

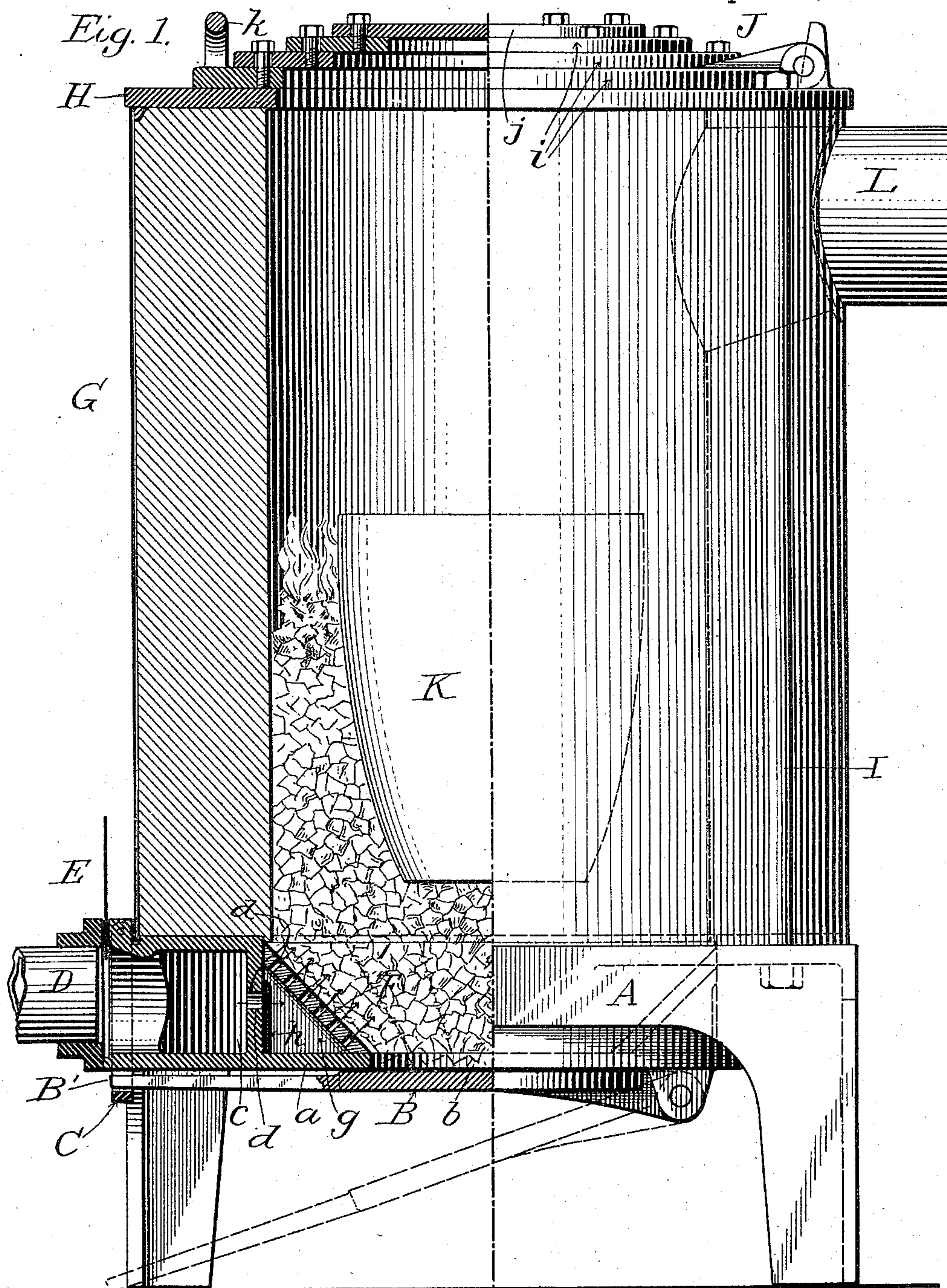
(No Model.)

2 Sheets—Sheet 1.

W. S. JOHNSON.
SMELTING FURNACE.

No. 580,403.

Patented Apr. 13, 1897.



Witnesses
C. E. Burdine
D. E. Burdine.

Inventor:
Warren S. Johnson,
by Dodge & Sons,
Attorneys.

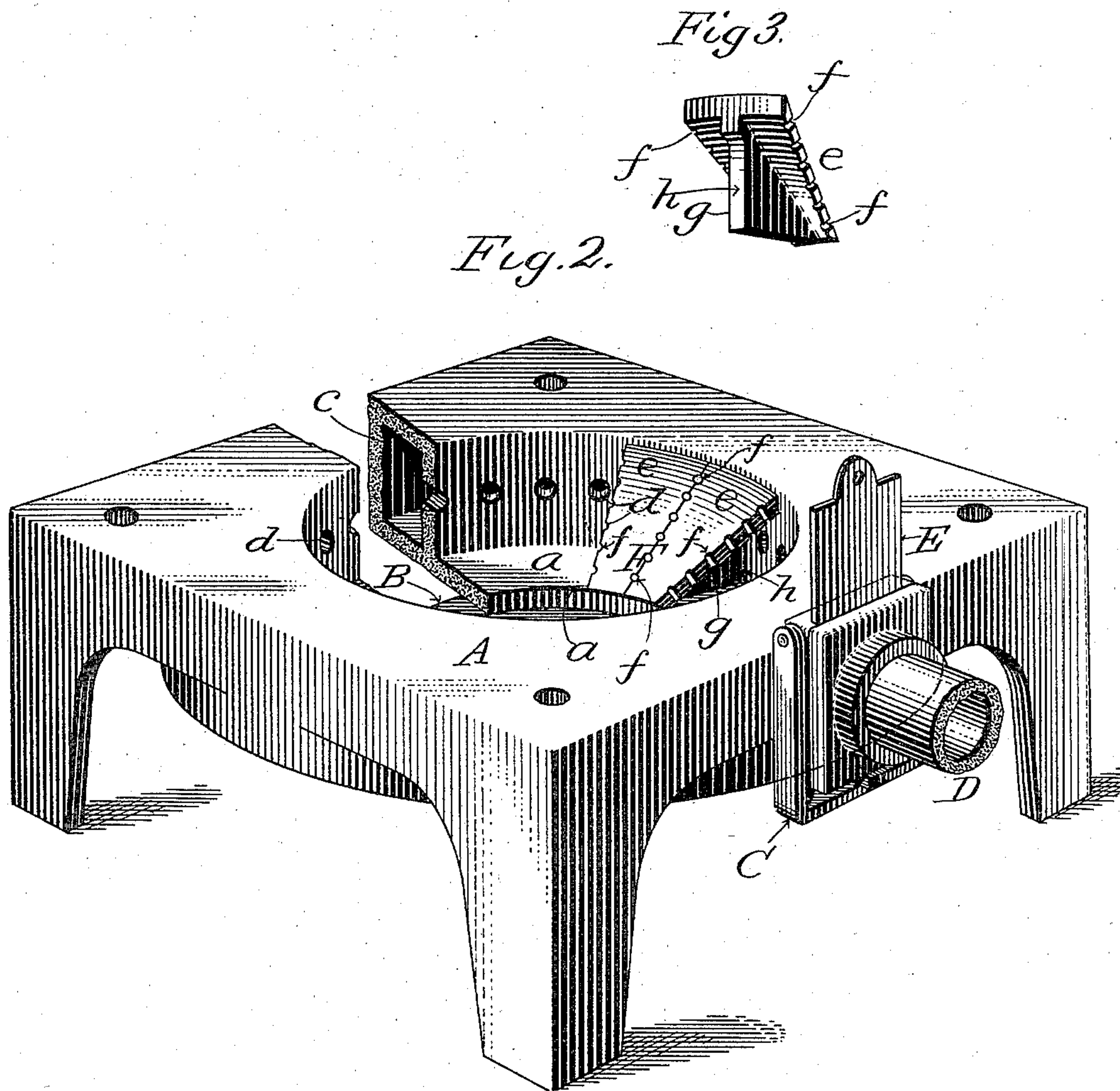
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UNITED STATES PATENT OFFICE.

WARREN S. JOHNSON, OF MILWAUKEE, WISCONSIN.

SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 580,403, dated April 13, 1897.

Application filed April 1, 1896. Serial No. 585,791. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. JOHNSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Smelting-Furnaces, of which the following is a specification.

My invention relates to brass-furnaces; and it consists in various novel features of construction hereinafter pointed out, whereby great economy and efficiency are secured.

In the annexed drawings, Figure 1 is an elevation, partly in section, showing the improved furnace; Fig. 2, a perspective view of the base of the furnace, showing the annular air-chamber and representing two of the sector-shaped castings of which the inner ring is composed; Fig. 3, a rear view of one of the sectors in perspective.

In the drawings, A indicates a cast-metal base, preferably of square or rectangular form, having a flat horizontal top and supporting-feet which raise the base sufficiently from the floor to permit the dumping of the furnace, as hereinafter mentioned.

The base A is formed with a circular central depression or cavity, at the bottom of which is an inwardly-projecting ledge or floor *a*, in which is a central opening *b*, which is normally closed by a hinged bottom plate B. This plate is formed with an outwardly-extending arm *B'*, which is upheld by a latch or bail C, Figs. 1 and 2, or by any equivalent device.

The base A is cast hollow in that portion surrounding the central depression or cavity, the chamber *c* so formed constituting an air-space to receive and contain a supply of air from any suitable air-forcing apparatus, heated or otherwise, as required, the air entering by a pipe D and its ingress being regulated and controlled by a gate or valve E. (Shown in Figs. 1 and 2.)

The upright wall of the central depression or cavity is provided with a series of holes *d*, through which air may freely pass from chamber *c*.

F indicates an inner ring composed of a series of sector-shaped sections *e*, each of the form shown in Figs. 1, 2, and 3—that is to say, each having a sector-shaped face or body

portion inclined at an angle of forty-five degrees, more or less, with notches *f* in their abutting edges and with a supporting web or rib *g* on the rear or under side to rest upon the ledge or floor *a* and to sustain the sector in proper position, as seen in Figs. 1 and 2.

In order that there may be free circulation of air from one section to another, the web or rib *g* is cut away at its outer end, as shown in Figs. 1 and 3, leaving a space *h* between it and the wall of the cavity in which it is placed.

The notches of abutting sectors being similarly spaced and located form holes for the passage of air from beneath the sectors to the fuel-chamber of the furnace and cause the air to be divided into a great number of fine streams which are distributed throughout the base of the fuel charge resting upon the ring F and the bottom plate B.

The holes *d* effect a quite even division of the air, so that all sides of the fuel charge are supplied alike; but this division is carried further by the sectors or sections *e* and the holes formed between their edges. The ribs or webs *g* also preclude the undue rush of air to any one point and consequent inequality of combustion and of heat at different points.

Resting upon the base A is a cylindrical body G, of fire-clay or other refractory material, jacketed with metal and provided with a top plate or ring H, which is drawn and held down upon the top of the shell or body G by tie rods or bolts I, as shown in Fig. 1.

To the top plate or ring H is hinged or applied a cover J, composed of several rings *i* and a plate or disk *j*, united by tap-bolts or equivalent means, the bolt-holes in one plate of each connected pair being somewhat larger than required for the free insertion of the bolts, as shown in Fig. 1, in order that each plate may expand and contract independently of others. This is a quite important feature, for the reason that the covers or "tiles" of this class of furnaces as ordinarily constructed speedily lose their shape and become so irregular and uneven, if they do not crack or fracture, that they are useless and must be renewed.

The construction herein set forth adds

greatly to the life of the covers and insures more perfect closure than has hitherto been attainable generally.

The cover may be provided with a handle, 5 bail, or eye *k*.

An outlet-pipe *L* for connection with a stack or chimney is provided, as shown.

By the construction herein set forth I am enabled to use anthracite coal of small size 10 instead of the coke which is almost universally used in other brass-furnaces, and this because of the copious supply of air and its thorough distribution.

With coke it is necessary to fill the cham- 15 ber with fuel to the top of the crucible *K* in order properly to melt its charge, but with anthracite it is only necessary to carry the fuel to about one-half the height of the crucible. This difference is important, not 20 merely on account of the saving in cost of fuel, but particularly because the crucible is left exposed, so that the lifting-tongs may be applied well down on its sides, where there is little or no danger of crushing its walls by 25 the gripping-pressure, whereas breakage from this cause is very frequent when the tongs are applied at or near the top of the crucible, as is necessarily done when the fuel is carried to its top.

30 When a crucible breaks, the molten metal fills the bottom of the furnace and is very apt to close the air-openings and to clog the furnace generally. In such case it becomes necessary to remove ring *F* or portions of it, 35 which may be done speedily and with ease owing to the sectional construction, and this without disturbing other parts.

The economy due to saving in fuel, rapidity of melting, freedom from breakage of cruci- 40 bles, and facility of repair is very great.

Having now described my invention, I claim—

1. The herein-described furnace, comprising a base having a central depression or cavity, 45 an air-chamber surrounding said cavity and communicating therewith by openings through its wall; an internal ring consisting of a series of sector-shaped members placed side by side in the cavity of the base and perforated to permit passage of air; a body of 50 refractory material supported upon said base; and a cover applied to said body.

2. In a furnace, the combination of a hol-

low base having an open center and perforate walls opening into the central space; and a 55 supplemental perforate ring placed within the central space and composed of sections separable on practically radial lines, substantially as and for the purpose set forth.

3. In combination with a base *A* having a 60 central depression or cavity provided with a ledge *a*, and an annular chamber *c* provided with holes *d*; sector-shaped sections *e* provided with openings for the passage of air; and a body *G* supported upon said base, sub- 65 stantially as set forth.

4. In a furnace, the combination of a base having an annular air-chamber provided with holes *d*; and a ring divided on substantially 70 radial lines into a series of sector-shaped blocks provided with notches *f*, located within the space surrounded by the air-chamber, and producing a second air-chamber, substantially as described and shown.

5. In a furnace, the combination of a base 75 *A* provided with floor or ledge *a* and annular air-chamber *c*; and a series of blocks *F* resting upon said floor, having inclined sector-shaped faces, and supporting-ribs beneath said faces, and provided with openings for 80 escape of air.

6. In a brass-furnace, the combination of a base *A* provided with floor *a* having opening 85 *b*; hinged bottom *B* applied to said opening; air-chamber *c*; air-pipe *D* opening into chamber *c*; a gate or valve *E* applied to pipe *D*; and an air-distributing ring *F* resting upon floor *a* within the space inclosed by chamber 90 *c*, said ring being composed of sections *e* having notches *f* and ribs *g*.

7. In combination with a furnace of the class described, a cover composed of a series of rings and a plate or disk superposed thereon, and means whereby said rings and plate 95 are loosely but permanently connected, substantially as described; whereby warping and breakage are prevented or lessened, and the cover is adapted to be handled without liability of separation.

In witness whereof I hereunto set my hand 100 in the presence of two witnesses.

WARREN S. JOHNSON.

Witnesses:

HORACE A. DODGE,
WILLIAM W. DODGE.