H. PRENTICE.

BY-PRODUCT RETORT COKE OVEN.

APPLICATION FILED DEC. 17, 1908.

939,086.

Patented Nov. 2, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

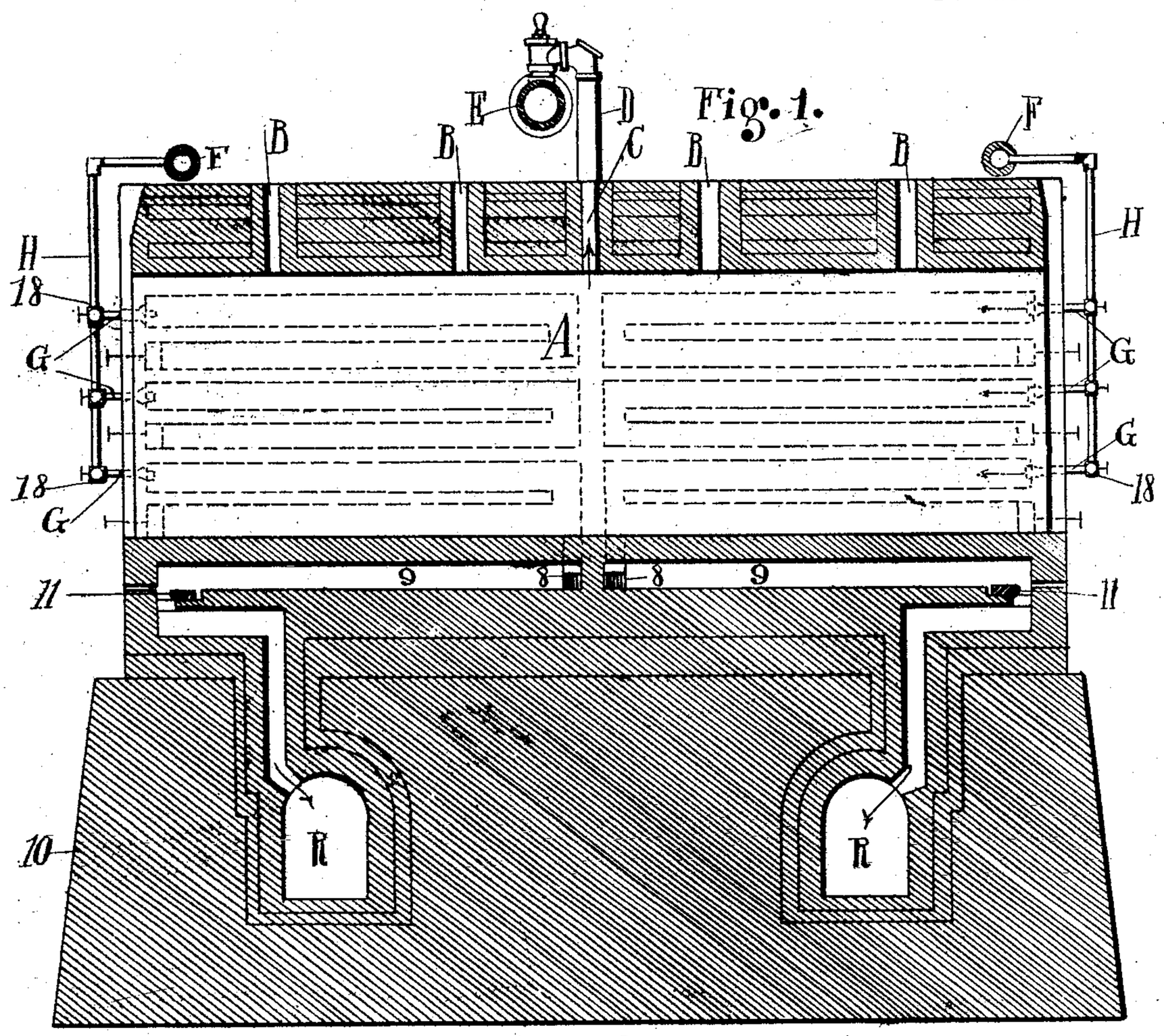
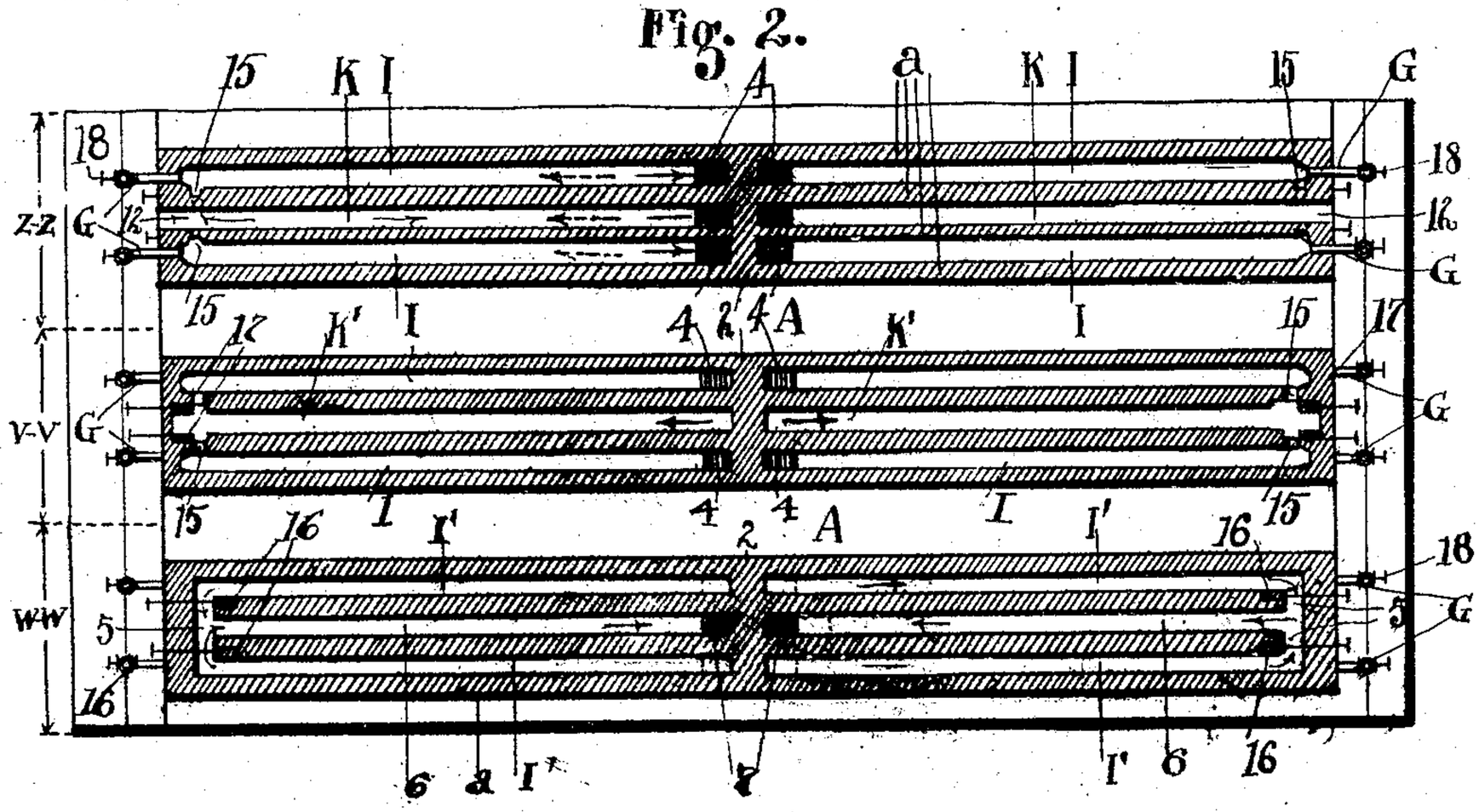


Fig. 2.



ATTEST
C. M. Fisher.
F. C. Museum.

INVENTOR
Hugh Prentice
BY Fisher & Ulbrich ATTYS.

H. PRENTICE.

BY-PRODUCT RETORT COKE OVEN.

APPLICATION FILED DEC. 17, 1908.

939,086.

Patented Nov. 2, 1909.

2 SHEETS—SHEET 2.

Fig. 3.

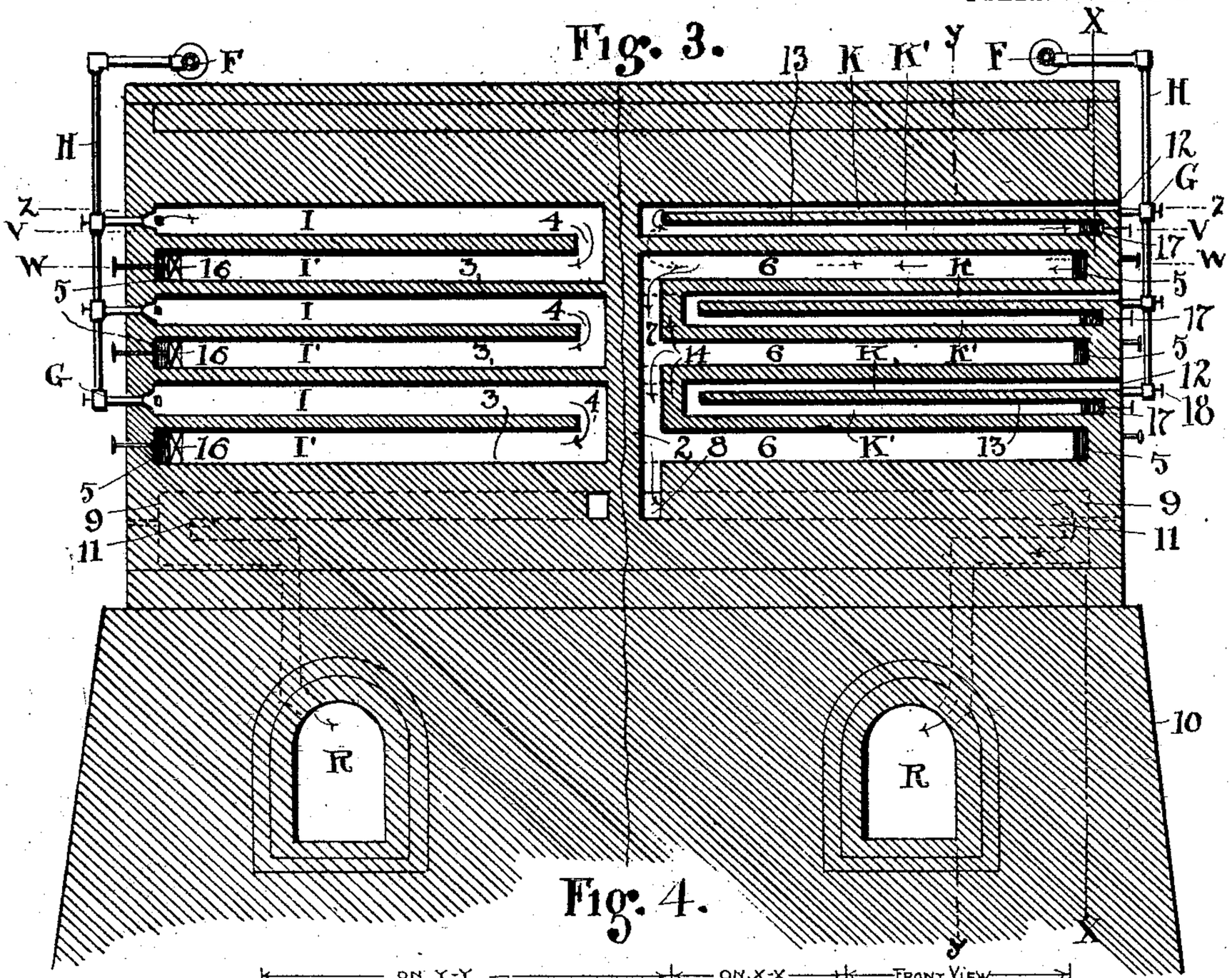
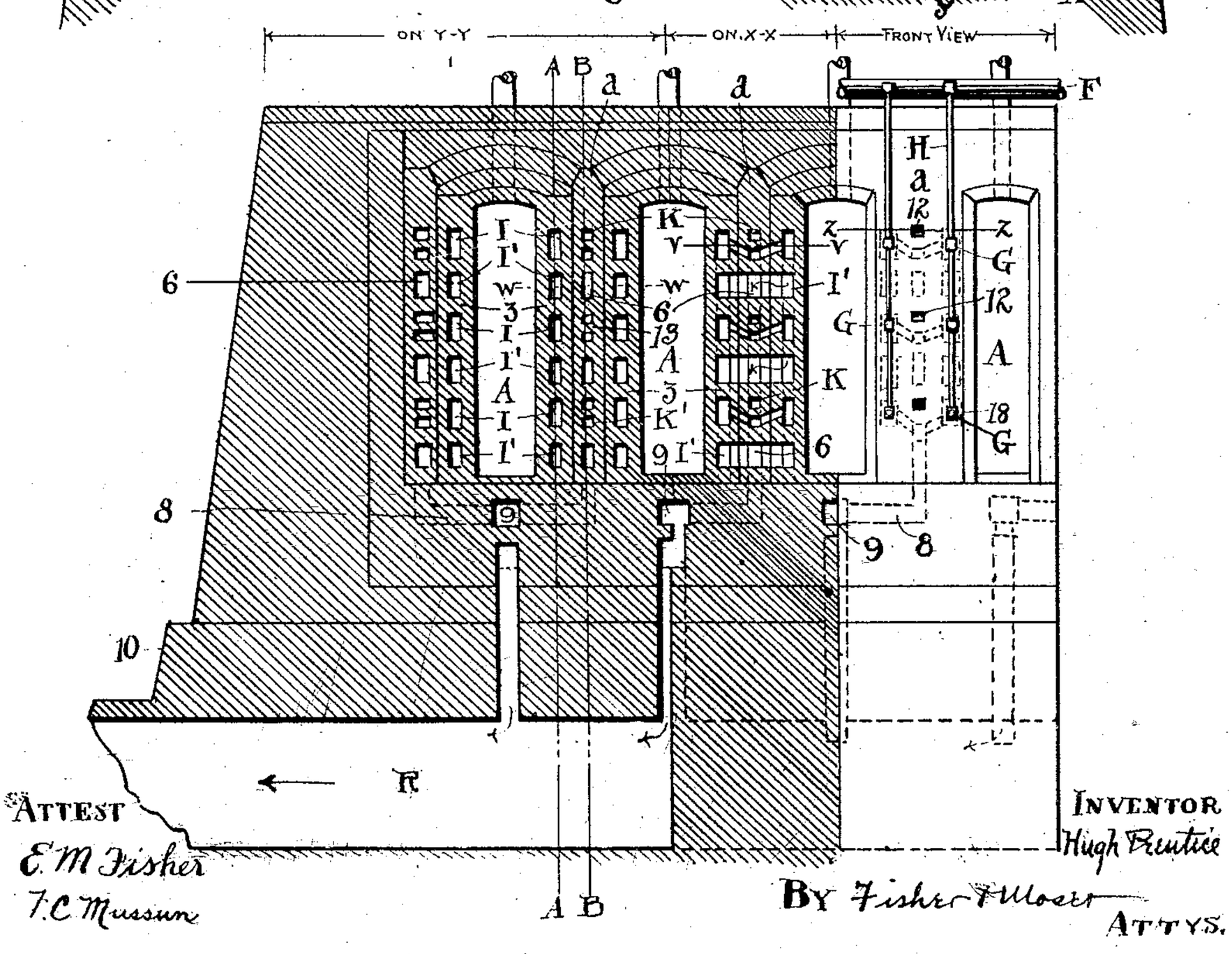


Fig. 4.



ATTEST

E. M. Fisher

T. C. Mussun

INVENTOR

Hugh Prentice

BY Fisher & Moser

ATTYS.

UNITED STATES PATENT OFFICE.

HUGH PRENTICE, OF BELLEVUE, PENNSYLVANIA.

BY-PRODUCT RETORT COKE-OVEN.

939,086. Specification of Letters Patent. Patented Nov. 2, 1909.

Application filed December 17, 1908. Serial No. 467,933.

To all whom it may concern:

Be it known that I, HUGH PRENTICE, a citizen of the United States, residing at Bellevue, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in By-Product Retort Coke-Ovens, of which the following is a specification.

My invention relates to by-product, retort coke ovens, and is an improvement consisting of the construction and arrangement of ovens substantially as herein shown and described and more particularly pointed out in the claims.

It is a common practice in coke ovens to employ regenerators adapted to pre-heat the air used for combustion purposes by effecting a reversal of flow of air and hot gases therein at intervals.

Now the object of my invention is to provide a simple form of oven adapted to preheat the air used for combustion purposes without a reversal of flow and without the use of regenerators. With this end in view, I provide means to utilize the burned gas from each burner or pair of burners and their corresponding set of oven heating flues to heat a continuous inflow of air for that particular burner or pair of burners, In other words, a continuous flow of fresh air for each burner is preheated by the heat generated by the same burner, and independently of the other burners of the oven. Each burner thereby receives a direct supply of preheated fresh air all of which is conducive to the best combustion and to continuous and uninterrupted operations of the oven.

In the accompanying drawings, Figure 1 is a sectional view of my improved coke oven centrally through a coking chamber. Fig. 2 is a sectional view in plan of several ovens, taken on three different horizontal planes represented by lines *z—z*, *v—v* and *w—w*, Figs. 3 and 4, respectively. Fig. 3 is a sectional view of the oven on two different lines A—A and B—B, respectively of Fig. 4, showing in the first instance the combustion and oven heating flues, and in the second, the air heating and burned gas flues. Fig. 4 is a sectional view through several ovens on lines *y—y* and *x—x*, Fig. 3, and also shows a front view thereof at the right.

The oven in its entirety embodies a series of coking ovens, or more specifically speaking, a series of coking chambers A arranged parallelly with intervening walls *a* extending from one side or front to the other. Openings B in the top of the oven are provided as usual to charge chambers A with the coal to be coked, and openings C are also provided to convey the gas into collecting pipes D and gas main E which conducts it to a gas cleaning plant or condensing house for the recovery of the by-products (not shown). The clean gas is returned through distributing pipes F and is used to heat the flues of the coking chamber to coke the coal therein and to this end burners G are connected to pipes F by pipes H.

As shown, there are twelve burners G to each oven A, comprising four sets of three burners each. Thus, three burners G are arranged one above the other at either side of oven chamber A at both fronts, and each burner G supplies gas to a corresponding number of combustion chambers I having a heating flue I′ which forms a part thereof. Chambers I and I′ are therefore horizontally arranged in tiers of three at either side of oven chamber A and extend parallel therewith and lengthwise thereof from both fronts to middle division wall 2. Horizontal walls 3 separate the respective combustion and heating chambers I and I′ from like chambers above and below and thereby make them independently operative and responsive to their own burners G and to none of the others.

Communication between main combustion chamber I and heating flue I′ is by passage 4 at middle wall 2 and combustion takes place in both of course. Now following the course of the gases from burners G, the same are discharged from flues I′ at the front end thereof through a valved opening 5 and pass into the front end of a passage 6 horizontally arranged in the center of wall *a* and parallel to and on the same plane with and between flues I′, see Fig. 3 and also section *w—w*, Fig. 2. The inner end of passage 6 opens into vertical flue 7 next to middle wall 2 and the bottom of this flue communicates with a lateral duct 8 which opens into bottom flue 9 beneath oven A. Flues 9 run lengthwise of the oven from wall 2 outward and direct the burned gases from all the burners downwardly into waste gas flues R which extend through foundation 10

of the entire battery of ovens and connect with a stack (not shown). Two flues R are preferably used, one for each front of the battery, and dampers 11 are used at the discharge end of flues 9 to control the heat under the oven floors.

Now it is obvious that combustion can not take place in the several combustion chambers unless air is provided in sufficient quantities to produce this result, and to obtain the best results this air must be preheated. Therefore, I provide each of the twelve burners G and their corresponding combustion chambers with air passages K, K′ having intakes 12, and which passages are located in walls *a* between combustion chambers I and run parallel therewith from front to rear. A horizontal partition 13 divides each air passage into two parts K, K′ respectively to provide a circuitous travel of the air. Thus, air is taken in at intakes 12 and passes through passage K to rear wall 2 in the top passage K of each tier and to the dividing wall 14 in the other or lower passages K′ and thence the flow is outward to lateral valved openings 15 which communicate with combustion chambers I at a point directly opposite the mouth of burners G. The air in its travel is exposed to the heated walls of both combustion chambers I at either side thereof and also of heating chamber I′ and becomes heated thereby before its exit into the combustion chamber where it mixes with the gas from the pair of burners G of that particular set. Then the heat from the burned gases flowing through middle passage 6 also contributes to the heating of the air in passages K through the intervening walls which separate them and form their bottoms and tops, respectively.

Although no valve is shown at each intake it is obvious that one may be used to control the inflow of air, especially if none be used at openings 15, the preferred location.

Now in operation, each burner G is provided with fresh air which becomes preheated by passing through top passage K from the front to the center of the oven battery and thence returning through lower passage K′ to the openings 15 through which the now heated air is discharged into combustion chambers I where it is mixed with the gas from burners G and where combustion occurs in flue chambers I and I′. The burned gases now pass to the burned gas passage 6 and again travel toward the center of the oven battery giving up heat to the air in the flues K and K′ and turning downward at the end through vertical flue 7 and into flue 9 beneath the oven floor, finally flowing into waste gas flues R.

The regulation of heating is controlled by suitable dampers 16 at openings 5 in chambers I′, and the air is regulated by suitable dampers 17 at openings 15 in air passages K′, and the gas supply is regulated by valves 18 at burners G. Dampers 11 are also used for flues 9 as hereinbefore described.

In view of the foregoing description, it is obviously apparent that the operation of the ovens is simple and control of each oven complete and independent of the rest in the battery, and that a uniform heat can be maintained in all the walls at all times, and if desired, I can place peep openings (not shown) at the ends of each heating flue or passage for inspection purposes. It will also be noted that with this form of oven, I am enabled to heat the air in the most economical manner; that no interruption in service need be endured because the flow of air is constant and always preheated before reaching the burners; that each burner and combustion chamber is independent from the others for its fresh supply of air, and that there are no reversing operations required nor such expenses incident thereto as with the use of ovens employing regenerators.

What I claim is:—

1. A by-product coke oven having a walled coking chamber and a series of parallelly arranged combustion chambers in the side walls thereof one above the other and independent of each other, and a gas burner for each of said combustion chambers, and said side walls also having a series of separate air passages adjoining each combustion chamber and opening thereinto at said burners and comprising two-part forward and return portions extending the full length of said combustion chambers, and separate air intakes for each of said air passages and their respective combustion chambers and burners.

2. A by-product coke oven having a walled coking chamber provided with a series of separate combustion chambers longitudinally arranged at each side thereof at different elevations and each of said combustion chambers having a separate discharge passage for the burned gases therefrom arranged parallel therewith and at one side thereof, and said discharge passages having communication with a discharge flue beneath said oven chamber.

3. A by-product coke oven having a walled coking chamber provided with a series of separated and independent combustion chambers arranged longitudinally thereof and each of said combustion chambers having air intake passages arranged immediately adjacent thereto substantially the full length thereof and with a return extension and each of said combustion chambers also provided with horizontal discharge passages for the burned gases arranged adjacent to said air intake passages, and whereby the air for combustion purposes is preheated.

4. A by-product coke oven having a series

of coking chambers and intervening walls provided with combustion chambers at each side thereof and air intake passages therefor arranged substantially the full length of and centrally of said walls between said combustion chambers, said walls having horizontal discharge passages for the burned gases from said combustion chambers located between said air intake passages the full length thereof, whereby said air passages are exposed at all sides to the heat flues within said walls.

5. In by-product coke ovens, a battery of ovens having intervening walls provided with a series of separate combustion chambers arranged in pairs at different elevations therein and separate gas burners therefor, and each pair of said combustion chambers having a discharge passage for the burned gases and also a horizontal air passage centrally located between them substantially the full length thereof, and each of said air passages having an independent fresh air intake and outlet openings for its respective combustion chambers, and a discharge flue open to the burned gas passages.

6. In by-product coke ovens, a battery of ovens arranged in parallel relation with separating walls and separate combustion chambers arranged in tiers in each wall, and separate burners for each combustion chamber, and said walls having double air passages adjacent to said combustion chambers substantially the full length thereof and also discharge passages adjacent thereto and to said air passages and parallel therewith, and waste gas flues lengthwise of said battery of ovens having connecting flues with all said discharge passages, and dampers for said respective chambers, flues and passages to regulate the flow of the air and gases and heat products.

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

HUGH PRENTICE.

Witnesses:
J. S. Rodgers,
James J. Cloonan.