

No. 814,206.

PATENTED MAR. 6, 1906.

C. W. HAWKES.
STEAM BOILER.

APPLICATION FILED SEPT. 11, 1905.

2 SHEETS—SHEET 1.

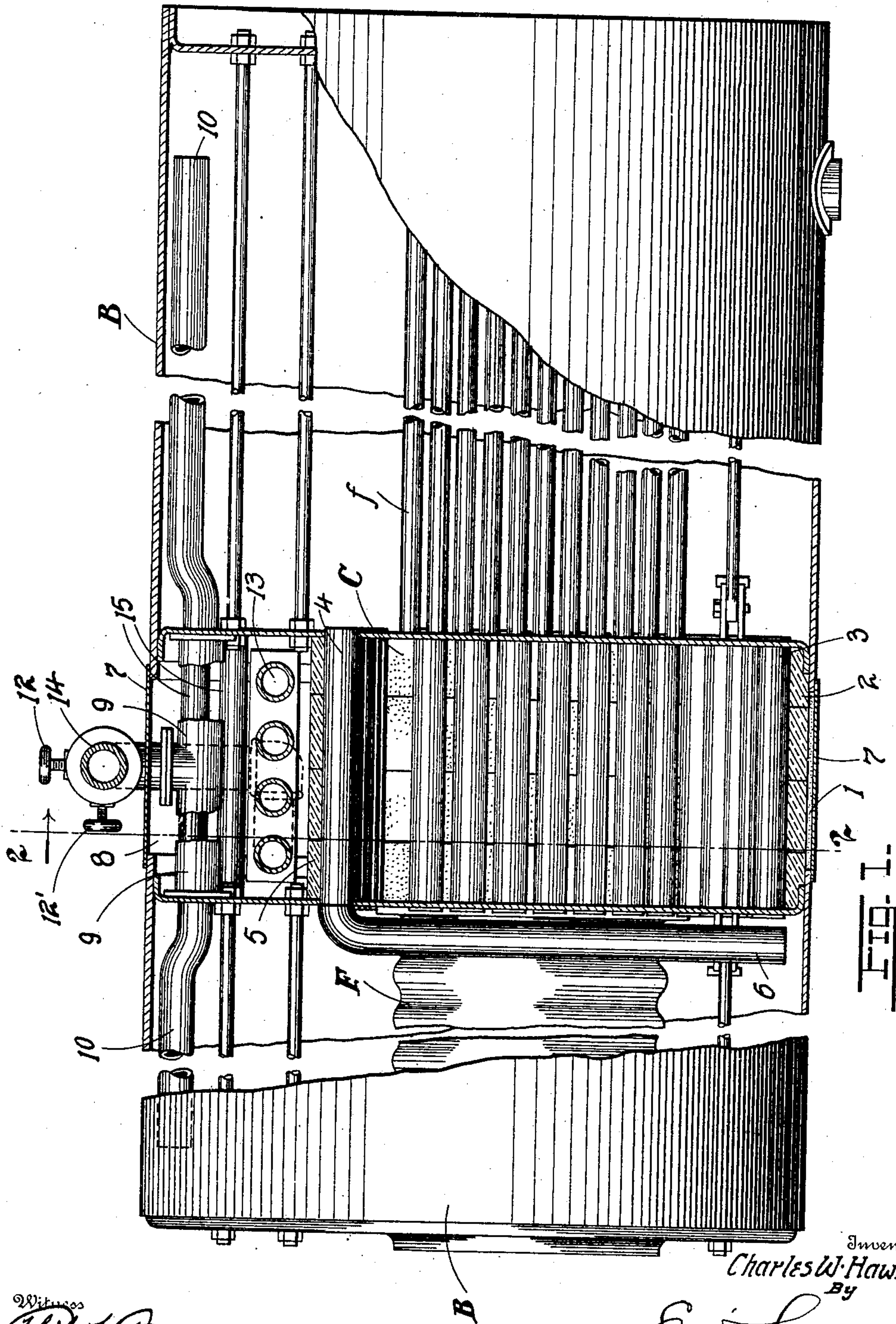


FIG. 1.

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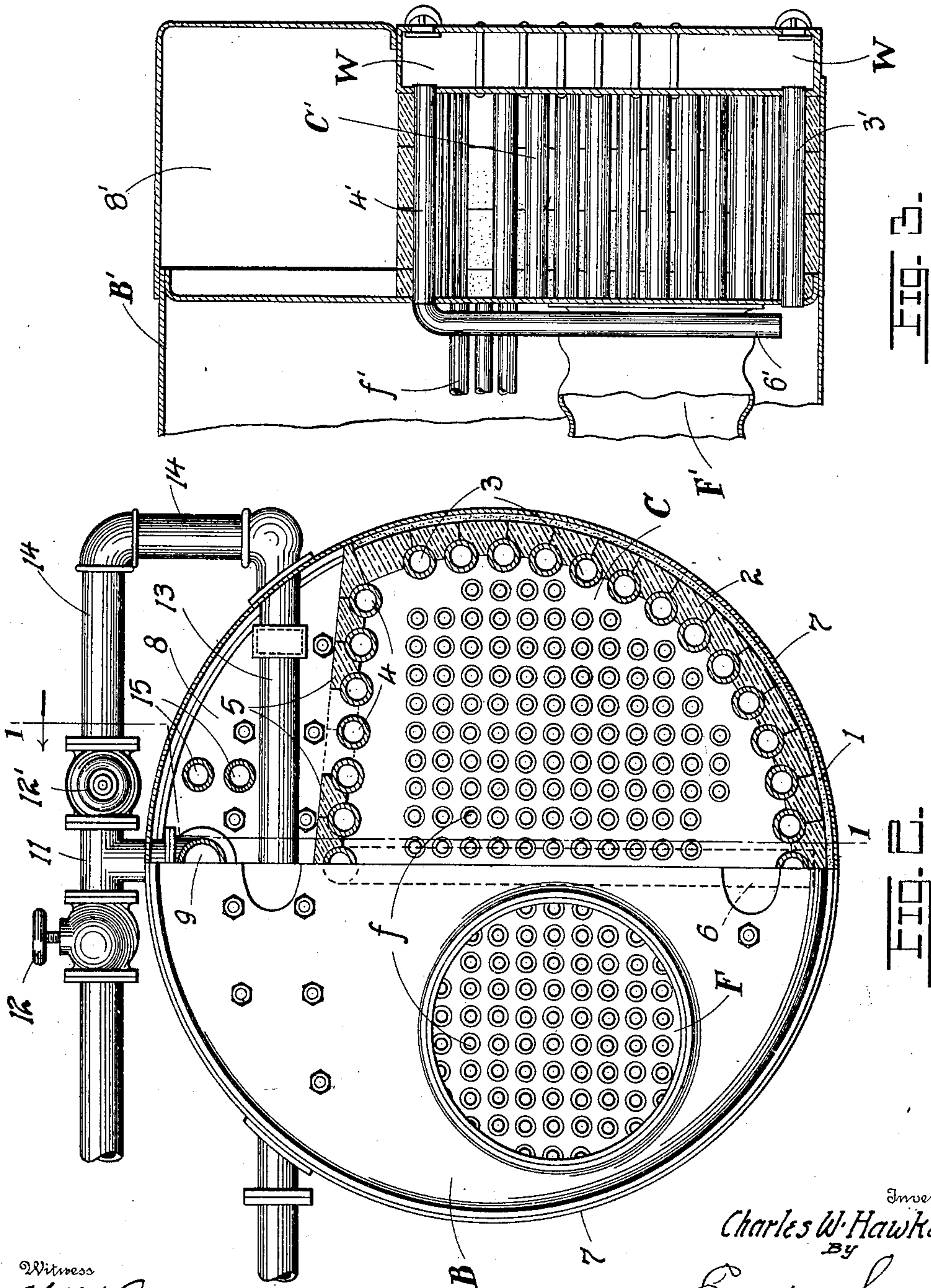
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2 SHEETS—SHEET 2.



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CHARLES WILLIAM HAWKES, OF CHICAGO, ILLINOIS.

STEAM-BOILER.

No. 814,206.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed September 11, 1905. Serial No. 277,884.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM HAWKES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in marine boilers; and it consists in the novel construction of boiler more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a combined longitudinal side elevation and section on line 1 1 of Fig. 2. Fig. 2 is a combined vertical end elevation and section on line 2 2 of Fig. 1; and Fig. 3 is a diagrammatic view of a modified form of marine boiler, (a Scotch boiler,) showing the application of my invention thereto.

The object of my invention is to qualify the construction of the prevailing types of marine boilers with a view of increasing their general efficiency. The improvements herein are directed more particularly to the details entering the construction of the combustion-chamber, and among these details may be mentioned the following: the substitution of crown water-tubes for the prevailing crown-sheet; the introduction of circulating-tubes extending to the bottom of the boiler-shell; the elimination of the prevailing forms of stayed service—such as screw-stays, crown-bars, radial stays, or crow-feet; the formation of a special chamber or compartment above the combustion-chamber by the extension of either the front wall or the front and rear walls of the combustion-chamber to the boiler-shell; the introduction of a superheater into this compartment directly over the crown water-tubes; the introduction into this compartment of a steam-connecting header from which leads the main steam-outlet pipe and with which the dry pipe communicates; the connection between said header and the superheater; the introduction of special equalizing steam-tubes for establishing communication with the steam-spaces on opposite sides of the aforesaid compartment, and the introduction of other and further features of construction whose ad-

vantages will be better apparent from a detailed description of the invention, which is as follows:

Referring to the drawings, and particularly to Figs. 1 to 2, inclusive, B represents the body or shell of one form of marine boiler, F the interior furnaces thereof, and C the combustion-chamber with which said furnaces communicate. Leading from the rear wall of the combustion-chamber are the fire-flues f, as usual.

The parts thus far referred to are well known and enter regularly into the construction of this type of boiler.

Disposed along the inner surface of the peripheral wall of the combustion-chamber and separated therefrom by an asbestos lining 1 is a fire-tile 2, the tiles having partially embedded therein the water-tubes 3, whose opposite ends establish communication between the front and rear water-spaces of the boiler. The crown of the combustion-chamber is built up of a series of crown water-tubes 4, also connecting the front and rear water-spaces of the boiler, the said tubes 4 being wholly or partially covered with complementary removable crown-tile 5, as shown. Adapted to lead from either end of one or more of the crown-tubes 4 is a circulating-tube 6, the same being projected downward or toward the shell and serving to carry or circulate the cool water at the bottom of the boiler toward the top, and thus correct an otherwise sluggish circulation. The asbestos lining 1 is confined between the adjacent ends of the front and rear sections of the shell of the boiler, the said ends being overlapped and the lining being covered by an intermediate wrapper-plate or boiler-section 7, this arrangement freely allowing for the expansion and contraction of the shell under variations of temperature. The front and rear walls of the combustion-chamber are extended upward to the walls of the boiler-shell, thereby forming above the combustion-chamber a compartment or chamber 8, herein denominated a "superheating-chamber." Disposed between the front and rear walls of the superheating-chamber is the steam-connecting header 9, to whose opposite ends are coupled the adjacent ends of the two sections of the dry pipe 10. The header also communicates with the vertical member of a T-coupling 11, superposed above the boiler, there being disposed on opposite

sides of the horizontal member the steam-valves 12 12', respectively, the valve 12 controlling the saturated steam delivered from the header and the valve 12' controlling the steam passing from the header through the superheater 13, confined within the superheating-chamber immediately above and contiguous to the crown-tubes. The superheater is connected to the T-coupling by a pipe or elbow 14, as shown. In order that the temperature in the steam-compartments on opposite sides of the superheating-chamber may be equalized as much as possible, I establish communication between said compartments or divisions of the boiler-shell by means of the equalizing steam-tubes 15, passing through the superheating-chamber and opening through the walls thereof into the respective steam-divisions of the boiler. In order to control the degree of the superheating of the steam in the superheater 13, a predetermined number of the crown-tiles 5 (which with the crown-tubes 4 form the dividing-wall between the combustion-chamber and superheating-chamber) may be removed, as shown in Fig. 1, the greater the number removed the greater the heat to which the superheater will be subjected, so that by removing any desired number of crown-tiles the temperature to which the steam in the superheater may be raised is controllable.

The present improvements are not necessarily confined to any specific type of marine boiler, and in Fig. 3 I illustrate the application of my improvements to a Scotch marine boiler, in which B' represents the shell, F' the furnace, C' the combustion-chamber. The superheating-chamber is designated by 8', the crown-tubes 4' forming the bottom thereof and communicating, respectively, with the boiler-shell above the flues f' and with the rear water-back W. The water-tubes 3' lead from this back to the shell and are disposed about the furnace F'. The chamber 8' may be equipped with a superheater and steam-connecting header, as in the illustrations already described, and the crown-tubes 4' may have circulating-tubes 6' depending therefrom, as in the main form. In the Scotch modification of course only the front wall of the combustion-chamber need be extended to the boiler-shell to produce a superheating-chamber, the rear wall of the latter being already formed by the rear or end wall of the boiler.

It will be seen from the foregoing that the present improved boiler possesses all the several advantages enumerated for it at the outset and that the principle of construction in which these improvements are embodied may by those skilled in the art be applied to any marine type of boiler whose construction may be qualified to receive them.

The outlets for the commercial steam and

superheated steam may of course lead to any pipe intended to conduct the steam generated by the boiler.

Having described my invention, what I claim is—

1. In a boiler, a shell having an inner furnace, a combustion-chamber at the rear thereof having front and rear vertical walls, a water-space adjacent to said walls, crown water-tubes for the combustion-chamber connecting said water-spaces, a complement of refractory material for said crown-tubes, and a chamber having inclosing walls superposed over the combustion-chamber, substantially as set forth.

2. A boiler comprising a shell having an inner furnace, a combustion-chamber leading from the rear of the furnace, fire-flues communicating with the combustion-chamber, and a chamber having inclosing walls, superposed above the combustion-chamber and adapted to be brought into communication therewith through the wall separating the two chambers, substantially as set forth.

3. A boiler comprising a shell having an inner furnace and combustion-chamber therefor, and having a water-space to the front and rear of said combustion-chamber, a superheating compartment or chamber located contiguous to the combustion-chamber, crown-tubes disposed along the wall separating the combustion-chamber from the superheating-compartment and establishing communication between the front and rear water-spaces aforesaid, and crown-tile or equivalent material forming with said crown-tubes the complement of the division-wall aforesaid, and being removable to any degree to expose the contents of the superheating-chamber to direct contact with the products of combustion, substantially as set forth.

4. A boiler comprising a shell, a furnace and combustion-chamber therefor, a superheating-chamber above the combustion-chamber, the wall dividing the two chambers having removable sections to allow for the admission of the combustion products into the superheating-chamber, crown water-tubes forming the complements of the removable sections of said dividing-wall, a dry pipe for the boiler, and suitable connections establishing communication between the dry pipe and superheater, substantially as set forth.

5. A boiler comprising a shell, an inner furnace and combustion-chamber for the same, fire-flues leading from the combustion-chamber, a superheating-chamber formed above the combustion-chamber, said combustion and superheating chambers having respectively water and steam spaces to the front and rear thereof, equalizing steam-tubes disposed between the front and rear walls of the superheating-chamber, and water and crown tubes disposed between the front and rear walls of the combustion-chamber, respectively

tively establishing communication between the opposite sections of the steam and water spaces, and a header confined within the superheating-chamber for conducting the steam out of the boiler, a superheater within the superheating-chamber having communication with the header from outside the boiler-shell, and a dry pipe for supplying steam to the header, substantially as set forth.

10 6. In a marine boiler, a sectional shell, a furnace and combustion-chamber therefor, the sides and top of the combustion-chamber being encompassed by series of water-tubes and crown-tubes respectively, an outer lining

of tile for the several water-tubes, a sheet of 15 heat-non-conducting material enveloping the water-tubes, a central shell-section enveloping the sheet of heat-non-conducting material, and front and rear shell-sections having their adjacent ends encompassed by the cen- 20 tral shell-section, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES WILLIAM HAWKES.

Witnesses:

HARRY MEDIN,
L. D. BOLTON.

Correction in Letters Patent No. 814,206.

It is hereby certified that the name of the patentee in Letters Patent No. 814,206, granted March 6, 1906, for an improvement in "Steam-Boilers," was erroneously written and printed "Charles William Hawkes," whereas the said name should have been written and printed *Charles Williams Hawkes*; 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 and sealed this 3d day of April, A. D., 1906.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.