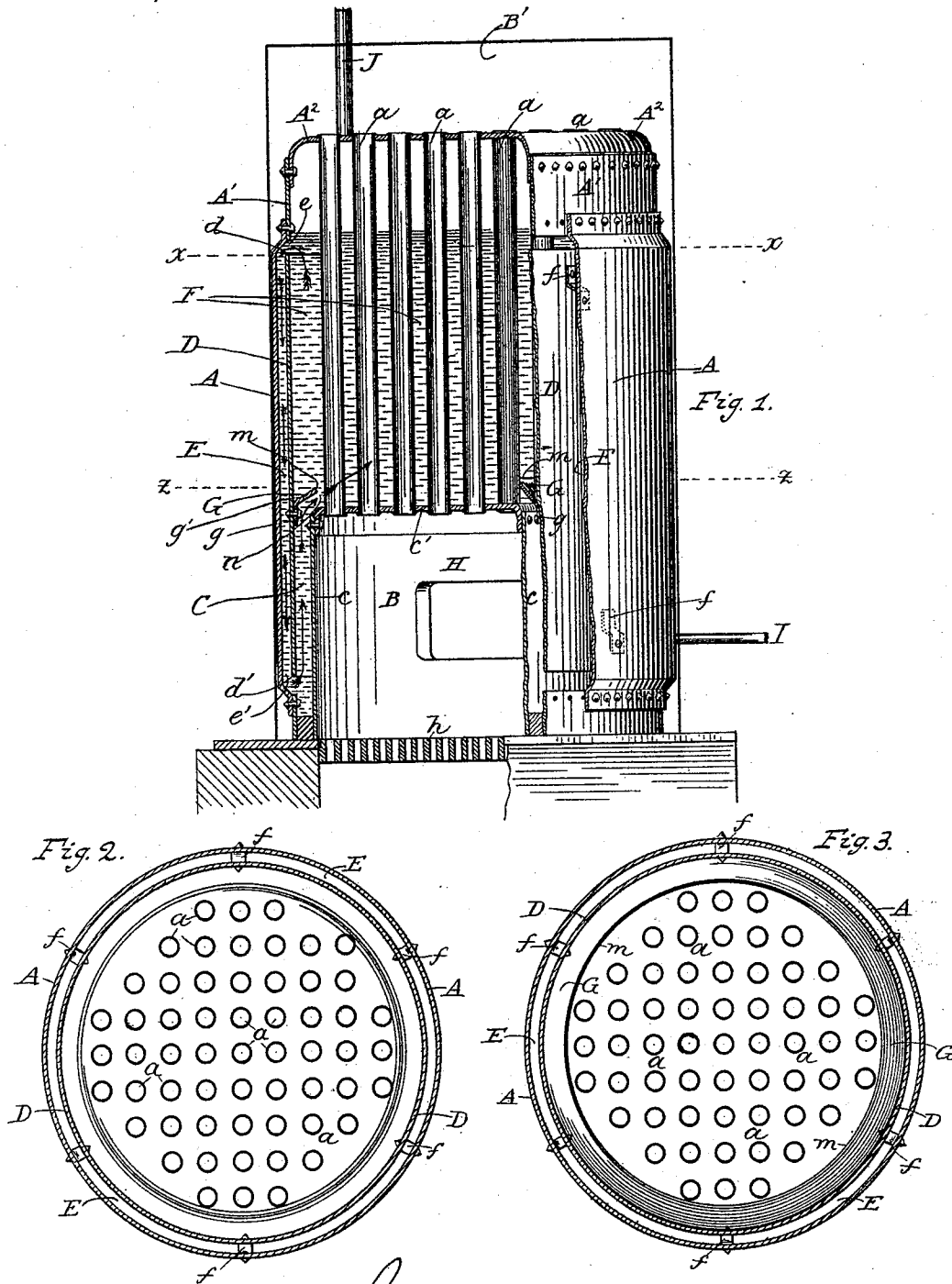


(No Model.)

J. HUNTER.
STEAM GENERATOR.

No. 498,272.

Patented May 30, 1893.



Witnesses. *Charles L. Kirk*
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UNITED STATES PATENT OFFICE.

JAMES HUNTER, OF ALBANY, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 498,272, dated May 30, 1893.

Application filed September 9, 1892. Serial No. 445,401. (No model.)

To all whom it may concern:

Be it known that I, JAMES HUNTER, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in steam generators of the class known as upright tubular boilers; and it consists of the combination of devices and elements herein-after particularly described and specifically set forth in the claim.

The object of my invention is to provide a combination of devices by which the water will be made to circulate downwardly to the lowest point in the boiler or its leg and thence upwardly and inwardly against the tubes of the boiler. I attain this object by the means illustrated in the accompanying drawings forming a part of this specification, in which—

Figure 1, is an elevation, part in section, of a steam generator embodying the improvements in this invention. Fig. 2 is a sectional view of the same taken at line $x x$ in Fig. 1, and Fig. 3 is a sectional view taken at line $z z$ in Fig. 1.

The same letters of reference refer to similar parts throughout the several views.

In the drawings $A A'$, A^2 represent the outer shell of the steam generator or boiler.

$a a$ are the vertical tubes through which the products of combustion pass from the furnace B, below to the chamber B' above and thence to an exit.

c is the inner sheet of the leg C, and is suitably secured to the lower head c' by rivets as is generally practiced by the trade.

D is a division sheet, concentric with portion A, or sheets forming portion A of the shell. This division sheet D is extended from a point on a plane a little below the water line of the boiler or generator, as from d Fig. 1, down to point d' near the lower end of the leg C and is made continuous in the form of a cylinder as shown in Figs. 2 and 3, and is set about one inch, more or less, all around from the portion A of the shell as shown. The said division sheet D with the portion A of

the shell forms the water circulating chamber E which communicates at its upper and lower ends, as at $d d'$, with the water chamber proper F of the boiler, by means of the continuous inlet opening e above and the discharge opening e' below. This cylindrical division plate is suitably fixed in place and supported from the portion A of the shell by means of a series of brackets or pieces f , secured to the respective parts, they hold with, by rivets. The drawing Fig. 1, illustrates the portion A, setting outward from a vertical line coincident with the vertical line of portion A' and with the said division sheet having its line of vertical extension on a line coincident with that of said portion A'. Yet this form of construction and arrangements of the said parts are not essential, as the sheet or portion A may be made integral or continuous with the sheet or portion A' without portion A setting out from the line of portion A'; in which case the division sheet D, in its cylindrical form, will be made with a less diameter than shown, but will extend from point d to point d' as before stated, and have its inlet opening e , to the water circulating chamber, and discharge opening e' , from said chamber E to the chamber F, as before described.

G is the water deflector which is formed of a piece of metal bent in the form of a ring with its body flaring upwardly and inwardly as shown in Fig. 1, with its inner edge m projected, preferably inwardly past a vertical line drawn coincident with the line of vertical extension of the sheet c of the leg C, and to a line about one half inch from the line of the outermost tubes a of the series in the boiler. This deflector is shown in its cross section in Fig. 1, to have its vertically extended portion g secured by rivets to the division sheet D, while its inwardly and upwardly projected portion g' is shown to project inwardly from the inner side of the division sheet D with its inner edge m a little above the plane of the inner side surface of the lower head piece c' so as to leave the passage way or discharge opening n between said inner edge m and the head c' . In this steam generator or boiler the fire chamber H, grate bed h , feed water pipe I, live steam pipe J and other parts or adjuncts of the same may be of

usual form of construction and arrangement as are generally employed by the trade.

The manner in which my improvements in this invention operate is as follows: Water
 5 is introduced and maintained within the water chamber of this steam generator or boiler up to its intended water line, which is a little above the inlet opening *e* communicating from the chamber *F* to the water circulating chamber
 10 *E*. The fire is started in the furnace or combustion chamber *H* in the usual manner and when burning the draft of the products of combustion will be upwardly through the several tubes *a a* of the series in the boiler
 15 and cause the walls of said tubes to become highly heated. These heated tubes and the heated head *c'* will operate to heat the water next to them when the water so heated will expand and rise upwardly and displace a portion of the water on a plane with the inlet
 20 opening *e* and pass through said opening into the chamber *E* and thence downwardly as indicated by arrows in Fig. 1, to be discharged into the portion of the water chamber, of the boiler, contained in the leg *C* of the same, where under
 25 the effects of the heat passing through sheet *c* of the said leg, the water will be further heated and will expand and flow with considerable energy out of said leg in direction of
 30 arrows, Fig. 1, and striking the water deflector will be discharged from the said leg inwardly toward the tubes *a a* and in between the same to be affected by the heat passing from the products of combustion through their walls,
 35 to raise the temperature of the water interior to a higher degree than the water in the chamber *E* from between the shell of the boiler and

the division plate or sheet *D*. This circulation of the water as described will be maintained continuously in the generator or boiler
 40 as long as a fire is kept burning in the fire chamber.

The advantages arising from these improvements are these: a constant circulation of the water is had through all portions of the
 45 chambers of the boiler, and the water will be heated more evenly and more effectively than it would be were the sheet *D* and deflector *G* omitted.

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

In a steam generator the combination with the outer portion *A* of the shell and the cylindrical division sheet *D* forming with said
 55 shell portion a water circulating chamber having at its upper and lower ends respectively openings for communication with the water chamber *F* of the said generator, of the ring
 60 form deflector *G* projecting, all around, inwardly and upwardly from the said division sheet toward the tubes *a a*, with inner edge
 65 *m* at a short distance from said tubes and also at a short distance from the lower head *c'* in which the said tubes are secured, substantially as and for the purposes set forth.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

JAMES HUNTER.

Witnesses:

ALEX. SELKIRK,
 A. SELKIRK, Jr.