

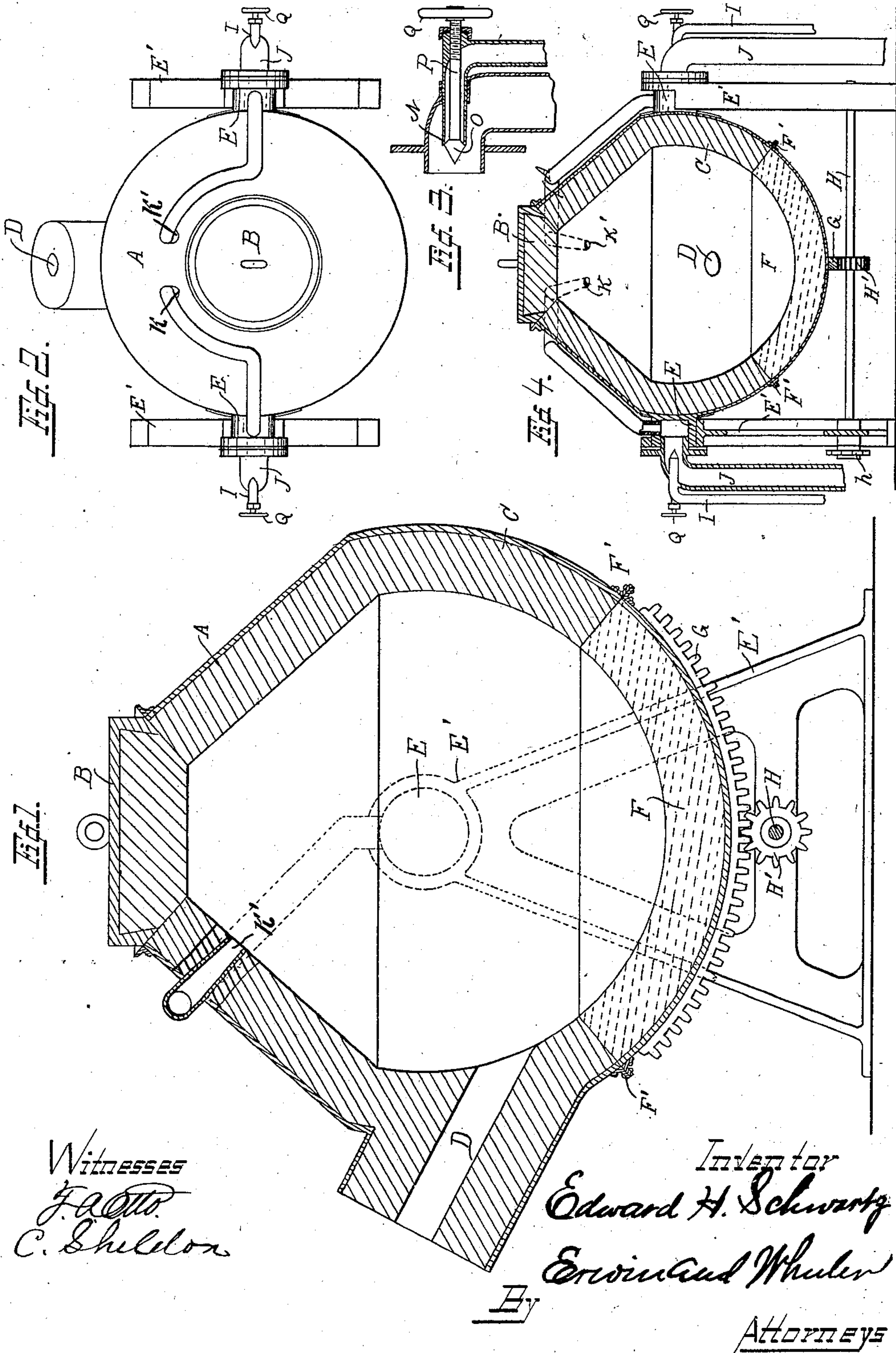
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E. H. SCHWARTZ.
MELTING FURNACE.

(Application filed July 16, 1900.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

EDWARD H. SCHWARTZ, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF TWO-THIRDS TO THE HAWLEY DOWN DRAFT FURNACE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 708,782, dated September 9, 1902.

Application filed July 16, 1900. Serial No. 23,770. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. SCHWARTZ, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Melting-Furnaces, of which the following is a specification.

My invention relates to melting-furnaces and the like; and the object thereof is to provide a novel, efficient, and economical furnace for the melting and treating of metals.

The features of advantage and utility in my furnace will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a vertical section of a furnace embodying my invention, the section being taken through the tapping-hole and vent; Fig. 2, a plan of the furnace; Fig. 3, a section of the mixer for mingling with air the oil or gas used as fuel; and Fig. 4, a vertical sectional view of the furnace, taken transversely to that of Fig. 1, the scale of this figure as well as of Fig. 2 being reduced in comparison with Fig. 1.

Like parts are identified by the same reference-letters throughout the several views.

The upper portion A of my improved furnace is tapered or conical in form, with a charging-door B at the apex. The lower portion C is semispherical and is provided with a vent-opening or chimney D, which is also used as a tapping-hole or discharge-vent for drawing off the molten metal. The entire furnace is supported to oscillate upon the trunnions E in the supporting-frame E'. A section F in the base of the furnace is made removable, being bolted to the main portion at F'. As the portion C of the furnace is semispherical, it is obvious that the brick-work forming the interior wall thereof above the joint F' will form an annular arch, so that when the section F is removed the brick-work above the joint F' will remain in place.

It will be observed that the section F is provided with a rack G, located in the same plane as the vent or tapping-hole D. By means of this rack the furnace can readily be oscillated upon its supporting-trunnions E through the medium of a shaft H and pinion

H', power being applied to the shaft through the sprocket-wheel h or any other convenient manner.

With the construction as shown in the drawings the upper portion of the furnace will be oscillated to the right when it is desired to charge the same, the door B being then removed and the metal deposited upon the lower portion of the right-hand wall of the furnace, which is then oscillated slowly to a vertical position, giving the flame time to thoroughly heat the interior floor of the section F before the metal falls or flows to a central position thereon as the furnace resumes its upright position, as shown in Fig. 1. When it is desired to tap the furnace, the furnace is tilted to the left until the molten metal will flow out through the aperture D, the latter being thoroughly heated by reason of the fact that it is used also as an escape-opening for the flame and gases.

Referring to the fuel-supply, it will be observed that I have provided for the use of oil or gas, this being conveyed to the furnace by means of pipes I, which discharge through the valved apertures, hereinafter described, into air-supply pipes J, which communicate axially with the trunnions E of the furnace. The mixed air and gas is then conveyed to the upper portion of the furnace through the pipes J and discharged through suitable burners into the furnace at K K' above the vent-opening D. The burners are adjusted to direct the blast downwardly in the furnace and converging toward the opposite wall, the respective discharges through the burners K K' being preferably caused to meet at or near the center axis of the furnace, whereby the blast becomes distributed against the opposing wall of the furnace and passes with a whirling motion downwardly and follows the curve of the interior wall of the furnace until it reaches the vent D, through which the products of combustion are permitted to escape. I attach great importance to the arrangement whereby the burners discharge their contents into the furnace at or near its upper end in such a direction and against a wall of such curvature as to carry the blast downwardly and

along the wall to the vent-opening, for it is obvious that the gases driven into the furnace in this manner are raised to a very high temperature before combustion sets in and before reaching the contents of the furnace of the walls thereof, the maximum combustion being attained at the bottom of the furnace.

Referring now more particularly to the mixing of the oil or gas passing through the pipe I with the air of the pipe J, it will be observed, Fig. 3, that the end N of the pipe I is formed into a flaring mouth, in which a conical valve O is located. The opposing surfaces of the valve O and of the mouth N being divergent inwardly, the valve is adjusted, by means of a stem P and hand-wheel Q, so as to permit the oil to discharge in an annular sheet or spray between the surfaces of the valve O and mouthpiece N into the air-pipe J. It will be understood that the usual blast appliances are used for forcing air through the pipe J, and it is therefore obvious that the oil or gas escaping from the pipe I will be thoroughly mixed with the air before reaching the burners. Where oil is used, it will be wholly evaporated and taken up by the air-blast, so that it enters the furnace in a gaseous form.

My invention is especially adapted for use in that class of portable furnaces which are supported upon a truck or platform-car and used for welding joints of railway-track, &c.; but it may obviously be also applied to any other form of furnace.

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

1. A furnace comprising side walls, a vent-opening through one wall, and a burner discharging into the furnace through an opening distinct from the vent-opening, the side walls being arranged to cause the flame to sweep downwardly and thence across the hearth or bottom of the furnace and out through the vent-opening; substantially as described.

2. A furnace comprising side walls, one of which has a downwardly-curved inner surface, a vent-opening through the other side wall, and a separate burner also extending through the second side wall, above the vent-opening, and arranged to project flame across the furnace directly upon said curved wall; substantially as described.

3. A furnace comprising side walls, one of which has a downwardly-curved inner surface, a vent-opening through the other side wall, and a separate burner also extending through the second side wall, above the vent-opening, and arranged to project flame downwardly and across the furnace directly upon said curved wall; substantially as described.

4. A furnace comprising side walls, a vent-opening through one wall, and a plurality of burners, each discharging into the furnace through an opening distinct from the vent-opening and arranged to project converging

flames across the furnace, the side walls being arranged to cause the flame to sweep downwardly and thence across the hearth or bottom of the furnace and out through the vent-opening; substantially as described.

5. A furnace comprising side walls, one of which has a curved inner surface, a vent-opening through the other side wall, and a plurality of burners extending through the second side wall, above the vent-opening, and arranged to project converging flames across the furnace directly upon said curved wall; substantially as described.

6. A furnace comprising a substantially spherical body, a vent-opening through one side, and a burner also extending through the side above the vent-opening and arranged to project flame directly across the furnace upon the curved wall opposite; substantially as described.

7. A furnace comprising a substantially spherical body, a vent-opening through one side, and a plurality of burners also extending through the side above the vent-opening and arranged to project converging flames directly across the furnace upon the curved wall opposite; substantially as described.

8. A furnace comprising walls of refractory material and a hearth for holding molten metal, means for throwing a flame across the furnace-chamber and directly upon a portion of the inner wall above the hearth, and means for shifting the furnace and thereby moving the heated portion of the wall beneath the molten metal lying on the hearth; substantially as described.

9. A furnace comprising walls of refractory material, a hearth for holding molten metal, a vent-opening through one side and above the hearth, a burner above the vent-opening, arranged to project flame across the furnace and directly upon a portion of the inner wall above the hearth, and means for shifting the furnace and thereby moving the heated portion of the wall beneath the molten metal lying on the hearth; substantially as described.

10. A furnace comprising walls of refractory material, a hearth for holding molten metal, a vent-opening through one side and above the hearth, a plurality of burners above the vent-opening, arranged to project converging flames across the furnace and directly upon a portion of the inner wall above the hearth, and means for shifting the furnace and thereby moving the heated portion of the wall beneath the molten metal lying on the hearth; substantially as described.

11. A furnace provided with a vent-opening and suitable burners at one side of the furnace, said burners being arranged to direct converging flames directly toward the opposite wall of the furnace; substantially as described.

12. A furnace provided with a vent-opening and suitable burners at one side of the furnace, said burners being arranged to di-

rect converging flames downwardly and directly toward the opposite wall of the furnace; substantially as described.

13. A melting-furnace for the purpose described, consisting of a closed tiltable body having its inner walls curved in the horizontal plane, a burner entering said closed body and adapted to project a flame directly therein upon the curved inner walls and upon the exposed body of metal contained in the furnace, and means for rocking said body on its supports to expose different portions of the inner walls thereof to the direct heat of said flame, whereby the metal may be melted in said furnace in an open and exposed condition without the use of a crucible; substantially as described.

14. A melting-furnace for the purpose described, consisting of a closed tiltable body mounted on trunnions and having its inner walls curved in the horizontal plane, a burner entering said closed body through one of the trunnions and adapted to project a flame directly therein upon the curved walls, and upon the exposed body of metal contained in the furnace, and means for rocking said body on its trunnions to expose different portions of the inner walls thereof to the direct heat of said flame, whereby the metal may be melted in said furnace in an open and exposed condition without the use of a crucible; substantially as described.

15. A melting-furnace for the purpose described, consisting of a closed tiltable body provided with a discharge-outlet for molten metal near its base and with removable top or cover and having its inner walls curved in the horizontal plane, a burner entering said closed body and adapted to project a flame directly therein upon the curved inner walls and upon the exposed body of metal contained in the furnace, and means for rocking said body on its supports to expose different portions of the inner walls thereof to the direct heat of said flame, whereby the metal may be melted in said furnace in an open and exposed condition without the use of a crucible; substantially as described.

16. In a melting-furnace, the combination of a furnace-chamber proper, a plurality of burners arranged to discharge flame-jets and entering one side only of the furnace, and arranged to focus substantially at the central axis of the furnace and strike the opposite wall of the furnace.

17. In a melting-furnace, the combination of a furnace proper, having curved interior walls, and a plurality of burners arranged to discharge flame-jets and entering one wall only of the furnace and arranged to focus substantially centrally of the furnace, said flame-jets being deflected downward by the opposite wall of the furnace.

18. In a melting-furnace, the combination of a furnace proper having curved interior walls, and a plurality of burners arranged to discharge flame-jets and entering one wall

only of the furnace and arranged to focus substantially centrally of the furnace, said burners being directed transversely and downwardly in the furnace.

19. A furnace provided with a lateral vent-opening and suitable burners in the upper portion of the furnace at one side only thereof, and above the vent-opening, said burners being directed convergingly toward the opposite side or wall of the furnace, the jets from said burners focusing before reaching said opposite wall.

20. A furnace, provided with a lateral vent-opening, and suitable burners in the upper portion, and on one side only of the furnace above the vent-opening directed convergingly toward the wall of the furnace opposite the vent-opening.

21. In a furnace, provided with an upwardly-inclined lateral vent-opening, a charging-door in the upper portion of the furnace, burners arranged at one side only of the furnace and located between the vent-opening and the charging-door, and directed toward the wall of the furnace opposite the vent-opening.

22. A furnace provided with an upwardly-inclined lateral vent-opening, and one or more burners arranged at one side only of the furnace and located at a higher level than the vent-opening, and directed downwardly toward the opposite interior wall of the furnace.

23. The combination of a furnace substantially spherical in form provided with a top charging-door B and a lateral vent D upwardly inclined from toward the bottom of the furnace and a plurality of burners located at one side of the furnace toward the top thereof, and directed downwardly and convergingly toward the opposite side or wall of the furnace and arranged to focus flame-jets near the central vertical axis of the furnace, which jets, by striking said opposite wall, obtain a rotary whirling motion.

24. A furnace formed with a charging-door at its upper end, a lateral vent-opening, burners located in the furnace between the vent-opening and the charging-door, and directed convergingly toward the interior wall opposite the burners, and a supporting-frame on which said furnace is pivotally mounted.

25. A furnace formed with a charging-door at its upper end, a lateral vent-opening, burners located in the furnace between the vent-opening and the charging-door, and directed toward the interior wall opposite the burners, a supporting-frame on which said furnace is pivotally mounted, and means for tilting the furnace to discharge the molten metal through the vent-opening.

26. A furnace formed with a charging-door at its upper end, a lateral vent-opening, burners located in the furnace between the vent-opening and the charging-door, and directed toward the interior wall opposite the burners, a supporting-frame on which said furnace is

pivotaly mounted, a sector-shaped rack-bar located on the lower portion of the furnace, and a pinion mounted in said frame upon a supporting-shaft, whereby the furnace may
5 be tilted on its pivotal support.

27. A furnace pivotaly mounted on supporting-trunnions, a recess in the outer ends of said trunnions, an air-blast pipe leading to said recess, a fuel-supply pipe communicating with the interior of said air-blast pipe,
10 a valve located in said fuel-supply pipe, and gas-supply-pipe connections leading from the recessed trunnions to a point in the upper portion of said furnace.

15 28. A furnace provided with an upwardly-inclined lateral opening forming a combined vent and tap and burners arranged in one side only of the upper part of the furnace and arranged to discharge flame-jets into the furnace.
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29. A furnace provided with an upwardly-inclined lateral opening forming a combined vent and tap and a plurality of burners passing through one side only of the furnace, being the side provided with said opening, and directly converging toward the opposite side or wall of the furnace.
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30. A substantially spherical furnace having an upwardly-inclined opening D forming a combined vent and tap and a plurality of downwardly-directed and convergingly-pointed burners arranged to discharge flame-jets into the furnace, in combination with a supporting-frame on which the furnace is pivotally mounted.
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31. A substantially spherical furnace having a charging-door B at the top and an upwardly-extending opening D forming a vent and tap, and also having trunnions, a frame receiving said trunnions whereby the furnace is pivotally supported, and burners K located above the said opening D and arranged to focus flame-jets substantially at the central vertical axis of the furnace, whereby the combined jets strike the wall of the furnace opposite the vent-opening.
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32. A furnace comprising a tiltable body provided with a vent-opening, and a burner entering said furnace through an opening distinct from the vent-opening but in proximity thereto, substantially as described.
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33. A melting-furnace comprising a tiltable

body having an opening in position to act as a combined vent and tap, and a burner entering said furnace through an opening distinct
55 from the vent and tap opening but in proximity thereto, substantially as described.

34. A furnace comprising a tiltable body having a vent-opening, and a burner entering said furnace through an opening distinct
60 from the vent-opening but in proximity to and in substantially the same vertical plane as the said vent-opening, substantially as described.

35. A furnace comprising a tiltable body having in its side an outlet for products of combustion, and a burner entering said furnace through an opening distinct from but adjacent to said outlet, substantially as described.
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36. A furnace comprising a tiltable body with a curved inner surface, an outlet for products of combustion, and a burner entering said furnace through an opening distinct from said outlet and arranged to discharge a
75 flame upon said curved surface, substantially as described.

37. A furnace having a curved inner surface, an outlet for products of combustion, and a plurality of burners entering said furnace through an opening or openings distinct from said outlet, and arranged to discharge converging flames upon said surface, substantially as described.
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38. A furnace comprising a tiltable body having a curved inner surface, a vent-opening, and a plurality of burners entering said furnace through an opening or openings distinct from said vent-opening and arranged to discharge converging flames which impinge
85 90 upon said curved surface, substantially as described.

39. A melting-furnace comprising a tiltable body mounted on trunnions and having in its side an opening for products of combustion, and a burner entering the body through one of the trunnions, substantially as described.
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In testimony whereof I affix my signature in the presence of two witnesses.

EDWARD H. SCHWARTZ.

Witnesses:

JAS. B. ERWIN,
L. C. WHEELER.