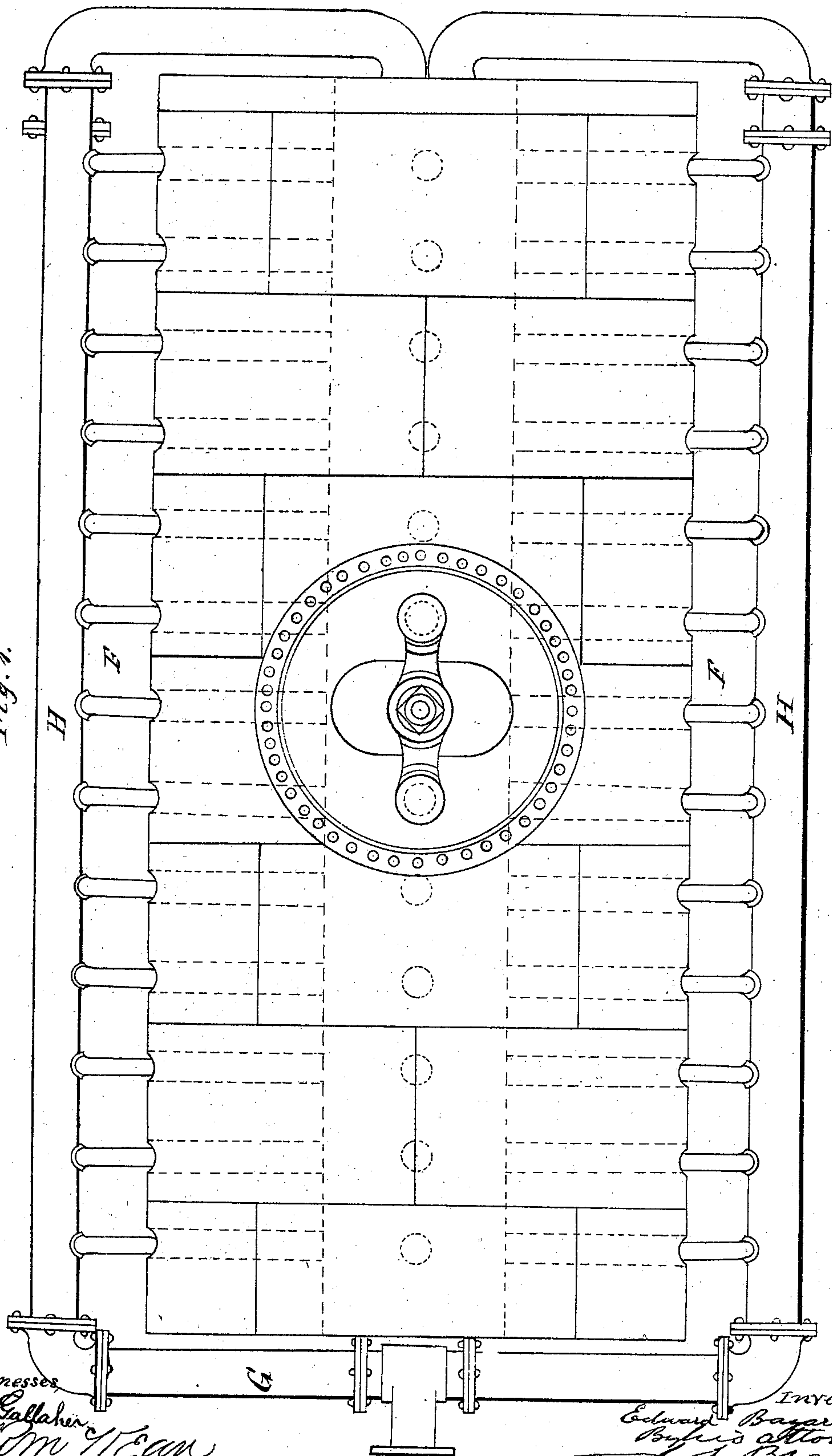


E. BAYARD.
No. 133,743.

3 Sheets--Sheet 1.
Steam-Generators.
Patented Dec. 10, 1872.

Fig. 1.

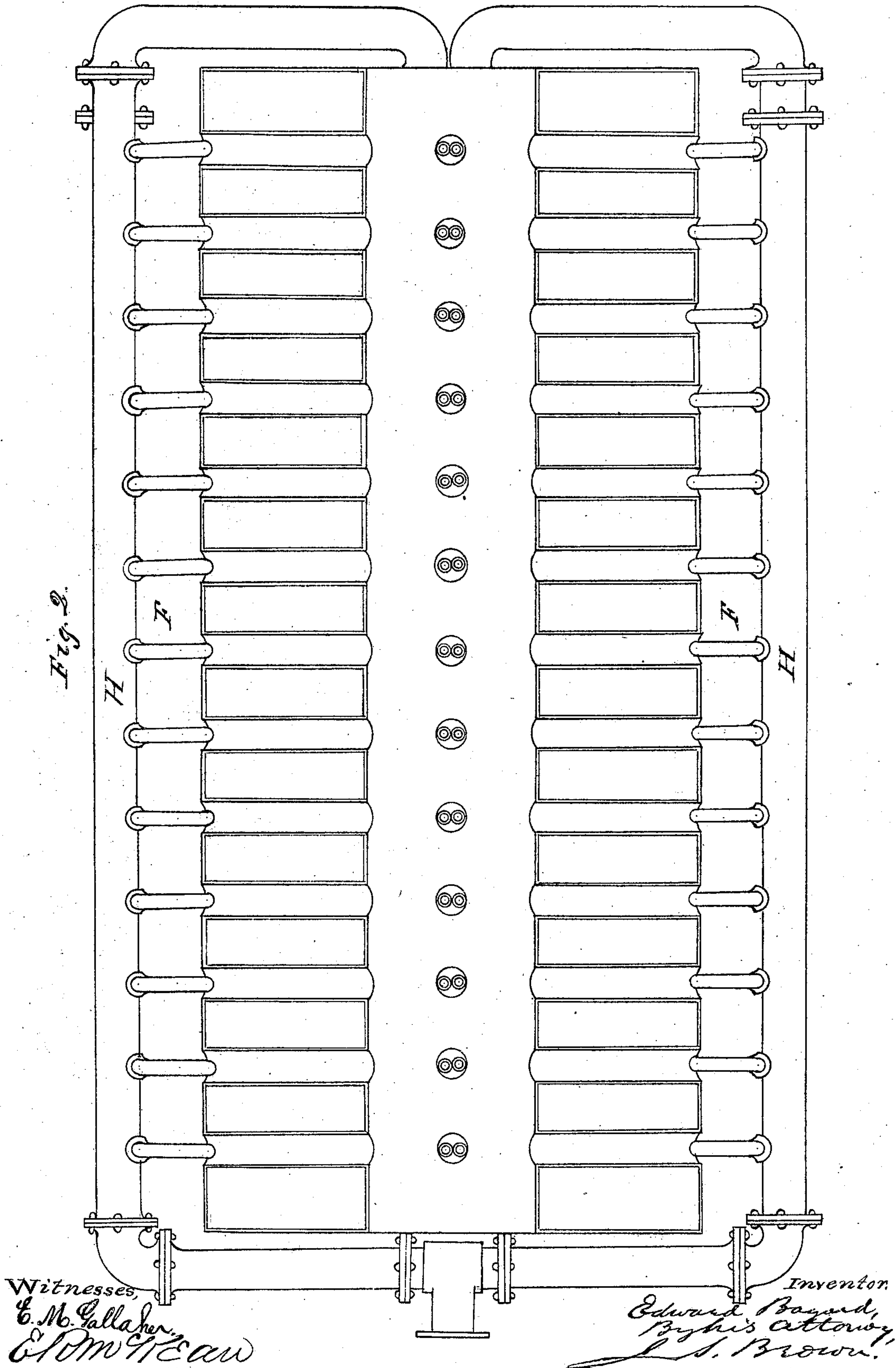


Witnesses,
C. M. Callahan
J. M. McLean

Inventor,
Edward Bayard,
By his attorney,
J. S. Brown

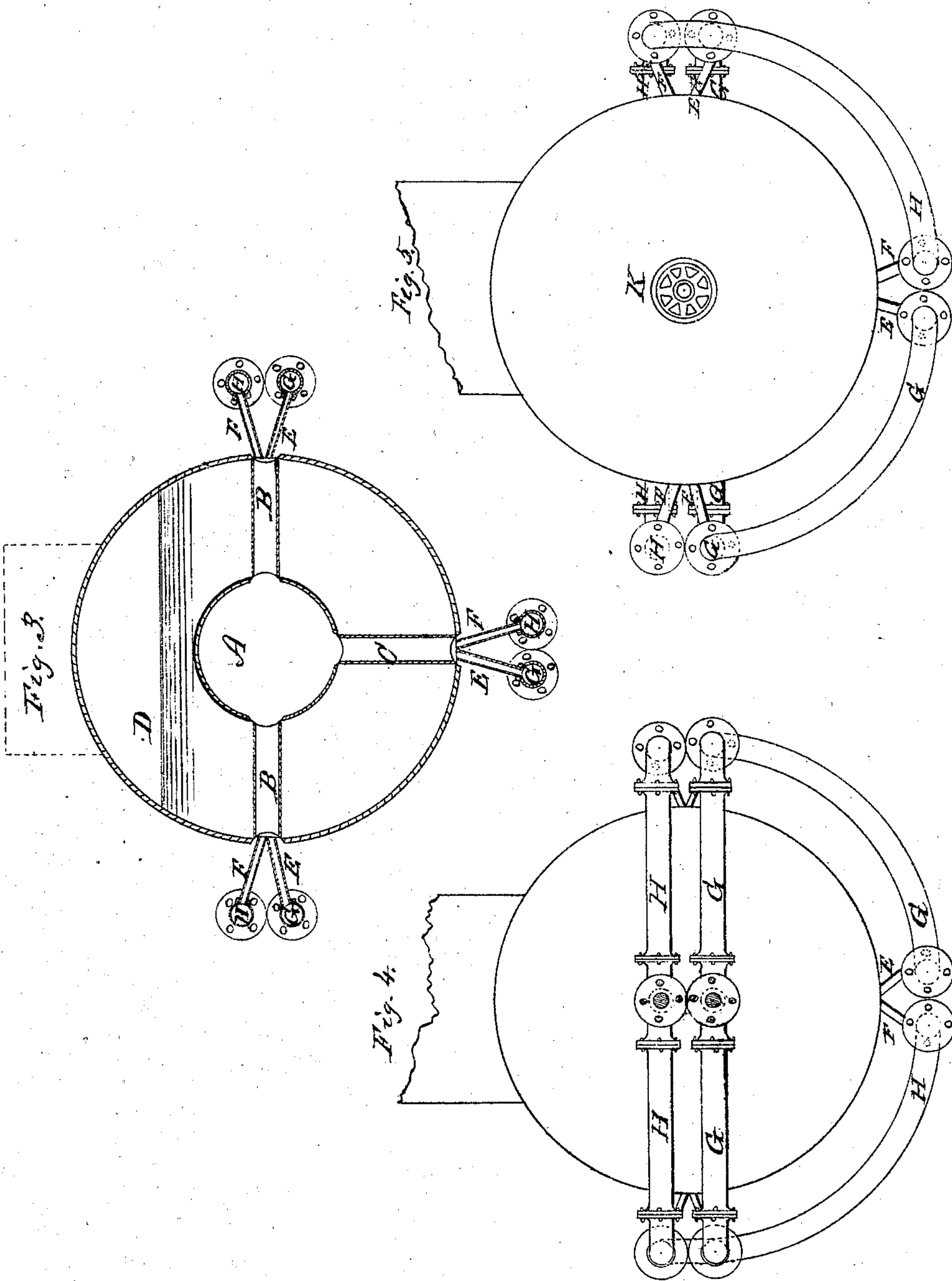
E. BAYARD.
No. 133,743.

3 Sheets--Sheet 2.
Steam-Generators.
Patented Dec. 10, 1872.



E. BAYARD.
No. 133,743.

3 Sheets--Sheet 3.
Steam-Generators.
Patented Dec. 10, 1872.



Witnesses:
E. M. Gallaher
C. M. T. Law

Inventor:
Edward Bayard
By his attorney,
J. M. Brown

UNITED STATES PATENT OFFICE.

EDWARD BAYARD, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 133,743, dated December 10, 1872.

To all whom it may concern:

Be it known that I, EDWARD BAYARD, of the city, county, and State of New York, have invented a certain new and useful Improvement in Method of and Apparatus for Generating Steam; and I hereby declare that the following is a description of the same, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a plan view of the apparatus; Fig. 2 is a longitudinal section taken through the line 1' 1'' of Fig. 5; Fig. 3 is a transverse section, showing the interior of the apparatus; Fig. 4 is a front elevation; and Fig. 5 is the rear-end elevation.

The same letters indicate like parts in the drawing.

I do not wish to be understood as limiting myself to the use of the boiler or generator hereafter described, and as shown in the drawing, as my method of heating water is applicable to all known forms of boilers, whether horizontal, vertical, or otherwise, in form or construction.

My method consists in burning gas or other volatile substances at or near the exterior of the vessel containing water, and forcing the same, by a powerful blast, through a series of pipes into a central flue within the interior of the boiler, by which an intense heat is obtained at a small expenditure of fuel in bulk and value, as compared with the combustion of coal or wood to produce like results. Gas that will burn steadily under the action of a powerful blast of air will answer my purpose; but I find the best and most economical results are obtained by the use of gas made from crude petroleum by the apparatus of the Guaranty Gas-Light Company, patented by Wren.

In Fig. 3 a central tube or flue, A, is shown within the shell of the boiler, with a tube, B, on either side in the same plane of its axis, riveted to the same and extending outward to and through the shell of the boiler, to which the other end is in like manner secured. The tube C descends vertically from the under side of the flue A to the shell, and is likewise secured at either end. These tubes, which form part of a series, are submerged below the water in the boiler, as shown by the water-level at D, the top portion of the flue A acting as a crown-sheet. At the mouth of the tubes B are shown the gas-pipes E, pointing into the tubes. On top

of these tubes are shown the blast tubes or pipes F, also pointing into the tubes B. At the mouth of the vertical tube C the pipes E and F stand side by side vertically, pointing upward into the tube C. The gas flows through the main G to the small pipes E, where it is ignited, while the blast passes through the main H and the small pipes F, uniting as it escapes with the ignited gas, and driving with increasing force and increasing heat the combined flame through the tubes B and C into the central flue A, where the combustion is perfected without any residuum. At K, Fig. 5, is a register, placed in the rear end of the center flue, which is opened when the gas is ignited, and partially closed when the tube is heated. I place the air-pipes above the gas-pipes, as I find the blast to be more effective in striking the burning gas from that direction than from any other position, though I obtain good results by placing them under, on the sides, or through the gas-pipes.

The improvement and advantage of my method of generating steam over any known process are so obviously plain that it may be superfluous to allude to them; yet I mention some in order to more readily illustrate my ideas and what I claim, viz: The strength of the boiler is increased by the arrangement of the tubes, they acting as stays and braces; the absence of grate-bars, furnace-doors, costly fire-bridges, flues, &c.; the cost of handling coal, and removal of cinders and ashes avoided; chimneys and smoke-stacks are done away with; the fire is always under control, can be instantly applied and as quickly extinguished, and when lighted will generate steam in a few moments; the fuel, being crude petroleum, or other volatile substances cheaply converted into gas, and economically applied, as above.

What I claim, and desire to secure by Letters Patent, is—

1. The gas and air-blast pipes G E and H F, arranged, substantially as described, in combination with a boiler for generating steam, as herein specified.

2. The radial tubes B C C, in the boiler, in combination with the gas and air-blast pipes G E and H F, substantially as and for the purpose herein specified.

EDWARD BAYARD.

Witnesses:

JONATHAN MARSHALL,
WILLIAM A. HARDING, Jr.