(No Model.) 2 Sheets—Sheet 1.

P. P. NUNGESSER.

KILN FOR THE MANUFACTURE OF CARBONS.

No. 409,489. Patented Aug. 20, 1889.

Fig. 1.

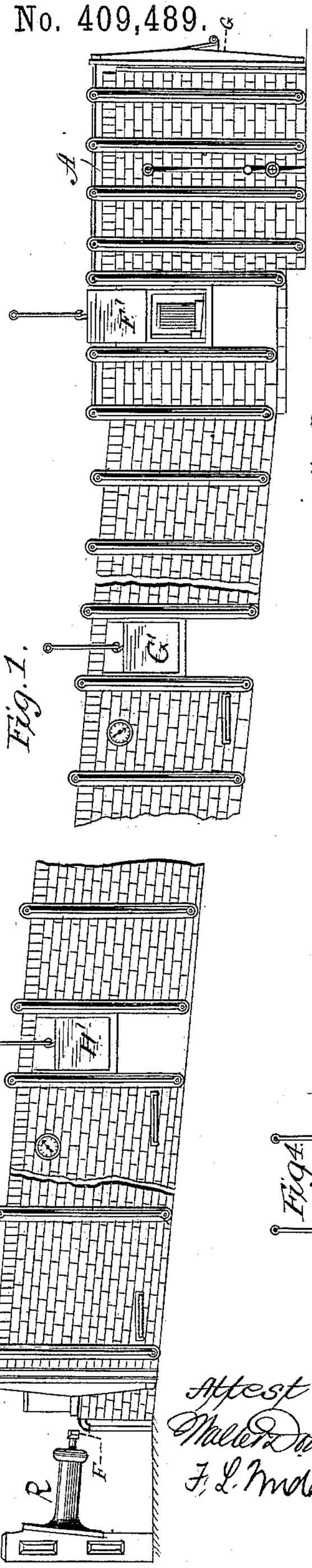


Fig. 5.

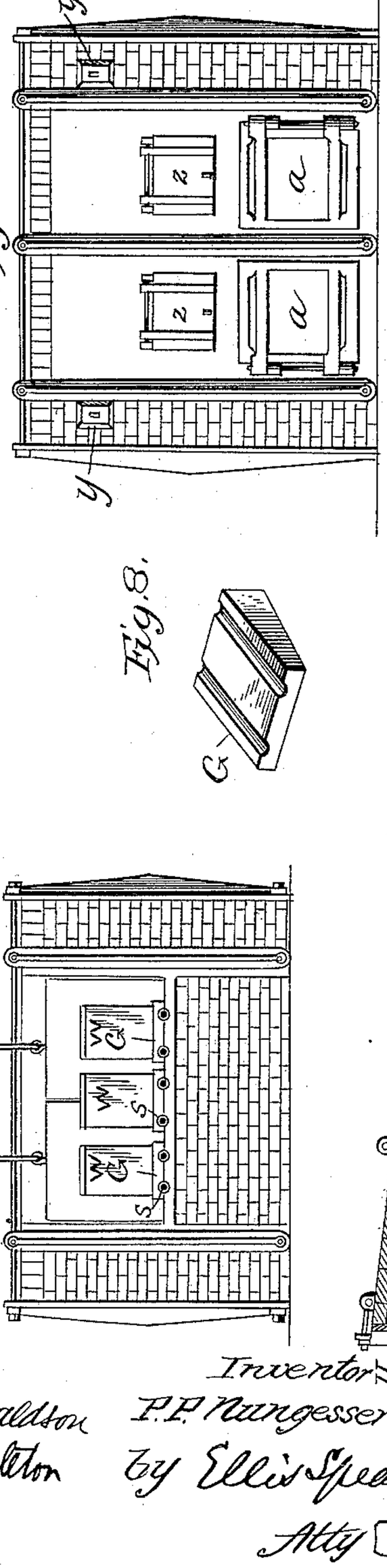
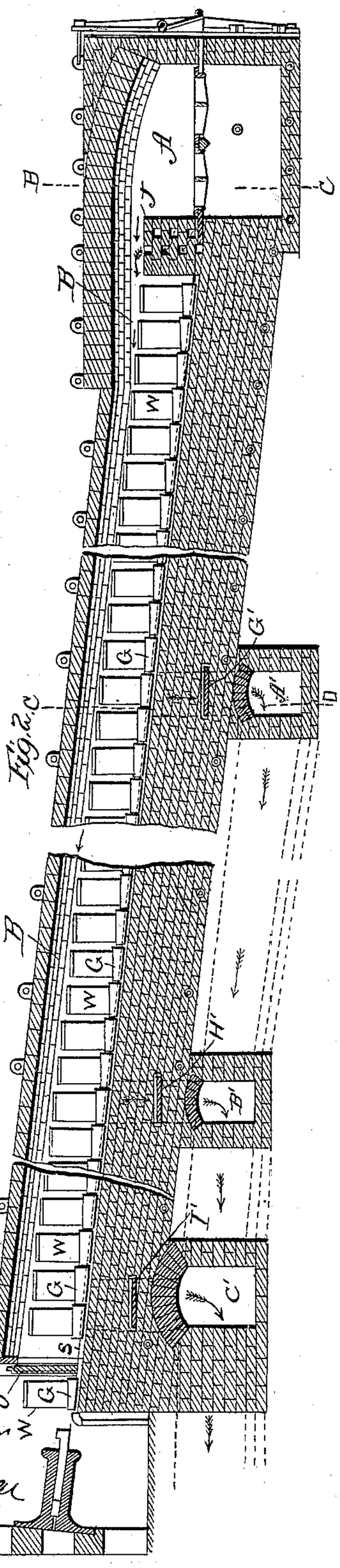


Fig. 8.

Fig. 4.

Fig. 2, 2.



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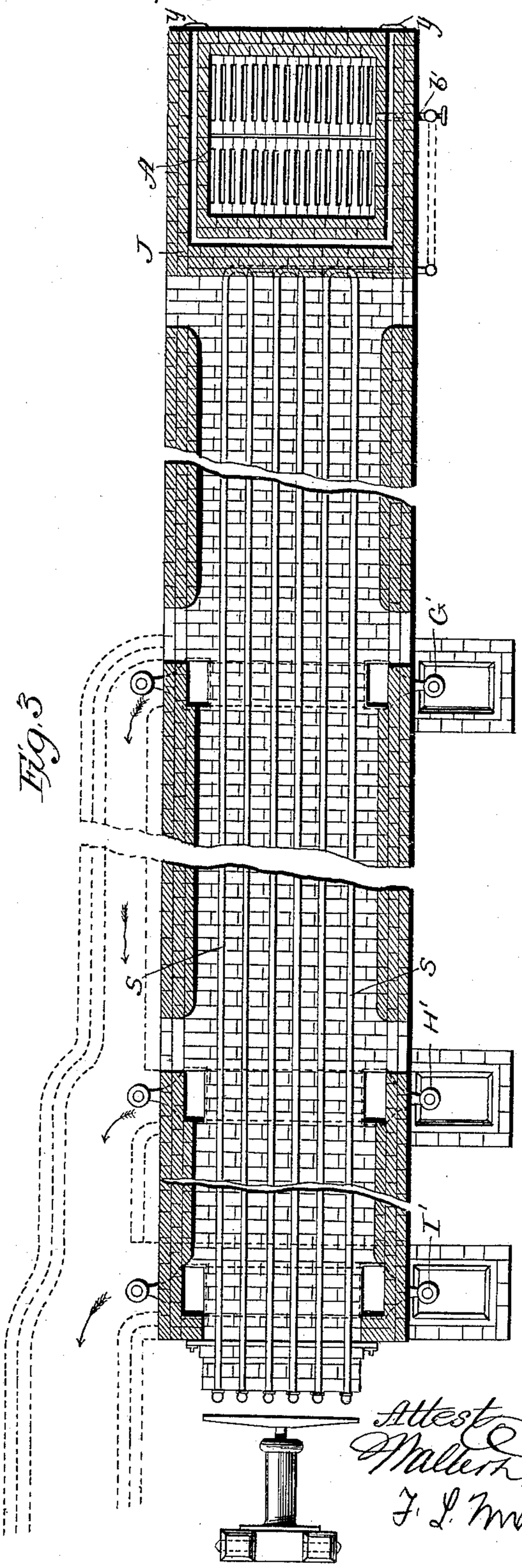

Fig. 3

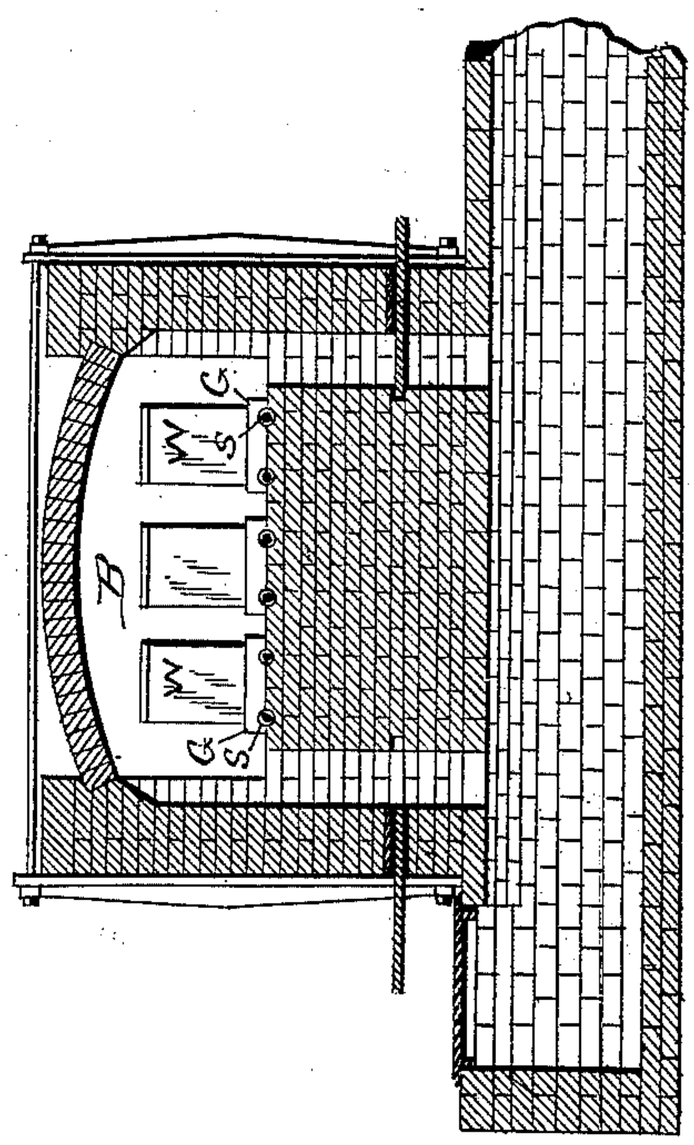

Fig. 7.

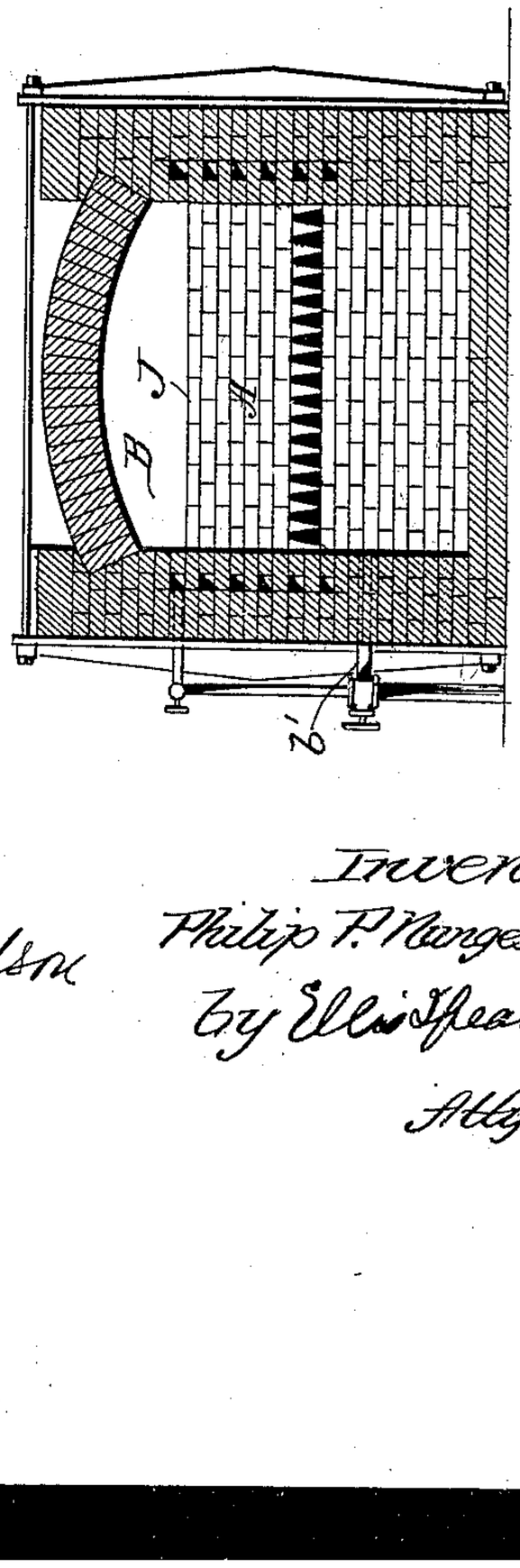

Fig. 6.

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UNITED STATES PATENT OFFICE.

PHILIP P. NUNGESSER, OF CLEVELAND, OHIO.

KILN FOR THE MANUFACTURE OF CARBONS.

SPECIFICATION forming part of Letters Patent No. 409,489, dated August 20, 1889.

Application filed December 27, 1888. Serial No. 294,790. (No model.)

To all whom it may concern:

Be it known that I, PHILIP P. NUNGESSER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in the Manufacture of Carbons; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to the manufacture of carbon electrodes as used in arc lamps for electric lighting; but I do not desire to limit the invention in this particular, though it is particularly adapted for this purpose.

The invention comprises a long heating or carbonizing chamber in connection with a furnace at one end or heating-chamber, and with a suitable flue or outlets with valves for controlling the draft, and thus regulating the temperature of the carbonizing-chamber; of conveyers within the chamber and receptacles for the carbons to be treated mounted upon or formed with the conveyers; means for cooling the conveyers; means for promoting the combustion of the gases arising from the receptacle containing the carbons under treatment, and, finally, many details of construction which I will describe more particularly hereinafter.

It will be understood that the invention consists in the parts enumerated above, combined as pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of the complete furnace; Fig. 2, a longitudinal vertical section. Fig. 3 is a longitudinal section taken horizontally on the line F G of Fig. 1. Fig. 4 is an end elevation of Fig. 1, while Fig. 5 shows an end elevation of the furnace end. Fig. 6 is a section through the line B C of Fig. 2. Fig. 7 is a section through the line C D of Fig. 2. Fig. 8 is a detail view of the conveyer in inverted position.

In the drawings, the furnace proper is shown at A, and it consists of ordinary grate-bars with an ash-pit beneath and doors *a a* leading thereto, with doors *z* leading to the opening above the grate-bars. In rear of the grate-bars is a bridge-wall J, which forms a contracted opening from the fire-chamber to an elongated chamber B, in which the carbons are baked. Both the fire-chamber and the baking-chamber are preferably built of brick-work suitably braced by iron-work, as shown in the drawings. A long baking-chamber is preferably formed on an inclined plane from the firing-chamber upward to the opposite end, where the carbons in their green state are inserted preparatory to being subjected to the baking process. At this end sliding doors U are provided, which, preferably, have means for opening them upward to admit the receptacles containing the carbons. The bottom floor of the baking-chamber is made inclined, so as to aid in the movement of the receptacles in their passage through the chamber from one end to the other.

I provide an underground flue from the baking-chamber leading to a suitable chimney, and I prefer to have openings leading to this flue from the chamber B at different points, as shown at A′ B′ C′, providing each opening with a suitable valve, as shown at G′ H′ I′, and more or less of these openings may be provided, the purpose being to provide means by which the temperature of the chamber B may be regulated with absolute certainty at different points in its extent, as it is necessary that the temperature shall vary within the chamber, being greatest in that part nearest the fire-chamber and growing less gradually and uniformly toward the opposite end, so that the action upon the carbons is regular, beginning with a drying heat and finally reaching a white heat to complete the baking process.

I do not limit myself to the underground flue in connection at several points with the baking-chamber, as it will be understood that chimneys may be erected instead, each being in connection with the chamber and controlled by suitable valves, which would thus have the same effect; but I prefer the arrangement shown as being more economical.

Extending along the bottom of the baking-chamber is a series of tracks S, which are arranged in pairs parallel to each other, and are composed of tubular metal. I have shown three sets of tracks; but it will be understood that a greater or less number may be used instead. Upon these tracks conveyers G are set, these conveyers, as shown in Fig. 8, being of approximately wedge shape on the bottom, with grooves formed thereon, which are adapted to fit the pipe-tracks S. By reason of the bottom

of the conveyers being formed inclined, their upper faces are in horizontal plane, and are thus adapted to hold the receptacles which contain the carbons (indicated at W) in an upright position. These conveyers are preferably made of refractory material, so as to withstand the excessive heat to which they are subjected, and as shown I make them separate from the conveyers themselves. I may, however, form the conveyers and receptacles in one piece; but I prefer making them independent of each other, as they can thus be more readily handled. I connect the ends of the pipes S at the upper end of the chamber B with a suitable water-supply, and in this manner provide a constant flow of water through the pipe, which tends to lower the temperature where contact is made with the groove of the conveyer and permits of a lubricant being used to facilitate the descent of the conveyers with their load. The lower ends of the pipes S are in connection with the ash-box by means of a pipe *b'*, and as the water is converted into steam it is discharged in the form of very dry steam beneath the grate, where it aids in the combustion of the fuel and tends to economize in the amount of fuel necessary to run the furnace.

The carbons are placed in suitable receptacles W, which are mounted upon the conveyers G so as to have a space all around each receptacle, and thus allow the heat to attack and penetrate from all sides of each receptacle, and thus allowing also a more uniform heating. It will be seen that the heat passes above the conveyers and the carbons are subjected to a uniform and gradual heating, beginning at their upper ends and continuing to the bottom. As the receptacles are kept in a vertical position, the carbons pass through the furnace without being changed from the vertical position, and thus they are kept straight, and there is no liability of their becoming bent or breaking. At different positions I place pyrometers to indicate the temperature of the furnace at different stages of the process.

In practical operation the temperature in the grate or fire-place is maintained at a comparatively uniform high heat, and the furnace from the fire-bridge to perhaps twenty feet, or about one-third the extent of the furnace, is kept at a white heat, and from this point to the upper end of the furnace the temperature gradually diminishes until where it reaches the doors U it is quite low, as the carbon cases and conveyers absorb a great deal of the heat.

I have found in practice that it is necessary to provide for the combustion of the gases which are continually being expelled from the receptacles containing the carbons, or else a great deal of combustible matter would be wasted which might be utilized to increase the heating capacity of the furnace, and thus economize in the consumption of fuel. In order to obtain this combustion and to utilize these gases, I make the walls of the fire-chamber hollow, with passages extending to the front covered by suitable valves Y, and to the rear to the upper part of the bridge-wall, so that the heated air may pass out of the top of the arch, and, together with the superheated steam, form a perfect combustion at this point, which will also promote the combustion of the gases and vapors arising from the carbons under treatment, as above explained.

I provide doors—such as F' G' H'—at intervals in the extent of the furnace, as shown in Fig. 1, and through these doors the interior of the furnace may be reached, and at the last door F' the cases containing the carbons may be removed in any suitable manner and by suitable means. Ordinarily a truck is inserted which comes to a level with the top of the conveyer, and the receptacle W is drawn off onto the truck and thus removed.

The series of conveyers may be aided in their movement through the furnace by any suitable means, such as the hydraulic jack represented at R in Fig. 1.

The method of manufacturing carbons referred to herein, but not claimed, is the subject of a separate application filed in the United States Patent Office on the 31st of January, 1889, Serial No. 298,255.

Having thus described my invention, what I claim is—

1. In the manufacture of carbons, a furnace having a fire-chamber at one end, an elongated heating-chamber in connection with the said fire-chamber, and a series of flues controlled by suitable valves in connection with said heating-chambers, substantially as described.

2. In the manufacture of carbons, a furnace having a fire-chamber at one end, a stationary elongated heating-chamber in connection with said fire-chamber, a charging-opening, and a discharge-opening in the side wall of the heating-chamber between the charging end and the fire-chamber, substantially as described.

3. In combination with a furnace having a fire-chamber, a heating-chamber having tubular tracks laid in the bottom thereof, conveyers adapted to said track, a suitable water-supply, in connection with said tubular track, and a pipe-connection between the lower end of the track and the ash-pit of the fire-chamber, substantially as described.

4. In combination with a fire-chamber and a heating-chamber, a series of independent sliding conveyers composed of refractory material and receptacles for the carbons mounted upon said conveyers and moving therewith, substantially as described.

5. In combination, in the described furnace, with the tubular water-tracks, of independent sliding conveyers having grooves in their bottom adapted to said track and composed of refractory material, substantially as described.

6. In combination with the heating-cham-

ber inclined from front to rear, of independent sliding conveyers composed of refractory material having inclined bottoms and tops in horizontal plane, with receptacles carried thereby, substantially as described.

7. In combination with the fire-chamber, the elongated heating-chamber, the water-tracks in said chamber, the grooved conveyers adapted thereto having inclined bottoms, and the receptacles supported on said conveyers and of less width, whereby spaces are provided between each receptacle, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

PHILIP P. NUNGESSER.

Witnesses:

G. C. METCALF,

H. P. MCINTOSH.