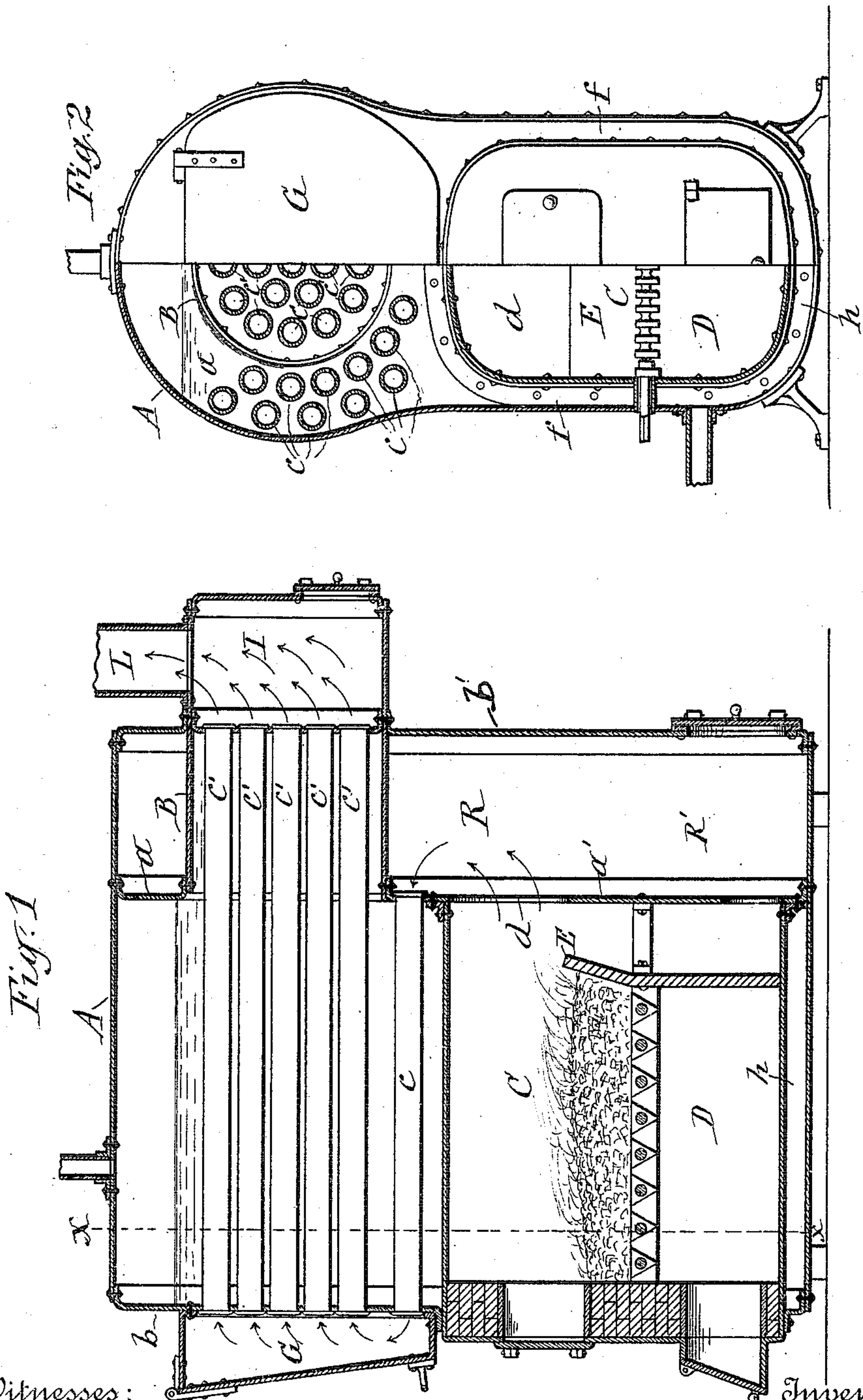


J. R. VANCE.
STEAM BOILER.

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983,184.

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JAMES R. VANCE, OF GENEVA, NEW YORK.

STEAM-BOILER.

983,184.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES R. VANCE, a citizen of the United States, and resident of Geneva, in the county of Ontario, in the State of New York, have invented new and useful Improvements in Steam-Boilers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of return flue-boilers, which have the furnace or fire box under the front end portion of the boiler, a set of direct fire-flues extending from the rear end of the fire-box to the front end of the boiler, and return fire-flues extending longitudinally through the boiler and leading from the front end of the boiler to the smoke exit chamber on the rear end of the boiler. And the invention has more especial reference to the steam boiler shown in my U. S. Letters Patent No. 575,786, of January 26, 1897.

The object of my present invention is to provide the boiler with a greater amount of heating surfaces properly distributed and arranged to cause the water in the boiler to effectually absorb the heat of the products of combustion passing from the fire-box through the boiler.

To that end the invention consists in the novel construction and arrangement of the component parts of the boiler hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a boiler embodying my improvements, and Fig. 2 is partly a front end view of the same, and partly a transverse section on the line —X—X— in Fig. 1.

—A— represents the main shell of the boiler, to the rear end of which is attached the smaller supplemental shell —B—.

—C— denotes the fire-box or furnace which is arranged under the main shell —A— and extends from end to end thereof as shown in Fig. 1.

—D— is the ash pit which is extended the entire length of the fire-box and is provided with the bridge-wall —E— to shield the adjacent portion —a¹— of a partition —a— which constitutes the rear flue-sheet of the direct flues and extends the entire depth of the shell —A—.

The front end plate or flue-sheet —b— of the main shell has attached to it the return smoke-box —G—. To the rear end

of the supplemental shell —B— is attached the smoke-exit box —I— which leads to the smoke-stack —L—. The supplemental shell passes through a combustion-chamber —R— which is formed by the space between the partition and the back plate —b¹— of the main shell and extends from the top of the main shell —A— to the bottom of the ash-pit —D— and is provided with a port —d— by which the combustion-chamber —R— communicates with the fire-box. The bottom portion of the said combustion-chamber forms a trap —R¹— for collection of the ashes which may enter it through the port —d—. Said supplemental shell is secured at its ends in coinciding openings provided in the partition —a— and back plate —b¹— respectively as shown in Fig. 1.

—c—c— represent the direct flues which extend horizontally through the interior of the main shell —A— and serve to conduct the products of combustion from the combustion-chamber —R— to the front smoke-box —G—.

—c¹—c¹— are the return flues which extend from the front flue-sheet —b— to the rear flue-sheet of the supplemental shell —B—, and conduct the products of combustion to exit smoke-box —I—.

In order to increase the heating surfaces of the boiler and thus render the boiler more efficient I form the sides of the main shell with water-legs —f— which constitute the side walls of the fire-box —C— and are extended across the bottom of the ash-pit —D— as shown at —h— by which latter the water is permitted to freely circulate through the water-legs in which the said water is effectually heated by the fire impinging the inner plate of the water-leg.

The aforesaid bridge-wall —E— is composed of a metal-plate which is preferably secured to the partition —a— by means of suitable braces bolted to the parts, and the upper portion of said bridge-wall is inclined toward the port —d—.

What I claim as my invention is:

1. A return-flue steam-boiler comprising a main shell of uniform dimensions from one end of the boiler to the other, a fire-box, an ash-pit, a transverse partition extending from the top to the bottom of the shell, the upper portion of the partition forming the rear flue-sheet for the direct flues, and the lower portion of said partition forming the back wall of the fire-box and

ash-pit, a combustion-chamber and an ash-trap formed by the space between said partition and the back-plate of the shell, the partition provided with an opening affording communication between the fire-box and combustion-chamber, a metal bridge-wall supported in the fire-box and shielding the portion of the partition below the opening, and water-legs formed at the sides of the shell and constituting the side-walls of the fire-box and extended across the bottom of the ash-pit as set forth.

2. In a return-flue steam-boiler the combination of a main shell, a fire-box and ash-pit, said shell provided with a transverse partition in its rear end portion to form a combustion-chamber and an ash trap between the said partition and the back-plate of the shell, said chamber extending from the top of the shell to the bottom of the ash-pit, the said partition constituting the rear walls of the fire-box and ash-pit and provided with an opening affording communication between the fire-box and combustion-chamber, a bridge-wall disposed in the fire-box and supported by the partition to shield the portion of the partition below the aforesaid opening, said bridge-wall consisting of a metal-plate having its upper portion inclined toward the said opening and water-legs formed at the sides of the shell and constituting the side-walls of the fire-box and ash-pit and extending across the bottom of the latter and from the partition to the front end of the shell as set forth.

3. In a return-flue steam-boiler, the combination of a main shell of uniform dimensions throughout the length of the boiler, fire-box and ash-pit, said shell provided with a transverse partition in its rear end por-

tion to produce a combustion-chamber between said partition and back-plate of the shell and which extends from the top of the shell to the bottom of the ash-pit, an ash-trap at the bottom of the combustion-chamber, the lower portion of the partition forming the rear walls of the ash-pit and fire-box, and provided with a port affording communication between the fire-box and combustion-chamber, and the upper portion of the partition forming a flue-sheet, said partition and back-plate being provided with coinciding openings, a supplemental shell passing through the combustion-chamber and secured in said openings, and provided in its rear end with a flue-sheet, direct flues extending through the main shell and secured at their ends in the front flue-sheet and partition, return-flues extending from the front flue-sheet to the flue-sheet of the supplemental shell, a smoke-box attached to the outer end of the supplemental shell and shaped correspondingly therewith in cross-section, a bridge-wall consisting of a metal-plate attached to the partition to shield the portion thereof below the aforesaid opening, the upper portion of the said bridge-wall being inclined rearwardly and having its upper edge disposed below the opening, and water-legs formed at the sides of the main shell and constituting the side walls of the fire-box and ash-pit and extending across the bottom of the latter and from the partition to the front end of the shell as set forth.

JAMES R. VANCE. [L. S.]

In the presence of—

GEO. A. PEEL,

A. L. BUCHHOLZ.