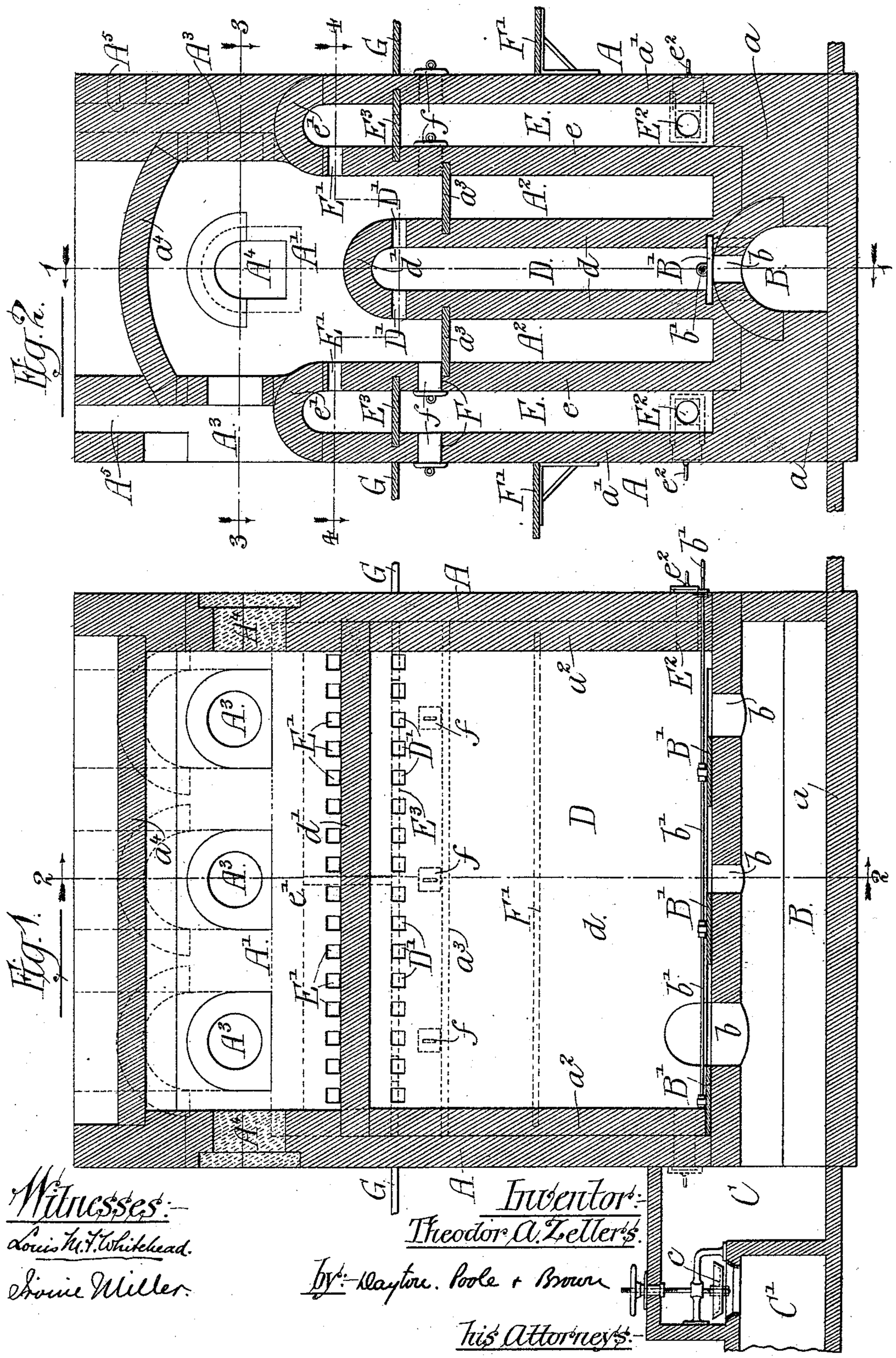
(No Model.) 2 Sheets—Sheet 1.

T. A. ZELLERS.

GLASS FURNACE.

No. 498,148. Patented May 23, 1893.



Witnesses:—
Louis H. T. Whitehead.
Lewis Miller.

Inventor:—
Theodor A. Zellers.
by:—Dayton. Poole & Brown
his Attorneys.—

(No Model.) 2 Sheets—Sheet 2.

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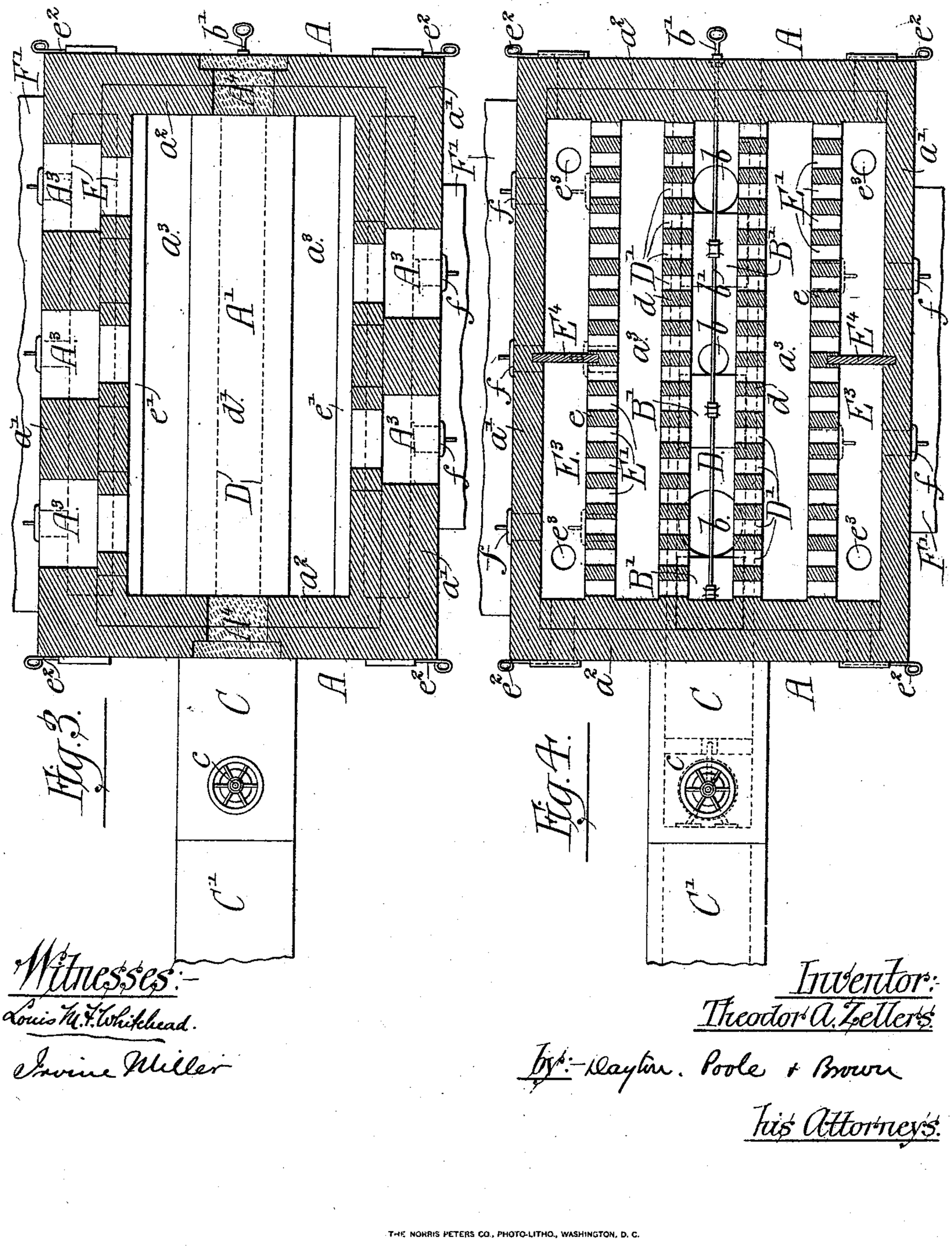

Fig. 3.

Fig. 4.

Witnesses:-
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Inventor:
Theodor A. Zellers
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UNITED STATES PATENT OFFICE.

THEODOR A. ZELLERS, OF OTTAWA, ILLINOIS, ASSIGNOR TO THE OTTAWA GLASS COMPANY, OF SAME PLACE.

GLASS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 498,148, dated May 23, 1893.

Application filed July 28, 1891. Serial No. 400,952. (No model.)

To all whom it may concern:

Be it known that I, THEODOR A. ZELLERS, of Ottawa, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Glass-Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to glass furnaces, and more particularly to that class known as reheating furnaces, and has for its objects, among others, first, to provide a construction by means of which gaseous fuel may be employed as the heating agent; and second, to provide means for readily removing the refuse glass.

To these and other ends the invention consists in certain novel features which will be hereinafter described and then particularly pointed out in the claims.

In the accompanying drawings: Figure 1 is a central, vertical longitudinal sectional view, taken on the line 1—1 of Fig. 2, of a furnace embodying my invention in one form. Fig. 2 is a transverse sectional view of the same, taken on the line 2—2 of Fig. 1. Fig. 3 is a plan section, taken on the line 3—3 of Fig. 2. Fig. 4 is a plan section taken on the line 4—4 of Fig. 2.

In the said drawings, A represents the body of the furnace, which is rectangular in its general shape, and is constructed of brick or other suitable material. This body comprises a suitable base, a, side-walls, a', and end-walls, a^2. In the base a is formed a central passage, B, extending from end to end thereof, one end of said passage being closed, while the other end opens into a valve chamber, C, provided with a cut-off valve, c, which controls the admission of the gas into said chamber from a suitable conduit, C', leading to the source of gas supply. Through the top wall of the passage B there is formed a plurality of openings, b, three of these openings being shown in the present instance, although it is obvious that this number may be varied as desired. These openings are controlled by means of regulating valves, B', corresponding in number with the said openings, over which they slide, being operated by means of a rod, b', extending to the exterior of the furnace, or by other suitable means.

Above the passage B there is located within the furnace A a gas chamber, D, into which the openings b open, so as to establish communication between the said chamber and the passage B. This gas chamber is formed by two parallel side-walls, d, extending centrally along the furnace from end to end thereof, and closed at the top by a connecting arch, d', the end walls a^2 of the furnace closing the ends of the chamber D, while the base a of the furnace closes the bottom thereof.

At the top of each of the walls d in those portions thereof which form the abutments of the arch d', there is formed a plurality of gas-outlet apertures, D', extending horizontally outward through the said walls and being located immediately below the springings of said arch. These openings D' are arranged in two rows extending from end to end of the chamber D on each side thereof, and form the means whereby the gas is introduced into the combustion chamber, A', hereinafter described.

E E are air chambers, located one at each side of the furnace and similarly constructed but reversely arranged, the description of one being applicable to the other. Each chamber E has its outer wall formed by the side wall a' of the furnace, its inner wall, e, being arranged parallel thereto, extending from end to end of the furnace, and being connected with the wall a' by an arch, e', at the top. Each chamber E is provided, at the top of its inner wall e, with a plurality of air outlet openings, E', arranged in a row extending from end to end of said chamber E just below the springing of the arch e', and extending horizontally through the wall e. The chambers E extend some distance above the chamber D so that the air outlet openings E' of these former are above the gas-outlet openings E' of the latter, the said openings E' and D' corresponding in other respects in number and location.

Each air chamber E is provided with air inlet openings, E^2, arranged one at each end thereof near the bottom and each controlled by a regulating valve, e^2, of any suitable con-

struction. Through these openings E^2 air is admitted into the chambers E from any suitable source.

Each chamber E is provided with a horizontal partition, E^3, located near its top, as shown, and provided with an aperture e^3 therethrough at each end, as shown more particularly in Fig. 4. Each chamber E is further provided with a vertical partition, E^4, located centrally therein and extending from the partition E^3 upward to the arch e' which forms the top of the chamber E. This subdivision of the chambers E insures an equal and regular supply of air at the several air-outlet openings E'.

The spaces, A^2, formed between the air chambers E and gas chamber D at each side of the latter, are closed near their upper ends by means of transverse floors, a^3, extending the entire length of the furnace and forming the floor or bottom of the combustion chamber A' thereof.

By providing the spaces A^2 and special floors a^3 said floors may be placed at a greater or less height according to the length of time which it is contemplated to run the furnace or the kind of work to be done, and according therefore to the amount of waste glass which is in consequence likely to accumulate upon the floors during the run, it being obvious that the mass of waste glass so accumulated on said floors must not be allowed to rise high enough to interfere with the air and gas openings leading into the furnace. The gas chamber D extends above the said floor or bottom to an extent sufficient to bring the outlet apertures D' thereof some little distance above the same. The combustion chamber A' which is also the reheating chamber for the glass is inclosed between the air chambers E, the side walls a', and the end walls a^2, and is closed at the top by an arch, a^4. The side walls a' are recessed and apertured at intervals, as shown at A^3, to afford access to the interior of the combustion chamber for the purpose of inserting and withdrawing the glass. In the construction shown, three of these recessed apertures are located on one side of the combustion or glass chamber, and two on the other side. The end walls a^2 are provided, at the ends of the combustion chamber A', with openings A^4 which are closed, as shown, by a suitable stopper of clay when the furnace is being used, said openings being adapted, when the stopper is removed, to give access to the interior of the combustion or glass chamber when the furnace is not in use, for the purpose of inspection and repairs. Flues, A^5, arranged one above each of the working apertures, permit the escape of the products of combustion.

The bottom proper of the combustion or glass chamber is formed by the horizontal floor walls a^3, and the top of the central gas chamber D rises above this floor and through its central or median line in order to afford side openings for the emission of the gas by which a lateral or horizontal direction is given to the gas jets as they enter the combustion or glass chamber. The gas chamber, by its projection above the bottom of the glass chamber, also affords a space below the gas outlets D' in which fragments of glass may accumulate without obstructing said openings or interfering with the proper operation of the furnace.

Under each of the apertures A^3 and on a level with the floor or bottom a^3, there are formed through the walls a' and e holes F, normally closed by removable plugs or other suitable closures, f, by the removal of which access may be had to the bottom of the combustion chamber for the purpose of removing therefrom the refuse glass which accumulates thereon under each of the apertures A^3. In order to render these plugs f and cleaning holes F readily accessible, platforms, F', are provided at the sides of the furnace. The floor upon which the workmen stand while using the furnace is indicated at G.

Gas from any suitable source is forced through the conduit C' into the valve chamber C, the valve c being opened, and passes from said valve chamber into the passage B. From the passage B the gas passes into the gas chamber D in such quantity as is deemed desirable or necessary, the quantity being determined and controlled by the regulating valves B' in an obvious manner. The gas issues from the outlet apertures D' of the chamber D, and is ignited as it issues. Air is drawn into the air chambers E, being regulated by means of the valves e^2, and passing upward through the apertures e^3, enters the smaller chambers above the partitions E^3 formed by the partitions E^4. The air issues from the apertures E' in steady streams, these apertures being so located that the several streams or jets of gas issuing from the apertures D' rise and mingle with the respective streams of air from the corresponding apertures E', thus insuring a proper mingling of the air and gas so as to obtain such a combustion as will give the best results.

The degree of heat and quality of flame obtained in the combustion may be controlled by varying the relative proportions of gas and air through the medium of the valves B' and e^2 and also by varying the pressure under which the gas is introduced.

Air under pressure may be employed, if desired, instead of relying on the draft of the furnace to draw in the air.

In furnaces of this class I have found that whether coal or gas be used, complete combustion is injurious to the glass, owing to the effect on the glass of those products of such combustion as result from the presence of sulphur in the coal or gas. By providing means for regulating the combustion, I am enabled to so regulate the combustion as to render it incomplete, thus preventing the formation of these deleterious sulphurous products, while, at the same time, I am enabled

to obtain and maintain a temperature sufficient for my purpose.

It will be noted that the subdivision of the air chambers causes the air to become sufficiently heated before it enters the combustion chamber. It moreover renders it possible to independently regulate the admission of air from each end of the chamber, so that the temperature at the various working apertures may be varied to suit the needs of the several workmen.

I claim as my invention—

1. A glass furnace comprising a combustion or glass heating chamber, a gas chamber extending along the median line of the combustion chamber and provided with lateral outlets for gas on both its sides above the floor of said combustion chamber, and two air chambers arranged one at each side of the combustion chamber and provided with outlets delivering into the latter.

2. A glass furnace comprising a combustion or glass heating chamber, a gas chamber extending along the median line of the combustion chamber and provided with lateral outlets for gas on both its sides above the floor of said combustion chamber, two air chambers arranged one at each side of the combustion chamber and provided with outlets delivering into the latter, and independent valves for regulating the absolute and relative quantities of gas and air admitted to the combustion chamber.

3. A glass furnace comprising a combustion or glass heating chamber, a gas chamber extending along the median line of the combustion chamber and provided with lateral outlets for gas on both its sides above the floor of said combustion chamber, and two air chambers arranged one at each side of the combustion chamber and provided with outlets delivering into the latter above the level of the outlets from the gas chamber.

4. In a glass furnace the combination, with a glass heating chamber and a gas chamber arranged along the center of said glass heating chamber and provided with lateral discharge openings, of two air chambers, one arranged at each side of the furnace and combustion chamber, each of said air chambers being provided with air inlets in its lower portion, a plurality of lateral outlets delivering into the glass heating chamber, a horizontal partition in the air chamber below said outlets, a vertical partition extending from said horizontal partition to the top of the air chamber, and apertures through the horizontal partition on each side of said vertical partition, and separate valves applied to the air passages whereby the admission of air to different parts of the glass heating chamber may be varied.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

THEODOR A. ZELLERS.

Witnesses:
THOMAS D. CATLIN,
IRVINE MILLER.