No. 677,820. Patented July 2, 1901.

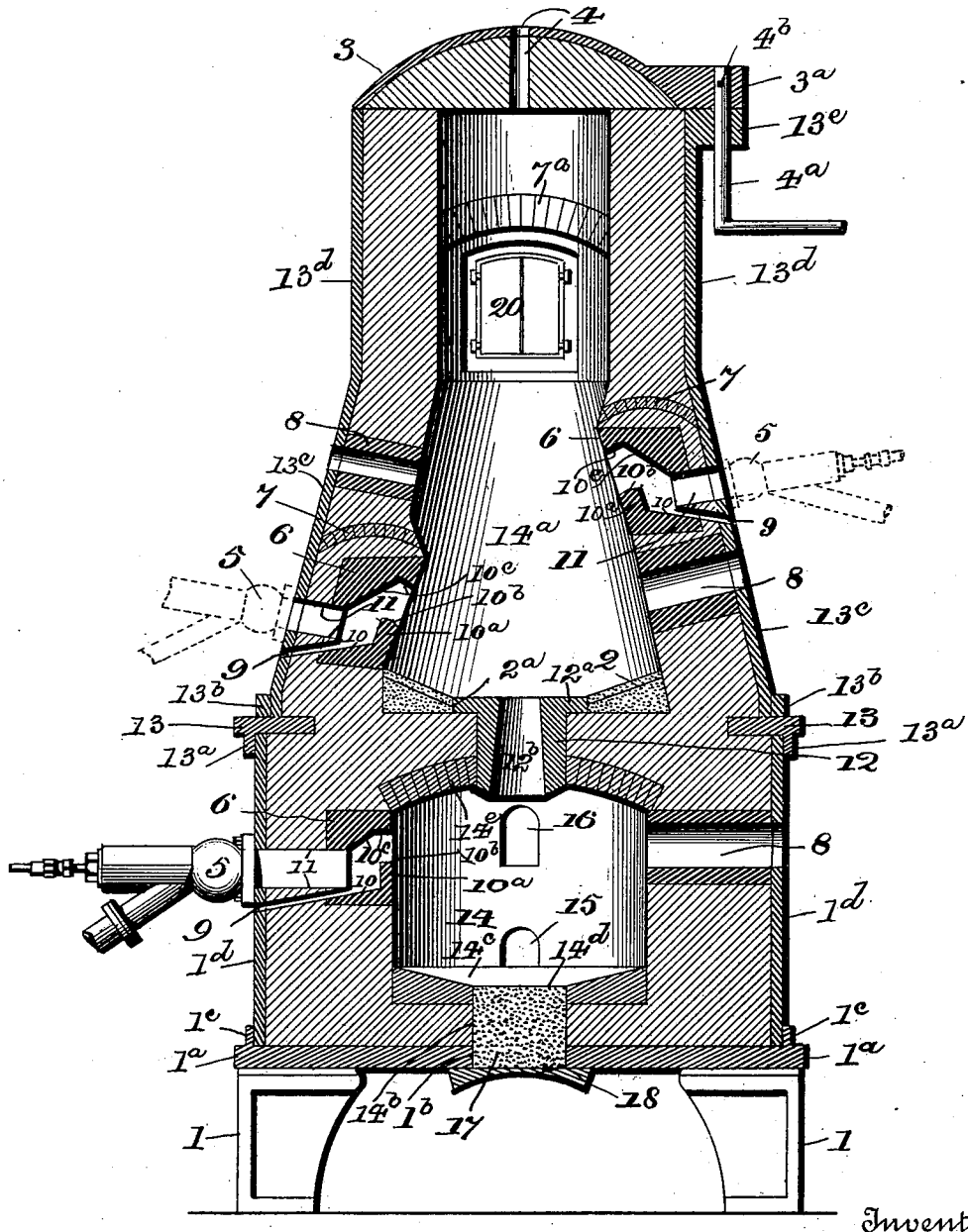
W. H. THORNLEY.

MELTING, SMELTING, AND CRUCIBLE FURNACE.

(Application filed June 26, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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Fig. 2.

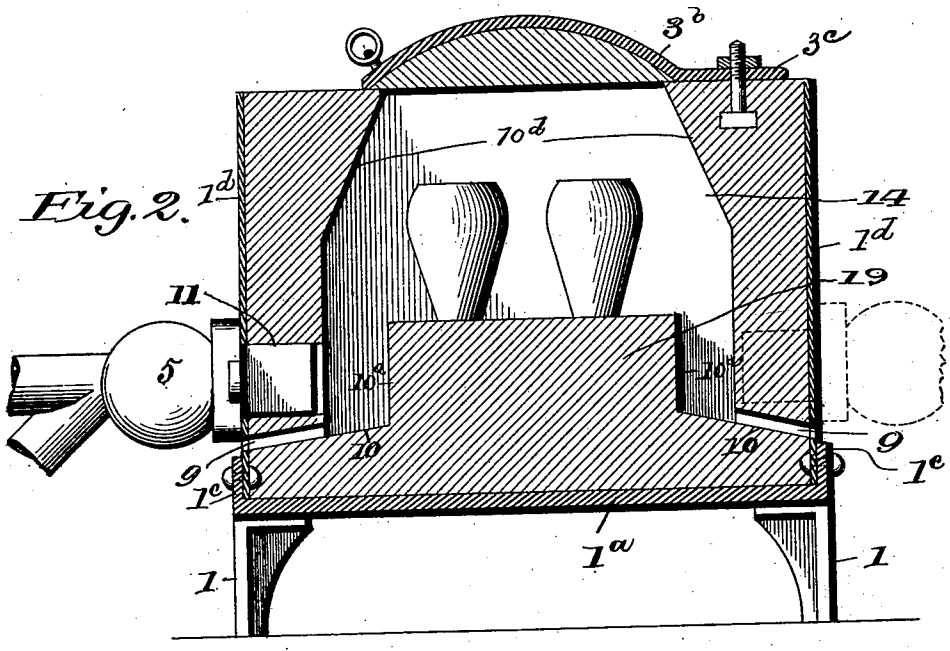
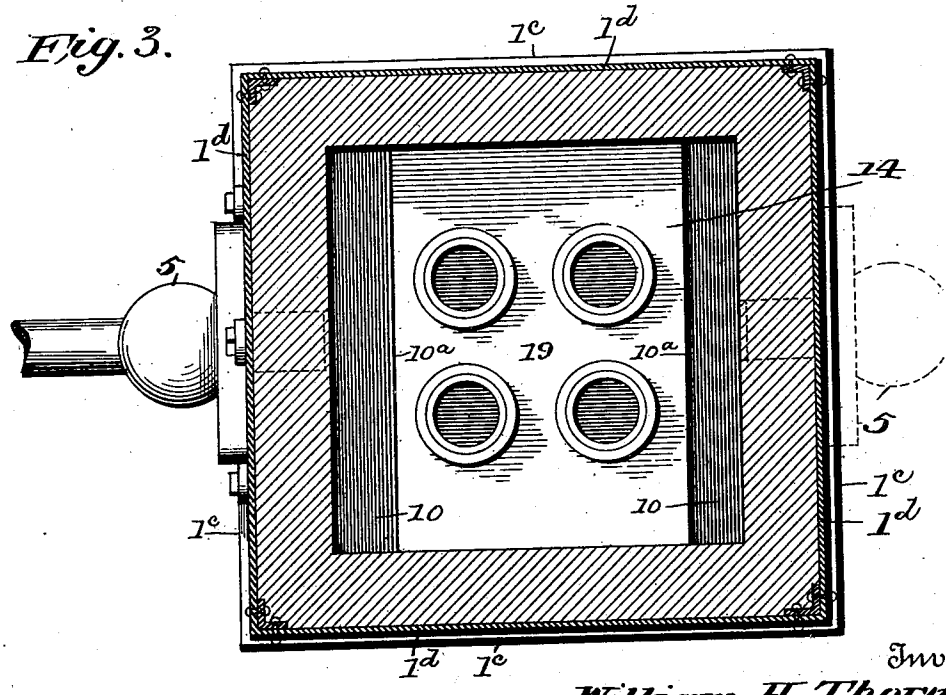


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM H. THORNLEY, OF READING, PENNSYLVANIA.

MELTING, SMELTING, AND CRUCIBLE FURNACE.

SPECIFICATION forming part of Letters Patent No. 677,820, dated July 2, 1901.

Application filed June 26, 1899. Serial No. 721,950. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. THORNLEY, a citizen of the United States, residing at Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Melting, Smelting, and Crucible Furnaces; and I do hereby 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 appertains to make and use the same.

My invention is an improvement in melting, smelting, and crucible furnaces; and it consists in the novel construction and arrangement of its parts, as hereinafter described and claimed.

The object of my invention is to provide a furnace of the class referred to having an upper receptacle adapted to be heated by hydrocarbon-burners placed at different altitudes or zones and a lower receptacle also adapted to be heated by auxiliary hydrocarbon-burners.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a vertical section showing my invention applied to a melting or smelting furnace. Fig. 2 is a vertical section showing my invention applied to a crucible-furnace. Fig. 3 is a horizontal section of the same.

Referring to Fig. 1, which shows a melting or smelting furnace, 1 represents supporting-frames, upon which is placed a steel lower plate 1^a, having a central opening or manhole 1^b and a vertical flange 1^c, surrounding a steel lower jacket 1^d, seated on the lower plate 1^a, which in turn supports a steel frame 13, having pendent flanges 13^a, surrounding the upper end of the lower jacket 1^d, and upwardly-projecting vertical flanges 13^b, within which fits a steel upper jacket formed with an upwardly-converging lower part 13^c and a vertical upper part 13^d, having a lateral projection or lug 13^e, to which a swinging cover 3, having a central gas-outlet opening 4 and a lateral projection or lug 3^a, is pivoted by a handle 4^a, extending through the lugs 13^e 3^a and secured by a pin 4^b to the projection or lug 3^a of the cover. The body of the furnace is composed of fire-brick and is formed with a lower receptacle 14, having vertical walls, and an upper receptacle 14^a, having a lower part formed with upwardly-converging walls strengthened by an arch 7^a. The base of the lower part of the body is formed with a central opening or manhole 14^b, and the lower receptacle is provided with a depressed bottom 14^c, having a central opening or manhole 14^d. The three central openings or manholes 1^b, 14^b, and 14^d are closed by a door 18 and have a filling 17, of sand, located therein to prevent the molten metal coming in contact with the door 18. The lower receptacle is provided with a lower outlet-opening 15 for the discharge of the molten metal and with an upper outlet-opening 16 for the discharge of the slag. 14^e is an arched crown to the lower receptacle. The upper receptacle has a depressed floor 2, provided with a central opening 2^a, in which fits the flange 12^a of a collar 12, having a downwardly-flaring opening 12^b, connecting the upper and lower receptacles 14 14^a. 20 is a side door closing an opening through which the metal or ore is introduced into the upper receptacle, or the metal or ore may be dumped into the upper receptacle through the top thereof after swinging the cover to one side. The furnace is further provided at different heights with a number of hydrocarbon-burners 5, which are preferably of the form of construction shown in my application Serial No. 721,948, of even date herewith, and which enter the furnace through openings 11 and at their inner ends extend into my improved fire-bricks 6, which are of a peculiar construction and are so placed in the walls of the furnace as to permit of their ready removal when burned out, and thus allow new bricks to be put in the place thereof. The arches 7, which extend transversely through the wall and support the upper part thereof, permit the removal of the bricks with safety. These removable bricks 6 are each formed with a crooked or angular passage leading therethrough for the fuel, with a downwardly-inclined floor 10, with an upwardly-extending deflector-wall 10^a, having a downward incline 10^b at the outlet to the passage, and with an upwardly-inclined and a downwardly-inclined angular roof 10^c. 9 indicates inclined

outlets extending from the inclined floors to the exterior of the furnace, providing passages for leading off any metal or slag that may be deposited in the passage of the bricks, thus leaving clear openings for the flame and ports through which air may be admitted to said openings. 8 indicates hollow bricks leading from the exterior of the furnace to the receptacles, providing sight holes or openings through which the gases issuing from the burners may be ignited. The manhole in the lower part of the furnace permits a workman to enter the interior of the lower receptacle for repairing the same. When the metal or ore is placed in the furnace, the gases issuing from the burners 5 are ignited, the flames striking the deflector-walls 10^a, while the upwardly and downwardly inclined roofs 10^c receive and force down the flames over the downward inclines 10^b of the deflector-walls 10^a. By manipulating the valves governing the burners the upper receptacle may be heated or permitted to cool at different elevations should occasion require. As the material is melted in the upper receptacle it passes down through the collar 12 into the lower receptacle, where it is maintained in a molten state by the burners of the lower receptacle. At the proper time the molten metal can be drawn off through the lower outlet-opening 15 and the slag through the upper outlet-opening 16.

Referring to Figs. 2 and 3, 19 is an elevated fire-brick bottom, on which the crucibles containing the metal are supported. The sides of this bottom constitute deflector-walls 10^a, and the base has fuel-passages and inclined floors 10. The outlets 9, which merge into the inclined floors 10 beneath the burner-openings 11, are adapted to conduct the slag or metal which overflows from the crucibles out of the furnace. The crucible-furnace is provided with a swinging cover 3^b, having a lateral projection or lug 3^c, whereby it is pivoted to the body of the furnace.

In the crucible-furnace the crucibles filled with metal are placed in the receptacle 14 in the manner indicated in Figs. 2 and 3 and the burners 5 are turned on and the contents of the crucibles are melted, the flames from the burners striking against the deflector-walls 10^a of the elevated bottom 19 and against the inclined roofs 10^d, where they are deflected and directed onto the crucibles.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A furnace comprising supporting-frames, a lower plate having a vertical flange, a jacket seated upon the plate and surrounded by the vertical flange, a body seated upon the plate and having a receptacle, fuel-passages extending through the body having outwardly-inclined floors, deflector-walls, and inclined roofs, burner-openings extending through the body, inclined outlets beneath the burner-openings merged into the inclined floors, and hydrocarbon-burners inserted into the burner-openings in front of the deflector-walls.

2. A furnace comprising a body having a lower receptacle formed with vertical walls having a lower outlet-opening for the discharge of the molten metal, and an upper outlet-opening for the discharge of the slag, an upper receptacle formed with a lower part having upwardly-converging walls, and with an upper part having vertical walls, a collar having an opening connecting the receptacles, fuel-passages and deflector-walls, located at different heights at the sides of the receptacles, burner-openings located in front of the deflector-walls, and hydrocarbon-burners inserted into the burner-openings.

3. A furnace comprising a body having a base formed with a manhole, a lower receptacle formed with vertical walls having a lower outlet-opening for the discharge of the molten metal, and an upper outlet-opening for the discharge of the slag, an upper receptacle formed with a lower part having upwardly-converging walls and with an upper part having vertical walls, a collar having an opening connecting the receptacles, fuel-passages and deflector-walls located at different heights at the sides of the receptacles, burner-openings located in front of the deflector-walls, hydrocarbon-burners inserted into the burner-openings, and a door closing the manhole.

4. A furnace comprising a body having a lower receptacle formed with vertical walls having a lower outlet-opening for the discharge of the molten metal, and an upper outlet-opening for the discharge of the slag, an upper receptacle formed with a lower part having upwardly-converging walls and with an upper part having vertical walls, a collar having an opening connecting the receptacles, fuel-passages and deflector-walls located at different heights at the sides of the receptacles, outwardly-inclined floors extending from the deflector-walls, burner-openings located in front of the deflector-walls, inclined outlets beneath the burner-openings merged into the inclined floors, and hydrocarbon-burners inserted into the burner-openings.

5. A furnace comprising a plate having a manhole, a body seated upon the plate and having a base formed with a manhole, a lower receptacle having a depressed bottom formed with a manhole, and vertical walls having a lower outlet-opening for the discharge of the molten metal, and an upper outlet-opening for the discharge of the slag, an upper receptacle formed with a lower part having upwardly-converging walls and with an upper part having vertical walls, a collar having an opening connecting the receptacles, fuel-passages and deflector-walls located at different heights at the sides of the receptacles, burner-openings located in front of the deflector-walls, hydrocarbon-burners inserted into the burner-openings, a sand filling in the manhole, and a door closing the manhole.

6. A furnace comprising supports, a lower plate having a vertical flange, a lower jacket seated on the plate and surrounded by the vertical flange, an upper plate supported upon the lower jacket and having pendent vertical flanges surrounding the upper end of the lower jacket, and upwardly-extending vertical flanges, the upper jacket having an upwardly-converging lower part seating upon the upper plate, and a vertical upper part, a body seating upon the lower plate and having a lower receptacle formed with vertical walls having a lower outlet-opening for the discharge of the molten metal and an upper outlet-opening for the discharge of the slag, an upper receptacle formed with a lower part having upwardly-converging walls and with an upper part having vertical walls, a collar having an opening connecting the receptacles, fuel-passages and deflector-walls located at different heights at the sides of the receptacles, burner-openings located in front of the deflector-walls, and hydrocarbon-burners inserted into the burner-openings.

7. A furnace comprising removable bricks having passages leading therethrough, hydrocarbon-burners entering the passages, and deflector-walls, located in the passages opposite to the ends of the burners; the outlets of the passages being inclined downward at an angle.

8. A removable brick for a furnace formed with an angular passage therethrough, a downwardly-inclined floor, an upwardly-extending deflector-wall having a downward incline at the outlet to the passage and an angular roof.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. THORNLEY.

Witnesses:
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BERTHA L. DANA.