(No Model.) 2 Sheets—Sheet 1.

J. F. GILPIN & J. ELLIOT.

GAS FURNACE.

No. 448,955. Patented Mar. 24, 1891.

Fig. 1.

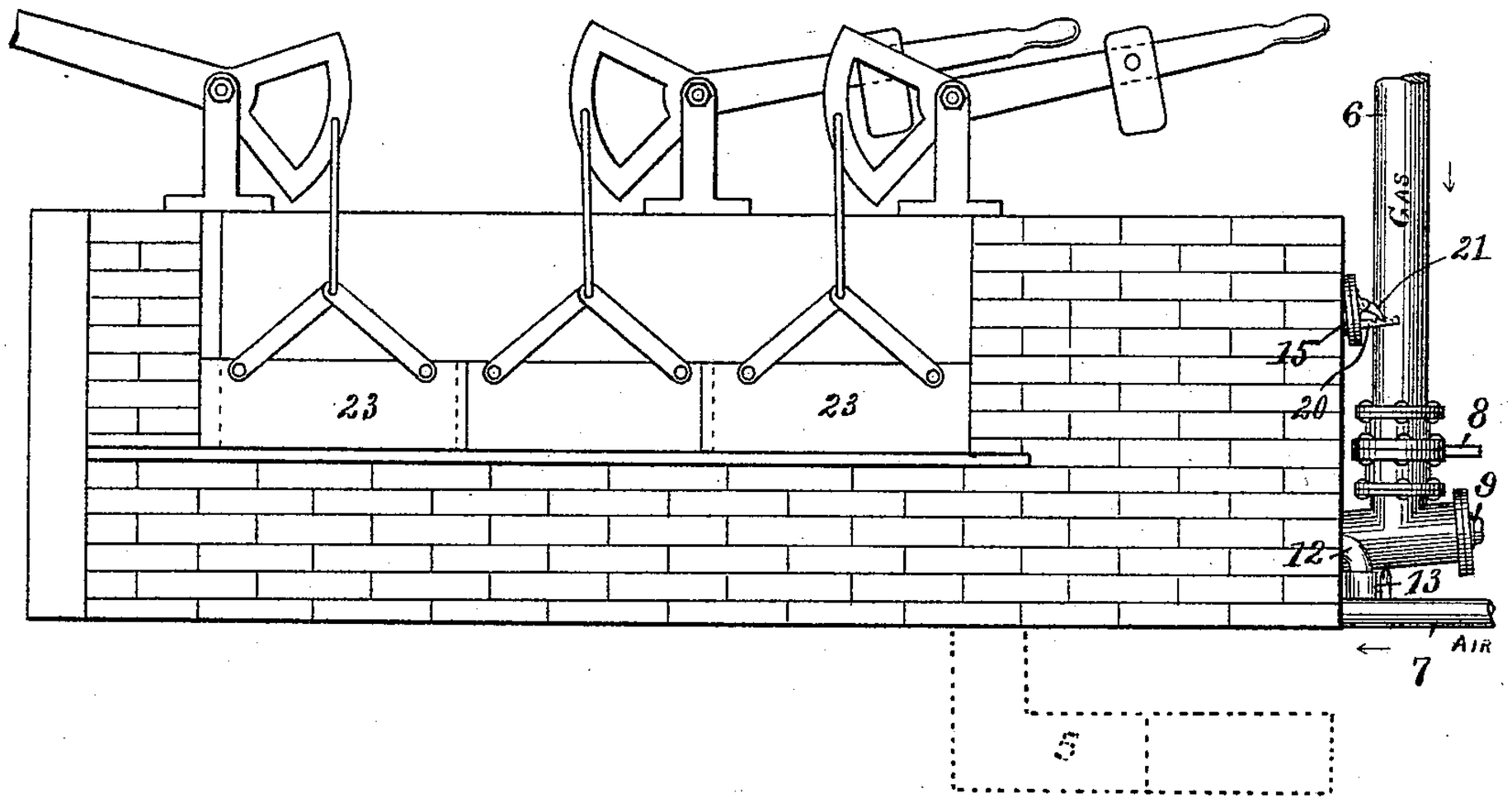
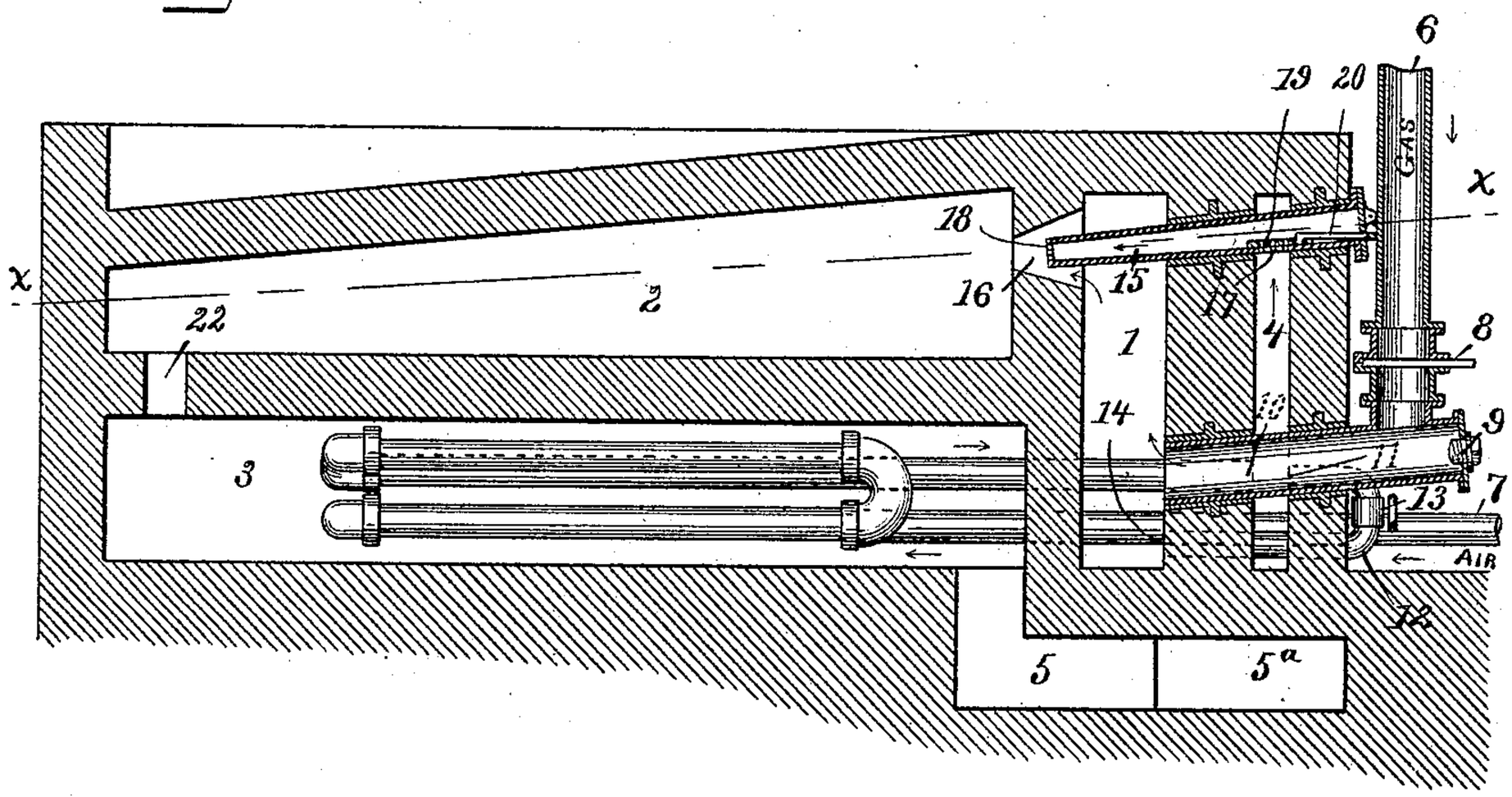


Fig. 2.



WITNESSES

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Fig. 3.

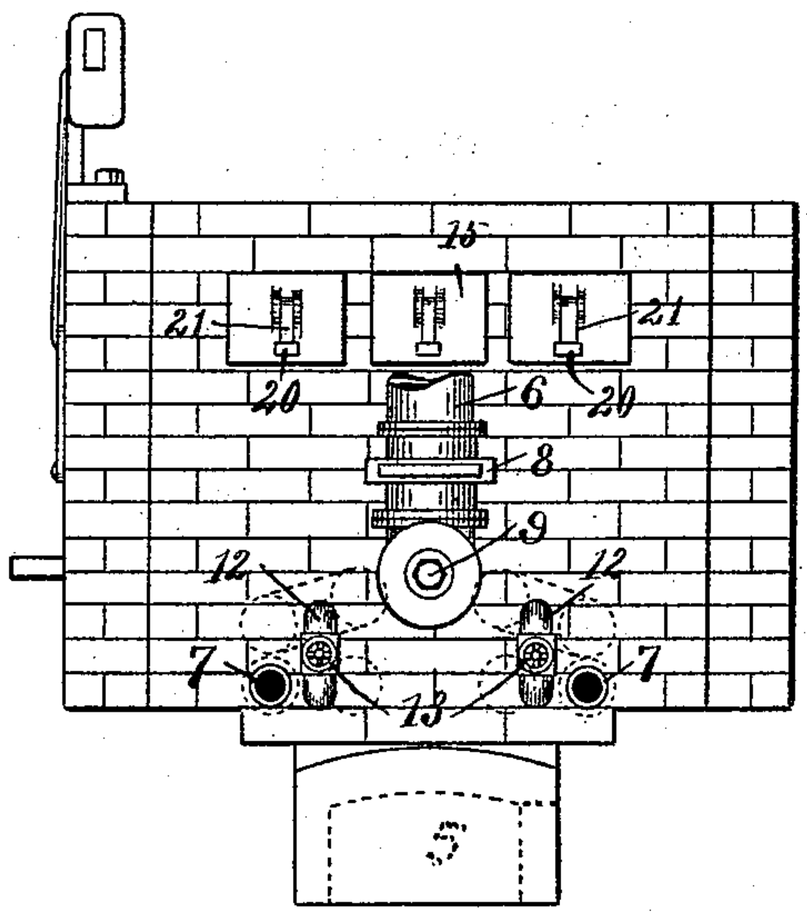
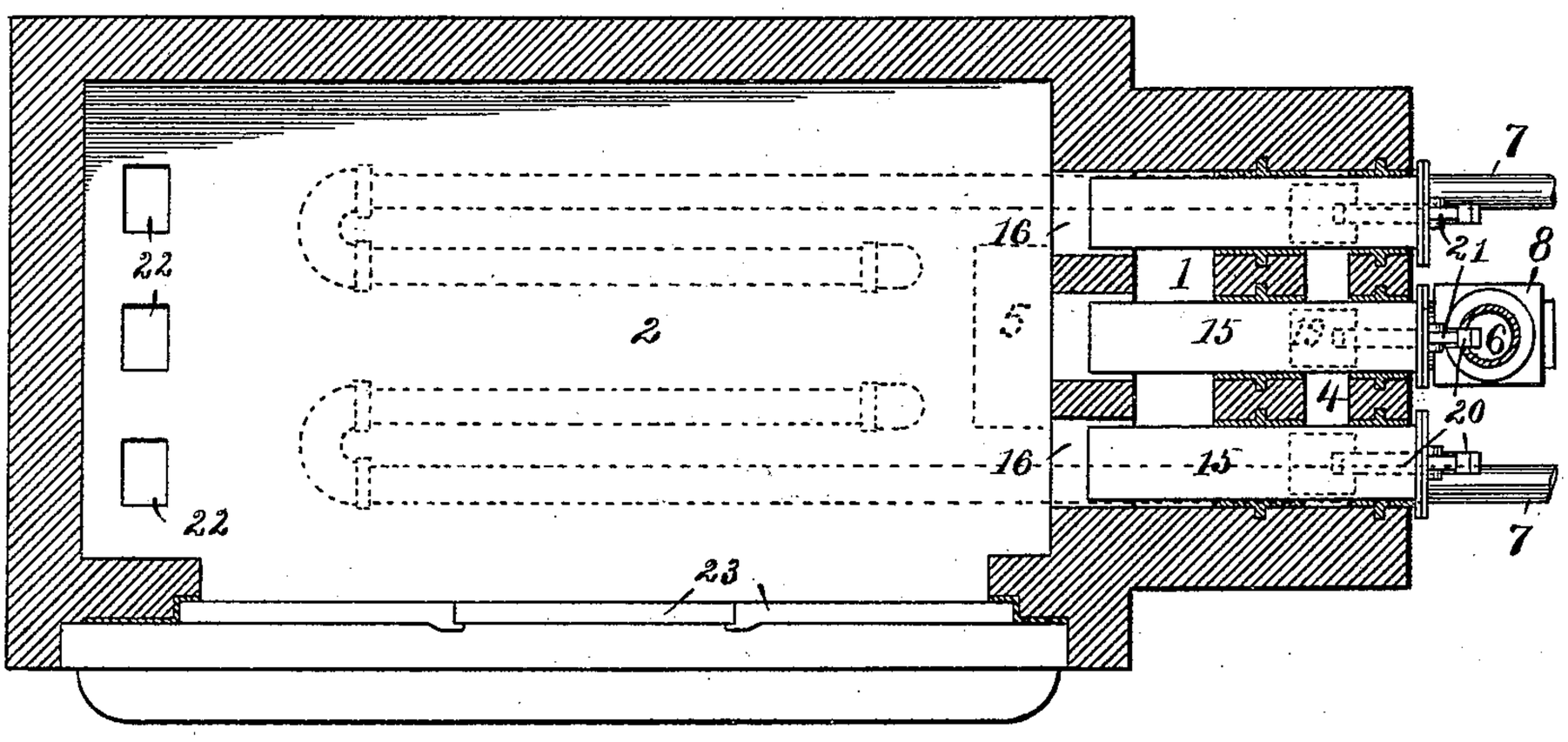


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH F. GILPIN AND JOHN ELLIOT, OF ANSONIA, CONNECTICUT.

GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 448,955, dated March 24, 1891.

Application filed June 9, 1890. Serial No. 354,761. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH F. GILPIN, a citizen of the United States, and JOHN ELLIOT, a subject of the Queen of Great Britain, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Gas-Furnaces; and we 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.

Our invention has for its object to so improve the construction of this class of furnaces that an almost perfect combustion of gas shall be secured, the result in practice being that we are enabled to reduce the size of the furnace and to greatly reduce the amount of gas required to produce any required degree of heat. We thereby effect a saving in space required, a great saving in the cost of construction, and a great and continual saving in the cost of running the furnace.

With these ends in view we have devised the novel gas-furnace of which the following description, in connection with the accompanying drawings, is a specification, numerals being used to denote the several parts.

Figure 1 is a side elevation of our improved furnace; Fig. 2, a vertical longitudinal section; Fig. 3, a front end elevation, and Fig. 4 is a horizontal section on the line *x x* in Fig. 2.

1 is the combustion-chamber; 2, the heating-chamber; 3, the air-heating chamber; 4, the air-chamber; 5, the flue; 6, the gas-supply pipe, and 7 air-supply pipes. The gas-supply pipe is provided with a suitable valve 8, an ordinary slide-valve being shown in the drawings, by which the supply of gas is regulated, a screw-plug 9 being also provided, in order that the pipe may be cleaned or the interior examined at any time, if required. The air is supplied from a blower of any ordinary or preferred construction, which forms no portion of our present invention, and is consequently not illustrated in the drawings. The gas also is supplied under pressure.. The air-supply pipes (see Figs. 2 and 4) pass across the combustion-chamber near the bottom thereof and into the air-heating chamber and are coiled or doubled backward upon themselves, as shown in the drawings, in order to provide a large amount of heating-surface within the air-heating chamber. The air-pipes then pass out from the air-heating chamber and across the combustion-chamber and open into air-chamber 4, as indicated at 10 in Fig. 2. From the air-chamber the air passes to the combustion-chamber by two independent sets of pipes. Near the bottom of the air-chamber and directly opposite the openings of pipes 7 are the openings 11 of main air-feeding pipes 12. These pipes are preferably smaller than pipes 7 and pass outward at the front of the furnace, in order to permit the convenient regulation by means of suitable valves 13 of the supply of air furnished to the combustion-chamber at the point where the combustion of the gas commences. These pipes then pass inward again and across the air-chamber near the bottom thereof and open into the combustion-chamber, as indicated at 14. 15 denotes the secondary air-feeding pipes, which pass from the front of the furnace across the air-chamber and the combustion-chamber and deliver air into the passage 16, leading from the combustion-chamber to the heating-chamber, the end of this passage toward the heating-chamber being contracted, as clearly shown in Fig. 2, and the pipes extending approximately midway the length of the passage. The air passes into these pipes from the air-chamber through perforations 17 and passes out into passage 16 through perforations 18 at the inner ends of said pipes. In order that the amount of air delivered by these pipes in passage 16 may be regulated with absolute accuracy, we provide suitable valves 19 for that purpose.

We have shown in the drawings slide-valves having perforations adapted to register with perforations 17 in the pipes. The stems 20 of these valves extend outward at the front of the furnace, as clearly shown, and are provided with teeth adapted to be engaged by pawls 21, so that the slide may be locked in such a position as to place the perforations wholly or partially in alignment with perforations 17 or wholly out of alignment therewith. It will of course be apparent that the combustion of the gas will commence near the bottom of the combustion-chamber—that is, where the gas as it passes from the gas-supply pipe becomes mixed with the air received

from the main air-feeding pipes 12. By the use of the secondary air-feeding pipes which deliver air at the point where the partially-consumed gases pass into the heating-chamber we produce an almost perfect consumption of gases, so that the current which passes out of the heating-chamber is free from unconsumed carbonaceous matter, a practically perfect combustion of all carbonaceous matter being caused to take place in the heating-chamber by means of the current of heated air received from the secondary air-feeding pipes at the instant that the partially-consumed gases are about to pass into the heating-chamber. We thus produce within the heating-chamber the highest degree of heat that it is possible to produce—that is, the heat of final perfect combustion. From the heating-chamber the products of combustion pass downward through a passage 22 into the air-heating chamber, where they are utilized to heat the air in the air-supply pipes, and from thence they pass out through flue 5 into the chimney. (Not shown.) In the furnace shown flue 5 opens into a transverse flue leading directly to the chimney, the transverse flue being indicated by 5^a.

23 denotes the ordinary vertically-sliding doors, which close the side of the heating-chamber. These doors may of course be operated in the ordinary or any preferred manner, which forms no portion of our present invention.

It will of course be apparent that our invention is not limited to the special style of furnace illustrated in the drawings, but is equally applicable to boiler and other furnaces, which, however, we have not deemed it necessary to illustrate and describe, as the details of construction of no two furnaces are exactly alike.

The furnace above described is practically self-cleaning in respect of the tar which, where ordinary made gas is used, condenses in the pipes, necessitating that the latter be cleaned very frequently, usually every night. This difficult job of cleaning is obviated by our improvement. In our furnace the air is admitted at the lowest point in the pipe. This burns the tar and at the same time heats the gas.

Having thus described our invention, we claim—

1. In a gas-furnace, the combination of the heating-chamber, the combustion-chamber at the front of the same, a connecting-passage between said chambers, the air-heating chamber situated beneath the main heating-chamber and connected therewith, the air-chamber situated in front of the combustion-chamber, air-pipes leading from a suitable blast device through said air-heating chamber and delivering into the said air-chamber, pipes leading from the air-chamber to the lower part of the combustion-chamber, a gas-supply pipe communicating with the combustion-chamber, and a secondary air-pipe leading from the air-chamber through the combustion-chamber to the said connecting-passage, substantially as set forth.

2. In a gas-furnace, the combination of the heating-chamber 2, the combustion-chamber 1 at the front of the same, the passage 16, connecting said chambers, the air-heating chamber 3, situated beneath the chamber 2, communicating therewith and having air-pipes 7 leading from a suitable blast device passing through the chamber 3 and delivering into the chamber 4, pipes 12, leading from the latter chamber to the chamber 1 and having valves 13, a gas-supply pipe communicating with the combustion-chamber, and a secondary air-pipe leading from chamber 4 and having a perforated nozzle situated in line with the passage 16, substantially as set forth.

3. In a gas-furnace, the combination of the heating-chamber 2, the combustion-chamber 1 at the front of the same, the passage 16, connecting said chambers, the air-heating chamber 3, situated beneath the chamber 2, communicating therewith and having air-pipes 7 leading from a suitable blast device passing through the chamber 3 and delivering into the chamber 4, pipes 12, leading from the latter chamber outside the furnace and thence to the chamber 1 and having valves 13, a gas-supply pipe communicating with the combustion-chamber, and a secondary air-pipe leading from the outside of the furnace through chambers 4 and 1, having a perforated nozzle situated in line with the passage 16, and having a valved communication with chamber 4, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH F. GILPIN.
JOHN ELLIOT.

Witnesses:
A. M. WOOSTER,
C. M. NEWMAN.