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W. MENZIES & C. BLAGBURN.

Steam-Boiler.

No. 204,750. Patented June 11, 1878.

Fig. 2

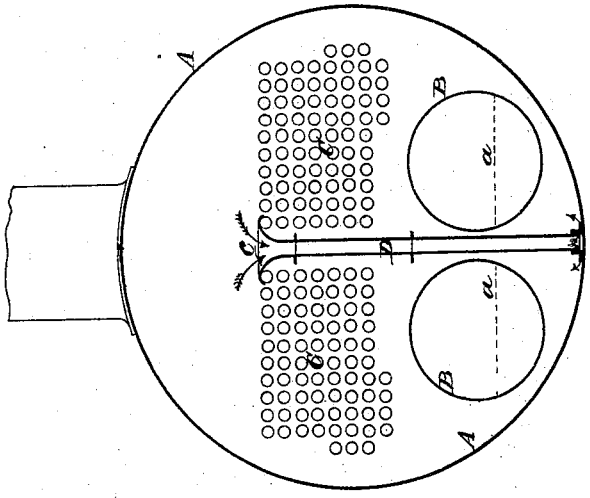

Fig. 1

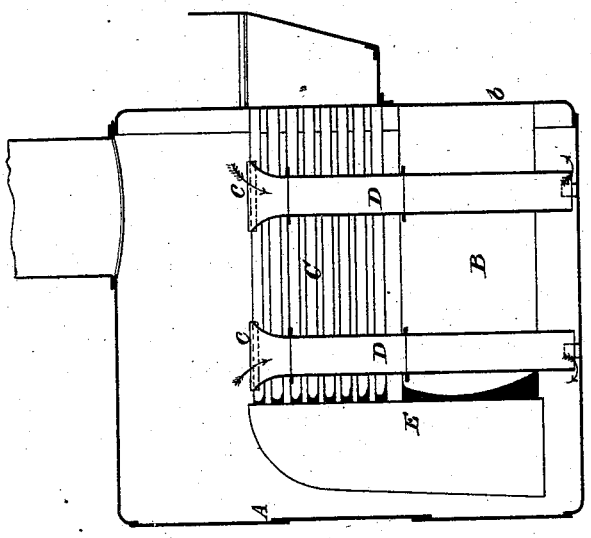

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Fig 4.

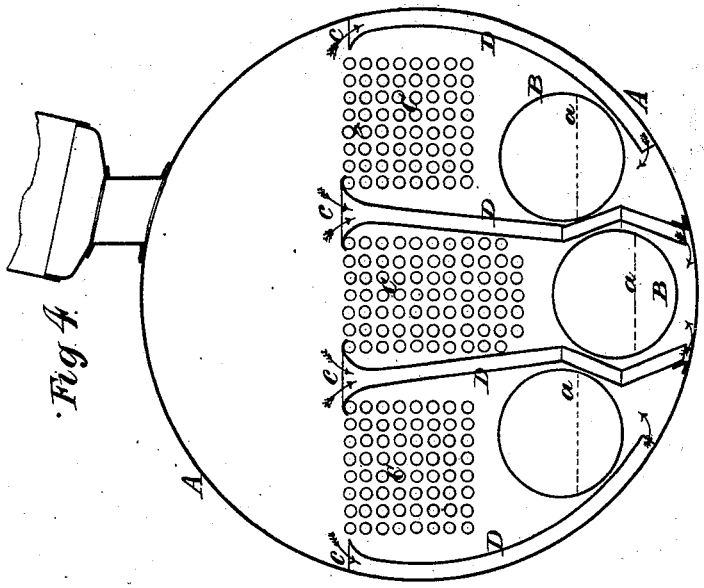
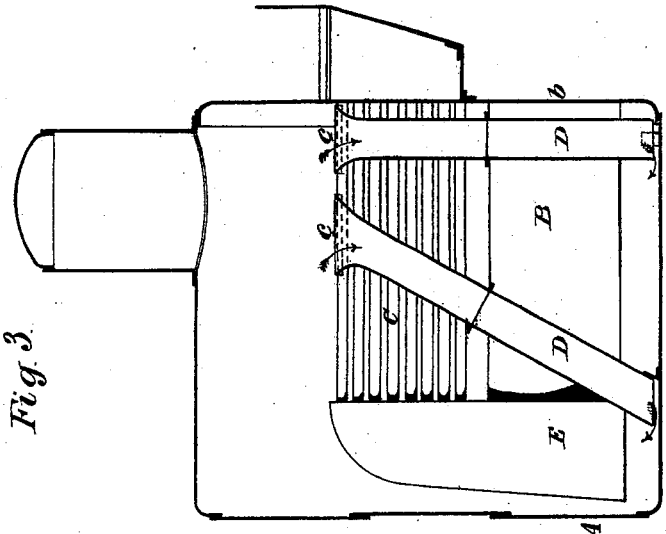


Fig 3.



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W. MENZIES & C. BLAGBURN.

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Fig. 6

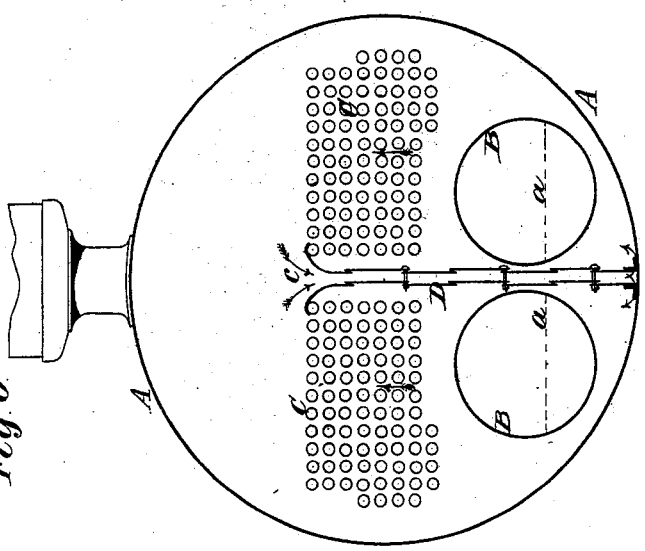
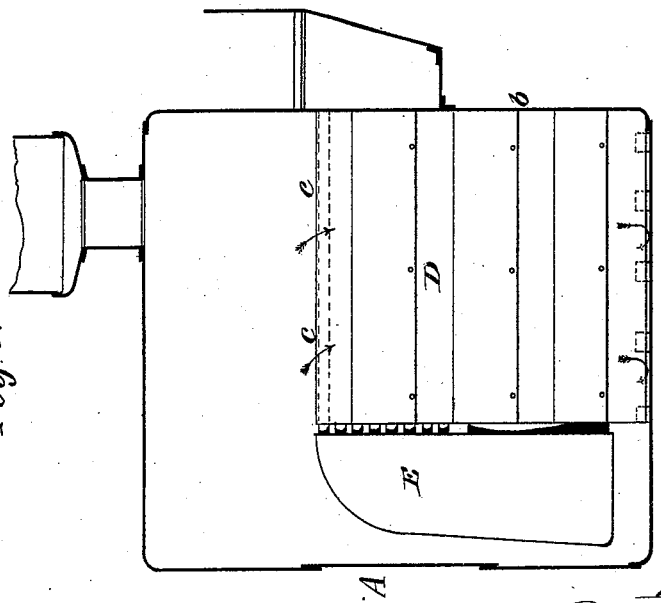


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM MENZIES AND CHARLES BLAGBURN, OF NEWCASTLE-UPON-TYNE, ENGLAND, ASSIGNORS OF ONE-HALF THEIR RIGHT TO JOHN STORER, OF MARLBOROUGH, NEW YORK.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **204,750**, dated June 11, 1878; application filed April 25, 1878; patented in England, February 2, 1877.

To all whom it may concern:

Be it known that we, WILLIAM MENZIES and CHARLES BLAGBURN, both of Newcastle-upon-Tyne, England, engineers, have invented Improvements in Steam-Boilers, of which the following is a specification:

Our said invention relates more particularly to marine boilers; and consists of improvements having for their object promoting the circulation of the water in the boiler, and thereby equalizing the heat and preventing the chemical or galvanic action which attacks the under side of the flues and the interior of the bottom of the boiler, and also the prevention of priming, and increasing the evaporative efficiency of the boiler.

In carrying out our said invention as applied, for example, to a double-flued multitubular marine boiler, we arrange between the two flues and the two sets of horizontal fire-tubes a passage or series of passages in a vertical plane, and opening at their upper ends, which are situated at or about the level of the top row of horizontal fire-tubes, into the water-space above, and at their lower ends into the water-space below. These passages may consist of tubes of an oval, rectangular, or other elongated section, or of a cluster or series of tubes of a round or other section, having an equivalent aggregate area, or the passages may be formed of double plates; but in all cases the passages terminate at their upper extremity at about (but below) the water-level, and at their lower extremity below the level of the fire-bars and just above the bottom of the boiler.

In the case of triple-flued boilers, a water-circulating passage or series of passages may be employed between each outer flue and the central flue, and additional passages may be arranged around the sides of the boiler, at its interior, if desired.

In order that our said invention may be fully understood, we shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figures 1 and 2 of our drawings represent, respectively, a longitudinal and transverse section of a double-flued multitubular boiler, with two vertical circulating-tubes, of an elongated section, arranged between the flues. Fig. 3 represents a similar view to Fig, 1, but with one of the circulating-tubes shown inclined. Fig. 4 represents a transverse section of a triple-flued multitubular boiler, with water-circulating tubes arranged both between the flues and on the outer sides of the outer flues at the sides of the boiler. Figs. 5 and 6 represent a similar boiler to that shown in Figs. 1 and 2, but with double plates substituted for tubes.

A is the outer shell of the boiler. B B are the flues, and C C are the fire-tubes. D D are the water-circulating passages, terminating at their upper ends at about the level of the water in the boiler, but below the same, and at their lower ends below the level *a* of the fire-bars.

In the arrangements illustrated in Figs. 1, 2, 3, and 4, the passages consist of tubes of an elongated section, for which a series of tubes of a round or other section having an equivalent aggregate sectional area may be substituted.

In the modifications shown in Figs. 5 and 6, double plates are employed, extending from the front of the boiler at *b* nearly to the flame-box E. In all cases, however, we prefer to make the passages bell-mouthed or expanded at their upper ends, as shown at *c*. The tubes or plates are made in convenient sections, so as to admit of their being introduced through the ordinary man-hole and subsequently bolted together.

By means of our said invention a partial division of the water-space is obtained, so as to prevent the steam generated on the furnace-crowns and lower fire-tubes from obstructing the free passage of the water to the bottom of the boiler. The water is thus maintained in circulation—that is to say, currents are constantly passing from the upper part of the boiler down the water tubes or passages D to the lower part of the boiler, (the hot water descending after having parted with its complement of steam,) and the currents thence return

through the main body of the water in the boiler, as indicated by the arrows, to the upper part, and then again pass down the water tubes or passages D, and again return to the upper part, and so on in succession. The boiler-shell consequently is maintained throughout at a uniform temperature, whereby the chemical or galvanic action which corrodes and pits the internal surface of marine boilers under the fire-grate level is obviated. By reason, moreover, of the constant circulation, the evaporative efficiency of the boiler is increased, and priming is also prevented, a clear passage being provided for the water downward after it has parted with its complement of steam. The apparatus is self-contained, and its action is automatic and continuous, it being maintained without any attention so long as the fires are kept up, in lieu of the circulation ceasing immediately the steam is raised, as in the case where donkey-engines and other ordinary external auxiliary apparatus are employed for the purpose.

Having now described and particularly ascertained the nature of our said invention, and the manner in which the same is or may be used or carried into effect, we would observe in conclusion that what we consider to be novel and original, and therefore claim as our invention, is—

The combination, in a multitubular boiler, of one or more flues containing the fire grate or grates, and water-circulating passages or tubes extending from above the fire-tubes, but below the level of the water in the boiler, to just above the bottom of the boiler, but below the level of the fire-grate, substantially as shown and set forth.

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

WM. MENZIES.
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