(No Model.)

C. C. CARROLL.

CRUCIBLE FURNACE.

No. 376,632. Patented Jan. 17, 1888.

Fig. 1.

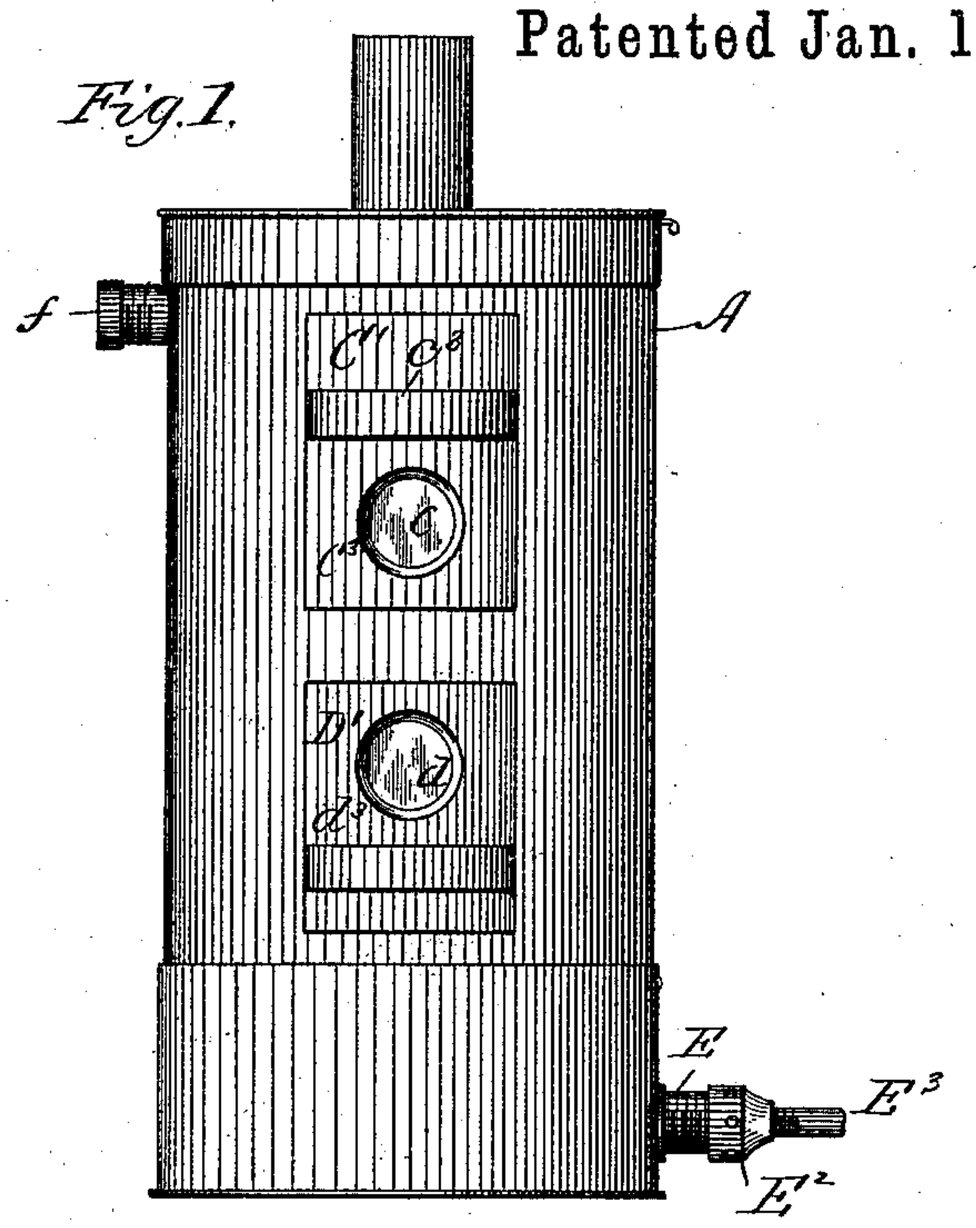
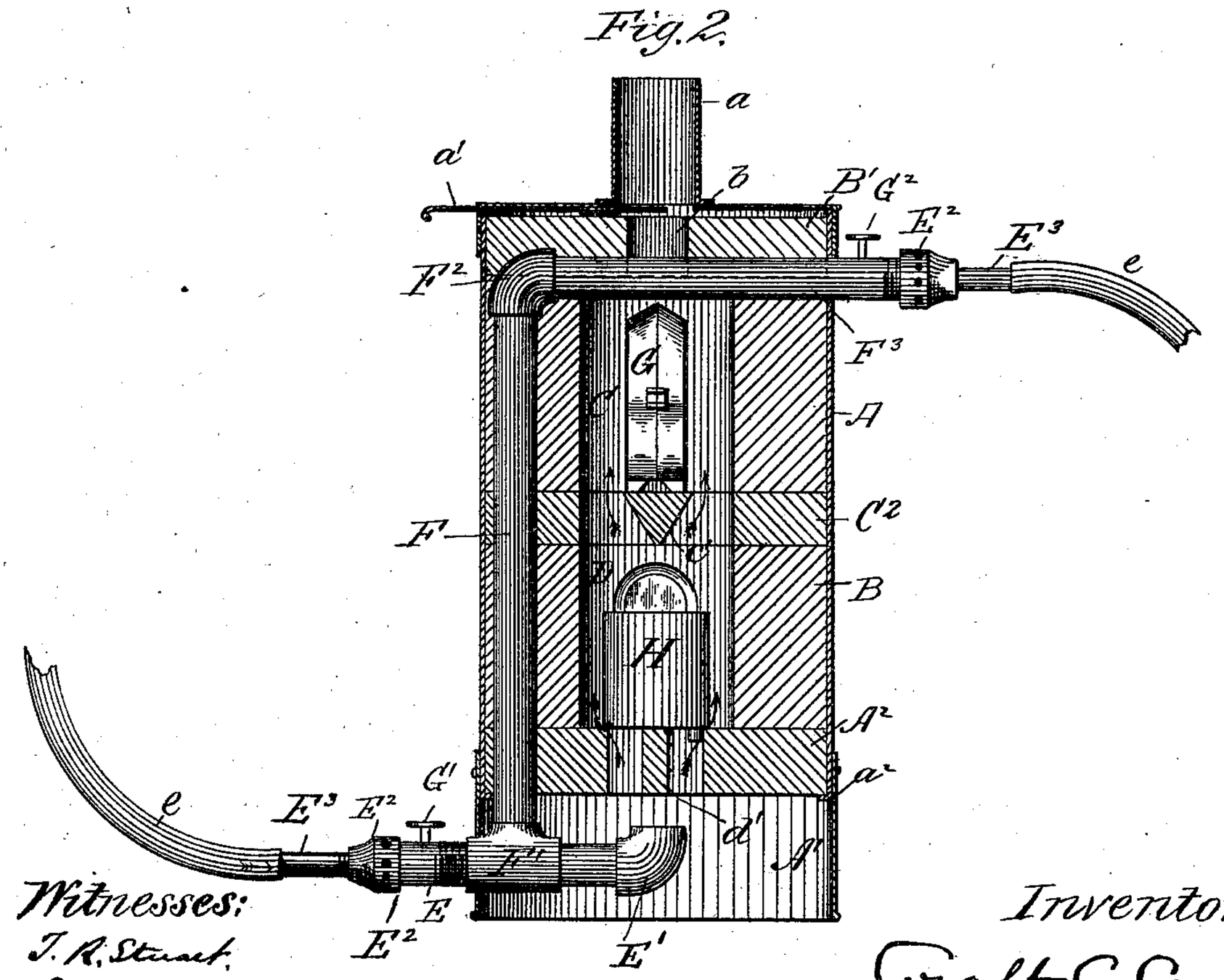


Fig. 2.



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UNITED STATES PATENT OFFICE.

CRAFT C. CARROLL, OF MEADVILLE, PENNSYLVANIA.

CRUCIBLE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 376,632, dated January 17, 1888.

Application filed January 31, 1887. Serial No. 226,057. (No model.)

To all whom it may concern:

Be it known that I, CRAFT C. CARROLL, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Crucible-Furnaces; 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 appertains to make and use the same.

My invention relates to smelting-furnaces; and it consists in the construction and arrangement or combination of the parts, which will be more fully hereinafter described, and pointed out in the claim.

The object of my invention is to provide a furnace having chambers in which high and different degrees of heat can be produced and maintained by natural or artificial gases or by hydrocarbon oils.

Preferably I construct my furnace so that it can be readily moved from place to place; but it may be constructed so as to remain fixed and stationary.

I am aware that furnaces have been constructed with more than one chamber and for substantially the same purposes and objects which I have found can be successfully accomplished with my furnace, but, so far as I know, with only partial success.

I am also aware that furnaces have been constructed so as to heat the gas used when found desirable, but not in the way I provide for heating the same.

I have found that with a furnace constructed and operated as hereinafter described any required degree of heat can be obtained, and that such differences of temperature can be maintained in the chambers as may be desired.

In the accompanying drawings, illustrating my invention and forming a part of this specification, and in which the same letters indicate the same or similar parts, Figure 1 is a front elevation of my furnace, and Fig. 2 is a vertical section of the same.

On said drawings, A represents the outer casing or jacket of my furnace, which may be made of any suitable material, but is preferably made of Russia sheet-iron suitably bolted or riveted together, and B the inner portion or lining of the same, which may be made of clay or fire-brick. This lining rests on a flange formed by turning the jacket A inward at its bottom, as shown at a^2, and its cap or top B′ is provided with a flue, *b*, which registers with a pipe, *a*, mounted on and secured to the top of casing A. Between this cap and the top of the casing is arranged a sliding damper, *a′*, for controlling the draft through the flue *b* and pipe *a*. The interior of the furnace is formed into two heating-chambers, C and D, which are provided with removable doors C′ D′, formed of fire-brick or clay and provided with curved handles c^3 d^3 and with isinglass peep-holes *c* and *d*, through which the interiors of the chambers may be inspected.

The walls of the chambers C and D are separated by an annular strip or ring of fire-brick, C^2. Extending across the space between the inner walls of this ring C^2 from side to side and preferably formed integral therewith is a triangular or V-shaped bridge, *c′*, of sufficient width on its upper side to support a flask, as G, Fig. 2, leaving on either side openings for the passage of heat, as shown. The bottom of the chamber D consists of an annular ring, A^2, provided with a bridge, *d′*, leaving openings on either side thereof, as shown, for the passage of heat.

A combustion-chamber, A′, is formed below the bottom A^2 of the chamber D, as shown, and consists of a thin metallic shell of a diameter sufficient to allow the casing A, which is securely riveted thereto, to enter the same at its upper end a short distance for securement.

Entering at one side of the combustion-chamber A′, and about midway from its bottom and the lower surface of the annular ring A^2, is a feed-pipe, E^3, which may be connected to any suitable source of supply of gas, preferably by means of a tube or pipe, *e*, of rubber or other suitable material, adapted to be removably secured thereto.

A revoluble perforated coupling, E^2, connects the pipe E^3 to a short pipe, E, of larger diameter than pipe E^3, the pipe E connecting with the T-joint F′, which carries the burner E′, which may be of any ordinary form. Connecting with the T-joint F′ is a vertical pipe, F, passing up through the fire-brick or clay lining B nearly to the upper end of the furnace, where, by an elbow, F^2, it is connected

to a horizontal pipe, F^3, which passes across the upper chamber, C, and protrudes through the casing a short distance, and is arranged to receive the perforated coupling E^2, to which is attached the pipe E^3, as shown in Fig. 2. This coupling E^2, with its pipe E^3, is transferable from the pipe F^3 to the pipe E, and vice versa, as may be desired.

When the gas is admitted through the pipe E, the outer end of the pipe F^3 may be closed by means of the cap *f*, as shown in Fig. 1, so that the gas cannot escape at that point; also, when the gas is admitted through the pipe F^3 and the perforated coupling E^2 and the pipe E^3, the outer end of pipe E may be closed by said cap; or, if preferred, cocks or valves G' and G^2 may be employed in the pipes E and F^3, as shown in Fig. 2, in lieu of the cap *f* and subserve the same end.

I have shown in Fig. 2 a flask, G, located in the upper chamber of the furnace and resting on the bridge *c'*, and in the lower chamber, D, a crucible, H, resting on the bridge *d'*; but it will be understood that I do not limit myself to the use of such devices in such chambers, as other uses may be made of said furnace, and other means than those shown may be utilized instead of the flask or crucible shown.

I contemplate using natural and artificial gases and hydrocarbon oils for fuel in my furnace, and will now describe the manner of employing the same.

When natural gas is to be used for heating the furnace, the valve or cock G' is opened and the gas admitted through the pipes *e*, E^3, and E. The air enters through the perforated coupling E^2 and unites with the gas in pipe E and passes on to the burner E', the air acting to produce perfect combustion of the gas.

When ordinary or manufactured gas is employed, it is desirable to heat both the air and gas before they reach the point of combustion. To effect this the valve or stop-cock G' is closed, the valve or cock G^2 opened, and the gas admitted through the upper pipe, E^3, and the air through the perforated coupling E, and together pass through pipes F^3 and F, elbow F^2, and T-joint F' to the burner E', where they are ignited.

I have found in practice that by the use of either of the gases named in a furnace constructed as above described and in the manner described the temperatures in the chambers C and D are very different, due to the different applications of the heat thereto, the lower chamber being closer to the burner or source of heat, will necessarily be of higher temperature than the upper chamber—as, for instance, if the temperature in chamber D reaches 1,300°, the temperature in chamber C will be about 1,100°.

I have found this furnace especially useful in dentistry, because of the high and different temperatures which can be obtained and maintained therein for melting aluminum and other metals requiring very high degrees of heat to melt them, and also in the formation of crowns, bridges, and dental plates where different degrees of temperature are required.

If it is desired to melt a very refractory metal, it is placed in a crucible, as H, in the lower chamber, and the heat is applied until the required degree is obtained. While such melting is going on a flask may be placed in the upper chamber, as G, and the ordinary and usual work of dentistry proceeded with. I do not, however, limit the use of said furnace to dentistry, as it is obvious that on account of its lightness and compactness it may be applied to many other uses.

It is obvious that many minor changes in the construction and arrangement of the parts may be made and substituted for those shown and described without departing from the nature or principle of my invention.

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

A smelting-furnace comprising a metallic outer casing having a fire-brick or clay lining, upper and lower heating-chambers having floors formed of bridges, horizontally-arranged fuel-feeding pipes entering near the base and the top thereof, and provided with one or more perforated couplings for the admission of air, a vertically-arranged pipe within the fire-brick or lining for heating the air, or the air and gas, a damper for controlling the consumption of fuel by closing or opening the flue, and a gas-burner, substantially as described.

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

CRAFT C. CARROLL.

Witnesses;
L. SEWARD BACON,
M. A. BALLINGER.