

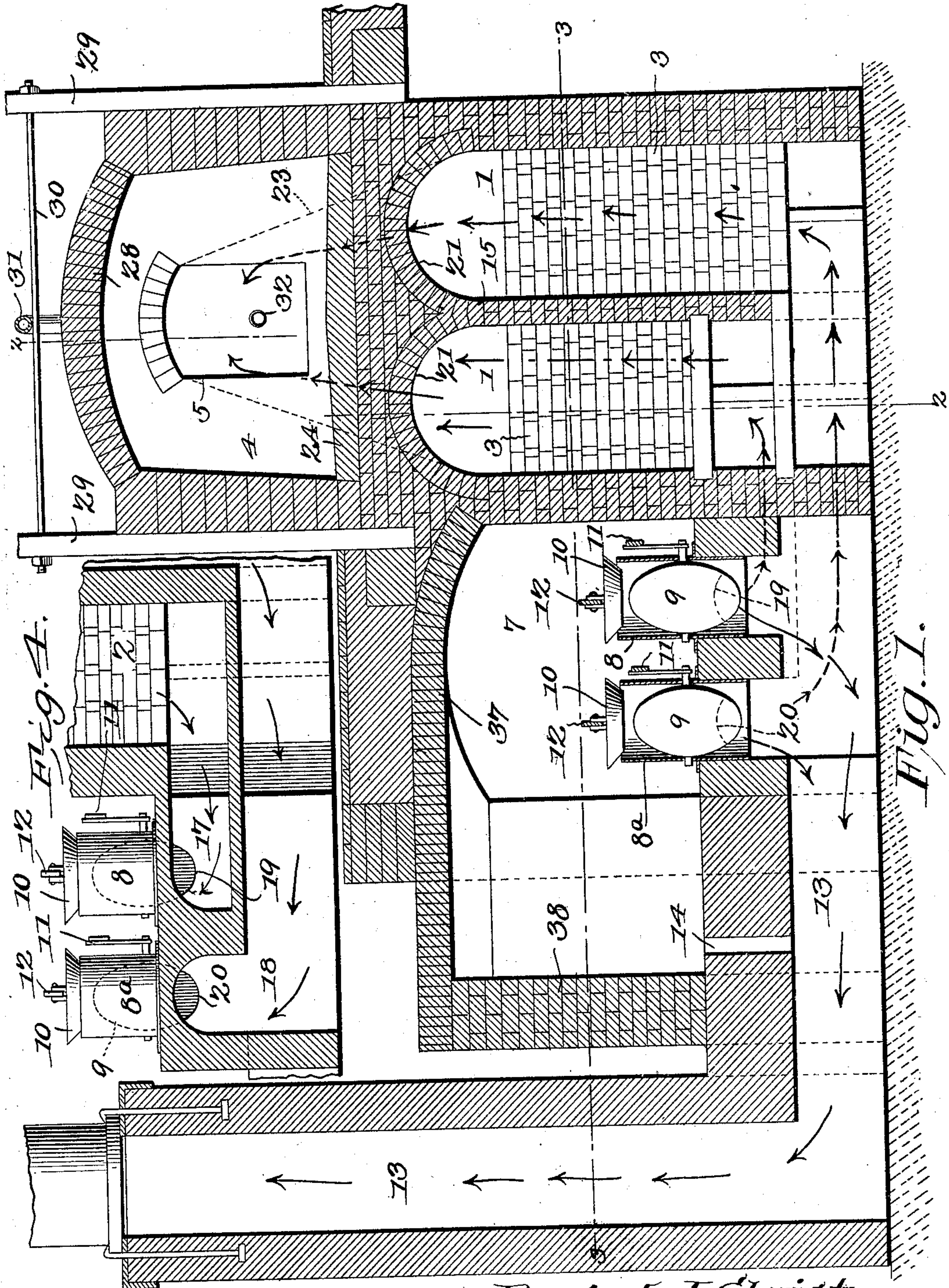
No. 828,283.

PATENTED AUG. 7, 1906.

D. J. GHRIST.  
GLASS FURNACE.

APPLICATION FILED FEB. 16, 1905.

3 SHEETS—SHEET 1.



Witnesses:

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*R. M. Elliott*

*David J. Ghrist*, Inventor,  
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Attorneys.



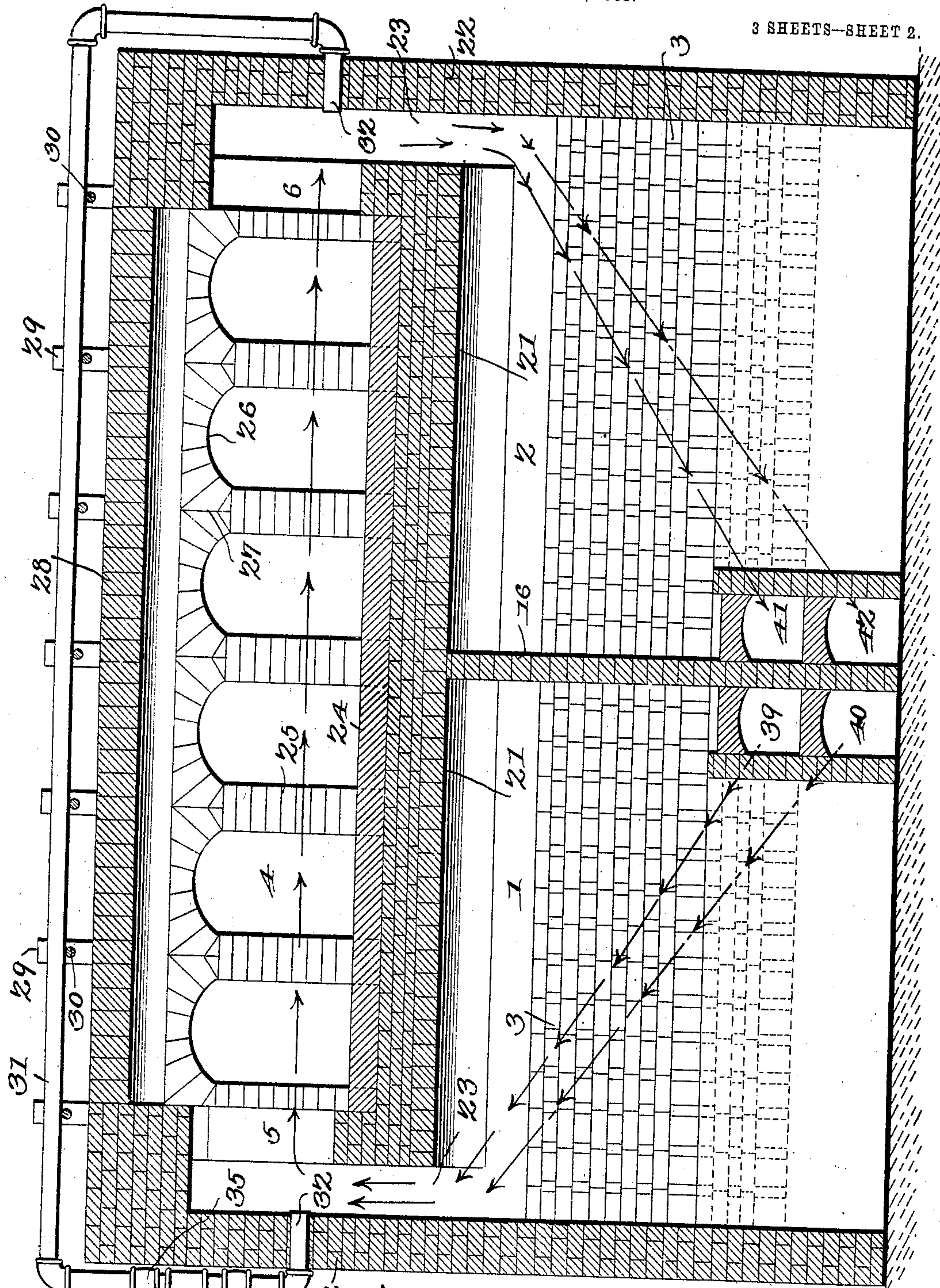
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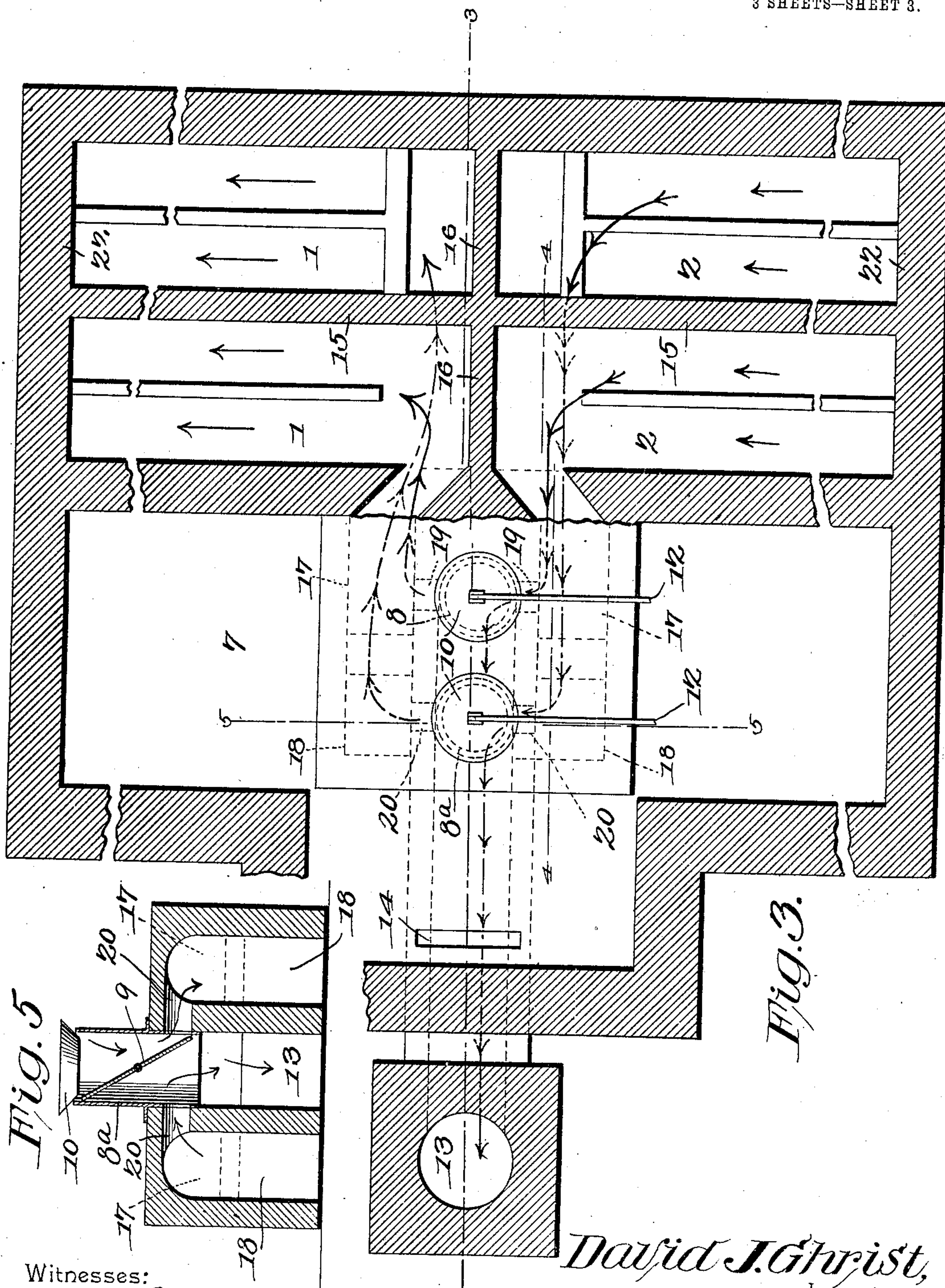
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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TO SAMUEL I. GHRIST, OF HITES, PENNSYLVANIA.

## GLASS-FURNACE.

No. 828,283.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed February 16, 1905. Serial No. 245,933.

*To all whom it may concern:*

Be it known that I, DAVID J. GHRIST, a citizen of the United States, residing at Hites, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Glass-Furnace, of which the following is a specification.

This invention relates to glass-furnaces.

The objects of the invention are in a ready and practical manner to conserve fuel; to effect rapid, economical, and even heating of the melting-chamber, obviating thereby, in a large measure, the breakage of melting-pots; to provide novel means for reversing the draft through the apparatus to permit combustion to take place at either end of the melting-chamber, and, generally, to improve furnaces of the character specified.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a glass-furnace, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, Figure 1 is a view in vertical transverse section through a glass-furnace constructed in accordance with the present invention. Fig. 2 is a view in vertical longitudinal section, taken on the line 2 2, Fig. 1. Fig. 3 is a view in horizontal section, taken on the line 3 3, Fig. 1. Fig. 4 is a view in vertical transverse section, taken on the line 4 4, Fig. 3. Fig. 5 is a view in vertical longitudinal section, taken on the line 5 5, Fig. 3.

The furnace embodies four regenerating-chambers 1 1 and 2 2, provided with the usual checkers 3, a melting-chamber 4, extending the entire length of the furnace and having ports 5 and 6, one at each end, communicating with the chamber, a cave 7, in which are arranged a pair of vertical conduits 8 and 8<sup>a</sup>, having combined with them butterfly-valves 9 and air-controlling valves 10, the two sets of valves being operable from the exterior of the furnace by suitable levers 11 and 12, and a stack 13, the cave being provided with a slot 14, through which air is admitted thereto.

The regenerating-chambers are separated by longitudinal and transverse walls 15 and 16, respectively, and communicate with the

conduits 8 and 8<sup>a</sup> through ducts 17 and 18, Fig. 4, having branches 19 and 20, Fig. 3, that open into the opposite sides of the conduits, as clearly shown in Fig. 5. As shown in Fig. 1, the checkers of the regenerating-chamber are elevated a sufficient distance above the foundation of the furnace to permit the requisite down and up draft from the four chambers to the ducts at either side, according to the direction in which the butterfly-valves may be adjusted—that is to say, to cause the draft to enter either through the duct 5 and out through the duct 6, or vice versa. The regenerating-chambers are bridged by arches 21, which terminate short of the end walls 22 of the furnace to form passage-ways 23, which lead to the ports 5, as clearly shown in Fig. 2.

The melting-chamber, as usual, is formed with a bench 24 with piers 25 with twyer-arches 26, having skewbacks 27, and with a cap 28. The melting-chamber is braced by backstays 29, which are connected by tie-rods 30, that will positively prevent any breaking down or warping of the walls of the chamber due to the heat.

The means for heating the melting-chamber consists of a gas-main 31, having branches 32, which project through the end walls of the structure and discharge into the ports 5 6, gas being supplied to the main through a pipe 33, leading to a suitable source of supply and carrying a controlling-valve 34. One of the end members of the pipe carries two valves 35 and 36, which, as will presently appear, by being manipulated will cause combustion to take place either at the port 5 or 6, as may be desired.

The cave may be of the usual construction and is provided with an arch 37, forming its top, there being provided a side wall 38, spaced from the stack and resting upon the base of the furnace adjacent to the slot 14.

It will be noted that with the exception of the partition-wall 16 that the regenerating-chambers extend the entire length of the furnace, so that a perfect heating of the melting-chamber from end to end is secured and, further, that the products of combustion by circulating through the checkers are caused to be more evenly distributed than if the regenerating-chambers were of the usual construction.

In heating the melting-chamber, if it be de-



sired to cause the combustion to take place at the port 5, the valves 34 and 36 on the gas-main are opened and the valve 35 is closed, and the butterfly-valves are adjusted to cause the products of combustion to travel in the direction of the ascending arrows, (shown in Figs. 1 and 2,) whereupon the heated air will be drawn from the port 6 down through the checkers, in through the flues 39 and 40, thence up through the checkers and into the port 5 along with the products of combustion. Should it be desired to cause combustion to take place at the opposite end of the chamber to that at which the port 5 is located, the position of the butterfly-valves are reversed and the valve 36 will be closed and the valve 35 will be open, whereupon the products of combustion will follow the reverse course. After traversing the length of the melting-chamber the spent products of combustion, together with a part of the heated air, pass down through the checkers and out through the flues 41 and 42 to the stack, as indicated in Fig. 3. By having the valves 10 coact directly with the conduits 8 and 8<sup>a</sup> the control of air to the melting-chamber is positive, and by the further provision of the butterfly-valves a reversal of the heated products can be secured in a rapid and practical manner and without loss of energy.

Having thus described the invention, what is claimed is—

1. A furnace comprising pairs of regenerating-chambers, a transverse wall inclosing the inner ends of both pairs of chambers, a melting-chamber located over and extending parallel with the regenerating-chambers, end walls inclosing the regenerating and melting chambers at their outer ends, a port at each end of the melting-chamber, a single flue arranged between each port and the outer ends of each pair of regenerating-chambers and inclosed by the adjacent end wall, fuel-discharging devices projecting through the end walls at the upper ends of the flues and arranged in line with the said ports to discharge longitudinally into the melting-chamber, a cave at one side of the regenerating-chambers and formed partly by one of the walls of the latter; separate conduits located under the regenerating-chambers and on opposite sides of the transverse wall to connect the cave and regenerating-chambers, and independently-controlled valves each controlling

communication between the two regenerating-chambers and cave.

2. A furnace comprising pairs of regenerating-chambers separated one from another and inclosed at adjacent ends by a transverse wall, a melting-chamber located over and extending parallel to the regenerating-chamber, a port at each end of the melting-chamber, a single flue between each pair of regenerating-chambers and the ports, fuel-discharging devices which discharge through said flues and ports into the melting-chamber, a cave located at one side of the regenerating-chambers near the center thereof, a flue for each regenerating-chamber that communicates therewith at a point diagonally opposite the first-mentioned flue and formed on opposite sides of and against said transverse walls, and independently-controlled butterfly-valves arranged to control the supply of air to and the discharge of the products of combustion from the regenerating-chambers.

3. A furnace comprising pairs of regenerating-chambers separated one from another and inclosed at adjacent ends by a transverse wall, a melting-chamber located over and extending parallel with the regenerating-chamber, a port at each end of the melting-chamber, a single flue between each pair of regenerating-chambers and the port, fuel-discharging devices which discharge through said flues and ports into the melting-chamber, a cave located at one side of the regenerating-chambers near the center thereof, flues located one above the other on opposite sides of the transverse wall and formed partly by the latter that communicate each with a separate regenerating-chamber, a stack, a pair of vertically-extending conduits arranged between the cave and the flues, valves at the upper ends of said conduits for controlling the supply of air from the cave to the flues, and independently-actuated valves in the conduits for controlling the supply of air from the cave to the regenerating-chambers and the discharge of the products of combustion from the latter to the stack.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID J. GHRIST.

Witnesses:

W. A. MARVIN  
G. G. HARVEY.