

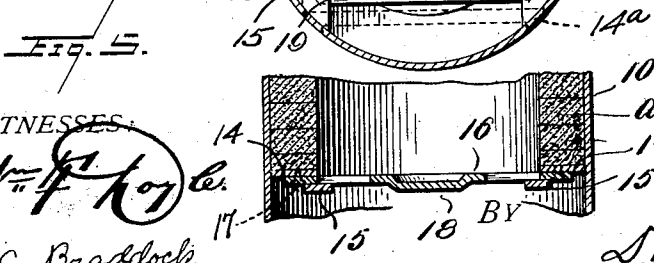
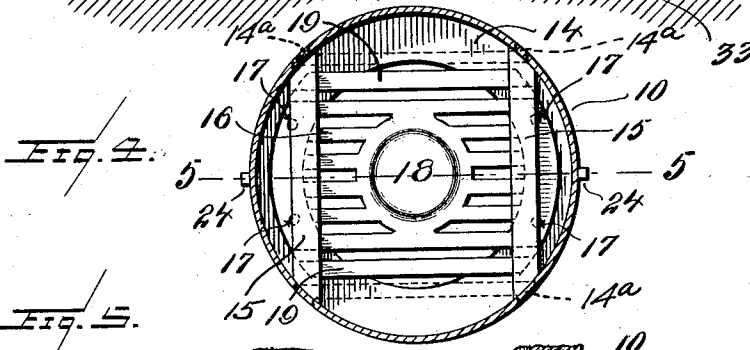
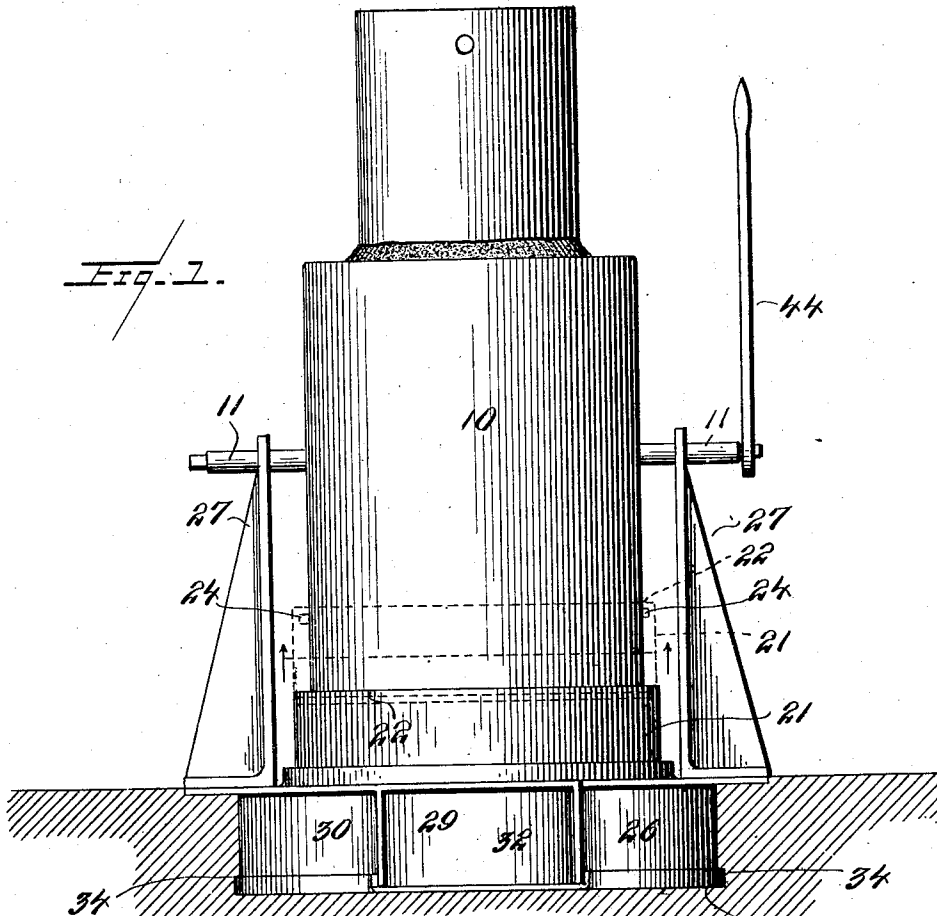
No. 891,256.

PATENTED JUNE 23, 1908.

W. J. HOLZAPFEL.  
SMELTING FURNACE.

APPLICATION FILED SEPT. 12, 1907.

2 SHEETS—SHEET 1.



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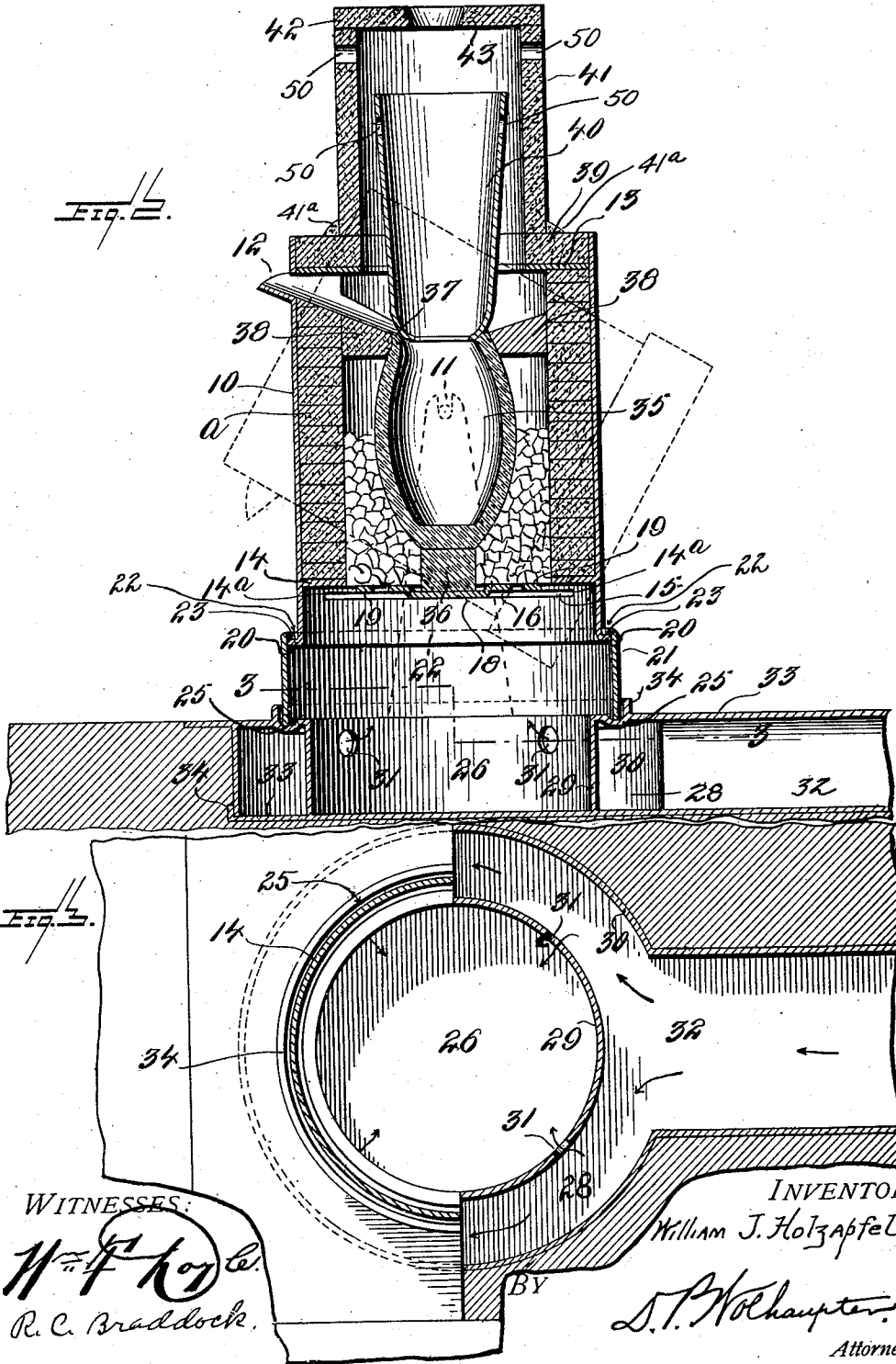
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2 SHEETS—SHEET 2.

Fig. 2.



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# UNITED STATES PATENT OFFICE.

WILLIAM JOSEPH HOLZAPFEL, OF SCOTTTDALE, PENNSYLVANIA.

## SMELTING-FURNACE.

No. 891,256.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed September 12, 1907. Serial No. 392,468.

*To all whom it may concern:*

Be it known that I, WILLIAM J. HOLZAPFEL, a citizen of the United States, residing at Scottdale, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Smelting-Furnaces, of which the following is a specification.

The present invention consists in certain new and useful improvements in smelting furnaces, and has special relation to that type of smelting furnaces in which the body is supported by the base and capable of being tilted to pour out the melted metal.

The principal object of the invention is to provide a smelting furnace in which the body thereof may be tilted at will without any hoisting or lowering thereof.

Another important object is to provide the furnace body with improved means for locking said body in an upright position while the metal is being melted, and which will be readily capable of releasing said body when it is desired to tilt it to the pouring position.

Another object is to provide a novel base for the furnace through which the air blast is conveyed to the fuel in the bottom of the furnace body.

A further object is to provide an improved form of feeding means for the metal that is to be melted, in which the metal is subjected to a preliminary heating without coming in contact with the heating agent. Also, another object is to provide a new and improved form of grate upon which the melting crucible is supported which permits of access being had to the fire for stoking &c.

Other and further objects of the invention will appear as the nature of the invention is better understood, and the same consists in certain details of construction and combination of parts set forth in the following detailed description and illustrated in the accompanying drawings.

In said drawings, wherein like characters of reference are used to designate corresponding parts,—Figure 1 is a side elevation showing a preferred embodiment of the present invention. Fig. 2 is a vertical sectional view thereof. Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 2. Fig. 4 is a bottom plan view of the furnace casing showing the grate construction. Fig. 5 is a detail sectional view on the line 5—5 of Fig. 4.

Referring to the accompanying drawings, 10 designates an upright furnace casing hav-

ing horizontal trunnions 11 projecting from its sides, and provided with an upper pouring lip 12. Within the furnace casing, and adjacent to the top thereof a cover supporting ring or flange 13 is provided, and adjacent to the bottom of said casing a grate base ring 14 is located. These two upper and lower rings are of substantially the same diameter and formed of fire-resisting material, and the intervening space therebetween is provided with a lining *a* of fire bricks or other fireresisting material serving to protect the casing 10 from the heat.

The grate construction of the present invention includes the transverse grate supporting bars 15, which are located beneath the grate base ring 14 at each side thereof and have their ends secured within the furnace casing as at 14<sup>a</sup> in any suitable manner.

The main central grate 16 is supported by the transverse supporting bars 15, as shown in Figs. 4 and 5 of the accompanying drawings, and by reference to said figures it will be observed that said main grate 16 extends across the opening of the base ring 14 and has its ends detachably secured thereto by means of screws 17 or other suitable fastening means. The center of said grate is provided with a solid, depressed portion 18, which forms a seat, the function of which will be presently described. It will thus be observed that said main grate 16 is of substantially oblong shape, the width of which is less than the size of the opening in the base ring 14, and that said grate extends across the center thereof, leaving a space on each side, and in each of said spaces a shiftable side grate bar 19 is arranged in the same plane as the main grate 16, its ends being slidably supported by the transverse supporting bars 15.

The bottom edge of the furnace casing 10 is outturned to form a holding flange 20 and loosely encircling said furnace casing over and above said flange 20 is a vertically movable coupling ring 21, the upper edge of which is inturned to form a flange 22. Oppositely located slots 23 are formed in said flange 22, which permit of said coupling ring 21 being dropped past lugs 24 projecting from the side of the furnace casing, and into an interlocking engagement with an annular retaining seat 25 in the form of a groove provided at the top side of a circular air feeding base 26.

The air feeding base 26 is provided with

bearing standards 27 which receive the trunnions 11 of the furnace casing 10. At the bottom side the said air feeding base 26 is provided with an air supply trunk 28 having circular walls 29 and 30, the inner one of which is provided with twyer openings 31 arranged to direct air blasts convergently toward the center thereof. The outer wall 30 of said air supply trunk 28 is provided with a neck 32, which is in communication with a source of any suitable air supply (not shown). A base plate 33, which is of the same shape and size as the outer wall 30 of said air supply trunk 28, is provided with an upstanding edge 34, which engages with the lower edge of said outer wall.

A crucible 35, preferably of graphite, is provided at the bottom with a supporting block 36, which is also preferably of graphite, and is adapted to be seated within the furnace casing 10 upon the depressed central seat 18 of the main grate 16. Said crucible 35 is provided with an upper pouring lip 37, and is held in said casing 10 in a position so that its pouring lip 37 will register with the pouring lip 12 of the said furnace casing. Any suitable means may be employed to retain said crucible 35 in its upright position upon the main grate 16, a convenient one being had by using wedges or spacers 38 of fire resisting material which bear against the upper portion of said crucible and the lining of the furnace casing.

A top ring 39 of fire resisting material is seated upon the upper supporting ring 13 within the furnace casing. The diameter of said top ring 39 is considerably larger than the diameter of the crucible 35, which readily permits of the said crucible being placed within the furnace casing or removed therefrom without removing said top ring. A hopper 40 projects through said top ring 39 and has its lower end resting within the crucible. The upper end of said hopper projects beyond said top ring 39 and is surrounded by an open ended cylinder 41 supported by said top ring 39. Said open ended cylinder 41 is formed of fire resisting material and its connection with said top ring 39 is made tight by means of wet sand or clay as at 41<sup>a</sup>. A cover or top piece 42 made from the same material as the cylinder 41, is carried by the outer end of said cylinder, and is provided with a small central opening 43 through which the surplus heat and gases from the furnace fire escape.

To facilitate the operation of handling the furnace a lever 44 is carried by one of the trunnions 11.

The operation of the invention is as follows:—Assuming the furnace to be in a tilted, or discharging position, and it is desired to return it to an upright position and lock it there.—By means of the operating lever, the furnace casing is turned on its standard bear-

ings 27 until it assumes an upright or vertical position over the air supply base 26. The coupling ring 21 is then turned around until its slots 23 aline with the lugs on the casing 10, whereupon said coupling ring 21 may be dropped vertically until its lower edge rests within the grooved seat 25 of the air supply base and its inturned flange is resting upon the holding flange of the furnace casing.

The charging of the furnace is performed while it is in an upright position, and in the following manner:—The cover 42 is removed from the cylinder 41 and the metal to be melted placed within the hopper 40 and crucible 34. The live coals in the furnace partially surround the crucible and the heat therefrom imparts a preliminary heating to the metal within the hopper 40. As the metal within the crucible melts, its bulk will be reduced and the heated metal from the hopper 40 will drop down into the crucible. This continues until all the metal within said hopper and said crucible has assumed a molten state, whereupon more metal may be placed within said hopper, until a sufficient quantity has been melted.

To discharge the melted material the coupling ring 21 is turned to cause its slots 23 to aline with the lugs 24, and then raised vertically from its grooved seat 25 until its flange 22 has passed said lugs 24, at which point a slight turn will move it to a position where it will be supported with the said flange 22 resting on said lugs 24. This unlocks said furnace from the air supply base 26, and it may then be tilted to its discharging position by means of the lever 44 and side bearings 27, and its melted material poured into a ladle or the like.

From the foregoing description and operation of the invention it will be seen that a simple and efficient locking means for holding the furnace casing in a vertical position over the air supply base has been provided. And that by means of the described structure of the air supply trunk, provision is made for supplying the necessary forced draft through the twyer openings 31 in the form of converging blasts directly under the furnace grate. And, further, that by means of the shiftable feature of the grate side bars 19, access may be had to the furnace fire for stoking, &c. And it will also be understood that by means of the removability of the cover for the cylinder which surrounds the feeding hopper access may be had to the furnace fire for the purpose of adding fresh fuel, in addition to access being had to the said hopper for the purpose of re-charging it with metal.

I claim as my invention:—

1. A smelting furnace consisting of a base, an upright tilttable casing supported over said base, and locking means carried by said

casing and interlocking with said base to retain said casing in an upright position.

2. A smelting furnace consisting of an upright tiltable casing carrying a vertically movable coupling ring, and a base provided with a seat for said coupling ring.

3. A smelting furnace consisting of a base, an upright tiltable casing supported over said base, and a movable coupling member carried by said casing adapted to engage with said base to retain said casing in an upright position.

4. A smelting furnace consisting of a base provided with a grooved seat, an upright tiltable furnace casing supported over said base, and a vertically movable coupling member carried by said casing and adapted to engage with said grooved seat to retain said casing in an upright position.

5. A smelting furnace consisting of an air supplying base provided with standard bearings, an upright tiltable casing supported by said standard bearings, and locking means having elements carried respectively by said air supply base and said casing for retaining said casing in an upright position.

6. A smelting furnace consisting of an air supply base carrying standard bearings, a tiltable casing mounted on said standard bearings, a grate within said casing provided with a seat, a crucible mounted on said grate seat, a hopper opening into said crucible, a cylinder carried by the casing and surrounding said hopper, and a cover for said cylinder.

7. In a smelting furnace, a casing provided with a bottom grate comprising a main grate detachably secured to said casing and provided with a seat, transverse supporting bars for said grate, shiftable side grate bars supported by said supporting side bars, and a crucible supported by said main grate.

8. The combination in a smelting furnace, of an air supply base, an upright tiltable furnace casing mounted over said air supply base, a vertically movable locking ring carried by said casing and adapted to engage with said air supply base to lock said casing in an upright position, a grate carried by said casing provided with shiftable side bars, a

crucible mounted on said grate, a hopper for feeding material to said crucible, and a heat retaining cylinder carried by said casing and surrounding said hopper.

9. The combination in a smelting furnace, of an air supply base, an upright tiltable furnace casing mounted over said air supply base, a vertically movable locking member carried by said furnace casing and adapted to engage with said air supply base to temporarily lock said furnace casing in an upright position, a grate carried by said furnace casing provided with movable side members, a crucible mounted on said grate, a hopper for feeding material to said crucible, a cylinder surrounding said hopper, and a removable cover for said cylinder provided with a central opening.

10. The combination in a smelting furnace, of an air supply base carrying a feeding trunk provided with twyer openings, and an upright tiltable furnace casing supported over said air supply base.

11. The combination in a smelting furnace, of a base carrying an air supply trunk provided with twyer openings adapted to direct air blasts convergently toward the center thereof, and an upright tiltable furnace casing supported over said base.

12. The combination in a smelting furnace, of a base carrying an air supply trunk having inner and outer walls one of which is provided with twyer openings adapted to direct air blasts convergently toward the center thereof, the other wall being provided with a neck which communicates with a source of air supply, an upright tiltable furnace casing supported over said base, means for locking said furnace casing in an upright position, a grate carried by said casing, a crucible mounted on said grate, a hopper for feeding material to said crucible, and a cylinder surrounding said hopper.

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

WILLIAM JOSEPH HOLZAPFEL.

Witnesses:

E. F. DOORLEY,  
H. B. LEE.