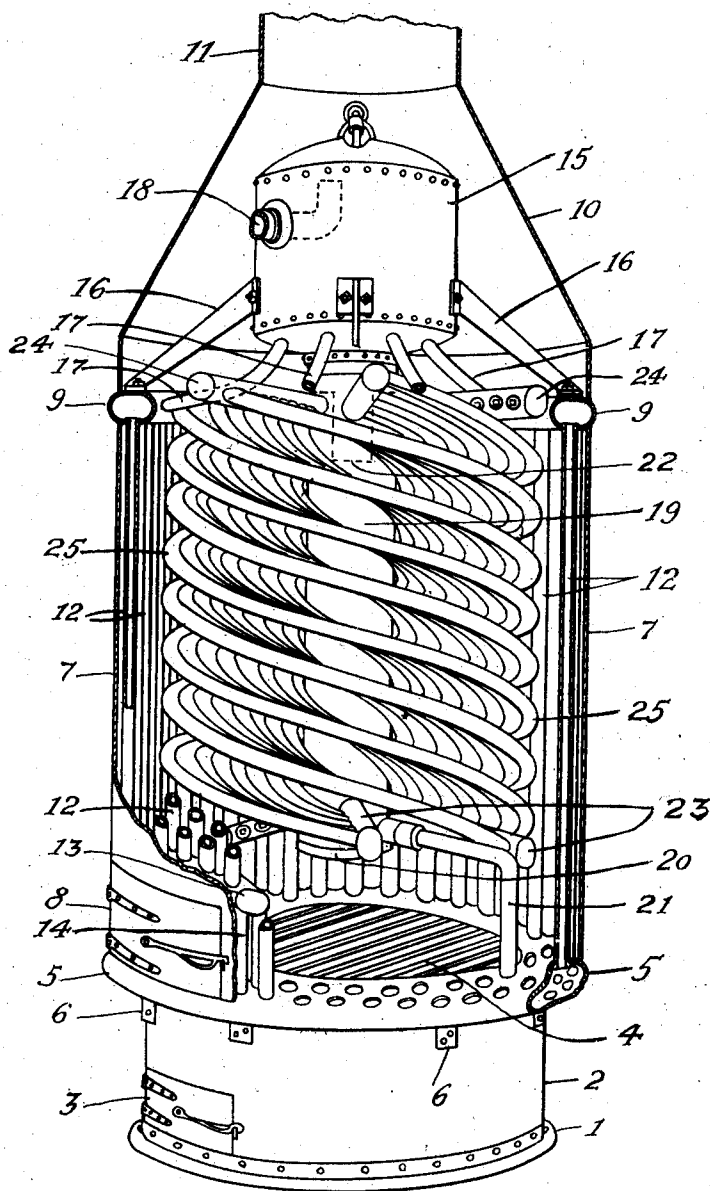


No. 882,959.

PATENTED MAR. 24, 1908.

H. E. PENNEY.
MARINE BOILER.
APPLICATION FILED SEPT. 28, 1907.



Witnesses.
Theo. Lagaard
H. A. Bowman.

Inventor:
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UNITED STATES PATENT OFFICE.

HERBERT E. PENNEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO NOTT FIRE ENGINE COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION.

MARINE BOILER.

No. 882,959.

Specification of Letters Patent.

Patented March 24, 1908.

Application filed September 28, 1907. Serial No. 394,953.

To all whom it may concern:

Be it known that I, HERBERT E. PENNEY, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Marine Boilers, of which the following is a specification.

My invention relates to marine boilers or steam generators of the water-tube type, and its object is to combine a nest of tube-sections connected to a central cylinder, of the character set forth in my Patent No. 751,002, of February 2, 1904, with a water-ring, steam-ring, steam-dome, and return-pipes in close circular arrangement connecting the steam-ring with the water-ring, for the purpose of producing an improved marine boiler.

My improvements are illustrated in the accompanying drawings, in which,

Figure 1 is partly a perspective and partly a sectional view of a steam-generator embodying my improvements.

In the drawings 1 designates the base upon which is secured the casing 2 of the ash-pit, which is provided with a door 3; 4 designates the fire-box grate seated on the ash-pit casing; 5, the water-ring secured on the casing 2 by angle-plates 6; 7, an exterior casing or shell seated on the ring 4 and having a door 8 to afford access to the fire-box; 9, the steam-ring above the shell 7; and 10, a tapering cap terminating in a smoke-stack 11 and seated on the ring 9. Return pipes 12 connect the steam-ring with the water-ring, and are set as close together as practicable, and to this end they are arranged in staggering order, for the purpose of preventing as far as possible the escape of gases or heat from within the circle they form. Coincident with the door 8 an opening to the fire-box is provided by having the return-pipes shorter and connecting them to a short water-drum 13 that communicates with the ring 5 through short pipe-connections 14.

Within the space provided by the cap 10 is a steam-dome 15 which is supported on the steam-ring by legs 16; and pipes 17 connect its bottom with the ring for the passage of steam from the dome to the ring for equalizing the steam-pressure in the ring and dome. A steam-discharge pipe 18 is connected to the upper portion of the dome.

In the space central to the return-pipes 12

is a vertical cylinder or drum 19 the upper end of which is attached to the base of the dome 15 for conducting steam into the dome. The lower end of the drum 19 is closed by a screw-cap 20. An intake pipe 21 connects the lower portion of the drum with the water-ring 5.

In the upper portion of the drum 9 is provided a separator 22 (shown by dotted lines) for the steam and water, constructed and arranged as set forth in my Patent No. 752,859, of February 23, 1904. This separator tube being placed opposite the outlets of the headers deflects their discharge downward, causing the water to fall to the water-level below and permitting the steam to rise through the separator to the dome.

To the lower and upper portions of the drum 19 are connected series of radially-arranged headers 23 and 24, respectively, having their outer ends closed, which may be of similar form and size and preferably six in number in each series and placed in vertical alinement. To each lower header and to the upper header that is in vertical alinement with it are connected the ends of a series of coiled tubes 25, that are preferably coiled two complete turns in their spiral courses between the headers to which they are attached. It is desirable to use tubes of comparatively small diameter placed as close together as practicable in order that a considerable number may be employed. In the construction illustrated eight tubes are shown connected to each header, making an aggregate of forty-eight coiled tubes in the boiler, and as such construction has proven satisfactory in use in a marine boiler it is suggested as a desirable form for that purpose; but I do not wish to be limited as to the size and number of tubes employed.

The tubes of a series connected to a pair of upper and lower headers are coiled concentrically and in parallel courses and are so bent that all of the coils of a series, or tube section, will trend on the same inclined plane. And the tubes of the successive tube-sections are so bent adjacent to their respective headers as that the coils of the successive tube-sections will be disposed equidistantly, that is, will trend in spiral courses on substantially equidistant inclined planes, as indicated in the drawings. In such arrangement of the tube-sections the intervening spaces provide spiral passage-ways through

which the major portion of the hot gases take their upward course.

The coils should be detachably connected to their headers, so that a defective tube can be readily detached and removed either upward or downward, by pulling upon it and at the same time twisting it conformably to its spiral shape and position with reference to adjacent coils.

The headers should also be detachably connected to the drum so that when freed from the coil tubes both the coils and headers of a tube-section can be readily removed.

While I have shown and described the tubes as coiled two complete turns in their course, I do not wish to be limited to such arrangement, for some or all of the coils may be given a different pitch to increase or diminish the number or extent of their turns. Nor do I wish to be limited to a construction wherein all of the tubes are coiled in the same direction, for some may be right and others left coils to accomplish the same general purpose.

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

1. In a marine boiler, the combination with a water-ring and a steam-ring and a series of closely arranged return pipes connecting them and inclosing the combustion chamber, of a steam-dome in communication with the steam-ring, a cylindrical drum in communication with the base of the steam-dome and with the water-ring, and tube-sections comprising upper and lower radial headers connected to said drum, and series of coils extending spirally around the drum and connecting the lower with the upper headers, substantially as set forth.

2. In a marine boiler, the combination with a water-ring and a steam-ring and a series of closely arranged return pipes connecting them and inclosing the combustion chamber, of a steam-dome in communication with the steam-ring, a cylindrical drum in communication with the base of the steam-dome and with the water-ring, and tube-sections comprising upper and lower radial headers connected to said drum, and series of coils extending spirally and trending in substantially equidistant courses around the drum and connecting the lower with the upper headers, substantially as set forth.

3. In a marine boiler, the combination with a shell, a water-ring, and a steam-ring and a series of closely arranged staggering return pipes connecting them and inclosing the combustion chamber, of a steam-dome, pipes extending from the bottom of the dome to the steam-ring, a cylindrical drum connected centrally to the base of the dome, an intake pipe connecting the lower portion of the drum and the water-ring, and tube-sections comprising series of lower and upper radially-arranged headers connected to the drum and having their outer ends closed, and series of coils extending on substantially equidistant spiral planes around the drum and connecting the lower with the upper headers, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 17th day of September, 1907.

HERBERT E. PENNEY.

Witnesses:

P. H. GUNCKEL,
H. A. BOWMAN.