(No Model.)

2 Sheets—Sheet 1.

# J. H. MARS.

## STEAM BOILER.

No. 332,267. Patented Dec. 15, 1885.

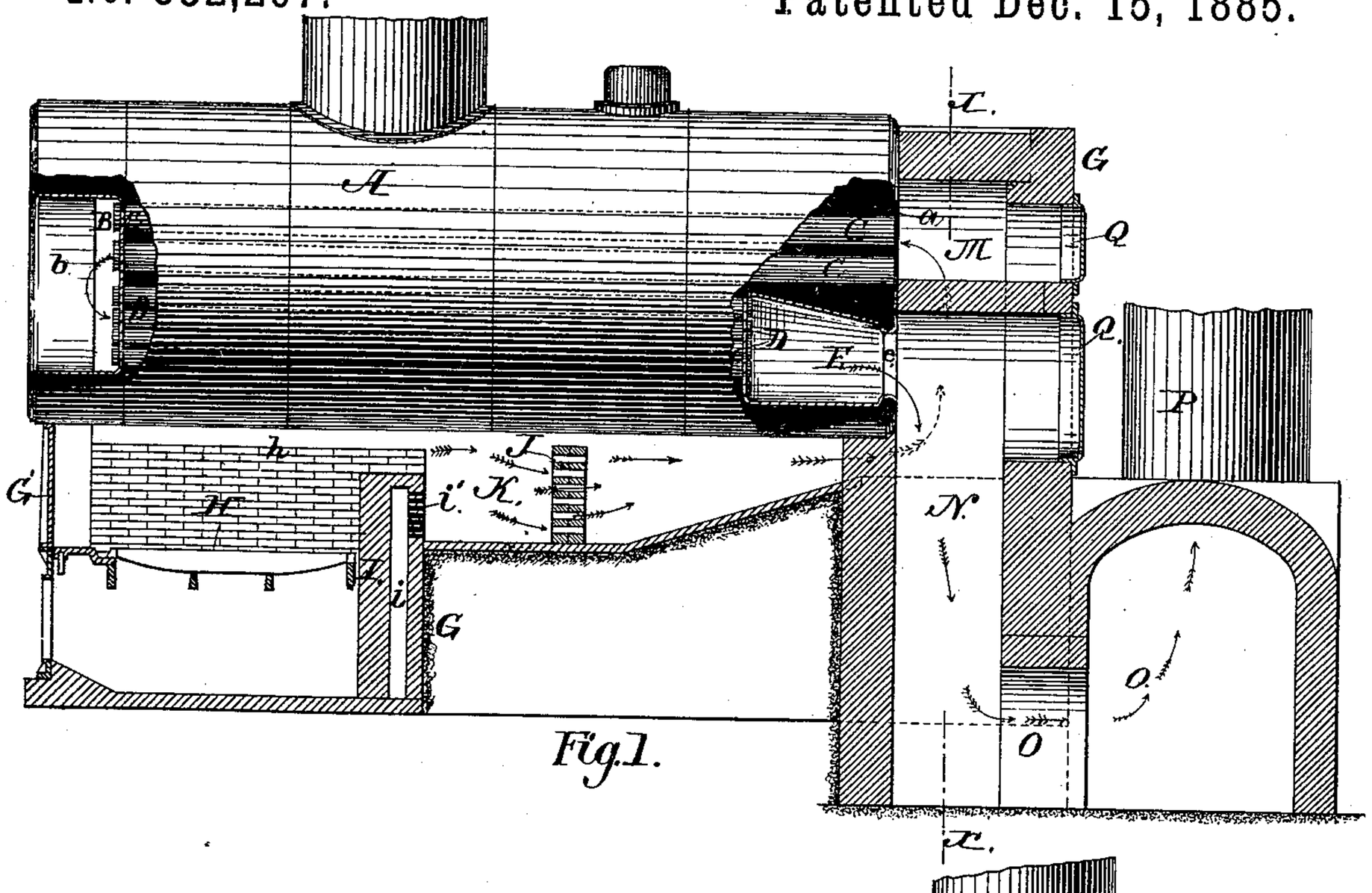


Fig. 1.

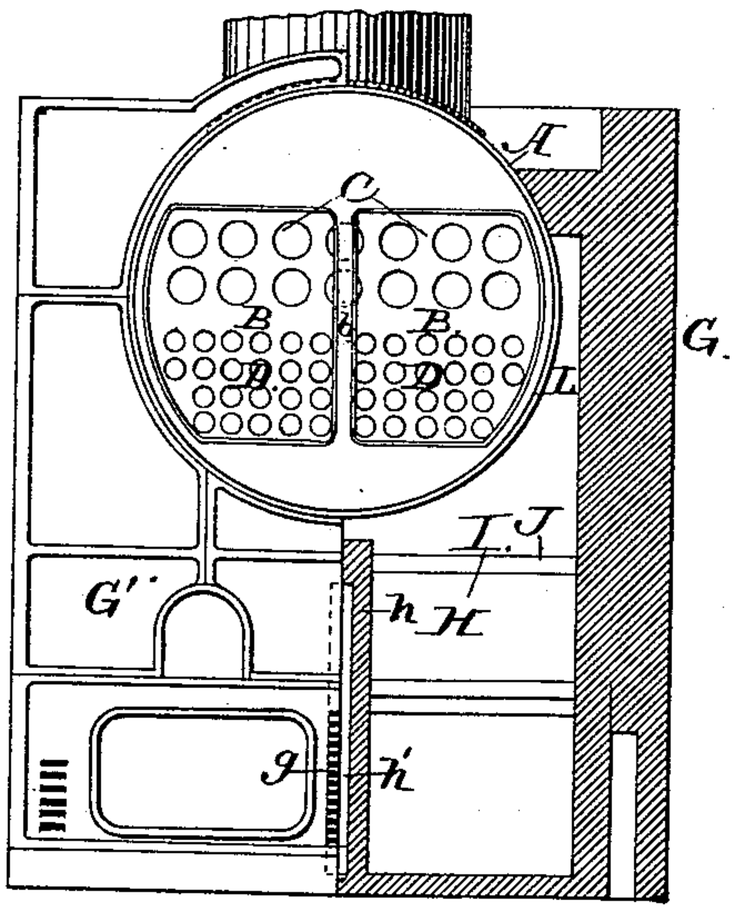


Fig. 2.

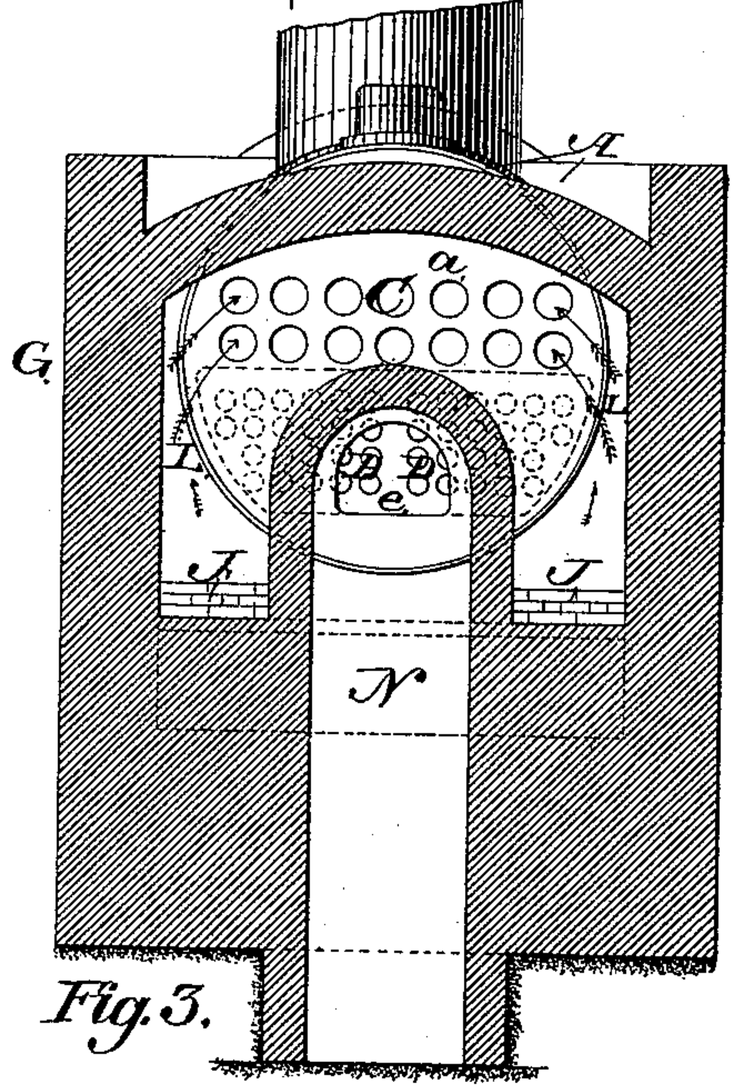


Fig. 3.

Witnesses:

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Chas. Hamlin.

Inventor:

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Attorney.

(No Model.)

2 Sheets—Sheet 2.

# J. H. MARS.

## STEAM BOILER.

No. 332,267. Patented Dec. 15, 1885.

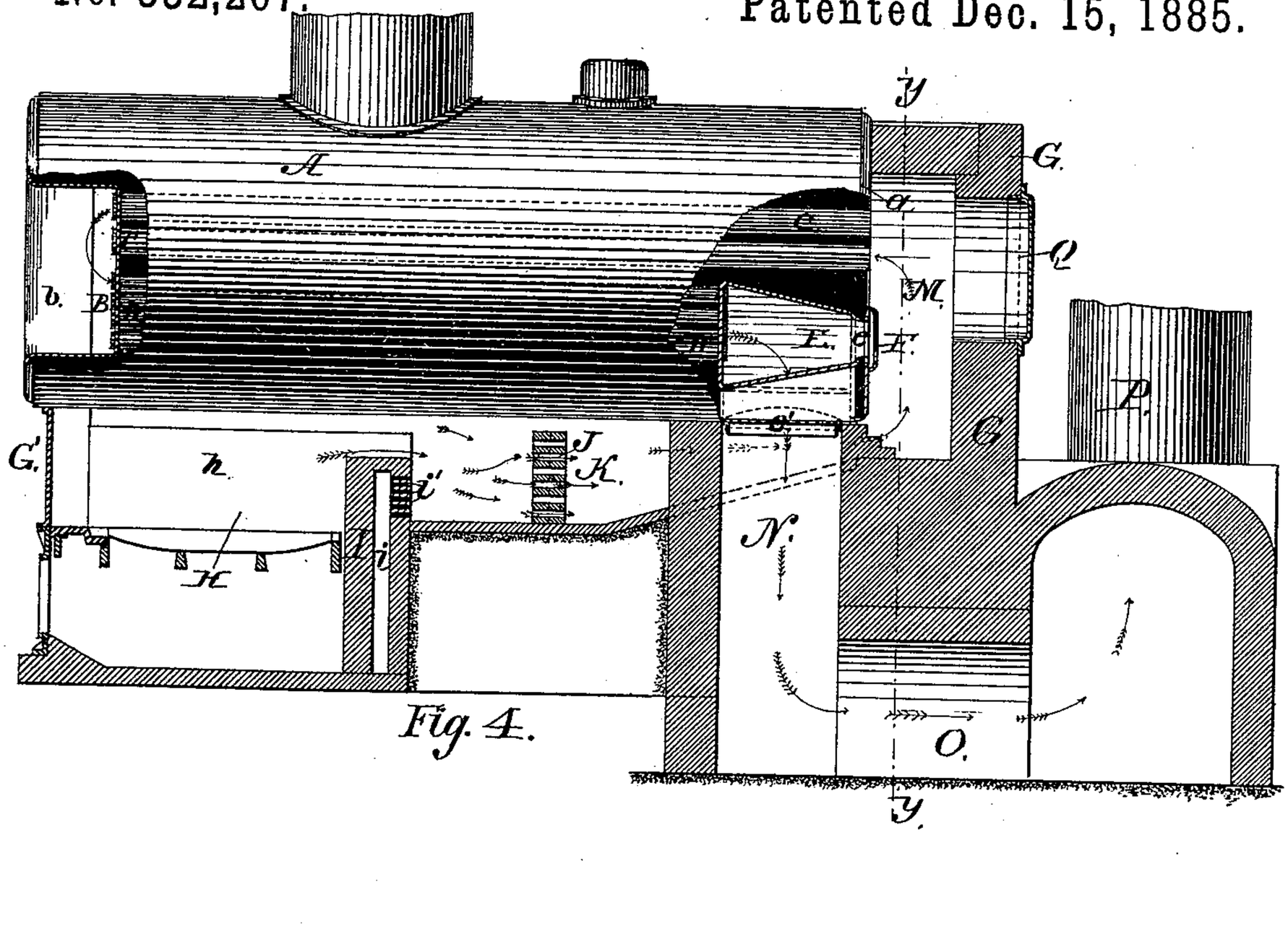


Fig. 4.

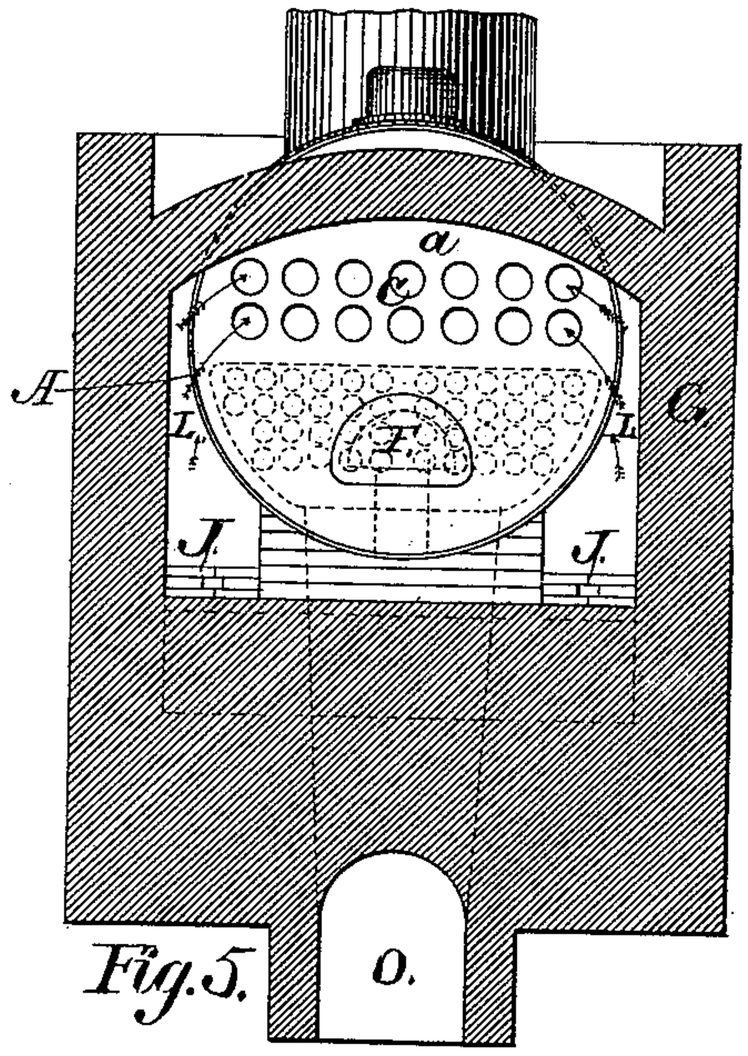


Fig. 5.

Witnesses:

S. B. Brewer.

C. A. Hamlin.

Inventor:

JOHN H. MARS,

by William H. Lee,

Attorney.

# UNITED STATES PATENT OFFICE.

JOHN H. MARS, OF ALBANY, NEW YORK.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 332,267, dated December 15, 1885.

Application filed July 24, 1885. Serial No. 172,538. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. MARS, of the city and county of Albany, in the State of New York, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in the construction of horizontal tubular boilers and in the brick-work setting for the same, and the object of my improvements is to more perfectly utilize the heat for the purpose of generating steam. This object I attain by means of a boiler and setting constructed as illustrated in the accompanying drawings, which, being hereinafter referred to, form part of this specification, and in which—

Figure 1 is a side elevation of a boiler containing my improvements, a portion of the shell being broken away to show underlying parts, and with the setting shown in longitudinal section; Fig. 2, a front elevation of the boiler and setting with one-half of the cast-iron front plate removed; Fig. 3, a transverse section at the line *x x* of Fig. 1; Fig. 4, a view like that shown in Fig. 1 of a modification of my boiler and setting, and Fig. 5 a transverse section at the line *y y* of Fig. 4.

My boiler is of that class of horizontal tubular boilers which are set in brick-work and receive the first action of the heat upon the lower part of their cylindrical shells.

The peculiar and novel feature of my boiler is that in it the heat, after passing rearwardly along the under side of the boiler, is carried upward to an upper system of large tubes, by which it is carried forward into a front connection. By the latter the heat is conducted downward to a lower system of tubes, by which it is returned rearward into a back connection, from which the spent products of combustion are permitted to escape and pass away through the smoke-stack.

In order to effectuate the circulation of the heat-currents in the manner above described, the brick-work setting of the boiler requires an arrangement of flues by which the upwardly-moving currents of heat may be separated and kept distinct from the downwardly-moving currents, and this provision I have made in the setting for my boiler herein described, and shown in the drawings.

In said drawings, A is the boiler, made in cylindrical form, and having in its forward part a front connection, B, which is preferably partially divided by a vertical water-connection, *b*, that runs from the bottom of said connection to its crown-sheet, so as to form a central free passage for the downward circulation of the water, it being understood that, the extreme forward part of my boiler being least acted upon by the heat from the furnace, a condition is there established which permits a downward flow of the cooler and consequently heavier portions of the water from the upper to the lower parts of the boiler, and the passages formed by the water-connection *b* and the water-spaces at each side of the front connection, B, afford full facilities for such downward circulation of the water; C, the upper system of tubes, which pass through the back head, *a*, of the boiler and extend forward into the front connection, B, so as to conduct the heat-currents from the rear of the boiler forward into the said front connection; D, the lower system of tubes, which extend from the front connection, B, to the back connection, E, so as to carry the heat-currents from the front connection, B, rearwardly into the back connection, E.

As shown in Fig. 1, the back connection, E, is provided with an outlet, *e*, through the back head of the boiler, and through said outlet the spent products of combustion pass into the outlet-flue of the boiler-setting.

As shown in Fig. 4, the opening through the back head of the boiler is used simply for the purpose of examining the condition of the back connection. It is kept closed by means of a door or stopper, F, and an outlet-opening, *e'*, is made from the bottom of the back connection, E, through the shell of the boiler, so as to conduct the spent products of combustion directly downward from said back connection.

The boiler is erected in a brick-work setting, G, in which the furnace H is divided by a partition-wall, *h*, having an air-space, *h'*, which receives its supply of air through openings *g* in the cast-iron front plate, G'. The partition-wall *h* extends from the lining of the front plate, G', backward to join a bridge-wall, I, which contains an air-space, *i*, with which

the air-space *h'* of the partition-wall communicates. The bridge-wall I has perforations *i'* formed in its rearmost face, through which the heated air from the air-space *i* issues to mingle with and ignite the unconsumed gases that have passed from the furnace over the bridge-wall I. A transverse lattice-work wall, J, of brick-work, is arranged in the combustion-chamber K behind the bridge-wall I, for the purpose of producing a more perfect commingling of the heated air and gases, so as to effect a more thorough ignition of the gases in the combustion-chamber. From the combustion-chamber K the products of combustion escape through the two side flues, L, into the flue M at the rear of the boiler, and, after passing through the upper system of tubes, C, front connection, B, lower system of tubes, D, and back connection, E, as hereinbefore described, the said products of combustion pass from the back connection, E, into a central or downcast flue, N, thence into the flues O, and then escape into the atmosphere through the stack P.

Suitable man-holes, Q, are formed in the rear wall of the boiler-setting, for the purposes of examination and repairs to the boiler and flues at that part of the structure.

I claim as my invention—

1. In a cylindrical steam-boiler that is provided with a front connection, B, and a back connection, E, both being contained within said boiler, the combination, with an upper system of tubes, C, which have one end secured in the back head and the opposite end communicating with the front connection, B, of the lower system of tubes, D, which form a communication between the front connection, B, and back connection, E, all constructed and arranged to operate as herein specified.

2. The combination, with a cylindrical steam-boiler, A, having contained therein a front connection, B, upper system of tubes, C, lower system of tubes, D, and back connection, E, all as herein described, of the boiler-setting G, containing the two side flues, L, and rear flue, M, which form a communication between the combustion-chamber K and upper tubes, C, and the central flue, N, which forms a communication between the back connection, E, and the escape-flues, as and for the purpose herein specified.

JOHN H. MARS.

Witnesses:
WM. H. LOW,
S. B. BREWER.