(No Model.)

R. SMALLWOOD.

STEAM BOILER.

No. 599,200. Patented Feb. 15, 1898.

Fig. 1.

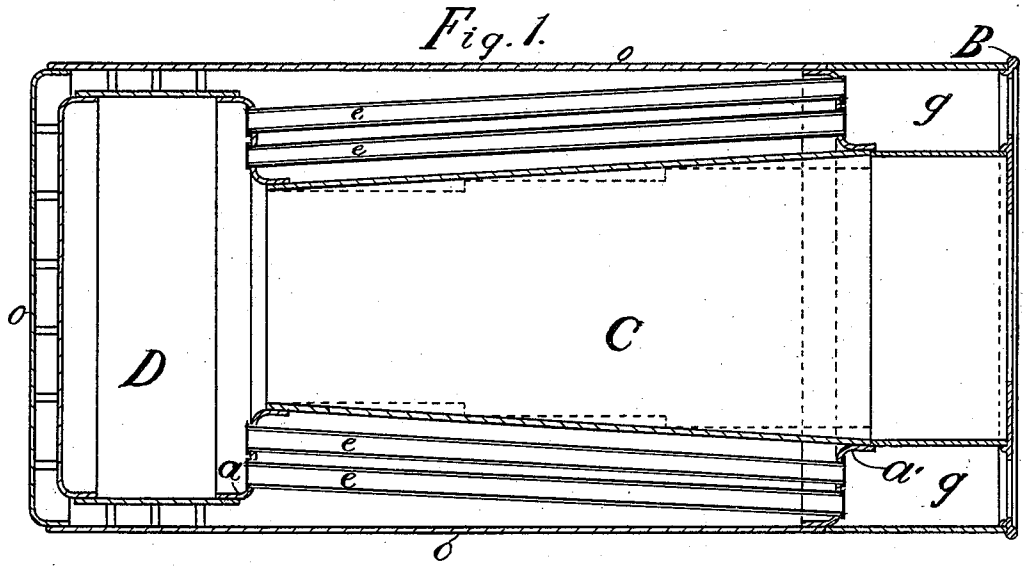


Fig. 3.

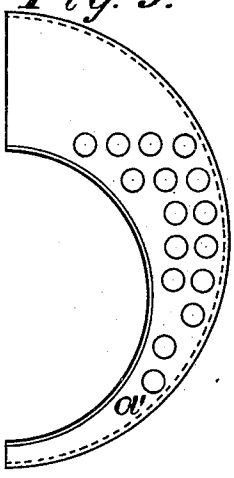


Fig. 2.

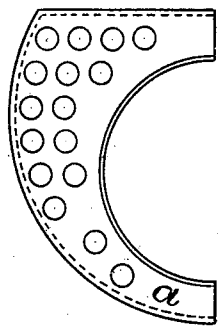
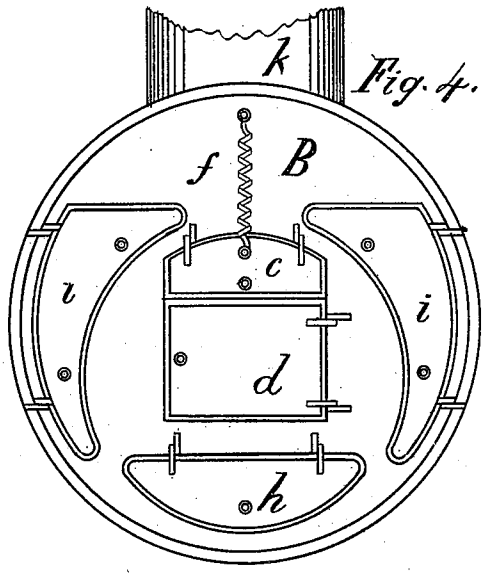


Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT SMALLWOOD, OF TRURO, CANADA, ASSIGNOR OF ONE-HALF TO GARDNER CLISH, DUNCAN McDONALD, AND SILAS R. TUPPER, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 599,200, dated February 15, 1898.

Application filed July 22, 1897. Serial No. 645,529. (No model.) Patented in Canada November 20, 1896, No. 54,127.

To all whom it may concern:

Be it known that I, ROBERT SMALLWOOD, a British subject, residing at Truro, in the county of Colchester, in the Province of Nova Scotia, Dominion of Canada, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification, and for which I received Letters Patent in Canada November 20, 1896, No. 54,127.

My invention relates to improvements in steam-boilers known as the "Scotch" or "marine" boiler, in which the fire-box and combustion-chamber extend nearly the whole length of the boiler and are surrounded by water when in use and have return-tubes extending from the combustion-chamber to the front end of the shell of the boiler; and the objects of my invention are, first, to produce a boiler having the maximum of steam-generating power attainable in a given shell obtained by a method of construction that will admit of a larger fire-box (and consequently increased space for fuel) than can be acquired by any other method of constructing this class of boilers; secondly, to obtain better facilities for feeding fuel into the furnace, so that full advantage can be taken of the enlargement of the fire-box. I attain these objects by the form of construction illustrated in the accompanying drawings, in which—

Figure 1 is a central horizontal section of a boiler embodying my invention. Fig. 2 is a half-elevation of the tube-sheet of the combustion-chamber D. Fig. 3 is a half-elevation of the tube-sheet of the boiler. Fig. 4 is a front elevation of the boiler, showing the doors and a portion of the smoke-pipe.

Similar letters refer to similar parts throughout the several views.

In the drawings, *o o o* is the shell of the boiler.

B is the cast-iron front, containing the doors.

C is the fire-box.

D is the combustion-chamber.

e e e e are fire-tubes, which, with the combustion-chamber D and the fire-box C, are surrounded by water.

a is the tube-sheet of the combustion-chamber.

a' is the tube-sheet of the boiler.

g g is the smoke-box.

d is the feed-door.

c is the supplementary feed-door.

f is a spiral spring which holds the door *c* in the desired position, either open or shut.

h is a door for the admission of air and for the removal of ashes.

i i are the tube-doors to admit of ingress to the smoke-box for the purpose of cleansing the tubes and to facilitate their removal or repair.

In boilers of this class to allow a sufficiency of water-space around the combustion-chamber it is necessary for it to be several inches less in diameter than the diameter of the shell, and as the rear ends of both the fire-box and tubes are connected into the front side or tube-sheet of the combustion-chamber it necessarily follows that the space allowed for the tubes and fire-box is governed by the size of the combustion-chamber. As this class of boilers has been usually constructed, the fire-box is parallel, of cylindrical form, and the tubes run parallel to the fire-box, causing an unnecessary amount of water-space between the outer tubes and the shell of the boiler and an insufficient fuel-space in the fire-box in comparison with the size of the shell.

In my invention the mass or body of the fire-tubes *e e e e*, &c., on each side of the fire-box C are made to diverge from the center line of the shell to such an extent that the position of their front ends in the tube-sheet *a'* is as close to the circumference of the boiler as they can be conveniently inserted. The fire-box C is then enlarged in diameter as it approaches the front end of the shell to the extent permitted by the divergence of the tubes. This enlargement of the fire-box may be accomplished in detail in various ways, but all embodying the principle of enlargement toward the front end to the extent practically permitted by the divergence of the tubes.

To accomplish the second object of my invention, which is to facilitate the process of feeding the furnace and thus take advantage of the enlargement of the fire-box C, there is provided, besides the usual feed-door *d*, opening sidewise, a supplementary feed-door *c*, the upper part of which is as high as the fire-box will permit of. This door is hinged, pref-

erably, at its upper edge or side, so that it can be opened and closed easily and without loss of time. In this construction catches of any kind are dispensed with and the door held either open or shut by the operation of a coiled spring *f*.

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

In a flue and tubular boiler, the tapering fire-box C, the combustion-chamber D, the tube-sheets *a*, *a'*, of different sizes and shapes, the fire-tubes having their ends secured to the sheets, and their inner ends inclined inwardly toward the center of the boiler, and the smoke-box *g* upon each side of the front end of the fire-box, combined with the front B, provided with doors *i* for the smoke-box, and the two doors *c*, *d*, moving at right angles to each other; with the fire-box, and the spring *f* for holding the door *c* either open or shut, substantially as set forth.

ROBERT SMALLWOOD.

Witnesses:
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