

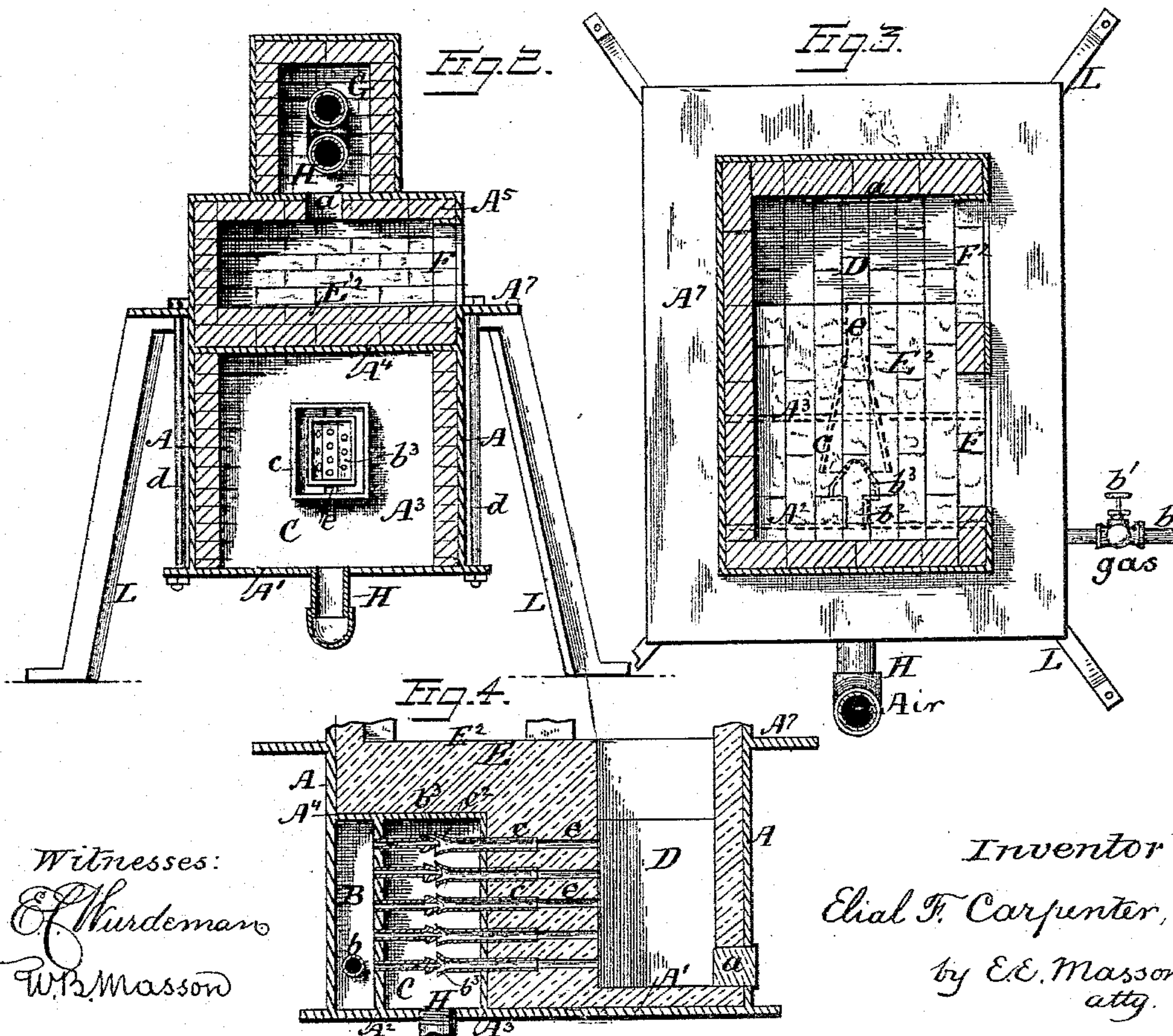
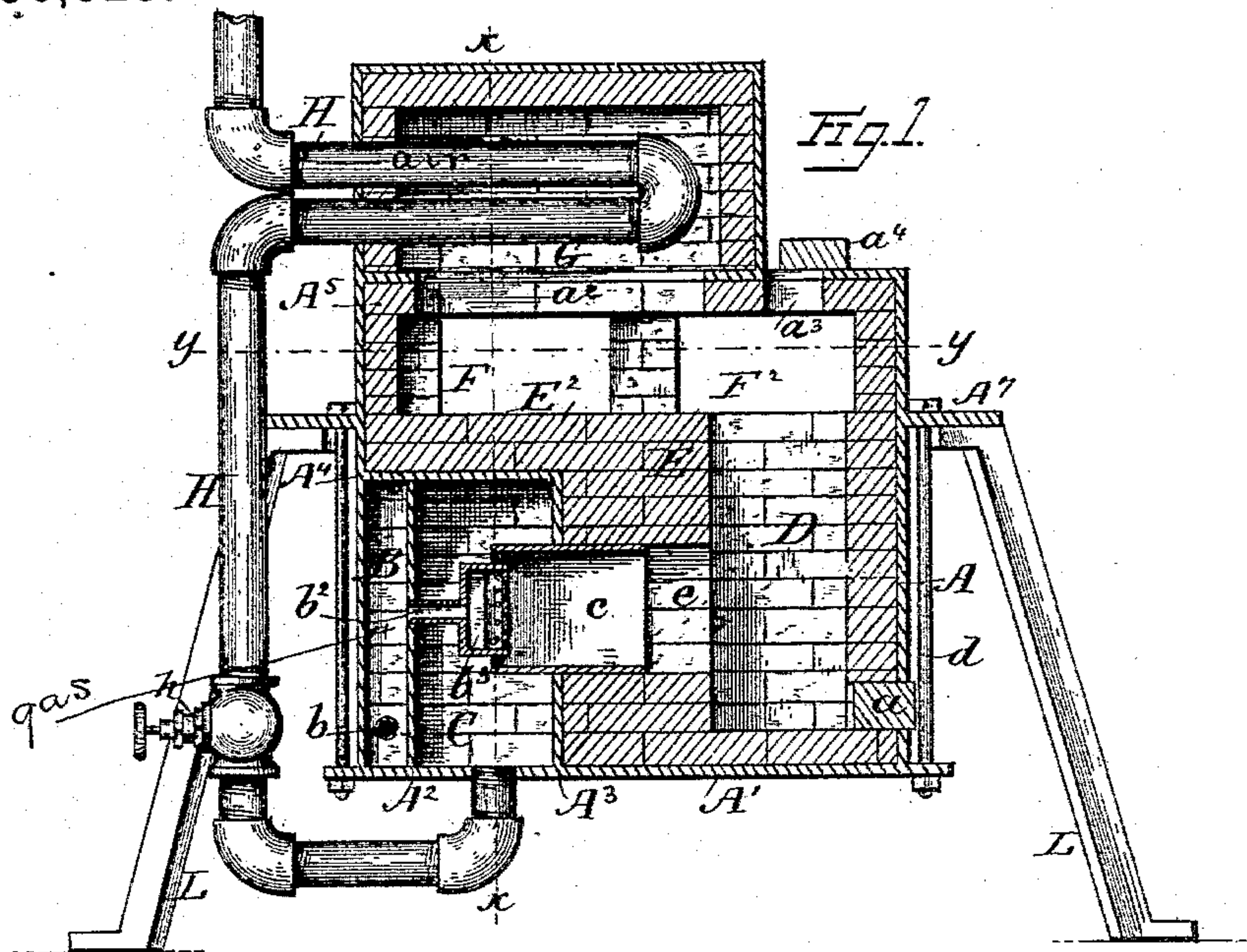
(No Model.)

E. F. CARPENTER.

GAS FURNACE FOR HEATING BLANKS.

No. 356,923.

Patented Feb. 1, 1887.



N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

ELIAL F. CARPENTER, OF JAMESTOWN, N. Y., ASSIGNOR OF TWO-THIRDS TO
FRED T. POWELL AND CHARLES J. CARPENTER, BOTH OF SAME PLACE.

GAS-FURNACE FOR HEATING BLANKS.

SPECIFICATION forming part of Letters Patent No. 356,923, dated February 1, 1887.

Application filed June 17, 1886. Serial No. 205,503. (No model.)

To all whom it may concern:

Be it known that I, ELIAL F. CARPENTER, a citizen of the United States, residing at Jamestown, in the county of Chautauqua, State of New York, have invented certain new and useful Improvements in Gas-Furnaces for Heating Blanks, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to furnaces for heating blanks, and the objects of my improvements are to produce small compact furnaces in which an intense iron-welding heat can be produced without oxidation of the metal acted upon by means of natural hydrocarbon-gas and hot air thoroughly mixed and consumed therein and cause a steady discharge of the products of combustion without inconvenience to the workmen. I accomplish these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a furnace constructed in accordance with my invention. Fig. 2 is a transverse vertical section of the same on line *xx* of Fig. 1. Fig. 3 is a horizontal section on line *yy* of Fig. 1, above the platform or shelf of the furnace. Fig. 4 is a vertical section of the lower portion of the furnace provided with a series of air and gas mixing burners constructed in accordance with my invention.

In these drawings, A represents a rectangular frame of cast-iron, provided with a closed bottom, A', and two transverse vertical partitions, A² A³, to form a gas-chamber, B, at one end, a gas and air mixing chamber, C, in the middle, and a combustion-chamber D, at the opposite end and upon substantially the same level. The chambers B C are closed air-tight at the top by a plate, A⁴, secured to the frame A. The gas, preferably natural hydrocarbon gas, is admitted into the gas-chamber B through a pipe, b, controlled by a suitable valve, b', and it issues again from said chamber into the mixing chamber or flue c, through a horizontal pipe, b², having at its end a hollow cap, b³, the front of which is provided with a series of small perforations about a sixteenth of an inch or more in diameter. This cap extends about half-way within the mixing-chamber, and its front end is preferably beveled, as shown by

dotted lines in Fig. 3, and is made to enter about an inch into a cast-iron flue, c, having its sides tapering toward each other at the front, but sufficiently wide at the rear to leave a passage between its walls and the cap b³ for the escape of the air forced into the air-chamber, and in said passage the air becomes thoroughly mixed with the inflammable gas issuing from the cap b³ through its small perforations, and draws and directs it into the combustion-chamber D. To protect the outer end of the flue c, it is incased in the fire-protecting substances, as perforated tiles or bricks, E, that leave only a narrow opening, e, for the burning mixture to enter the combustion-chamber.

When the furnace is to be of rather large size, or it is desired to have a large surface of flame, the gas is made to issue from the gas-chamber, as shown in Fig. 4, through a series of twenty to thirty horizontal pipes, b², arranged at short distances apart, and each having at its outer end a conical cap, b³, provided with a small central perforation about a sixteenth of an inch or more in diameter. The pipes b² extend about half-way within the mixing-chamber, and opposite them are secured, in the partition A³, a corresponding series of pipes c, having their inner end, c², flaring, and into said flaring end the conical cap b³ of the gas-pipes b² enters for about an eighth of an inch, but leaves an annular passage between each cone and metal forming the flaring end of the pipes c, through which the air forced into the chamber c enters and draws therewith the gas issuing from said cone and directs it into the combustion-chamber D. To protect the outer ends of the pipes c, they are incased into fire-protecting substances E, as puddled fire-clay, perforated tiles, bricks, or abestus; but although partitions of fire-bricks are preferred, as being easiest to repair, puddled clay is also used, as small perforations e can be made therein by inserting small wooden plugs in the outer end of the pipes c and packing clay around said pipes and plugs, and when the clay is sufficiently dry the plugs are withdrawn and leave small tubular perforations of about one-half inch diameter in the clay opposite the ends of the pipes c. Puddled clay or fire-bricks are also arranged on top of the cap-plate A⁴ of the gas and air cham-

bers, to form a floor or hearth at E^2 , upon which are placed the blanks to be heated, the temperature obtained at that point being very near welding-heat. From this floor each blank is seized through the front opening, F , by a workman with a pair of tongs and inserted through the opening F^2 , and held a short time in the combustion-chamber D , over the flame issuing from the opening or openings c^2 made in the fire-protecting substance E , and a welding-heat is promptly obtained, and also a sufficient amount of heat to finish the heads of axes, bit-heads, mattocks, &c.

To utilize the caloric after it has been deflected by the arch or ceiling A^5 of the combustion and blank-heating chambers for heating the air fed to the furnace, there is left in said ceiling a long but narrow opening, a^2 , over which is located a close chamber, G , and into said chamber is placed one or more coils of the pipe H , through which passes a current of air from a fan-blower to the bottom of the gas and air mixing chamber c , and the size of said current is controlled by a valve, h , placed upon said air-pipe. The floor of the combustion-chamber and also its interior, as well as the interior of the chamber G , is lined with fire-bricks or other fire-protecting material. A part of the heat goes to the top chamber, G ; but the products of combustion escape through the front openings, F , close to the top thereof.

In the lower portion of one of the walls of the combustion-chamber there is an opening through which the slag accumulating in said chamber may be removed; but said opening may be otherwise generally closed by removable bricks a . In the arch or ceiling of the combustion-chamber there is an opening, a^3 , through which a bar of iron may be introduced to break the slag that may occasionally become hardened on the bottom of the combustion-chamber. The top opening, a^3 , is generally closed with a brick or slab, a^4 ; but it may be left partly open after the fire is well under way to allow a portion of the products of combustion to escape at that point and thus relieve the workmen of a portion of the heat escaping at the front openings.

The parts forming the frame of the furnace are retained together by bolts d , and the whole

is supported at a proper height upon legs L , secured to the under side of the platform A^7 of said furnace.

I am aware that the air fed to coal-burning furnaces has been heated before bringing it into contact with this heavy and condensed fuel, and do not claim the use of heated air to this class of combustibles. Neither do I claim that it is broadly new to feed heated air with hydrocarbon gas into furnaces.

I am also aware that in reverberatory gas-furnaces the air fed therein has been heated by conducting it first through passages under the hearth or around the stack, and sending it, with the hydrocarbon gas, over and upon the material placed in said furnaces, and do not claim this mode of heating air, nor the furnaces in which it is provided.

Having now fully described my invention, I claim—

1. In a reverberatory furnace for heating and welding blanks, the combination of a gas-chamber, B , an air-chamber, C , a gas and hot-air mixing chamber or flue, c , communicating with said gas and air chambers, and a separate combustion-chamber, D , all substantially on the same level, with a blank-receiving chamber located above said gas and air chambers and having a permanent ceiling and front openings, substantially as and for the purpose described.

2. In a reverberatory furnace for heating blanks, the combination of a gas-chamber, an air-chamber, a gas and hot air mixing-flue communicating with said gas and air chambers, and a separate combustion-chamber, all substantially on the same level, with a blank-receiving chamber having front openings and a permanent ceiling, an air-heating chamber located above the blank-receiving chamber and communicating therewith, and an air-pipe coiled therein and connected with the air-chamber under the hearth of the furnace, substantially as described.

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

ELIAL F. CARPENTER.

Witnesses:

WILLIS TEW,
FRED T. POWELL.