

(No Model.)

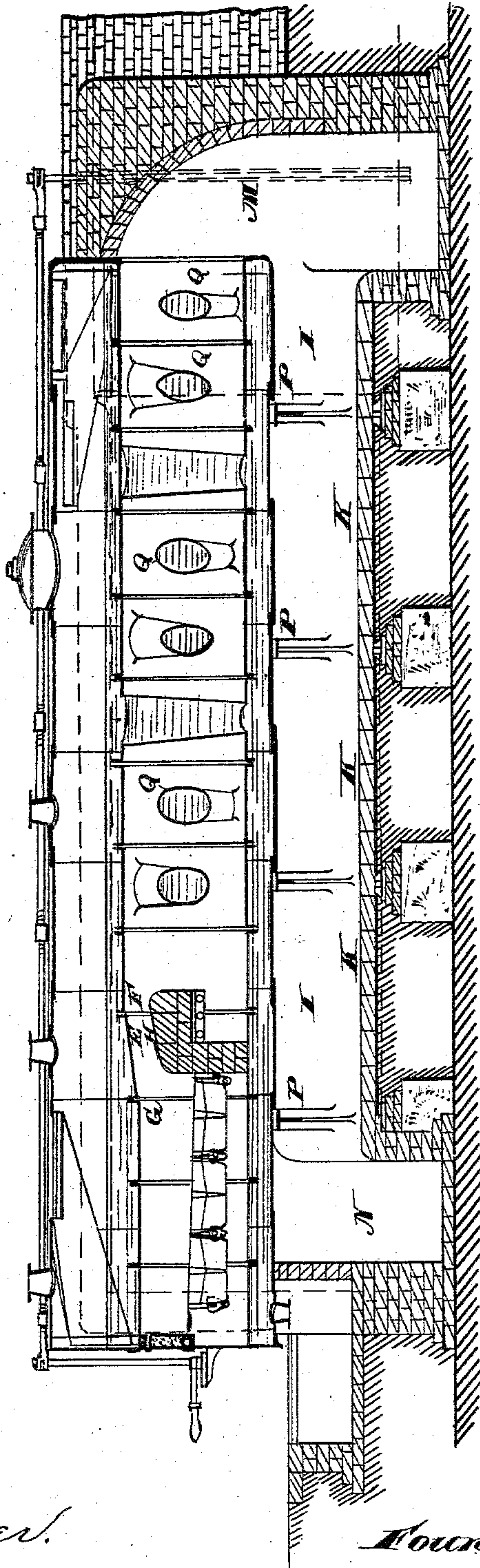
4 Sheets—Sheet 1.

F. LIVET.
STEAM BOILER FURNACE.

No. 288,079.

Patented Nov. 6, 1883.

Fig. 1.



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Kinton Coombs

Inventor:
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By James L. Norris,
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(No Model.)

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Fig. 2.

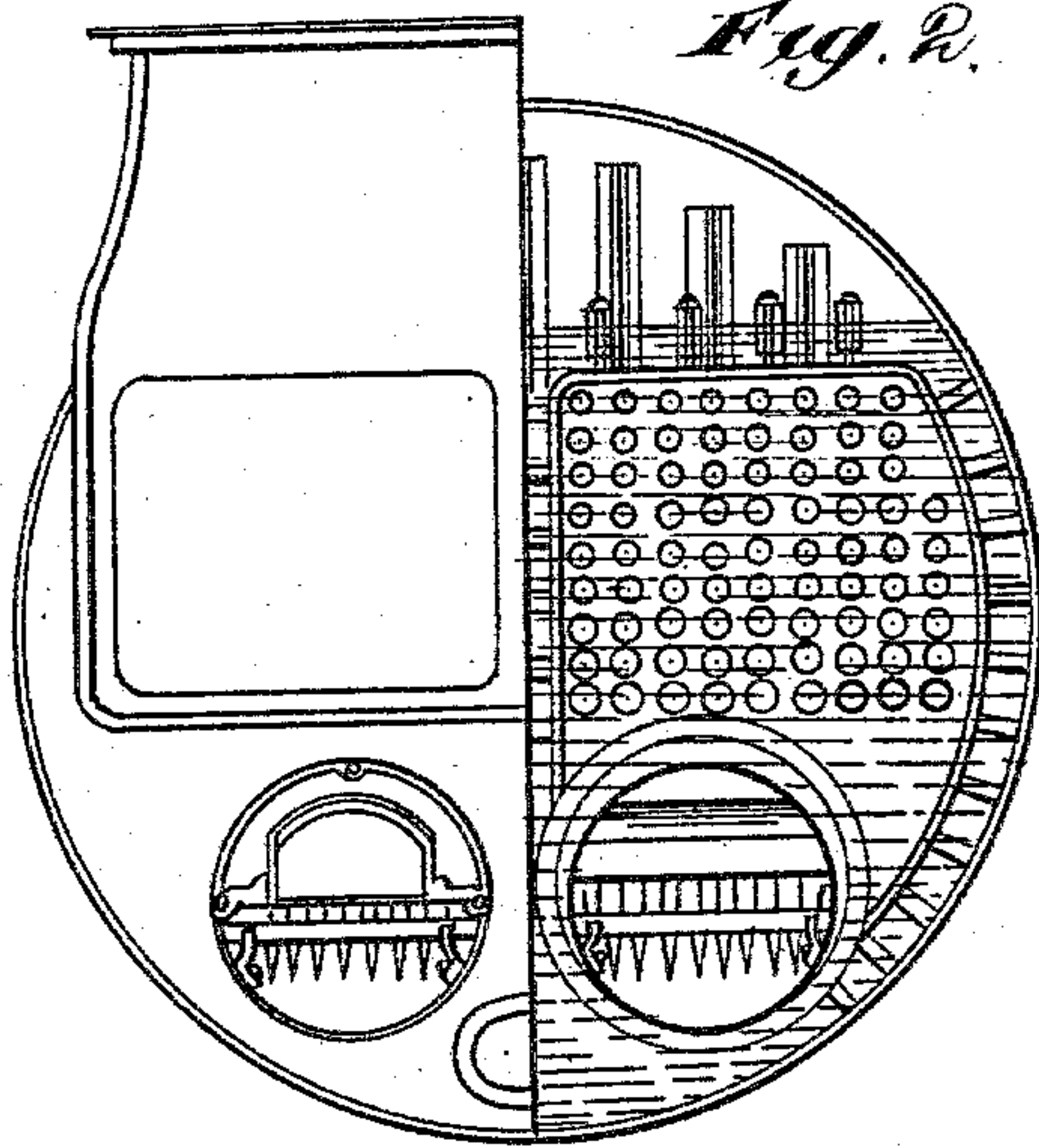
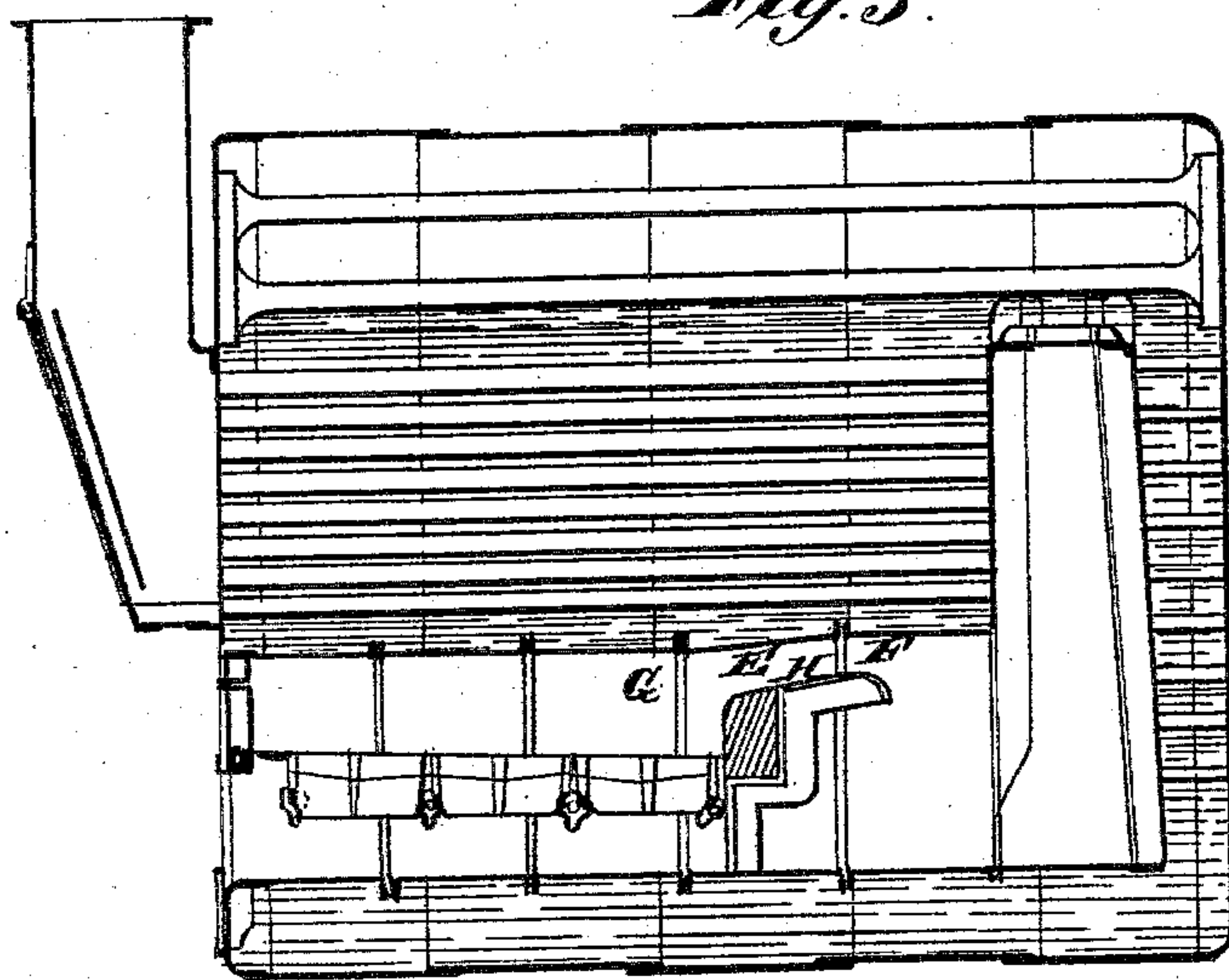


Fig. 3.



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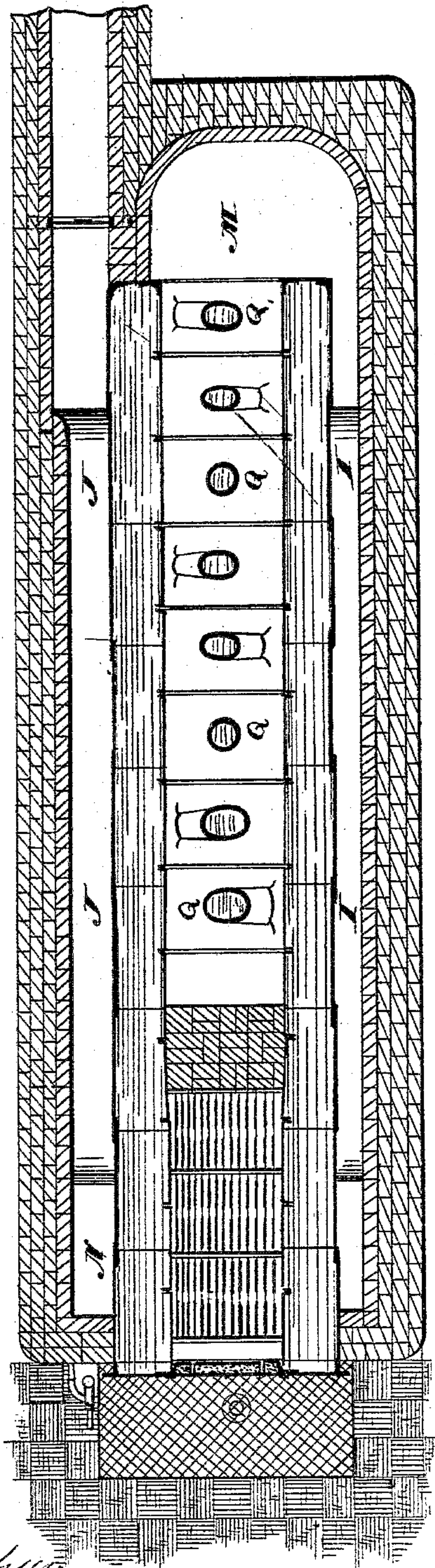
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Fig. 4.



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Fig. 5.

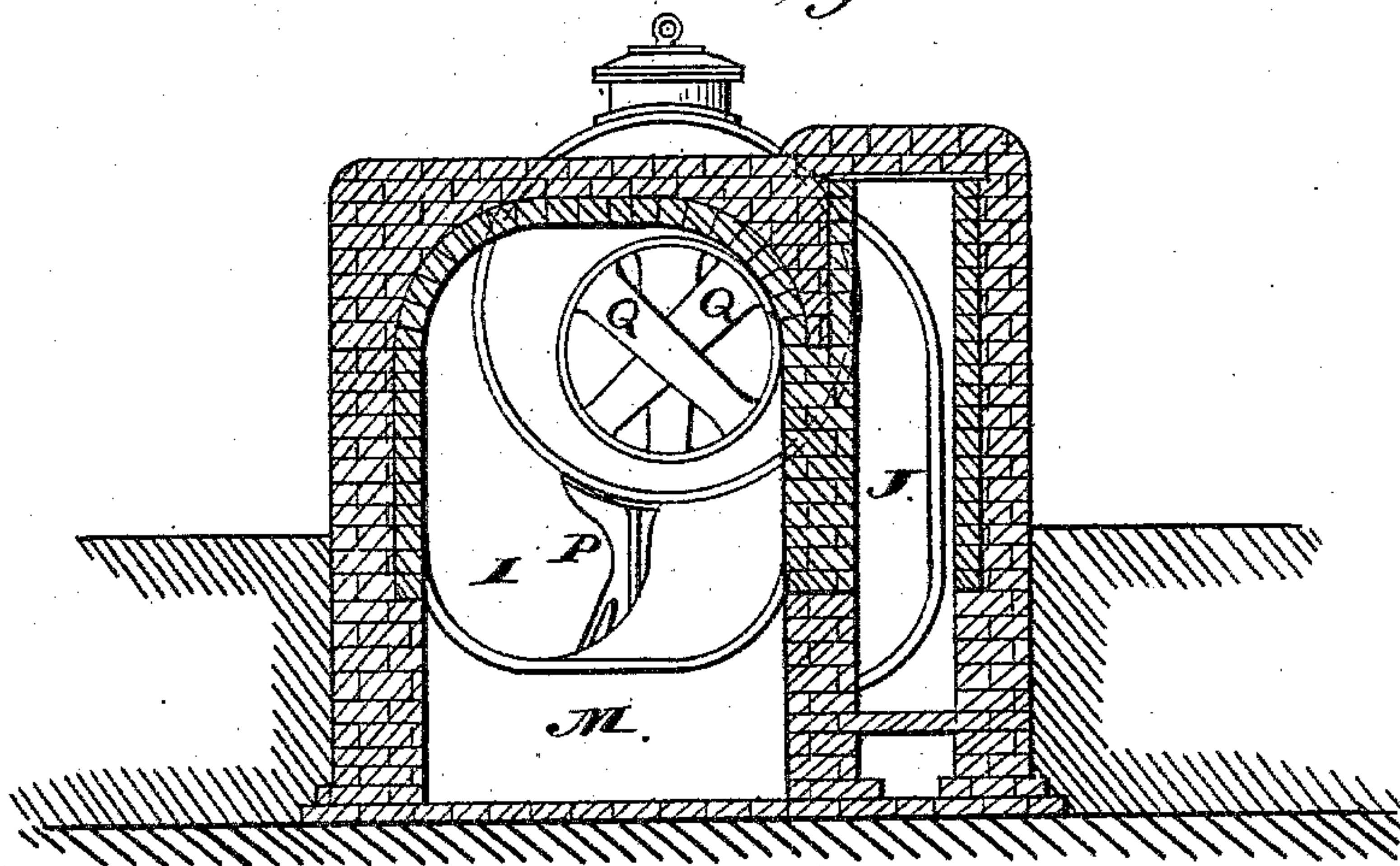
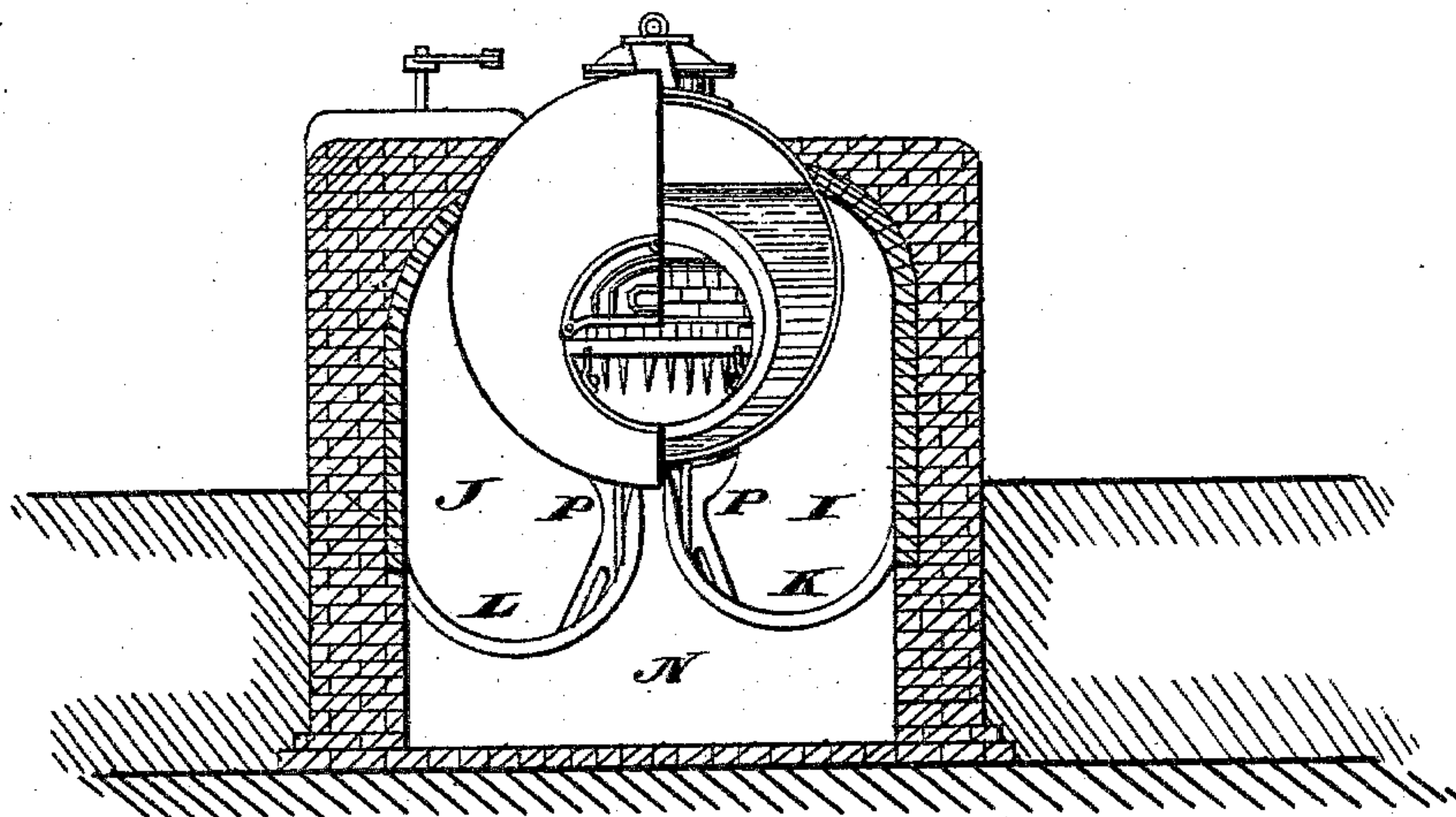


Fig. 6.



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UNITED STATES PATENT OFFICE.

FOUNTAIN LIVET, OF LONDON, ENGLAND.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 288,079, dated November 6, 1883.

Application filed July 18, 1882. (No model.) Patented in France July 15, 1882, No. 150,112; in Belgium July 13, 1882, No. 53,507; in Italy November 25, 1882, No. 14,833; in Austria December 31, 1882, No. 38,013, and in England February 9, 1883, No. 726.

To all whom it may concern:

Be it known that I, FOUNTAIN LIVET, a subject of the President of the Republic of France, residing at London, England, have invented
5 new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates, first, to setting a section of the furnace-flue directly over the bridge,
10 and also the bridge at a higher level at the back than at the front and parallel with each other; second, to increasing the flues in sectional area toward the damper, and making their bottoms of inverted-arch form; third, to
15 fitting or forming expansion-chambers of large area compared to the flues at the end of each flue, and rounding the tops level with the water-line of the boiler; fourth, to supporting the boiler at intervals upon saddle-shaped supports, the intermediate spaces being filled and
20 closed in by a coping, which touches the boiler in a thin line only; fifth, to arranging "Galloway" tubes of diminishing diameters from front to back in a boiler in order to increase
25 the sectional area of the boiler-flue to the back end; sixth, to fitting rows of tubes vertically over each other, said rows diminishing in diameter upward in order to form an expansion-chamber of increasing area at the upper
30 part.

The first part of my invention is illustrated in Figures 1 and 3 of the drawings, the crown of the section E of the furnace-flue being higher at the back F than at the front G, and the top
35 of the fire-bridge H being made parallel therewith. The object of this is to direct the current through the furnace upward instead of allowing it to escape horizontally, as over an ordinary bridge, also to retain the gases longer
40 in the furnace for the purpose of blending them, meanwhile allowing the heat to act direct on the whole of the crown-surface of the furnace-tube before leaving the furnace.

The second part of my invention is represented at Figs. 5 and 6 of the annexed drawings, I being the first return-flue, of larger area than the boiler-flue but smaller than the next
45 return-flue, J. The bottoms K L of these flues are rounded, and also their tops, which terminate at the water-level, as at Fig. 10.

According to the third part of my inven-

tion I form very large expansion-chambers M N at each end of the boiler, the said chambers being carried down as low as possible to serve as soot-receivers, as seen at Figs. 1, 4, 5, and
55 6. The object of these expansion-chambers being larger in proportion to the flues is that they may allow the gases to mingle and expand and thereby develop the greatest possible amount of heat. The upper parts of the ex-
60 pansion-chambers are also level with the water-level of the boiler, as shown.

According to the fourth part of my invention, as shown at Figs. 5 and 6, P P are saddle-shaped supports under the longitudinal
65 boiler. These supports are placed at intervals, and rest upon piers having a foundation below the inverted arches, as shown more particularly at Fig. 1, the coping there shown just touching the shell of the boiler and filling
70 up the spaces between these supports.

The next part of my invention is shown at Figs. 1, 4, and 5, in which the Galloway tubes Q Q diminish in diameter from front to rear of the boiler-flue, whereby the sectional area
75 of the boiler-flue is increased gradually to the back end.

In the arrangement of tubes in multitubular and marine boilers, forming the sixth part of my invention, I fit tubes of diminish-
80 ing diameter over each other in vertical lines, as shown at Figs. 1 and 4 of the annexed drawings, whereby I obtain a gradually-increasing area of the expansion-chamber from the lower to the upper rows of tubes to allow steam to
85 escape more freely from the tubes and to expand naturally in rising, thus generating steam more rapidly and evenly, and avoiding priming. Sometimes I make, say, two rows of
90 such tubes of the same diameter, and the next two rows above them slightly smaller, and so on.

Having fully described my invention, what I desire to claim, and secure by Letters Patent,
95 is—

1. A boiler having a flue the rear part, F, of which is higher than the front part, G, and said parts connected by a tapering section, E, in combination with a bridge-wall, H, having its upper side made parallel with said flue E,
100 substantially as described.

2. The combination of a flue, E, F, and G,

the rear part, F, of which is higher than the front part, and provided with Galloway tubes Q made of gradually-diminishing diameter, substantially as described.

5 3. The combination of a boiler having a flue, E F G, the rear part, F, being provided with Galloway tubes Q of gradually-diminishing diameter, with the return-flues I of larger area than the flue, J, and the bottoms K L of
10 said flues rounded, substantially as described.

4. In a boiler, the combination of a flue, E F G, constructed as shown, and part F, provided with Galloway tubes Q, with the re-

turn-flues I of larger area than flue J, and the bottoms K L of said flues rounded and con- 15
nected by expansion-chambers M N, all constructed and arranged substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing 20
witnesses.

FOUNTAIN LIVET.

Witnesses:

CHARLES A. GROSSETETE,

H. GARDNER,

Both of 166 Fleet Street, London.