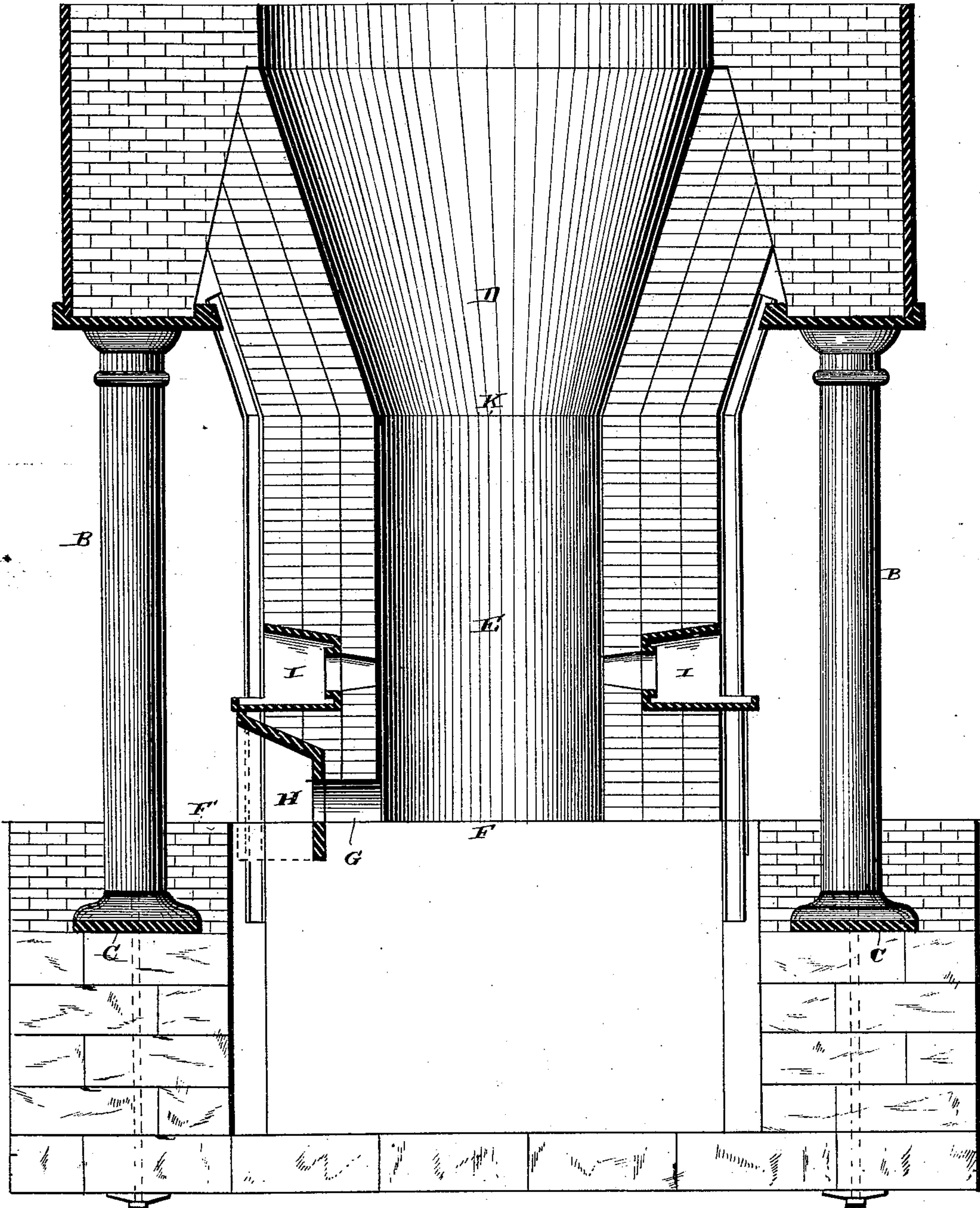


P. L. WEIMER.
Blast-Furnace.

No. 226,690.

Patented April 20, 1880.

Fig. 1.
A



WITNESSES

E. J. Nottingham
A. M. Bright

INVENTOR

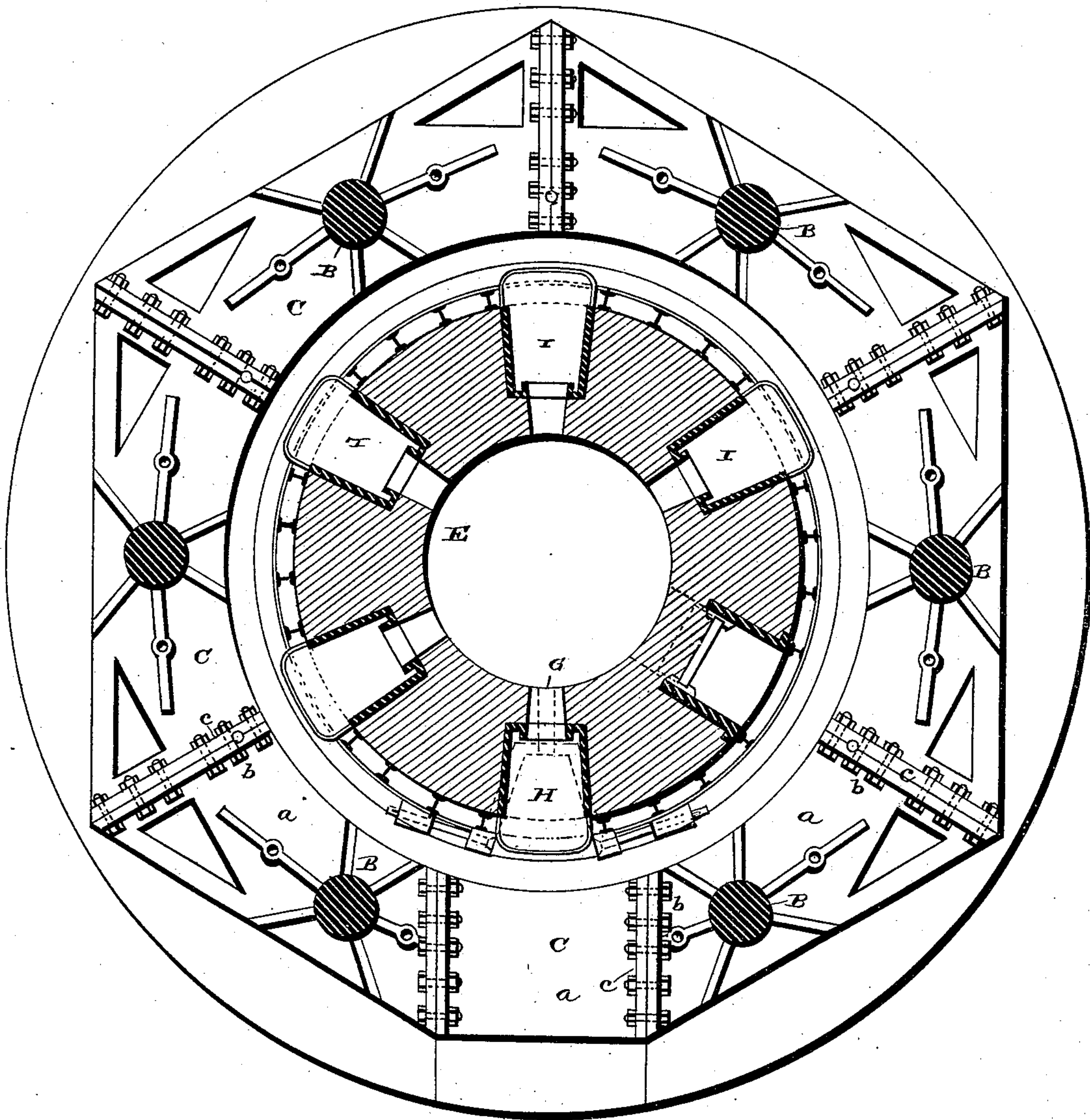
Peter L. Weimer.
By H. A. Symon.
ATTORNEY

P. L. WEIMER.
Blast-Furnace.

No. 226,690.

Patented April 20, 1880.

Fig. 2.



WITNESSES

E. Nottingham
A. M. Bright

INVENTOR

Peter L. Weimer
By H. A. Symmon
ATTORNEY

UNITED STATES PATENT OFFICE.

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 226,690, dated April 20, 1880.

Application filed January 22, 1880.

To all whom it may concern:

Be it known that I, PETER L. WEIMER, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Iron-Smelting Furnaces, which have not been patented to myself or to others with my consent or knowledge in any foreign country; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in iron-smelting furnaces.

Heretofore in ordinary iron-columned iron-smelting furnaces the columns supporting the shaft of the furnace rest upon a cast-iron base-plate, usually placed from twelve to fifteen inches below the hearth-line of the furnace. In order to provide sufficient space for the trough employed for taking away the iron from the tapping-hole, as well as to provide for the lowering of the trough as the bottom of the furnace wears away, the annular base-plate on which the columns are supported is cut away or omitted between two of said columns, thereby forming a gap in the otherwise continuous base-plate. By forming an opening or gap in the base-plate, as set forth, the expansion of the hearth of the furnace operates to force apart the lower ends of the columns resting on the base-plate adjacent to said opening, and thus impair the strength and durability of the structure, while in some instances these columns are broken in two.

Again, in smelting-furnaces as ordinarily constructed the point of juncture of the upper end of the crucible and lower extremity of the boshes is located in such proximity to the tuyeres that the latter operate to burn away the brick-work and destroy the inclined supporting-surface formed by the lower portion of the boshes, and thus allow the stock to rest solidly on the hearth, and thus seriously impair the effective operation of the furnace.

The object of my invention is to obviate the defects above set forth; and to that end my invention consists, first, in the combination, with the supporting-columns of a smelting-fur-

nace, of a continuous annular base-plate located a sufficient distance below the hearth to allow of the adjustment of the iron trough and the working or repair of the furnace without interference with said base-plate, whereby the supporting-columns are provided with a firm foundation, the expansion and contraction of which are equally disposed throughout its entire length.

My invention further consists in a smelting-furnace constructed with the vertical sides of the crucible extending a sufficient distance above the tuyeres to confine the cutting action of the tuyeres to the upper portion of the crucible and below the lower end of the boshes, and thereby preserve the angle of the boshes and insure a proper support for the stock of the furnace irrespective of the condition of the crucible or hearth.

In the accompanying drawings, Figure 1 is a vertical section of the lower portion of an iron-smelting furnace embodying my invention, and Fig. 2 is a horizontal section taken through the tuyeres.

A represents the stack, and B the iron columns supporting the stack, the lower ends of the columns resting upon an annular cast-iron base-plate, C, which latter is made up of sections *a*, firmly secured together by bolts *b*, inserted through flanges *c*.

D represents the bosh of the furnace; E, the crucible; F, the hearth; F', the hearth-line; G, the dam; H, the tapping-hole, and I the tuyeres.

As heretofore stated, the base-plates of ordinary smelting-furnaces are formed with a gap or opening adjacent to the tapping-hole, to allow for the adjustment of the trough, such being necessary, as the base-plates are located but slightly below the hearth-line of the furnace.

In my improved construction of furnace the base-plate C is sunk sufficiently below the tapping-hole H to allow of the adjustment of the trough throughout the different stages of wear of the furnace without interference with the base-plate, the position of the latter also allowing the furnace to be repaired without interference therewith. As the base-plate is situated considerably below the hearth-line of the furnace it is thereby relieved to a great extent from the effect of contraction and expan-

sion experienced in ordinary furnaces, where the base-plates are nearly on a horizontal plane with the hearth-line.

The annular base-plate C, being made continuous, without gap or opening formed therein, operates to prevent undue strain or impair the stability of the iron columns by reason of the expansive effect of heat to which the base-plate is necessarily subjected, for the reason that every portion thereof is subjected to an equalized strain, and hence the integrity of the base-plate insures a firm and reliable support for the iron columns, and precludes their being forced out of position.

In smelting-furnaces as ordinarily constructed the tuyeres are located at or slightly above a horizontal plane cutting the vertical center of the crucible, and, as heretofore explained, the upper portion of the crucible and lower walls of the boshes are cut away by the action of the tuyeres after a comparatively short time, the effect of which is to destroy the angle of the boshes, and thus allow the stock to rest heavily on the hearth, thereby seriously deranging and impairing the effectiveness of the furnace.

In my improved construction of furnace the tuyeres I are placed in the crucible E at the usual height above the hearth-line; but the distance from the center of the tuyeres I to the angle K formed by the slope of the boshes is made sufficiently great to insure the cutting action that takes place immediately above the tuyeres not to reach the angle K formed by the slope of the boshes, and thereby preserve intact the angle K of the boshes, and cause the latter to perform its function of supporting the stock irrespective of the condition of the crucible.

It is evident that slight changes in the relative proportions of parts may be resorted to without departing from the spirit of my invention—as, for instance, the distance of the base-plate from the hearth-line may be varied and still effect the desired results; and, further, the distance from the angle K of the boshes and the tuyeres I may be varied somewhat and still restrict the cutting action of the tuyeres within the necessary boundaries to prevent the destruction of the angle of the boshes.

In some of the old charcoal-furnaces the crucibles have been made quite deep; but the diameter of the crucible is only from one-fourth to one-sixth the diameter of the bosh, or widest portion of the furnace, and hence, while the crucibles in such furnaces have the requisite depth, they do not have the requisite diameter for furnaces wherein anthracite coal is used, and by the time the crucible has

burned out to the requisite diameter it will not have the requisite height to confine the cutting action of the tuyeres within the crucible.

In anthracite-furnaces the fuel used is smooth, and, unlike coke or charcoal, takes no lateral hold on the wall of the furnace; hence when the inclines of the boshes employed to hold up the stock are destroyed the effectiveness of the furnace is destroyed.

Hence the object of my improvement is to locate the boshes sufficiently above the tuyeres in the crucible that the cutting action of the tuyeres will be expended within the crucible and below the angle of the boshes, and I effect this result by constructing the lines of the interior of an iron-smelting furnace so that when the diameter of the crucible is approximately one-half that of the bosh, or widest part of the furnace, the vertical height of the crucible above the center line of the tuyeres will be equal to from three-fourths to twice the diameter of the crucible measured at the line of the tuyeres, for the purpose of raising the incline of the boshes beyond the cutting action that takes place over the tuyeres, and confining the action to the crucible-walls alone.

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

1. The combination, with the iron-supporting columns of an iron-smelting furnace, of a continuous bed-plate for supporting the lower ends of said columns, said bed-plate formed of sections bolted together and located at a sufficient distance below the tapping-hole in the crucible to allow of the varied adjustment of the trough as the furnace wears away, substantially as set forth.

2. In an iron-smelting furnace, the crucible formed with its sides practically straight from the hearth to the incline of the boshes, and circular in form throughout its height, the diameter of the crucible being practically from one-half to five-eighths the diameter of the boshes, or widest part of the furnace, and the vertical height of the crucible above the center line of the tuyeres being equal to from three-fourths to twice the diameter of the crucible measured at the line of the tuyeres, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 12th day of January, 1880.

PETER L. WEIMER.

Witnesses:

J. WEIDMAN MURRAY,
W. MORRIS WEIDMAN.