

(No Model.)

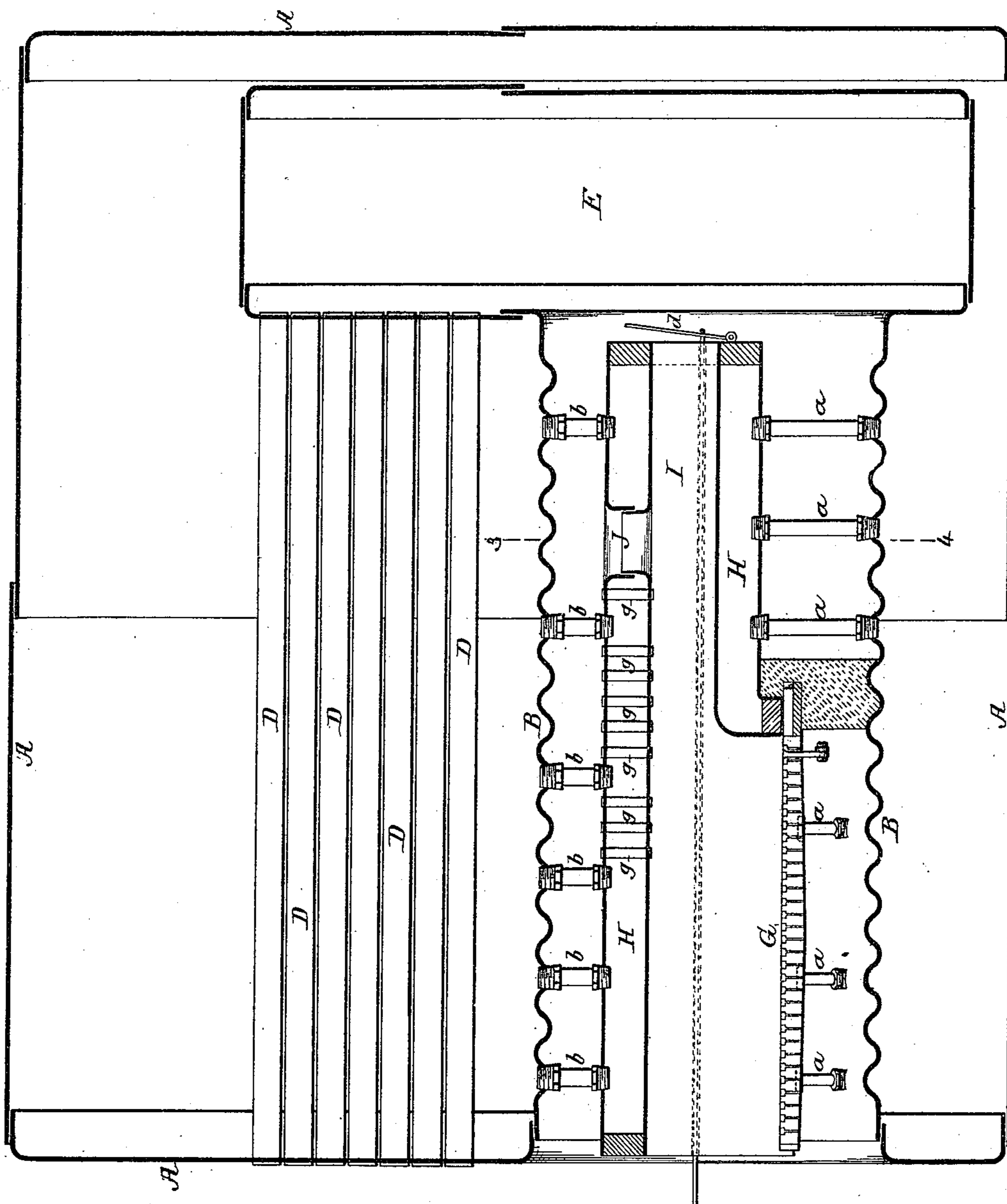
3 Sheets—Sheet 1.

F. G. BATES & W. L. HOLMAN.

MARINE BOILER FURNACE.

No. 438,907.

Patented Oct. 21, 1890.



Witnesses:
Murray C. Boyer
A. V. Grouse.

FIG. 1.

Inventors:
Francis G. Bates &
William L. Holman
by their Attorneys
Howson & Howson

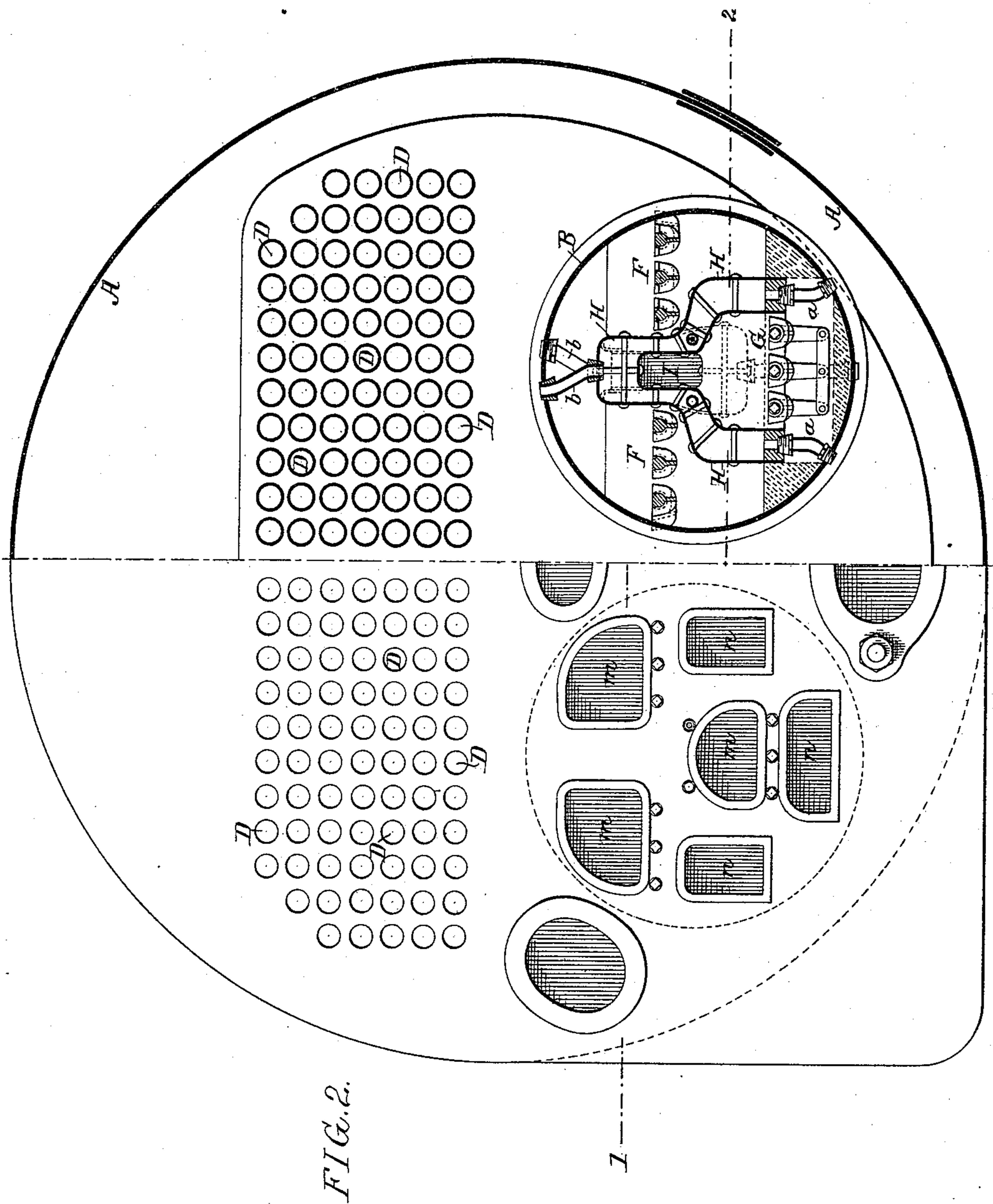
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3 Sheets—Sheet 3.

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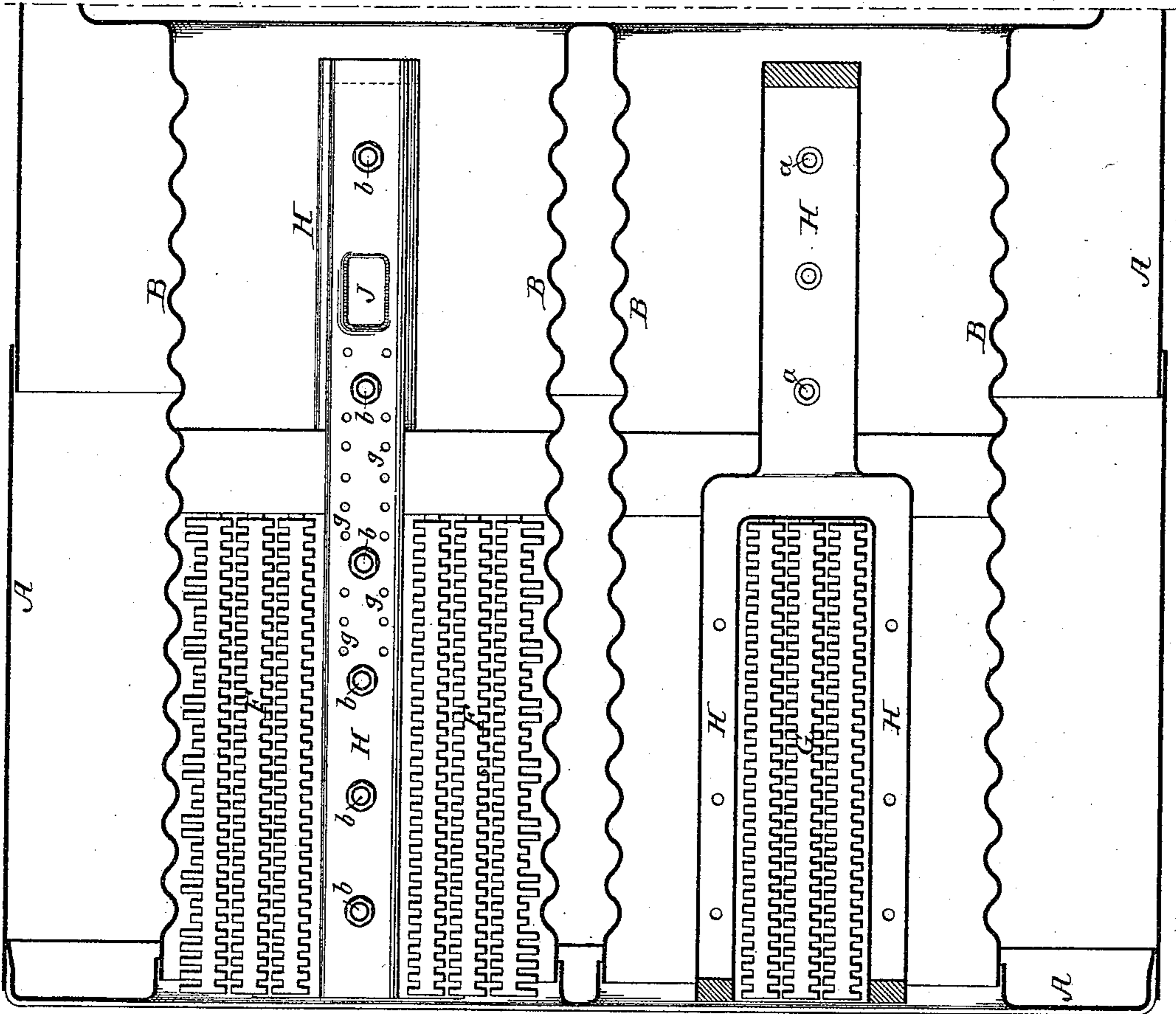


FIG. 3.

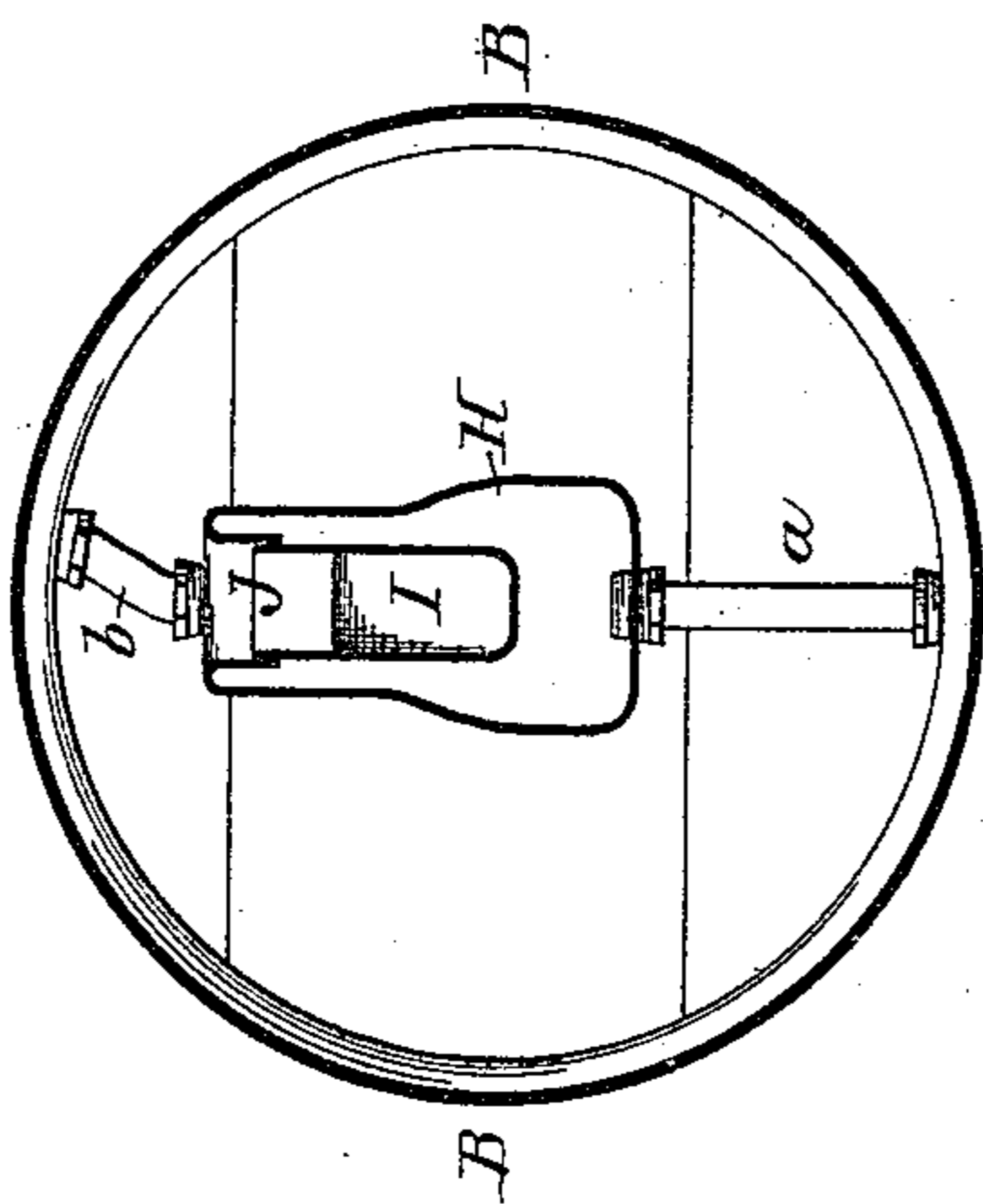


FIG. 4.

Witnesses:

Murray C. Boyer
A. D. Groupe.

Inventors:

Francis G. Bates &
William L. Holman
by their Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

FRANCIS G. BATES, OF PHILADELPHIA, AND WILLIAM L. HOLMAN, OF RENOVO,
ASSIGNORS TO FRANCIS G. BATES, OF RENOVO, PENNSYLVANIA.

MARINE-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 438,907, dated October 21, 1890.

Application filed May 26, 1890. Serial No. 353,193. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS G. BATES, of Philadelphia, Pennsylvania, and WILLIAM L. HOLMAN, of Renovo, Clinton county, Pennsylvania, and both citizens of the United States, have invented certain Improvements in Marine-Boiler Furnaces, of which the following is a specification.

The object of our invention is to so construct a steam-boiler furnace as to insure the effective combustion of the gases arising from the fuel, to provide an extended heating-surface, and to cause an effective circulation of the water from the lower to the upper portion of the boiler. This object we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a marine steam-boiler of a well-known type embodying our invention. Fig. 2 is a view of the boiler, partly in transverse section and partly in front elevation. Fig. 3 is a sectional plan view of the boiler on the line 1 2, Fig. 2; and Fig. 4 is a transverse section on the line 3 4, Fig. 1.

A represents the outer shell of the boiler, which has in the present instance two flues B in the lower portion and a series of return-tubes D in the upper portion, the tubes and flues being in communication with each other through a combustion-chamber E at the rear, as usual. It will be understood, however, that our invention is applicable to boilers having but a single flue or to boilers having more than two flues, if desired.

In each flue B, at the front end of the same, is a furnace, comprising three fire-places F, F, and G, the fire-place G being located centrally between and on a lower level than the fire-places F F, and extending through the flue is a central water-chamber H, which separates the side fire-places from each other, and is forked at the front portion so as to form depending legs on each side of the lower central fire-place G. This central water-chamber communicates through tubes *a* with the water-space of the boiler below the flue B, and the upper portion of the said water-chamber

communicates through tubes *b* with the water-space of the boiler above said flue, so that an effective circulation of water from the lower portion of the boiler into and through the water-chamber and thence into the upper portion of the boiler is insured, both the inner and outer walls of the water-chamber being subjected to the action of the products of combustion from the fire-places, so as to be highly heated thereby.

The products of combustion from the central fire-place escape through a longitudinal flue I in the rear portion of the water-chamber H and enter the combustion-chamber E at the rear of the boiler, where they meet and mingle with the products of combustion from the side fire-places, the entire volume of the products of combustion then passing through the tubes in the upper portion of the boiler. The rear end of the discharge-flue I, however, is provided with a damper *d*, and in the upper portion of the water-chamber, some distance in advance of the rear end of the same, is a short vertical flue J, extending upward from the longitudinal flue, so that by closing or partially closing the damper at the rear end of the flue I any desired proportion of the products of combustion from the central fire-place may be caused to pass through this vertical flue J, and thus mingle with the products of combustion from the side fire-places before said products reach the smoke-box or combustion-chamber E at the rear end of the boiler.

Each of the fire-places is accessible through an opening *m* in the front plate of the boiler, and has a suitable ash-pit, access to which can be gained through an opening *n* in said front plate, and it is preferable that the ash-pits of the side fire-places should be cut off from communication with the ash-pit of the central fire-place—as, for instance, by the use of filling-slabs, as shown by dotted lines in Fig. 2—so that the draft in each fire-place may be regulated independently of that in the others.

By firing in the fire-places alternately the gases arising from the green fuel on each fresh firing are caused to meet and mingle with the

highly-heated products of combustion from the incandescent masses of fuel in the other fire-places, and the thorough combustion of all of the gases is thereby effected.

5 It will be observed that our improved furnace is so constructed that it can be very readily used as a substitute for the ordinary internal or flue furnaces of marine boilers. Hence boilers of the present construction can
10 be very readily adapted for carrying out our invention.

In many cases it may be advisable to supply the upper portion of the water-chamber above the central fire-place and its discharge-
15 flue with a series of tubes *g*, as shown in Fig. 1, so as to provide communication between said fire-place and its flue and the space above the water-chamber and between the two side fire-places.

20 Our invention, although specially designed for application to marine boilers, is not limited to such use, as our improved form of multiple furnace with central water-chamber can be used in the combustion-chambers of other
25 boilers, and the side fire-places may in some cases be used without the central fire-place.

Having thus described our invention, we claim and desire to secure by Letters Patent—

30 1. The combination of the internal flue-casing of a steam-boiler with a furnace consisting of opposite side fire-places, and a water-chamber separating the same and having at top and bottom pipe-connections with the flue-casing, whereby it communicates with the
35 water-space of the boiler, substantially as specified.

40 2. The combination of the internal flue-casing of a steam-boiler with a furnace consisting of opposite side fire-places, a central fire-place, and a water-chamber separating the central fire-place from the side fire-places and having at top and bottom pipe-connections with the flue-casing, whereby it communicates

with the water-space of the boiler, substantially as specified. 45

3. The combination of the combustion-chamber casing of a steam-boiler with a furnace comprising the opposite side fire-places, the lower central fire-place, and a water-chamber interposed between said central and side fire-
50 places and forked at the front end, so as to inclose the central fire-place, said water-chamber communicating at top and bottom with the water-space of the boiler, substantially as specified. 55

4. The combination of the combustion-chamber casing of a steam-boiler with a furnace comprising the opposite side fire-places and the central lower fire-place, and a water-chamber interposed between said central and side
60 fire-places and having a rearwardly-projecting flue extending from the central fire-place, said water-chamber communicating at top and bottom with the water-space of the boiler, substantially as specified. 65

5. The combination of the combustion-chamber casing of a steam-boiler, the opposite side fire-places, the lower central fire-place, and the water-chamber interposed between the
70 central and side fire-places and communicating at top and bottom with the water-space of the boiler, said water-chamber having a discharge-flue for the central fire-place and a vertical passage some distance in advance
75 of the rear end of the flue and communicating with the space above the water-chamber, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANCIS G. BATES.
WM. L. HOLMAN.

Witnesses:

EUGENE ELTERICH,
HARRY SMITH.

Correction in Letters Patent No. 438,907.

It is hereby certified that the residence of the assignee in Letters Patent No. 438,907, granted October 21, 1890, upon the application of Francis G. Bates and William L. Holman, for an improvement in "Marine-Boiler Furnaces," was erroneously written and printed "Renovo, Pennsylvania;" that said residence should have been written and printed *Philadelphia, Pennsylvania*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 18th day of November, A. D. 1890.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

C. E. MITCHELL,
Commissioner of Patents.