through it corresponding with the opening S and having guide channels on opposite sides, and an open slot at the top for the introduction of a plate of glass V through which the operator can see the interior and inspect his work. When this is finished, the bar is withdrawn and the slide closed to prevent any escape of air through the opening.

When it is desired to close down the furnace, the screws which support the crucible are lowered so as to let the crucible down from the upper portion of the furnace which then remains suspended by the rods previously described. The crucible is then run out upon the car upon which it is supported and the bolts which hold the two segments or sections together are removed so that the two halves may be taken apart. This leaves the metal which remains in the crucible loose and free from everything, resting upon the cast iron plate. It is then easily removed from the plate, the two halves of the crucible are again bolted together on the plate and the car run

in again beneath the furnace. The screws H are then turned up so as to raise the crucible into contact with the upper sections of the furnace, and the whole is ready for further operation. By this construction I am enabled to remove any portion of the furnace that may be burned out or need repairs, without destroying the whole furnace.

It is easy to obtain access to and clean the furnace frequently, which keeps it in good running order for a long time.

The removable crucible made in two sections makes it easy to remove the metal or other deposit from the furnace and to keep it clean, while the copper lining greatly increases the life of the furnace.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The furnace consisting of the independent separable superposed sections, the lowermost section forming a crucible made in two semi-cylindrical halves, means for securing these halves together, a bottom plate upon which the halves are supported, a car adapted to run beneath the furnace, and screws resting upon the car and supporting the bottom plate of the crucible whereby the latter may be forced into contact with the adjacent section above or withdrawn therefrom and removed upon the car, substantially as herein described.

2. A furnace consisting of the independent separable sections, each having its own independent annular lining forming a water jacket between itself and the exterior shell of the furnace, supply pipes whereby water is admitted into the annular chamber of the lowermost section, pipes connecting each of the sections successively whereby water flows from each lower section to the one above, and overflow pipes whereby a constant circulation of water is created in each independent section of the furnace, substantially as herein described.

3. In a furnace, the wind-box surrounding the body of the furnace, tuyeres leading therefrom to the interior of the furnace, plugs having spherical faces adapted to fit the exterior mouths of the tuyeres, and shafts journaled within the wind-box extending up through the top and having lever handles connected therewith, whereby the plugs are moved so as to close or unclosed the tuyere openings by the rotation of the shafts, substantially as herein described.

4. In a furnace, a wind-box surrounding the exterior, with blast openings therefrom to the interior, and controlling valves, in combination with gates covering corresponding openings on the exterior of the box, and vertically movable slides fitted to the gates and having arched openings in the lower edges, substantially as herein described.

5. In a furnace, a wind-box surrounding the

exterior, with blast openings to the interior
and valves by which said openings are controlled,
gates covering corresponding openings in the exterior
of the wind-box, and having openings made through them
with curved lower edges, vertical slides movable in guides
upon the gates, and having notches in the lower edges
to correspond with the curved lower edges of the gate
openings, and trans-

parently-covered inspection openings in the slides,
above the notched bottoms thereof, substantially as
herein described.

In witness whereof I have hereunto set my hand.

JOSEPH L. GIROUX.

Witnesses:

G. W. HULL,
FRED STEPHENS.