No. 821,964.

PATENTED MAY 29, 1906.

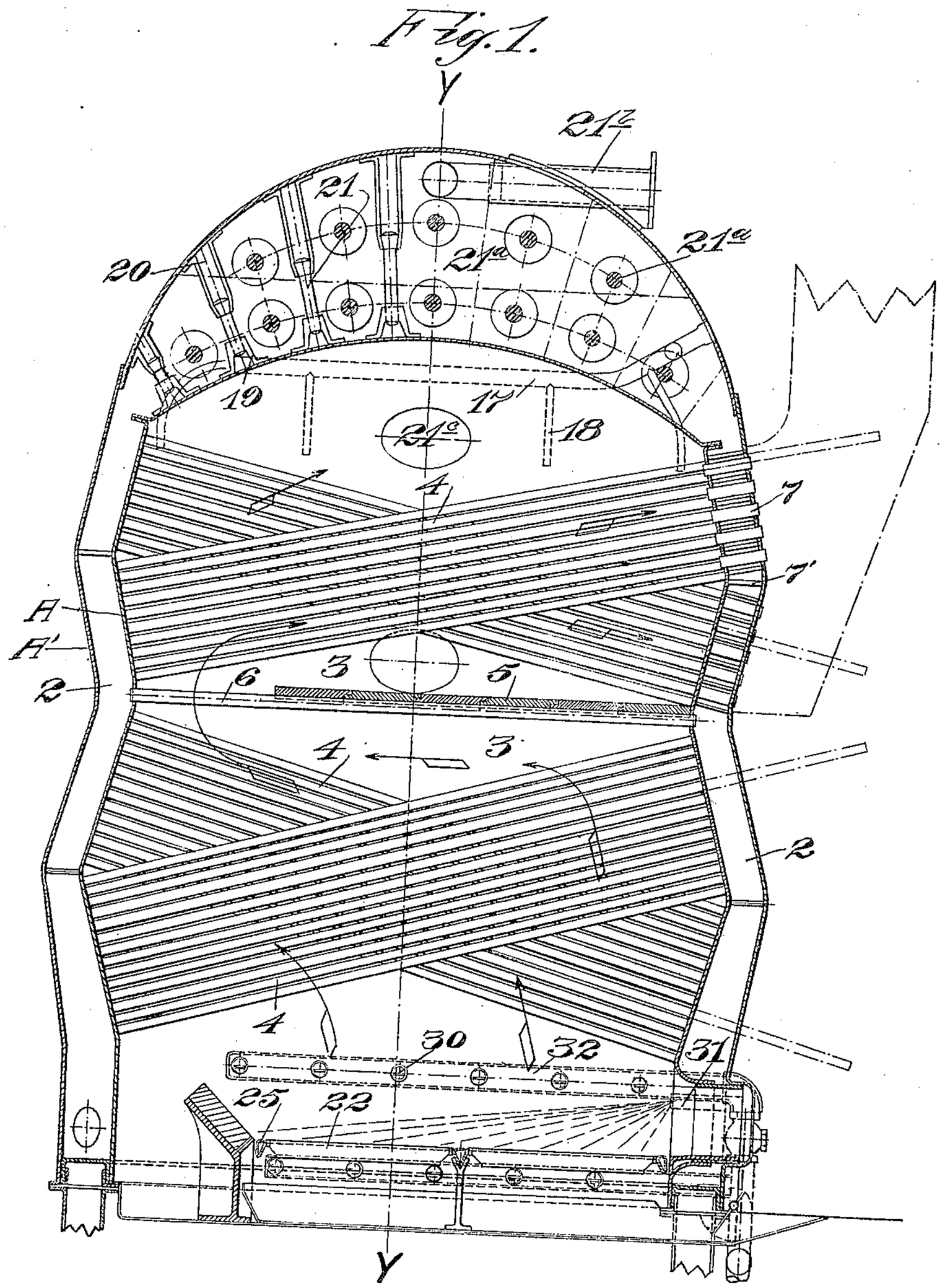
J. C. SHERRY.

WATER TUBE BOILER.

APPLICATION FILED AUG. 21, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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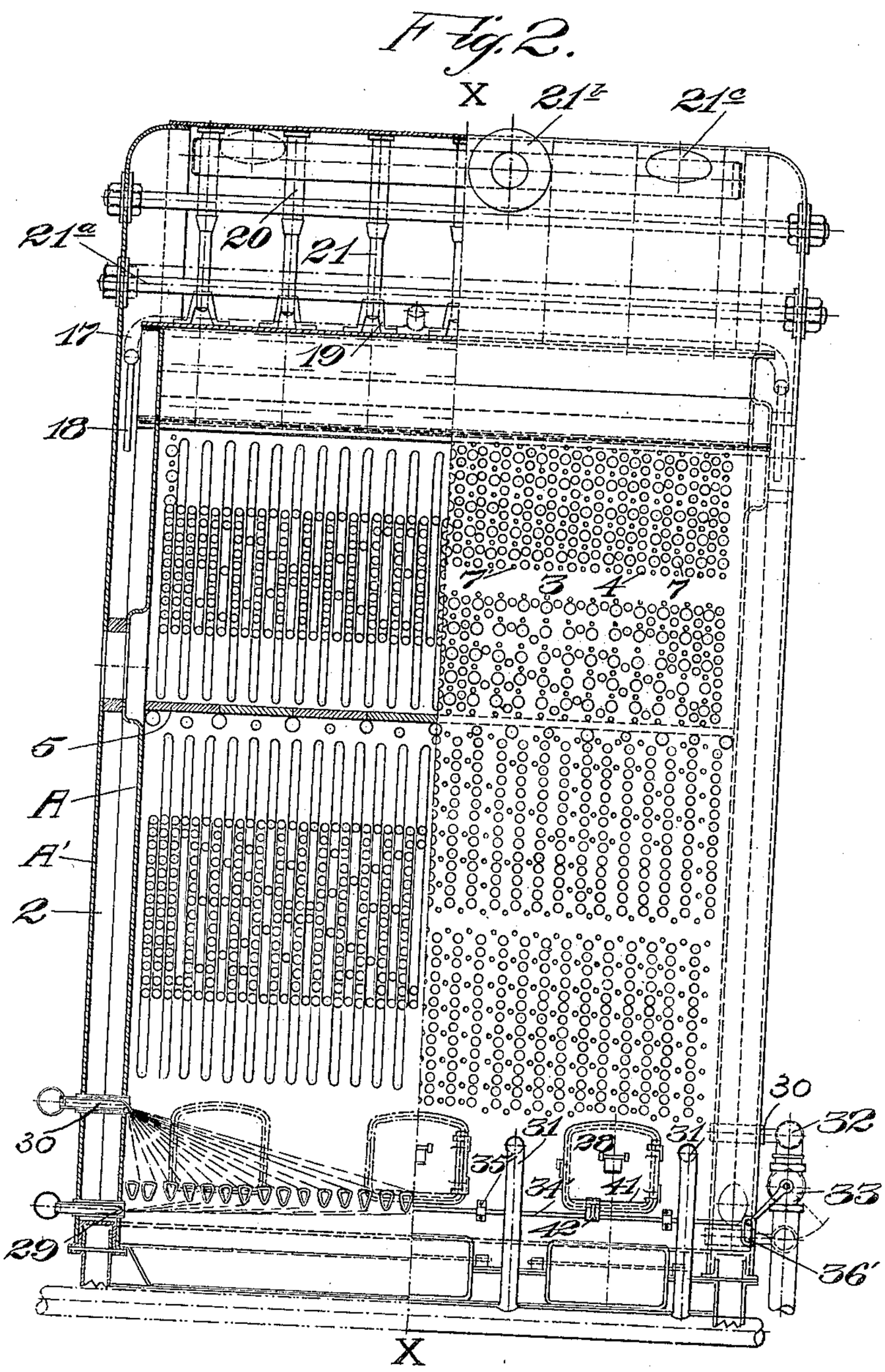
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN C. SHERRY, OF VALLEJO, CALIFORNIA.

WATER-TUBE BOILER.

No. 821,964. Specification of Letters Patent. Patented May 29, 1906.

Application filed August 21, 1905. Serial No. 275,022.

To all whom it may concern:

Be it known that I, JOHN C. SHERRY, a citizen of the United States, residing at Vallejo, in the county of Solano and State of California, have invented new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

My invention relates to boilers or steam-generators.

The object of my invention is to provide a boiler particularly designed and adapted for supplying steam to marine engines which will be simple in construction, compact, as light as is consistent with necessary strength, effective as to steaming capacity, and economical in the use of fuel.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical cross-section of my improved boiler on line X X, Fig. 2. Fig. 2 is an elevation in partial section on line Y Y of Fig. 1.

A A′ represent, respectively, inner and outer shells inclosing water-spaces 2 at front, back, sides, and top of the combustion-chamber 3, these water-spaces being all in free communication with one another around the inner shell to permit of free circulation. The water-spaces at front and back are connected through the inner shell by the tubes 4, which are inclined to accelerate circulation and the release of steam. The tubes are arranged in nests or groups over the fire-box, and the interior of the furnace is divided into two or more compartments or chambers 3 by a horizontal brick or fire-tile division 5, with an opening or openings 6 at the back to let the gases and smoke pass to the upper chamber. The smoke issues to the uptake through short smoke-tubes 7 in the front of the upper chamber, these smoke-tubes passing through both shells and alternating in vertical rows with the water-tubes. The smoke-tubes are of suitable size to retard the escape of the smoke and gases just sufficiently to insure perfect combustion and prevent escape of heat up the smoke-stack, at the same time not interfering with the draft necessary for combustion.

The water-tube nests incline upwardly and alternately from front and rear, and the tubes alternate with rows of screw stay-bolts 7′, which connect the inner and outer sheets.

Opposite the end of each water-tube is a hole in the outer sheet for the insertion or removal of the tube and for rolling the same in the tube-sheet. These holes in the outer sheets are closed steam-tight by suitable covers or plugs. (Not necessary here to be shown.)

Feed-water is delivered into the furnace from any suitable source of supply through the pipe 17 and distributed into the water-legs at the sides of the furnace through the branches 18. The cold water circulates downward and then passes around to the front and back water-spaces to circulate upward again through the tubes 4. The body of water extends completely around the furnace and above the crown-sheet, so that a steady water-level may be maintained. At the same time sufficient steam room is provided above the water-level to insure a constant supply of dry steam.

The crown-sheet and top are stayed by wrought-iron or steel braces, each brace comprising a lower part 19, an upper part 20, and a connecting bolt or member 21. The lower part 19 is made with a plurality of feet to be riveted to the crown-sheet and raised high enough so as not to interfere with the free circulation of water. The upper part 20 is formed with flat sides bent at the top for connection with the inside of the outer shell. The upper part has a suitable perforation and socket for the passage of bolt 21 and the seating of the head of the bolt, while the lower part has a threaded perforation for the threaded end of the bolt. The two parts are arranged in line, one secured to the crown-sheet and the other to the outer shell and the bolt inserted and properly drawn up. By this system of bracing the top and crown-sheet a nice adjustment of the braces is possible, strains are distributed, and the highest pressures may be successfully resisted. Under the old system of riveted rigid braces one brace often bore a much greater strain than others, with resulting disaster or injury to the boiler.

21ª represents stay-bolts.

21ᵇ is the steam connection.

21ᶜ represents manholes.

While any suitable form of fuel—liquid, gaseous, or solid—may be used to produce the requisite heat, I have shown the furnace as adapted to burn coal. The grate-bars 22 are hollow and triangular in cross-section, with the apex of the triangle downward. The

dead-air spaces in the grate-bars give both lightness and durability to the bars. Fuel is fed to the furnace through the doors 28. An upward draft on the under side of the grate-bars is supplied in the ash-pan from the air-nozzle 29. A downdraft on the grate is provided at the sides of the nozzles 30 and at the front by the nozzles 31.

There has always been more or less danger in firing marine boilers using a forced draft above and down on the grate at the side of the furnace, by reason of the flames bursting out into the room whenever a door is opened. The only way to do was first to turn off the air and then open the door. This turning off of the air has usually been done by hand, and if an operator forgets to turn the draft off first there is generally trouble. I have designed a means by which the upper side drafts are necessarily shut off before the door can be opened at all. The side air-nozzles 30 connect with the air-trunk 32, in which is a controlling-valve 33 of suitable construction. A bar 34′ extends across the furnace-front and is supported to slide in suitable guides 35′. The sliding bar 34, which is preferably polygonal and kept from turning in the guides 35′, connects by a Scotch yoke 36′ with the crank on the valve-stem. The door, which has the usual latch to engage the keeper on the furnace-front, is provided with the horizontal rib or guide 41, and the bar 34′ carries a rigid bracket 42, having a lateral projection extending inwardly toward the door, but not shown, to engage on the top of the guide 41. To open the door, the rod 34′ must be shifted far enough to the right to carry the bracket 42 beyond the door-hinges and clear of guide 41, which shifting movement also operates valve 33, to cut off the draft. When the door is closed and the bracket is in the position shown, the draft is on and it is impossible to lift and open the door.

Among the advantages of my boiler construction are: that by the arrangement of the tubes provision is made for numerous free spaces around the tube-nests for the combining and combustion of the fuel-gases. All the surfaces in contact with the flame are surrounded by ample water-spaces. A large heating-surface is provided in proportion to the grate-surface. The weight of the boiler is small in comparison to the power generated. There are no brick walls in the fire-space as commonly used in water-tube boilers. These only increase the weight and add nothing to the heating-surface. Sufficient steam room is provided to insure a constant supply of dry steam. Straight tubes which can be easily cleaned, both inside and out, are used throughout. No screw-fittings are used in any portion of the boiler. The working parts of the boiler have no flat surfaces where sediment can collect. The boiler can be made of any required power and size, adapted to any space, both for marine and land work.

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

1. A boiler having in combination a combustion-chamber and fire-box, inner and outer shells inclosing water-spaces at the front, back, sides and top of the combustion-chamber, said spaces being in free communication with one another around the inner shell, nests of tubes arranged over the fire-box, a horizontal partition dividing the furnace into a plurality of compartments said partition having an opening at the back whereby the upper and lower compartments are in communication, said water-tube nests inclining upwardly and alternately from front and rear, an uptake, and smoke-tubes connecting therewith and passing through both shells and alternating in vertical rows with the water-tubes.

2. An improved boiler having in combination a combustion-chamber and fire-box, inner and outer shells inclosing water-spaces at the front, back, sides and top of the combustion-chamber, said spaces being in free communication with one another around the inner shell, a horizontal partition dividing the furnace into a plurality of compartments said partition having an opening which connects one compartment with the other, nests of tubes in the respective compartments said tubes inclining upwardly and alternately from front and rear, an uptake, some tubes connecting with the uptake and passing through both shells and alternating in vertical rows with the water-tubes, a feed-water inlet-pipe, means for supplying heat beneath the lowermost nest of tubes, and valve-controlled air-trunks and connections for producing a downdraft on the grate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN C. SHERRY.

Witnesses:
S. A. COPPER,
E. KAVANAGH.