

No. 892,012.

PATENTED JUNE 30, 1908.

E. H. SCHWARTZ.
CRUCIBLE FURNACE.

APPLICATION FILED JAN. 16, 1908.

2 SHEETS—SHEET 1.

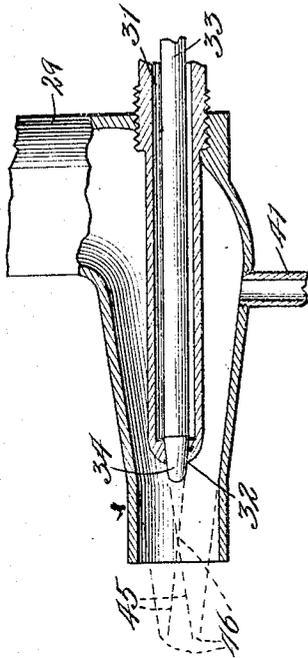


Fig. 2.

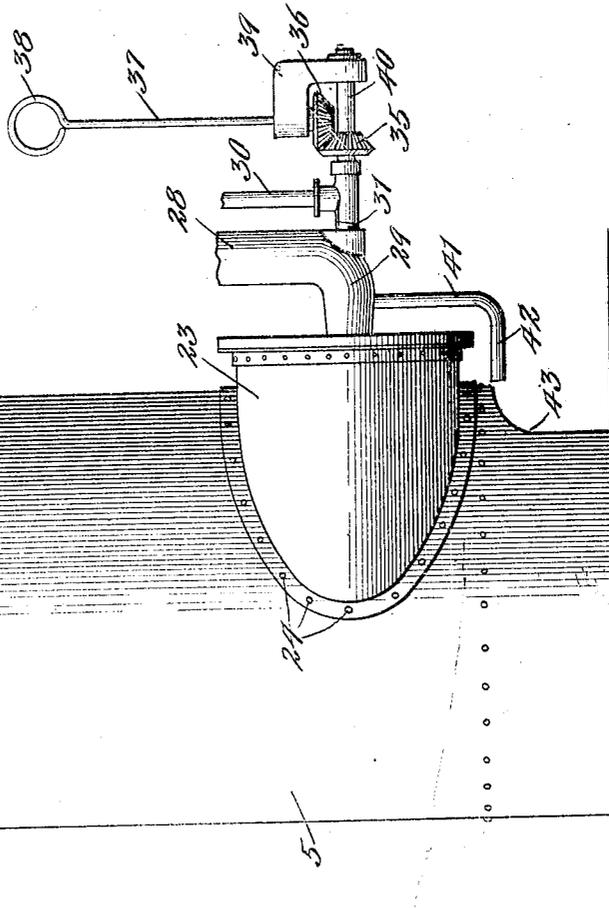


Fig. 1.

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Fig. 4.

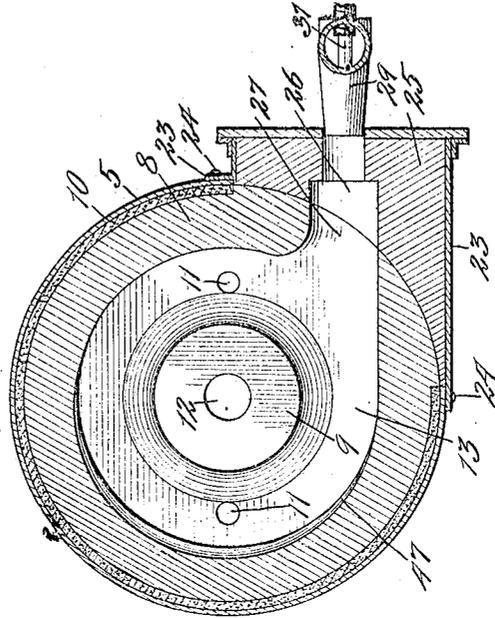
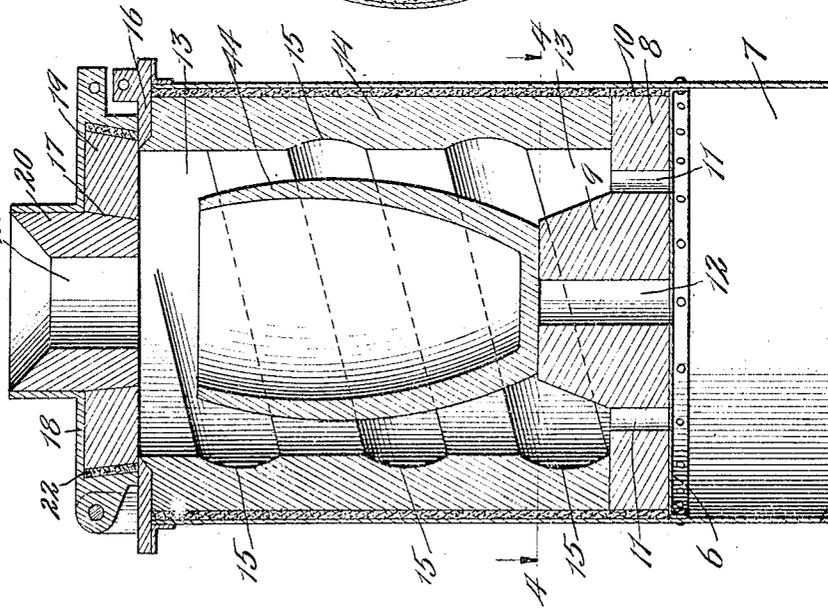


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD H. SCHWARTZ, OF CHICAGO, ILLINOIS, ASSIGNOR TO KROESCHELL BROTHERS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CRUCIBLE-FURNACE.

No. 892,012.

Specification of Letters Patent.

Patented June 30, 1908.

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To all whom it may concern:

Be it known that I, EDWARD H. SCHWARTZ, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Crucible-Furnaces, of which the following is a specification.

My invention relates to improvements in crucible furnaces, and has for its object the production of a furnace in which the flame is given a gyratory action, thereby increasing the draft and the effectiveness of the furnace.

A further object is the production of a furnace in which the danger of clogging by the overflowing of slag or material is reduced to a minimum.

A further object is the production of a furnace the parts of which can be readily assembled and disassembled, and one that is least liable to get out of order.

These and such other objects as may hereinafter appear are attained by my device, embodiments of which are illustrated in the accompanying drawings, in which

Figure 1 represents a side elevation of my furnace. Fig. 2 is an enlarged sectional view of the burner. Fig. 3 is a vertical sectional view through the center of Fig. 1. Fig. 4 is a sectional view on line 4-4 of Fig. 3, looking in the direction indicated by arrows.

Like numerals of reference indicate like parts in the several figures of the drawings.

Referring to the drawings—5 represents the outer cylindrical shell or casing of the furnace. A supporting bottom partition 6 divides the furnace and forms a foundation for the bottom of the combustion chamber and the top for the air chamber 7 located below the combustion chamber. A circular base of fire-brick 8 having a raised central portion 9 is first placed within the casing, sufficient space being preferably left between it and the inner periphery of the shell to permit the insertion of a lining 10 of asbestos or like material. The base 8 is provided with a plurality of openings 11-11 extending through the thinner portion thereof, a single opening 12 extending through the center of the base. These openings register with corresponding openings in the bottom 6, providing three passages from the air chamber 7 to the combustion chamber 13 of the furnace. The cylindrical shell or lining 14 of fire-brick is then put in place, which may be formed in one piece or laid in sections, as desired. The

inner periphery or shell of the lining is provided with a groove or channel 15 extending spirally the entire length of the combustion chamber. A circular rim 16 is secured to the top of the casing, and to this is secured a cover 17 comprising a metallic outer portion 18 and a fire-brick lining 19. A portion of the cover extends upwardly, forming a stack 20 with the central opening 21. A packing 22 of asbestos or similar material is inserted between the outer portion 17 and the fire-brick 19 corresponding to the asbestos lining of the main body of the furnace.

Referring now to Figs. 1 and 4, a portion of the casing is cut away and a horizontal tubular portion 23 bolted thereto, as shown at 24, having a cylindrical fire-brick 25 inside provided with a passage 26 registering with the passage 27 from the combustion chamber. It will be noted that this tube is so placed that the outer line of the passages 26, 27 is tangential to the outer periphery of the combustion chamber. An air tube 28 is provided with an elbow 29 extending into and closing the passage 26. A gas supply tube 30 has a portion 31 extending into the air pipe 28 terminating in a conical orifice 32. A valve-stem 33 is provided with a conical end 34 adapted to register with the orifice 32. A bevel gear 35 is seated on the end of the valve-seat outside of the pipe, and meshes with an extending bevel gear 36 attached to the bottom of a handle or rod 37 which terminates in a handle 38 near the upper line of the furnace. A supporting frame 39 secured to a prolongation 40 of the valve-stem serves to hold the rod 38 in place. A supplemental air pipe 41 extends downwardly from the elbow 29 and is turned inwardly at 42, whereby air from said air pipe may be forced directly into the chamber 7 through the opening 43 in the air chamber. The furnace is placed in position with the top practically on a level with the floor. Brass scraps or other material to be melted are placed within a crucible 44, the bottom resting on the top of the upwardly projecting base 9. The air and oil or gas is admitted through the tubes and ignited, forming a flame within the combustion chamber. When oil is used as the fuel, the valve-stem 33 is screwed backward sufficiently to allow the desired amount of oil to be forced through the orifice 32 around the outer periphery of the conical end 34. This oil is

preferably forced through the opening under considerable pressure, in the form of a thin sheet in the position as shown in dotted lines at 45. The air through the pipe or tube 28 passes around the end of the oil tube and meets the thin sheet of oil as shown in dotted lines at 46. The oil is, therefore, quickly vaporized, and the resulting mixture is ignited within the combustion chamber. It will be noted that the edge of the passage 27 is tangential to the inner periphery of the wall of the combustion chamber, consequently, as the ignited mixture enters the combustion chamber and strikes the opposite wall at 47, and is naturally forced about the chamber, the spiral groove 15 aiding in the passage of the ignited gases about the combustion chamber, causing a gyratory motion. It is evident, if the burning vapor is admitted without material pressure, that the burning gas would tend to rise in the combustion chamber on the side nearest the vaporizer.

At the same time that air is forced into contact with the oil or fluid to be ignited, air through the supplemental tube 41, 42 is blown into the air chamber 7. The ignited gases being thrown forcibly across the bottom of the combustion chamber, and naturally tending to rise in gyratory currents conforming to the position of the spiral groove, an upward draft is created tending to draw the air from the air chamber 7 into the combustion chamber, and thereby aid in the complete combustion of the ignited material. It will thus be seen that shortly after the furnace is lighted, the entire chamber outside of the crucible is a mass of upwardly gyrating flames. The top of the furnace prevents the escape of the greater part of the burning gas, although a small portion ordinarily comes out of the stack 21. It will thus be seen that I have produced a furnace especially adapted to reduce bars or other desired material in a crucible that can be entirely surrounded by the products of combustion. The opening 12 from the air chamber 7 to the combustion chamber is covered by the bottom of the crucible 44. The bottom of the crucible, as well as the top of the upwardly projecting portion 9 are not so smooth as to render the union therebetween perfect. Consequently sufficient air passes upwardly through this passage and between the bottom of the crucible and the top of the support to prevent the crucible from sticking to the top of the support, and also prevents the formation of slag therebetween. Of course, during the melting of the contents of the crucible the slag will often be forced over the edge and down through the bottom of the combustion chamber. So, also, some portions of the lining itself may be fused under the intense heat and be carried to the bottom. This will, of course owing to the

intense heat, be in a fluid state, and will readily run down through the passages 10—11 through the bottom and into the air chamber 7, from which it can be removed from time to time. The cover of the furnace and all parts thereof are readily removable, so that in the event that it becomes necessary, any portion of the furnace can be quickly renewed.

I claim:

1. A furnace comprising an outer casing, an inner lining of refractory material, a crucible support, and means for imparting a gyratory motion to the flame and products of combustion, and an air chamber in open communication with the combustion chamber of said furnace.
2. A furnace comprising an outer casing, an inner lining of refractory material, a base of refractory material, a crucible support, means for imparting a gyratory motion to the flame and products of combustion, and an air chamber in open communication with the combustion chamber of said furnace.
3. A furnace comprising an outer casing, an inner lining of refractory material, a base of refractory material, said base having an opening extending therethrough, a crucible support, means for imparting a gyratory motion to the flame and products of combustion, and an air chamber in open communication with the combustion chamber of said furnace.
4. A furnace comprising a spirally grooved combustion chamber, an air chamber in communication therewith, a passage extending tangentially from said combustion chamber, and a vaporizer communicating with said passage.
5. A furnace comprising a spirally grooved combustion chamber, an air chamber in communication therewith, a passage extending tangentially from said combustion chamber, a vaporizer communicating with said passage, and a supplemental tube connecting the air supply of said vaporizer with the air chamber.
6. In a furnace, a combustion chamber, an outer casing, an inner lining of refractory material having a spiral channel in its inner periphery, an air chamber below said combustion chamber and in communication with said combustion chamber, a vaporizer comprising an air supply, an oil supply, and means for regulating said supply.
7. In a furnace, a combustion chamber, an outer casing, an inner lining of refractory material having a spiral channel in its inner periphery, an air chamber below said combustion chamber and in communication with said combustion chamber, a vaporizer comprising an air supply, an oil supply and means for regulating said supply, and a tube leading from said air supply to said air chamber.

8. A furnace comprising a casing, a combustion chamber, means for imparting a gyratory motion to the flame and products of combustion, an apertured base, an air chamber below said combustion chamber in communication therewith and with the atmosphere, and vaporizing means communicating with said combustion chamber.

9. A furnace comprising a spirally grooved combustion chamber, an air chamber in communication therewith, a passage extending tangentially from said combustion chamber, a vaporizer communicating with said passage, and a communicating pipe connecting

the air supply of said vaporizer with said air chamber.

10. A furnace comprising a spirally grooved combustion chamber, an air chamber in communication therewith, and a fuel feeding passage opening tangentially into said combustion chamber.

Signed by me at Chicago, Illinois, this 7th day of January, 1908.

EDWARD H. SCHWARTZ.

Witnesses:

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ALBERT JOHN SAUSER.