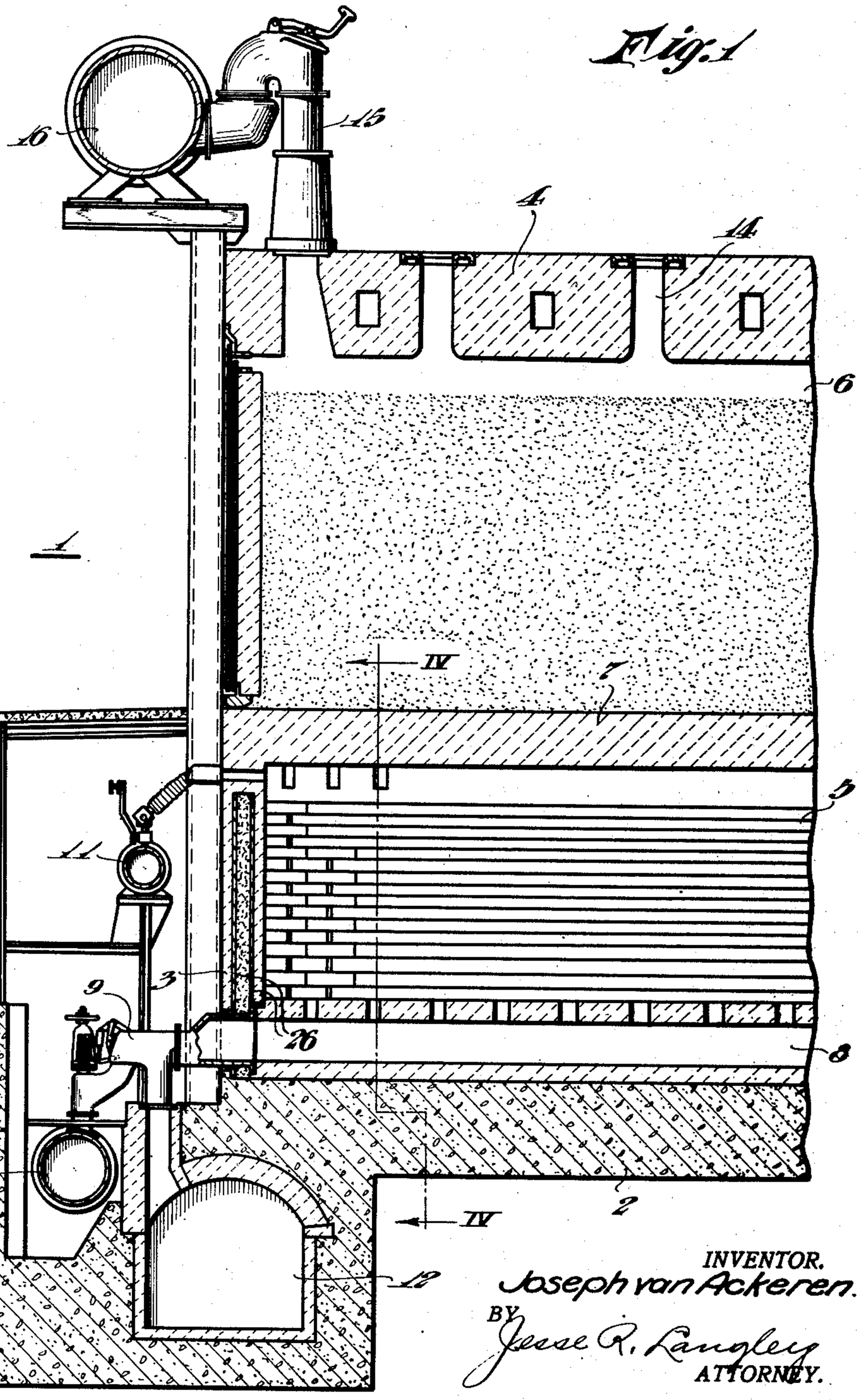
June 5, 1934. J. VAN ACKEREN 1,961,264

COKING RETORT OVEN

Filed Jan. 17, 1930 3 Sheets-Sheet 1

Fig. 1



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3 Sheets-Sheet 2

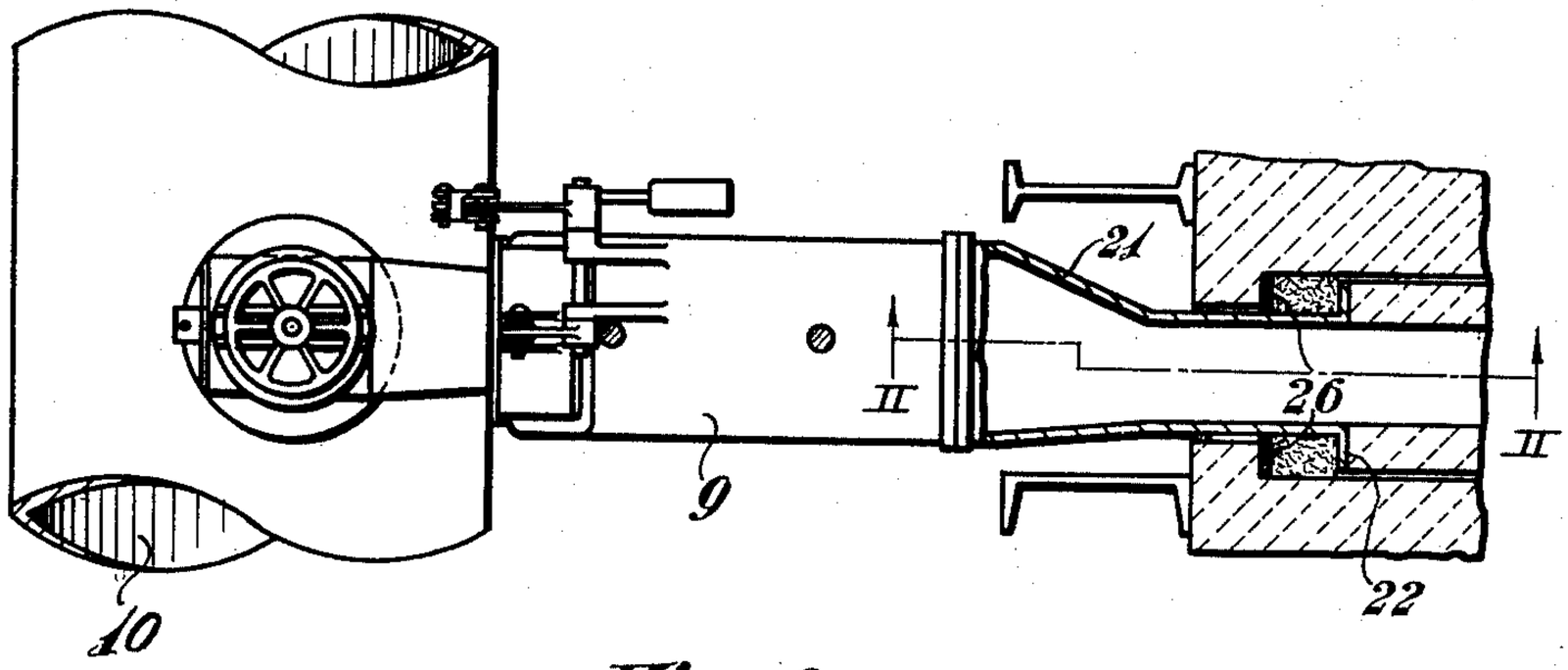

Fig. 3

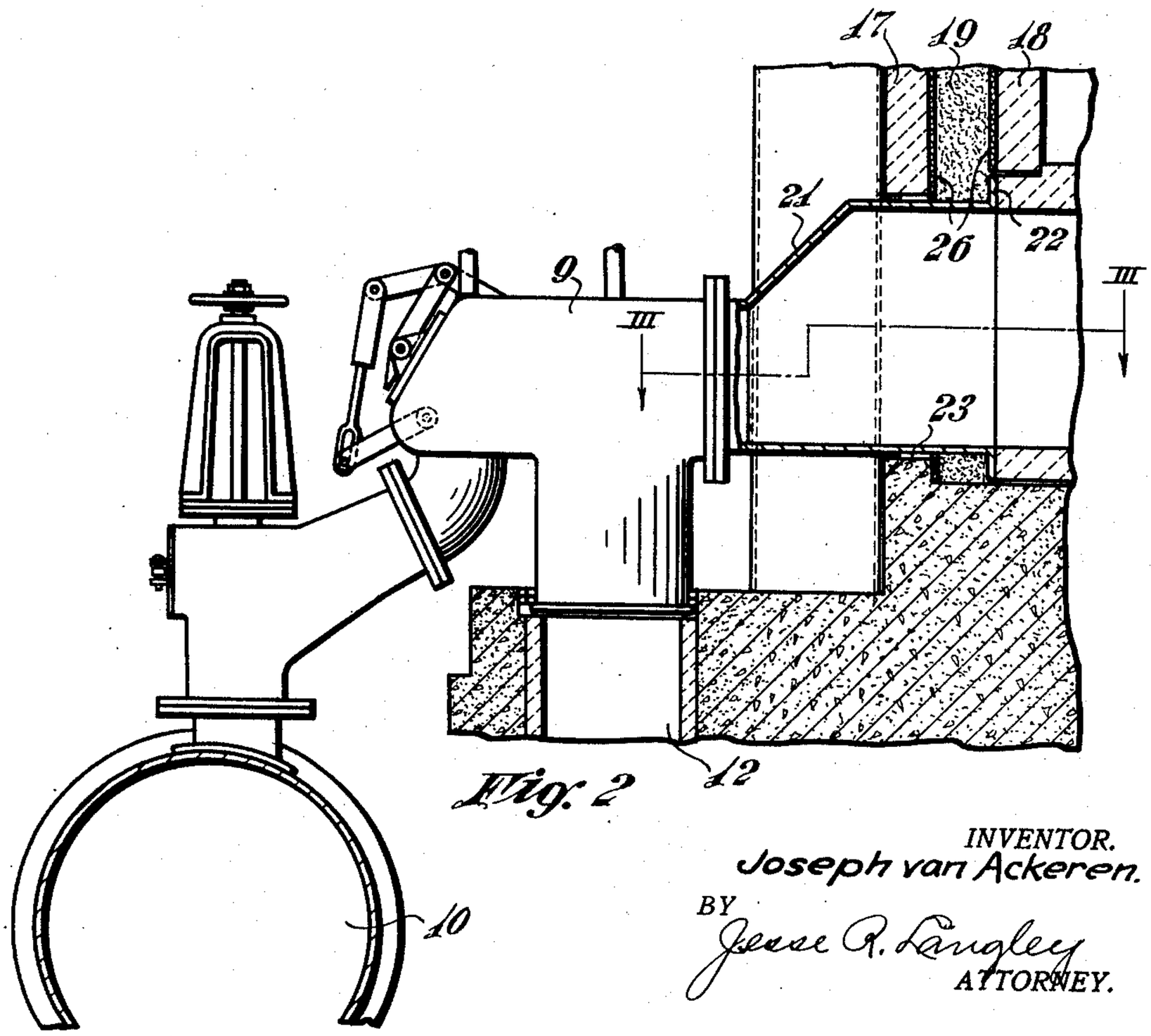

Fig. 2

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3 Sheets-Sheet 3

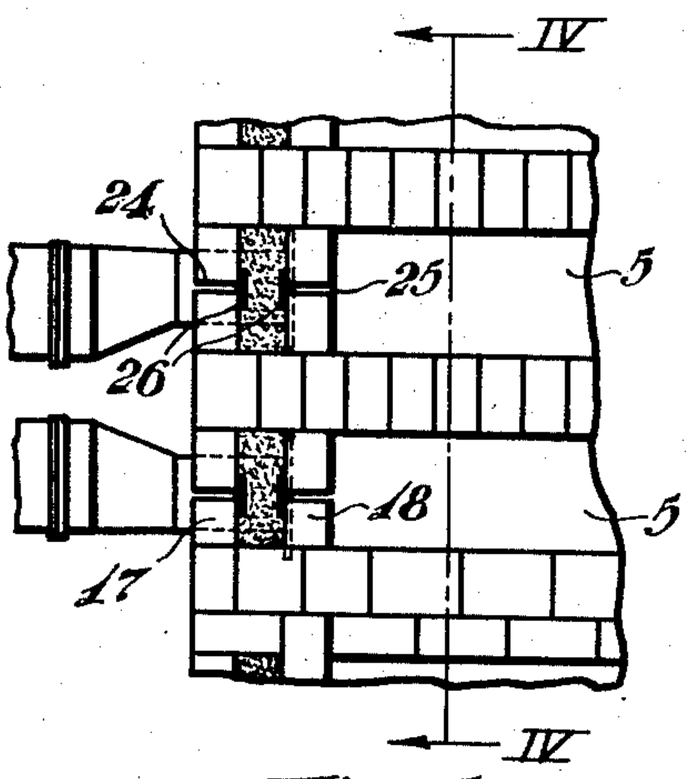

Fig. 5

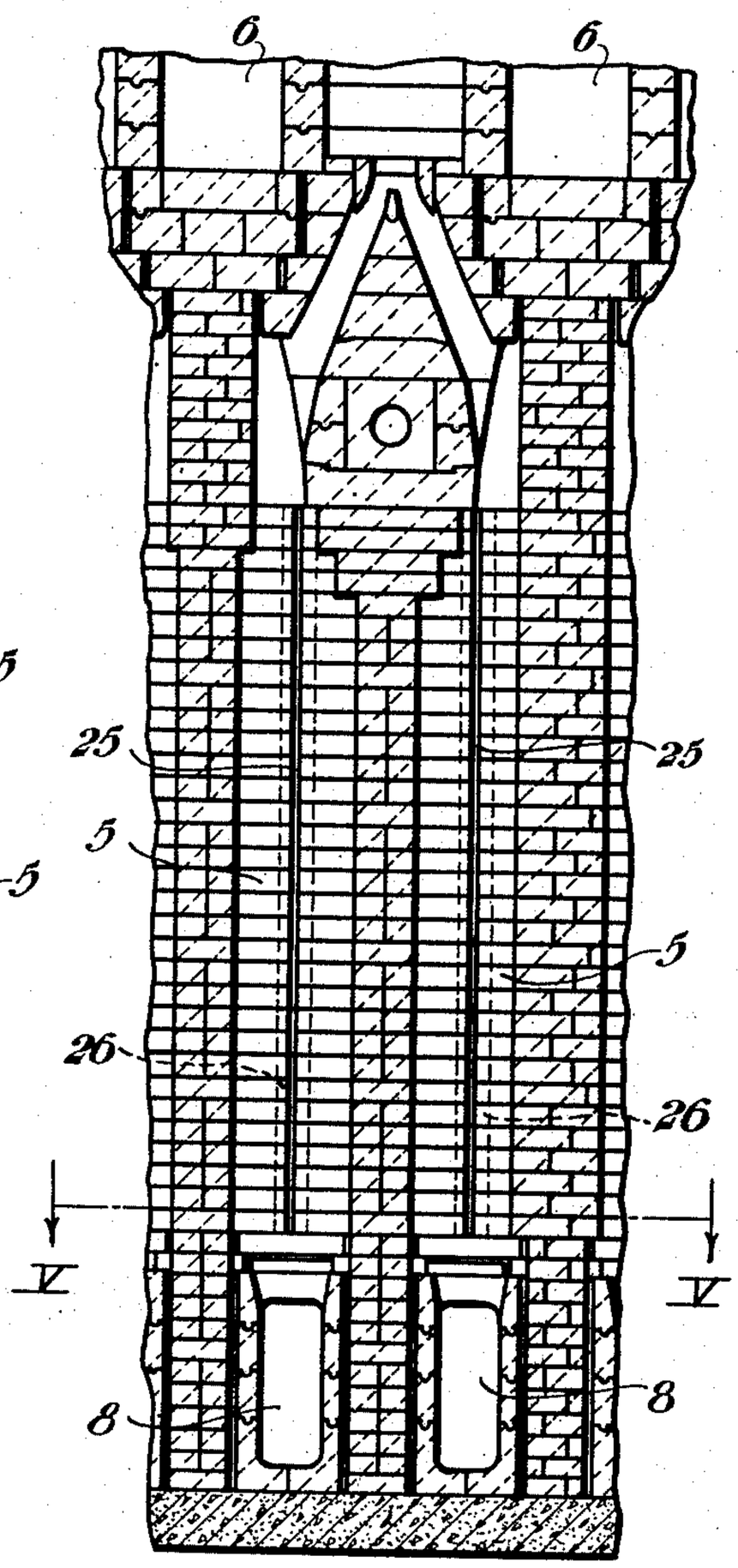

Fig. 4

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UNITED STATES PATENT OFFICE

1,961,264

COKING RETORT OVEN

Joseph van Ackeren, O'Hara Township, Allegheny County, Pa., assignor to The Koppers Company of Delaware, a corporation of Delaware

Application January 17, 1930, Serial No. 421,456

1 Claim. (Cl. 202—141)

My invention relates to coking retort ovens and particularly to the construction of the side walls thereof with regard to the connections between the regenerators and the valve mechanisms for controlling the flow of gaseous media in the coke-oven structure.

An object of my invention is to provide a simple and efficient means for connecting reversing boxes to the sole flues of coke-oven regenerators whereby leakage is effectually prevented.

A further object of my invention is to provide a construction whereby reversing boxes may be installed when the coke-oven walls are built and whereby the reversing boxes are retained in position but relative movement by reason of temperature changes is permitted.

In the prior construction of coke-oven batteries, the outer side walls of the regenerators of the batteries have ordinarily consisted of an outer layer of red brick, an inner layer of clay and an intermediate layer of insulation between them. Inasmuch as these various materials have temperature coefficients that differ considerably from that of the silica brick constituting the main portion of the battery structure, these walls have not been interconnected with the body of the battery and it has been necessary to provide expansion joints therebetween. The expansion of the various portions of the battery has accordingly been of different degrees and the result has been that openings have been caused through which air may leak into the interior of the regenerators.

Leakage of air has occurred around the portions of the reversing boxes that extend through the wall of the battery for connection to the sole flues of the regenerators. The alternate expansion and contraction of the castings of the air and the gas boxes has caused relative movement between the masonry and the castings of the boxes, with the result that it has been extremely difficult to prevent leakage of air into the regenerators. Such leakages may cause explosions or combustion within the regenerators.

In the improved construction of the wall in accordance with the present invention, both the inner and the outer layers of the wall are of silica brick whereby the wall may be interconnected with the silica brick of the main body of the battery since the materials are the same. The air and the gas boxes are provided with a casting in the form of a tubular member for extending through a portion of the wall for connection to the sole flues.

The inner end of the casting is provided with a flange and the space between the inner layer of silica brick and the outer layer of the same material is filled or packed with a material such, for example, as rock wool which closely surrounds the casting of the reversing box and securely retains it in position. The rock wool, which is a finely-divided refractory material, also renders the connection between the wall and the casting substantially gas-tight and leakage is thereby prevented.

This arrangement permits the air and the gas boxes to be placed in position during the construction of the battery and the expense and inconvenience of stopping leaks by means of asbestos rope, cement packing and other expensive materials is thereby avoided.

My invention will be described in connection with the accompanying drawings, in which

Figure 1 is a view in transverse vertical section of a portion of a coke-oven battery constructed in accordance with my invention;

Fig. 2 is an enlarged view, partially in elevation and partially in section, on line II—II of Fig. 3 of a reversing box and a portion of the wall to which it is connected, together with certain associated parts;

Fig. 3 is a view, partially in plan and partially in section, on line III—III of Fig. 2;

Fig. 4 is a vertical sectional view, taken on line IV—IV of Figs. 1 and 5; and

Fig. 5 is a horizontal sectional view taken on line V—V of Fig. 4.

Referring particularly to Fig. 1, a coke-oven battery 1 comprises a foundation 2, a side wall 3 and a top 4. A series of regenerators 5, one of which is shown, is separated from an upper structure comprising a coking chamber 6 by horizontal brickwork 7.

The regenerator 5 is provided with a sole flue 8, which is connected through the side wall 3 to a reversing box 9, which may be either an air box or a gas box or a combination box, as the case may be. A gas main 10 supplies producer gas for combustion in the battery and a gas main 11 supplies coke-oven gas when the latter is employed as a fuel. A waste gas main 12 conducts products of combustion from the battery to the usual stack.

The oven top is provided with charging holes 14 for charging the coking chambers 6. An ascension pipe 15 conducts products of distillation to a collecting main 16.

The main body portion of the coke-oven structure, including the regenerators 5, is of silica brick, as is also an outer layer 17 and an inner

layer 18 of the side wall 3 at the end of each regenerator 5. An intermediate layer 19 of a suitable comminuted or fibrous material, such as rock wool, separates the inner and outer layers of the wall. Rock wool is a relatively fine resilient and somewhat fibrous refractory and heat-insulating material that is substantially gas-tight when used to seal joints in masonry structures. In view of the relatively low temperatures prevailing at this portion of the structure, it is not necessary, however, that the sealing material be refractory.

Reference may now be had to Figs. 2 and 3, in which the details of construction of the cooperating parts of a reversing box and the side wall 3 are shown in enlarged views. The reversing box 9 may be an air box, a gas box, or, as in the case of the box illustrated, it may supply either gas or air. In either case, when the direction of flow is reversed, the box conveys products of combustion to the waste gas main 12.

The reversing box 9 is provided with a tubular extension member 21 having a flanged connection thereto which extends horizontally through an opening in the outer layer 17 of the wall 3 and is provided at its inner end with an outwardly-extending flange 22, which is adjacent the outer edge of the inner layer 18. The extension member 21 may be placed in position at the time of construction of the battery, in which case it is inserted at the proper time in the construction of the masonry and the silica bricks of the layer 17 are separated from the member 21 only by a layer of asbestos paper 23 or the like.

The inner portion of the member 21 between the flange 22 and the outer layer 17 of the wall is closely surrounded by the intermediate layer 19 of rock wool. This layer, in conjunction with the flange 22 and the layer 17, operates both to firmly secure the member 21 in position within the wall 3 and to form a gas-tight seal around the member for preventing leakage between the sole flue 8 of the regenerator and the atmosphere.

As shown in Figs. 4 and 5, expansion joints 24 and 25 may be provided respectively in the outer and the inner layers of the wall 3 and these are separated by the layer 19 of rock wool and a layer of asbestos paper 26 for covering the joints to prevent rock wool from entering the joints when the latter are expanded. It will be noted, also, that the inner layer 18 may be interconnected with the adjacent structure of silica brick and that no expansion joint is necessary between the layer 18 and the main body portion of the battery.

The construction described above affords a simple and efficient means whereby the reversing boxes of a battery may be installed at the time of construction of the battery, with a resultant saving in time and labor. The walls of the battery may be of the same material as the main body portion of the battery whereby expansion joints between these parts may be eliminated.

Furthermore, the construction of the tubular member 21 and the manner of connecting it to the corresponding wall portion insures that the reversing box 9 will be retained in position, regardless of the variations in temperature resulting from the reverse directions of flow of gaseous media. It will be apparent, also, that my improved construction provides a substantially gas-tight connection between the reversing boxes and the sole flues of the regenerators under all conditions since, by reason of its characteristic of resiliency, the rock wool adapts itself to the various relative positions of the connected parts and a seal is thereby effectually maintained.

Other advantages will be apparent to those skilled in the art relating to the construction and operating of coking retort ovens. My invention is not to be limited to the preferred embodiment herein shown and described except as expressed in the appended claim.

I claim as my invention:

Coke-oven structure comprising a silica-brick superstructure comprising coking chambers and combustion chambers therefor, a substructure comprising a side wall having two spaced layers of refractory material, a regenerator within said substructure and communicating with said combustion chambers, said substructures side wall also being formed of silica brick and being formed integrally with said silica superstructure for expansion as a unit therewith, a valve mechanism on the outer side of said substructure side wall and communicably connected to said regenerator for controlling the flow of gases to or from said regenerator, said valve mechanism having a tubular member of metal connected thereto and extending through said substructure side wall for communication with said regenerator, said tubular member being adapted to be subjected to alternate expansion and contraction, and a layer of finely divided refractory material between the layers of said substructure side wall for closely surrounding said tubular member in its various positions for preventing leakage adjacent thereto.

JOSEPH VAN ACKEREN.