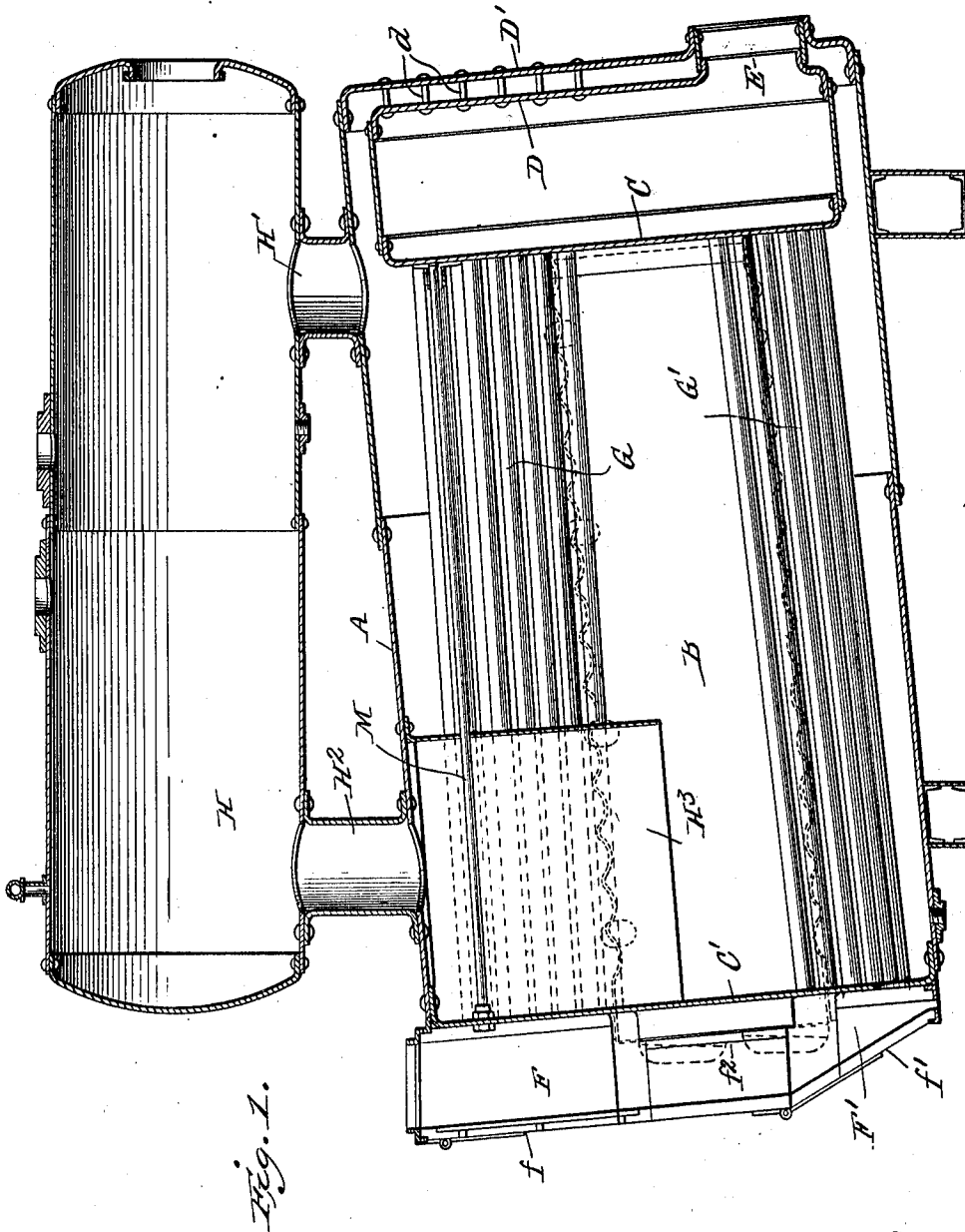


STEAM BOILER.

1,003,776.

2 SHEETS--SHEET 1.



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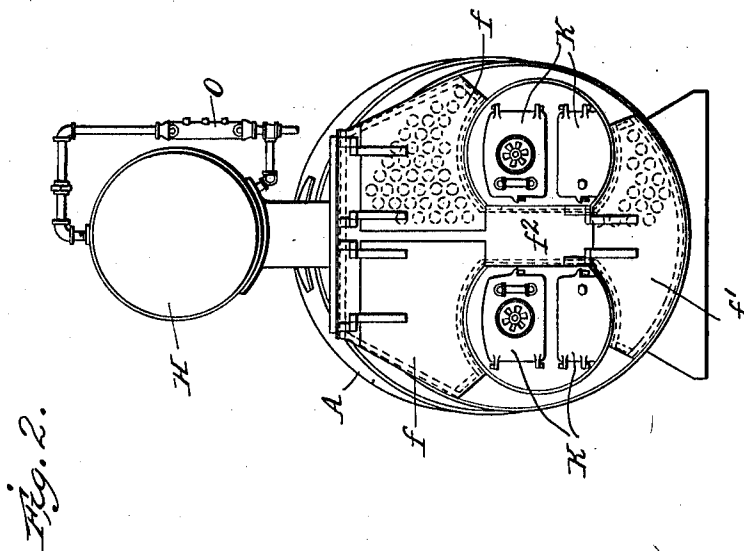
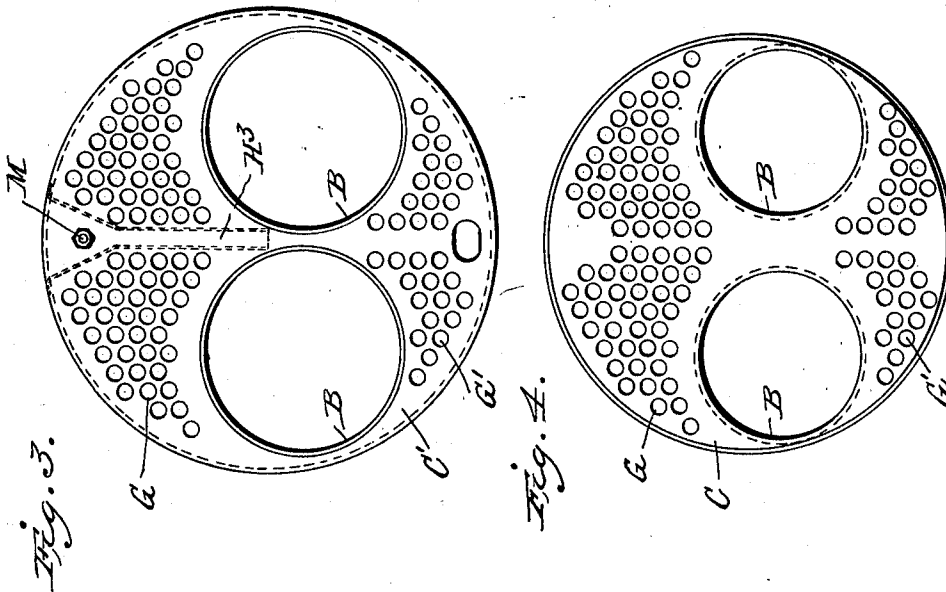
his Attorneys

J. A. MUMFORD.
STEAM BOILER.
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1,003,776.

Patented Sept. 19, 1911.

2 SHEETS-SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

JOSEPH ALEXANDER MUMFORD, OF ROSLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROBB-ENGINEERING COMPANY, LIMITED, OF AMHERST, CANADA, A CORPORATION.

STEAM-BOILER.

1,003,776.

Specification of Letters Patent.

Patented Sept. 19, 1911.

Application filed November 23, 1908. Serial No. 464,032.

To all whom it may concern:

Be it known that I, JOSEPH A. MUMFORD, a citizen of the Dominion of Canada, residing at the village of Roslyn, Nassau county, New York, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

The present invention relates to that type of steam boilers illustrated in Letters-Patent heretofore granted to me, particularly U. S. Letters - Patent 558,698, April 21, 1896; 752,351, February 16, 1904, and 753,902, March 8, 1904, the boiler illustrated being especially designed for marine use, although well adapted for stationary boilers, where it is desired that the same shall be self-contained and occupy a relatively small area.

Referring to the accompanying drawings: Figure 1 is a vertical section taken longitudinally through a boiler embodying the present improvements. Fig. 2 is a front elevation. Fig. 3 is an elevation of the front tube sheet. Fig. 4 is an elevation of the rear tube sheet.

Similar letters of reference indicate the same parts in the several figures.

The cylindrical shell A of the boiler is set at an inclination, as in the boilers of the patents hereinbefore referred to, but is made relatively short as compared with its diameter in order to reduce the longitudinal space required for the setting. The internal or fire-box shell B extends longitudinally through the boiler from the front to the rear tube sheet. This internal or fire box shell may be of the well known transversely corrugated type illustrated, or of the equally well known sectional construction with the sections united by Adamson flanges, and while two of such internal fire box shells are preferably employed arranged side by side as illustrated, it will be understood that the present invention contemplates the employment of any number of these as may be found desirable or necessary.

At the rear end, the fire box shells open into a combustion chamber which may be of the well known dry type, lined internally with fire brick, or, in the preferred construction, and as illustrated, the said combustion

chamber is of the so-called wet type or arranged entirely within the boiler shell, the forward wall of the combustion chamber being formed by the rear tube sheet C. The rear wall D of said chamber is connected with the rear boiler head D' by numerous stay-bolts indicated at d, and near the bottom and opening through both of the rear walls, is a door opening E, of approved type.

Fire tubes connect the front and rear tube sheets C' and C respectively, for leading the products of combustion from the combustion chamber forwardly through the body of the boiler to the front communicating smoke boxes F and F', whence the products of combustion pass upwardly to a suitable stack connection. The fire tubes referred to are arranged both above the internal fire box shells, as indicated at G, and below the same, as indicated at G', thus the products of combustion are caused to circulate through fire tubes in all parts of the water spaces of the boiler, keeping the water at a practically uniform temperature throughout the shell, a result which is important in view of the relatively great diameter of the boiler shell as compared with its length.

A horizontally arranged steam and water drum H is located above the boiler A and connected therewith at front and rear by water legs or necks H' and H², respectively. The water leg H' at the rear, it will be noted, is at substantially the highest point of the boiler shell and, therefore, with a water level above the bottom of the drum the water is caused to circulate upwardly through said water leg H' from the boiler into the drum and thence down through the water leg H² into the front portion of the boiler. To insure the continuance of this circulation and to prevent any conflict of circulation by reason of superior heating of the water at the front of the boiler, a circulating pipe is provided to form a downward continuation of the front water leg H², such pipe being preferably an elongated structure indicated at H³, extending down between the fire tubes G to a point well below the top of the internal fire-box shells or into position to discharge the water at the lower half or below the center line of the boiler shell. This circulating pipe at its upper end is preferably flared outwardly, as indicated in Fig. 3, so as to embrace the water leg open-

ing, and below said flared portion is contracted or made thin enough to pass between the fire tubes, and its lower end extends down between the two internal fire box shells. In this particular arrangement the water is discharged between the fire box shells and passes down among the flues G' below said shells.

The two smoke boxes F and F' are provided with upwardly swinging covers or doors *f* and *f'*, giving ready access to all of the flues or fire tubes for cleaning purposes, and the said smoke boxes communicate with each other through a passage or passages *f*² at the side of the fire pot and ash pit doors K, as shown in Fig. 2.

Various arrangements of the shells and circulating pipe will suggest themselves inasmuch as it is only important that the said pipe should extend substantially straight down from the water leg H², and should be of such thickness as to pass readily between the tubes without requiring wide spacing of the latter or necessitating the employment of additional stays, although in some instances, particularly as illustrated in Figs. 1 and 3, a long stay-bolt M may extend from the front to the rear tube sheet directly through the circulating pipe itself.

The water gage O is arranged on the steam and water drum above the boiler proper, and suitable hand holes and blow-off connections are provided, as in other well known types of boilers.

Having thus described my invention, what I claim as new, and desire to secure by Letters-Patent, is:

In an internally fired boiler the combination of the boiler shell inclined upwardly from front to rear, the internal fire box shell connecting the front and rear tube sheets and opening into a combustion chamber at the rear end fire tubes also connecting said front and rear tube sheets and arranged in parallelism with the fire box shell, a smoke box into which the tubes open at the front of the boiler, a horizontal water and steam drum above the boiler shell, water necks connecting the proximate ends of the boiler shell and drum, and a circulating pipe extending from the water neck at the low end of the boiler shell down between the upper fire tubes and the fire box shell.

JOSEPH ALEXANDER MUMFORD.

Witnesses:

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