

(No Model.)

2 Sheets—Sheet 1.

K. M. MITCHELL.
GAS RETORT FURNACE.

No. 437,611.

Patented Sept. 30, 1890.

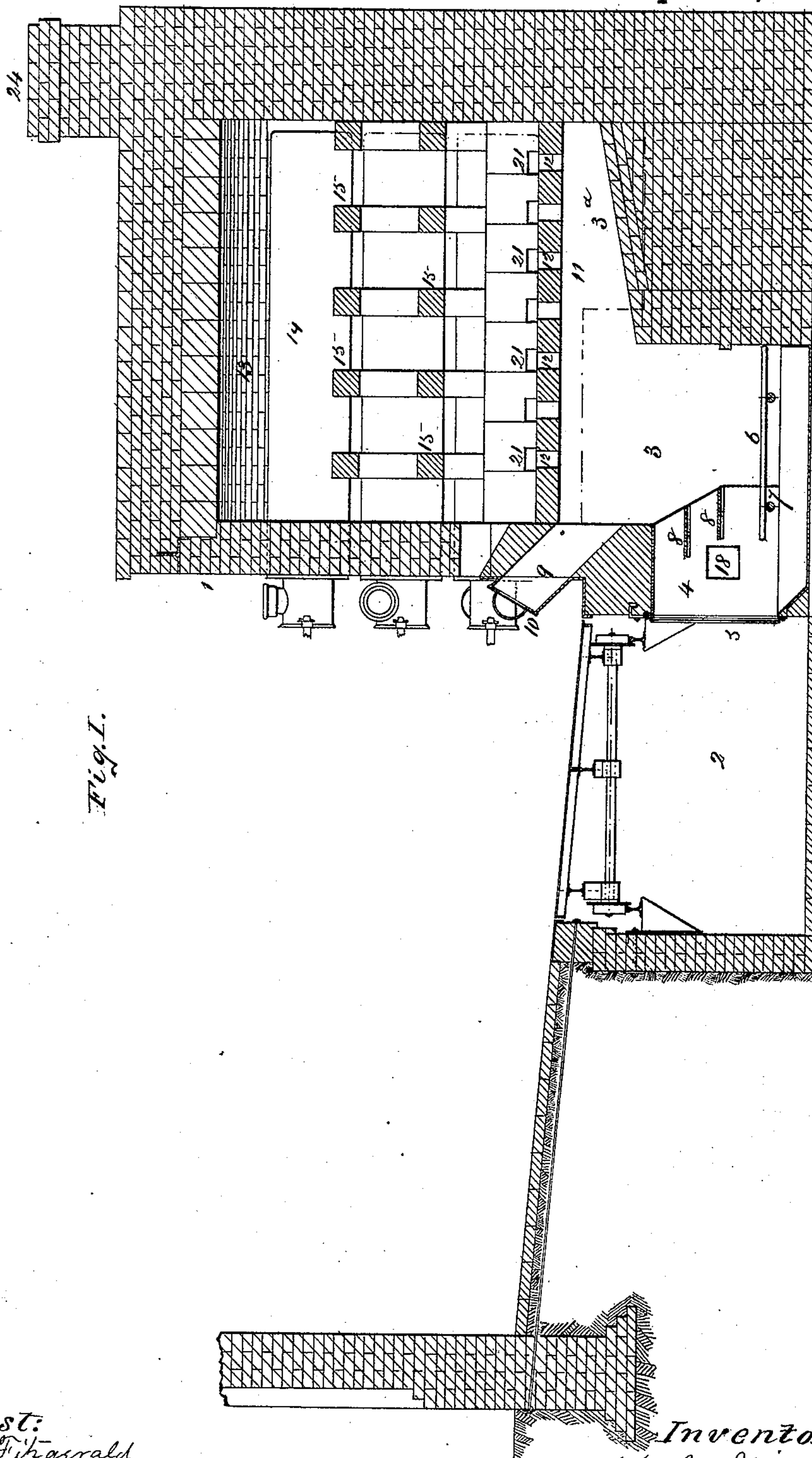


Fig. 1.

Attest:
John H. Fitzgerald
D. H. C. McMill

Inventor:
Kerr M. Mitchell.
By Knight Bros.
Atty.

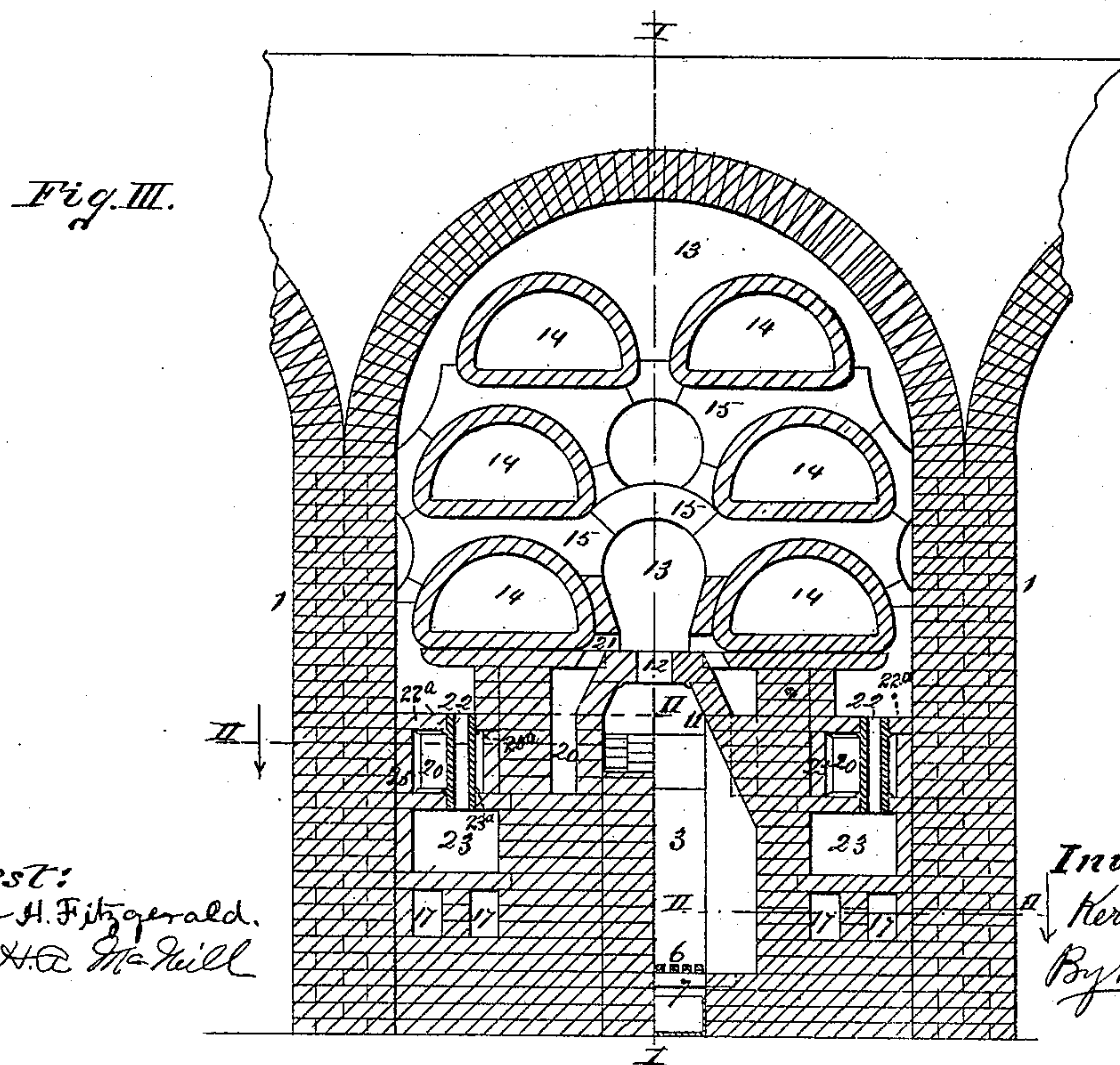
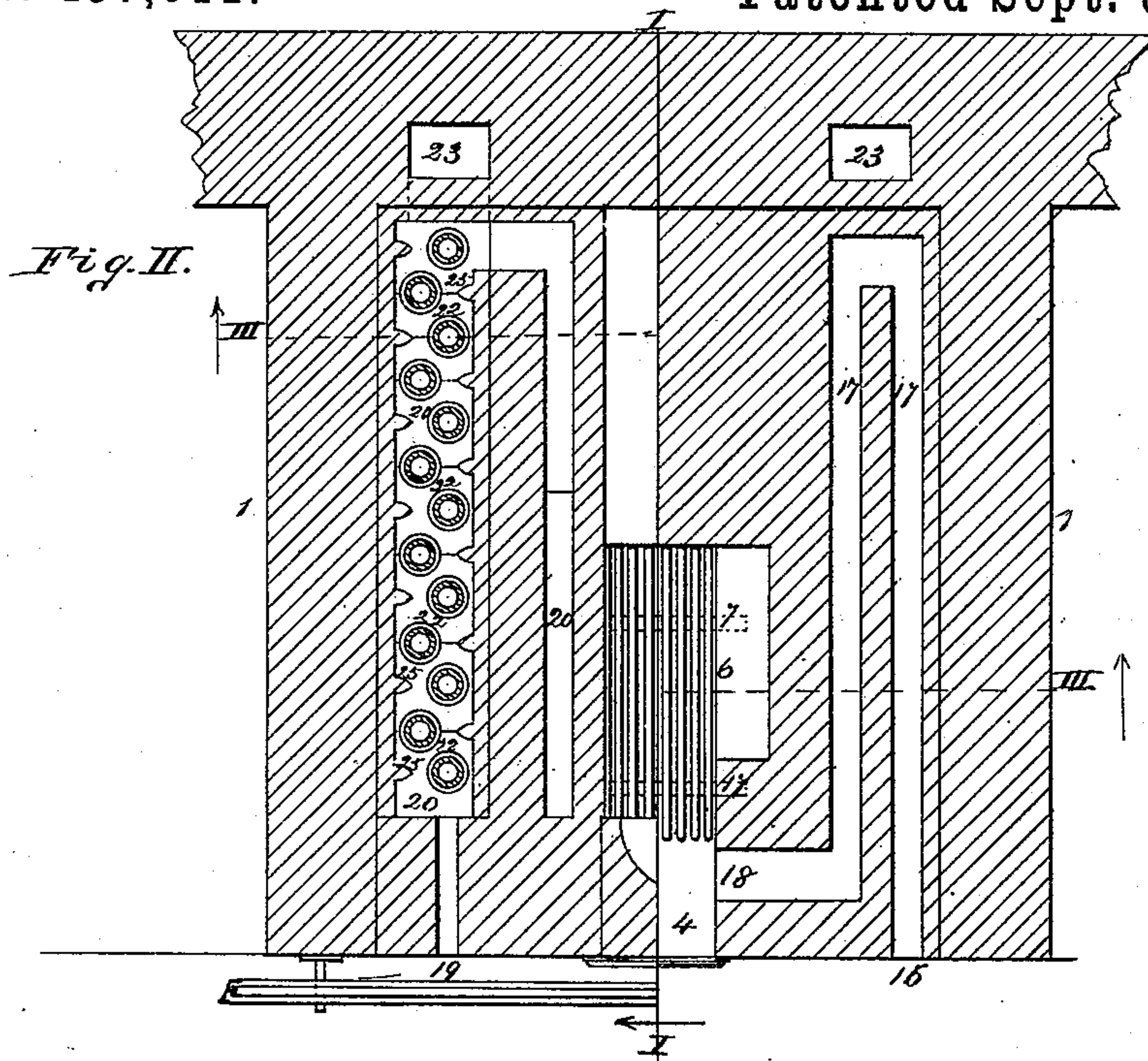
(No Model.)

2 Sheets—Sheet 2.

K. M. MITCHELL.
GAS RETORT FURNACE.

No. 437,611.

Patented Sept. 30, 1890.



Attest:
John H. Fitzgerald.
D. H. McNeill

Inventor:
Kerr M. Mitchell.
By *Knigh* *Bro*
Atty.

UNITED STATES PATENT OFFICE.

KERR M. MITCHELL, OF ST. JOSEPH, ASSIGNOR OF ONE-HALF TO JOHN DELL,
OF ST. LOUIS, MISSOURI.

GAS-RETORT FURNACE.

SPECIFICATION forming part of Letters Patent No. 437,611, dated September 30, 1890.

Application filed August 27, 1889. Serial No. 322,100. (No model.)

To all whom it may concern:

Be it known that I, KERR M. MITCHELL, of St. Joseph, Buchanan county, State of Missouri, have invented a certain new and useful Improvement in Gas-Retort Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

10 This improvement relates to the style of coal-gas generators having what are called "regenerating furnaces," in which the primary air-supply goes directly to the fire and a secondary air-supply mixes with the gases
15 above the fire.

Figure I is a longitudinal section at I I, Figs. II and III. Fig. II is a horizontal section upon two planes II II, Fig. III. Fig. III is a transverse section at III III, Fig. II.

20 In Fig. I is shown a truck which is used when charging or discharging the bench of retorts, but which forms no part of the present invention. No novelty is claimed in the arrangement of the retorts or position of the
25 furnace in the bench.

1 is the brick-work of the bench.

2 is a pit from which, if desired, the furnace may be fed and which is in communication with the fire-chamber 3 by a way 4, closed by a door 5. The grate-bars 6 are shown
30 removable and resting on round bearing bars or rollers 7.

At 8 are horizontal shelves extending across the way or mouth 4, whose purpose is to sustain the fuel at that point when the fire is
35 made to extend from the grate-bars above the level of the shelves, as is usual in this form of furnace. In this case the fuel is fed through a mouth 9, closed by a cap or door 10.

40 11 is the arch or cover to the fire or furnace chamber. The upper part of the fire-chamber extends backward in an extension 3^a.

At 12 are a number of openings extending through the top of the arch to the combustion-chamber 13, in which the retorts 14 are supported in the usual manner by supports 15.

The primary currents of air for the support of the partial combustion which takes place in the fire-chamber 3 enter at the front of the
50 bench through the mouth 16 into the flues 17, which extend through the brick-work to the

rear part of the bench and then forwardly to the front part, where the warmed air escapes into the fire-chamber through openings 18 at the sides of the mouth 4. The secondary air-
55 currents enter mouth 19 in the front of the bench and pass through horizontal flues 20, which extend through the brick-work to the back part of the bench, and from that point forwardly beneath the combustion-chamber. 60
21 are a number of passages from the top of the inner part of the flues 20 into the combustion-chamber 13. The openings 21 and 12 are in close proximity, so that the hot air from the flue 20 is mingled with the products
65 of partial combustion from the fire and very thorough combustion takes place, the flames and heated gases filling the combustion-chamber. The products of combustion escape from the lower part of the combustion-chamber
70 through a number of vertical pipes 22, which traverse the flue 20 and discharge into flues 23, arranged directly under and parallel with the air-flues 20, and lead to the smoke-stack 24. These tubes 22 are secured in the top
75 and bottom walls of the flues 20 and are arranged in zigzag horizontal line, which causes the air to come into very intimate contact with their heated surfaces.

At 25 are seen vertical ribs projecting from
80 the sides of the flue and forming deflectors, causing the current of air to take a devious course in its passage through the flue, so that all portions of it are brought in contact with the hot pipes 22. These deflectors, it will be
85 seen, are for this purpose arranged alternately with each other on opposite sides of the flue, and the said pipes 22 are arranged alternately with said deflectors on both sides of the flue in a zigzag line, and thus form a sinuous pas-
90 sage for the air entering the combustion-chamber. These pipes 22, it will also be observed, are necessarily very thin, so as to afford a minimum of resistance between the heat passing through them and the air in flue
95 20, and owing to their thinness they are arranged vertically, as otherwise they would hardly support their own weight, and also as an incident to their thinness they are neces-
100 sarily removable to enable the ready insertion of others when they become damaged, which is very apt to occur. To enable the

removal of these pipes 22, the setting-stones 22^a are simply supported on upper flanges 20^a on the pipes, while the latter are themselves supported on the floor of the flue 20 by means of lower flanges 23^a.

It will be observed that the retort-chamber 13 has direct communication with the fire-box of the furnace, while the discharge or smoke flue 23 has no communication with said fire-box excepting *via* the vertical tubes 22, which latter lead from the chamber 13; and on the other hand it will be seen that the chamber 13 has no communication with the uptake or stack excepting *via* the vertical tubes 22 and smoke-flue 20, while the latter (the smoke-flue) is directly connected to the uptake or stack. Hence it will be understood that the products of combustion, after having impinged against the retorts in the chamber 13, will pass downward through the vertical tubes 22, and thence along the flue 23 to the uptake, heating in their course the current of air passing through the flue 20 and also heating to a considerable degree the air passing through the flues 17.

The pit is shown open and having a movable platform, as described and claimed in my application, Serial No. 323,008, filed September 4, 1889; and I therefore do not claim the same in this application.

I claim as my invention—

1. The combination, in a gas-generator, of the combustion or retort chamber 13, a horizontal flue 20, conducting air through the body of the bench to the said combustion-chamber, and the vertical tubes 22, extending from the chamber 13 through the flue 20 to the discharge-flue 23, said tubes 22 being removably inserted in the upper and lower walls of the flue 20 and having the supporting-flanges 20^a, substantially as and for the purpose set forth.

2. The combination, in a gas-generator, of the fire-chamber, the combustion-chamber 13, containing retorts and having communication with said fire-box, the horizontal air-flue 20 in communication with the combustion-chamber, the uptake, a discharge-flue 23, the removable tubes 22, arranged vertically in the air-flue 20 and communicating with chamber 13 and discharge-flue 23, said discharge-flue having direct communication with the uptake, but no communication with the fire-chamber except *via* the tubes 22, substantially as set forth.

3. The combination, in a gas-generator, of the fire-chamber, the combustion-chamber 13, having the openings 12 throughout its length

leading to the fire-chamber, the air-heating flue 20, with openings 21 leading to the combustion-chamber, the discharge-flue 23, arranged lengthwise of flue 20, the tubes 22, arranged vertically and in a zigzag line along the flue 20, leading from the combustion-chamber transversely through flue 20 to the said discharge-flue, and the air-supply tubes 17, arranged parallel with and adjacent to discharge-flue 23, said discharge-flue 23 having no communication with the fire-chamber except *via* the tubes 22 and the combustion-chamber, substantially as set forth.

4. In a gas-generator, the combination, with the fire-chamber and combustion-chamber, of a longitudinal air-flue communicating with the outer atmosphere and with said combustion-chamber, a longitudinal smoke-flue arranged directly under and parallel with said air-flue and being open and unobstructed throughout its entire length, and vertical cylindrical pipes 22, extending from the combustion-chamber transversely through the air-flue and opening in the smoke-flue under said air-flue, said smoke-flue being connected directly with the uptake, but having no connection with the fire-chamber except *via* the tubes 22, substantially as set forth.

5. In a gas-generator, the combination, with the fire-chamber and combustion-chamber, of a horizontal air-supply tube leading to the combustion-chamber, a smoke-flue arranged under and parallel with said air-flue, vertical pipes or flues 22, leading from the combustion-chamber and emptying into said smoke-flue and being arranged in a zigzag line throughout the length of said air-flue, and deflectors projecting laterally from the side walls of the air-flue and but partially across the latter and being arranged opposite every alternate one of the said vertical flues, substantially as set forth.

6. The combination, with the combustion-chamber and fire-chamber, of an air-flue leading to said combustion-chamber, a smoke-flue under said air-flue, deflectors arranged alternately with each other on opposite sides of said air-flue, and vertical flues 22, arranged alternately with said deflectors on both sides of the air-flue and forming a zigzag line, said flues 22 having communication with the combustion-chamber and said smoke-flue, substantially as set forth.

KERR M. MITCHELL.

Witnesses:

JOHN H. FITZGERALD,
D. H. A. MCNEILL.