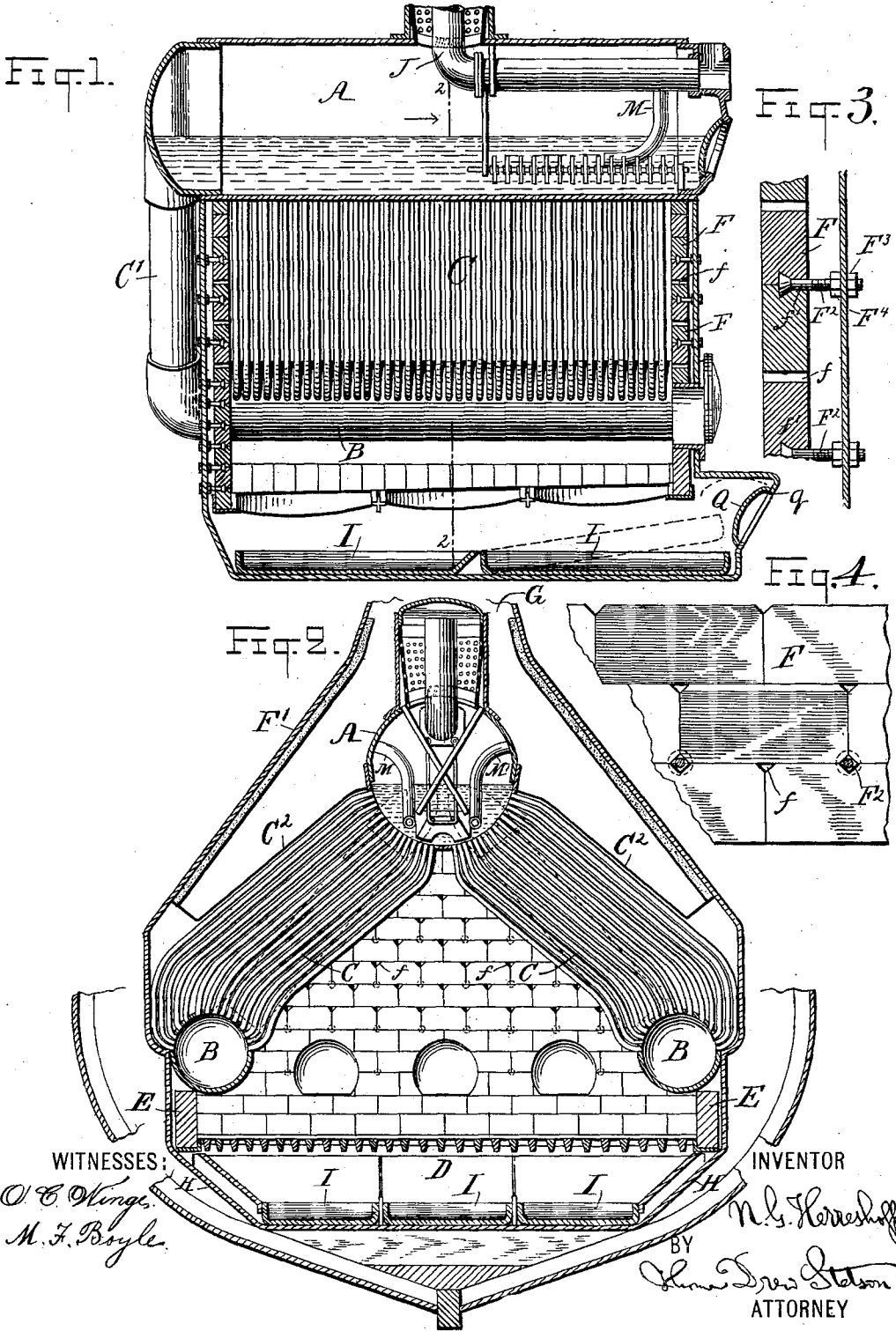


(No Model.)

N. G. HERRESHOFF.
STEAM BOILER.

No. 605,786.

Patented June 14, 1898.



UNITED STATES PATENT OFFICE.

NATHANIEL GREENE HERRESHOFF, OF BRISTOL, RHODE ISLAND, ASSIGNOR
TO THE HERRESHOFF MANUFACTURING COMPANY, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 605,786, dated June 14, 1898.

Original application filed September 28, 1897, Serial No. 653,288. Divided and this application filed January 11, 1898. Serial No. 666,307. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL GREENE HERRESHOFF, a citizen of the United States, residing at Bristol, in the county of Bristol and State of Rhode Island, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a specification.

My improvement is intended more especially for use in what is known as the "Du Temple" form of boiler, in which the fire-surface is presented mainly by tubes more or less bent and connecting three horizontal cylinders, the middle one being the highest, the tubes, properly bent, extending therefrom to the lower cylinders on each side, respectively. I have devised important improvements in the details.

My improvements are intended more especially for steam vessels of moderate size, as yachts and torpedo-boats, and I will describe the invention as thus applied; but it may be of service in many other situations.

I provide bevel-corner bricks in the front and back walls of the furnace, which conveniently and efficiently allow the admission of heated air in small streams above the surface of the burning fuel. I provide also for reliably locking together the several fire-bricks and the metallic casing and also for more efficiently preventing any backflow of the gases from the boiler into the fire-room in case of the bursting of a tube or other similar accident.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a central longitudinal vertical section, and Fig. 2 a transverse vertical section on the line 2 2 in Fig. 1. The remaining figures show portions on a larger scale. Fig. 3 is a vertical section of a portion of the front wall, and Fig. 4 is a view of one face thereof.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is the main cylindrical drum or shell, of boiler-iron.

B B are the two lower shells, one on each side, respectively, C C the bent tubes arranged along the sides of the furnace, and C' the large inclined tubes at the rear connecting the shells, all in the style long and favorably known in the Du Temple boiler.

C² are baffle-plates extending down from the central shell a considerable distance just exterior to the tubes.

D is the grate, extending across so far below the side shells B that its edges are directly under them.

E E are the fire-brick sides of the furnace, and F F the fire-brick walls at the front and rear of the furnace.

G is the inclined portion of the casing above, which conducts the products of combustion to the stack G.

H is the thin shell of the ash-pit, and I I I are the movable pans therein. The sides of the ash-pit are of two thicknesses and inclined, as shown.

The walls F are formed each with an iron shell F' on the outer face and a wall of fire-brick on the inner face, with a continuous space between, maintained by giving a proper length to the holding-bolts. The lower portion of this space is in free communication with the ash-pit. The bricks in the wall are beveled, so that there are at the corner junctions triangular passages *f*, leading quite through the brick portion of the wall from the connected air-space to the interior of the furnace. When, as usual, a partial vacuum obtains above the fire-bed in the furnace, streams of fresh air will be drawn in through the small passages thus provided. If a blower is employed and a pressure above that of the atmosphere obtains in the ash-pit, the same is felt in the connected space between the brick wall and the continuous outer shell of metal F', so that still more fresh air under pressure will enter through the small passages and supply oxygen properly distributed to burn the gases in the furnace.

F² are the holding-bolts. They lie with their heads received in recesses *f'* in the mid-thickness of the bricks and with their opposite ends extending out across the air-space and fitting in corresponding holes in the metal

shell, adjusted and secured by nuts F^3 F^4 . The bricks may be molded or pressed with the proper recesses for the heads of these bolts in the mid-thickness and with the proper channels extending from the head-recess through the portion of the thickness of the brick required to reach the outer face; but in case the bricks are not so formed it is but little labor to cut recesses by ordinary tools. In case the fire-bricks are cemented together with fire-clay the bolts are inserted while the material is plastic, and they may be thus tightly matched. Ordinarily no such mortar is required. My invention in the absence thereof allows a slight yielding of the wall, which is an advantage on shipboard or in any case where the boiler or its adjacent parts may be required to spring or yield. The metal shell F' may be of sheet-iron or low steel, giving great strength with but little thickness and affording efficient and slightly-elastic support to the brick portion of the wall.

M is the feed-pipe, receiving water in the ordinary manner from the pump (not shown) and delivering it in the lower portion of the upper drum. M' is an auxiliary feed-pipe correspondingly located on the opposite side.

My boiler is adapted to serve either with natural draft or with a blower. The efficiency of this style of boiler allows the heat generated in a large grate to be utilized in the space immediately over it. This is a great advantage in swift steam vessels; but there is increased liability of the gases to be driven downward through the fire and out through the ash-pit in emergencies. I provide at the front of the ash-pit a light self-acting damper Q , turning on a light axis at q and of arched form. While the draft is flowing properly this light arched damper is held up to the horizontal position, being received in a recess provided between the axis q and the grate, the current of air beneath keeping it well open, as shown in dotted lines in Fig. 1, so that it offers no appreciable obstruction to the air. When through a sudden failure of any part, as the bursting of a tube, there is a liability of a backflow of the gases through the ash-pit into the fire-room, the back current shuts this damper. The curved form enables a light damper to resist a strong back pressure better than the usual flat form of damper.

It will be understood that my boiler may have all the ordinary appurtenances, clothing, safety-valves, gage-cocks, &c.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention.

I do not in this patent claim the broad grate in a plane below the side drums and extending outward under the same, because such is made the subject-matter of a separate application for patent filed September 28, 1897, Serial No. 653,287. Neither do I claim in this patent the provisions for conducting away the steam in a dry condition, such being made the subject of a separate application for patent filed September 28, 1897, Serial No. 653,288, of which this present is a division.

I claim as my invention—

1. In a steam-boiler having a central drum A and lower side drums B with connections C C' , the front and rear walls F containing fire-bricks having their corners beveled, in combination with an exterior shell of metal F' and with a continuous intermediate air-space in free communication with the ash-pit, arranged to serve substantially as herein specified.

2. In a steam-boiler having a central drum A and lower side drums B , with connections C C' , the front and rear walls F containing fire-bricks provided with recesses f' in their mid-thickness, in combination with an exterior shell F' of metal held at a little distance outside of such bricks, bolts F^2 having their heads and the adjacent portions of the shanks recessed into the bricks of the wall, and their opposite ends adjustably secured in the metallic shell, and adjusting-nuts F^3 , F^4 , all arranged to serve substantially as herein specified.

3. In a steam-boiler furnace a brick wall F having bricks formed and matched together so as to provide air-spaces f at the angles, a continuous metallic shell F' exterior to such wall, and standing at a sufficient distance therefrom to provide an intermediate air-space connecting the several apertures in the brick wall with the ash-pit, a series of holding-bolts F^2 having their heads and adjacent portions engaged with the brick wall and their opposite ends engaged with the metallic shell, and adjusting-nuts F^3 , F^4 , all combined and arranged to serve substantially as herein specified.

4. In a steam-boiler ash-pit, the damper Q , of arched form adapted to automatically open by the incoming air and assume a horizontal position within a recess provided, and close and resist archwise any back pressure of the gases, combined and arranged to serve substantially as herein specified.

NATHANIEL GREENE HERRESHOFF.

Witnesses:

K. K. II. DE WOLF,
C. W. YOUNG.