

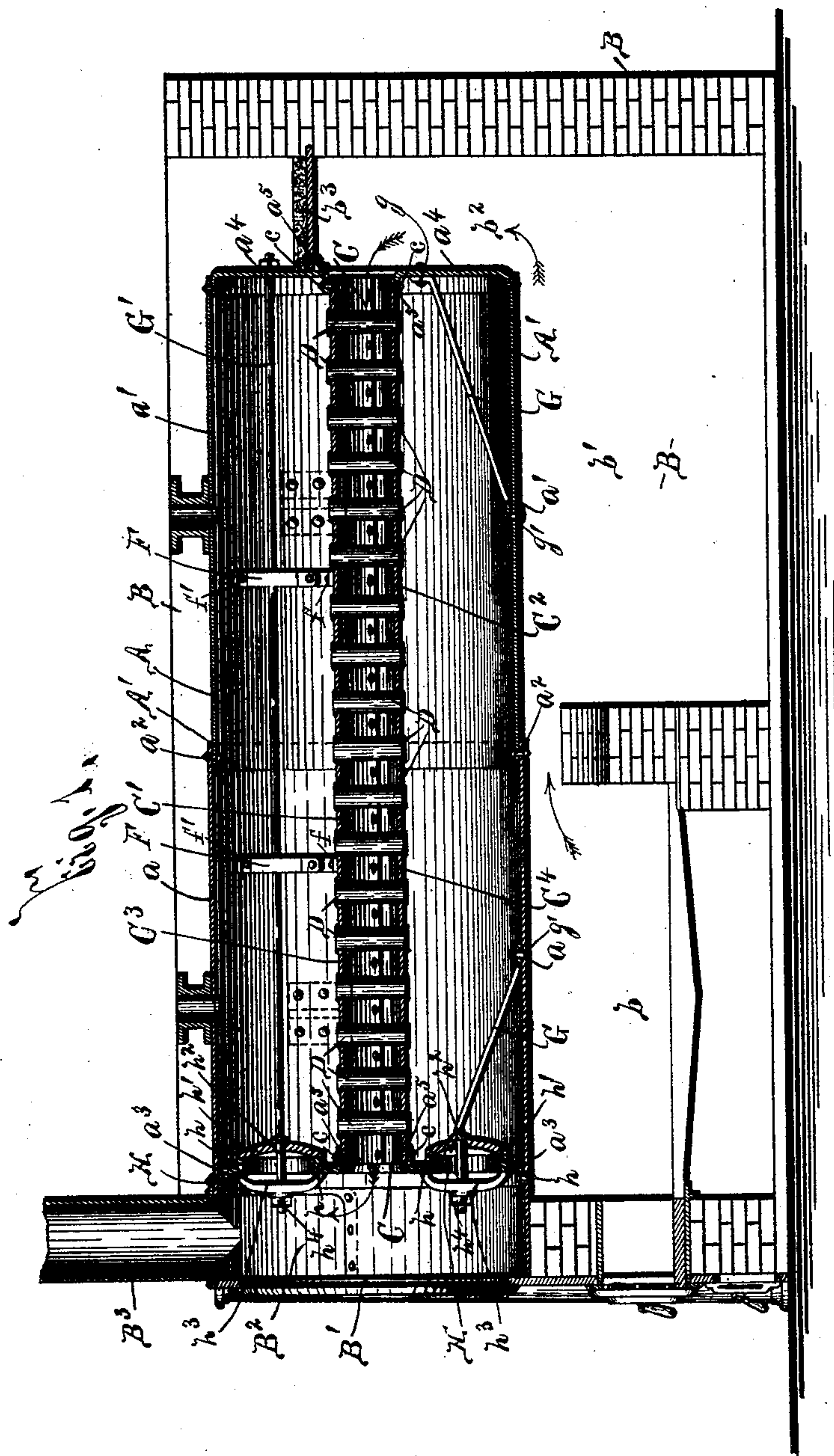
(No Model.)

2 Sheets—Sheet 1.

W. J. RANTON.  
STEAM GENERATOR.

No. 484,339.

Patented Oct. 11, 1892.



WITNESSES:

W. C. Chase,  
G. A. Wright.

**INVENTOR**

William J. Ranton

BY

51  
*Steph. Wilkinson Parsons*  
 ATTORNEYS.

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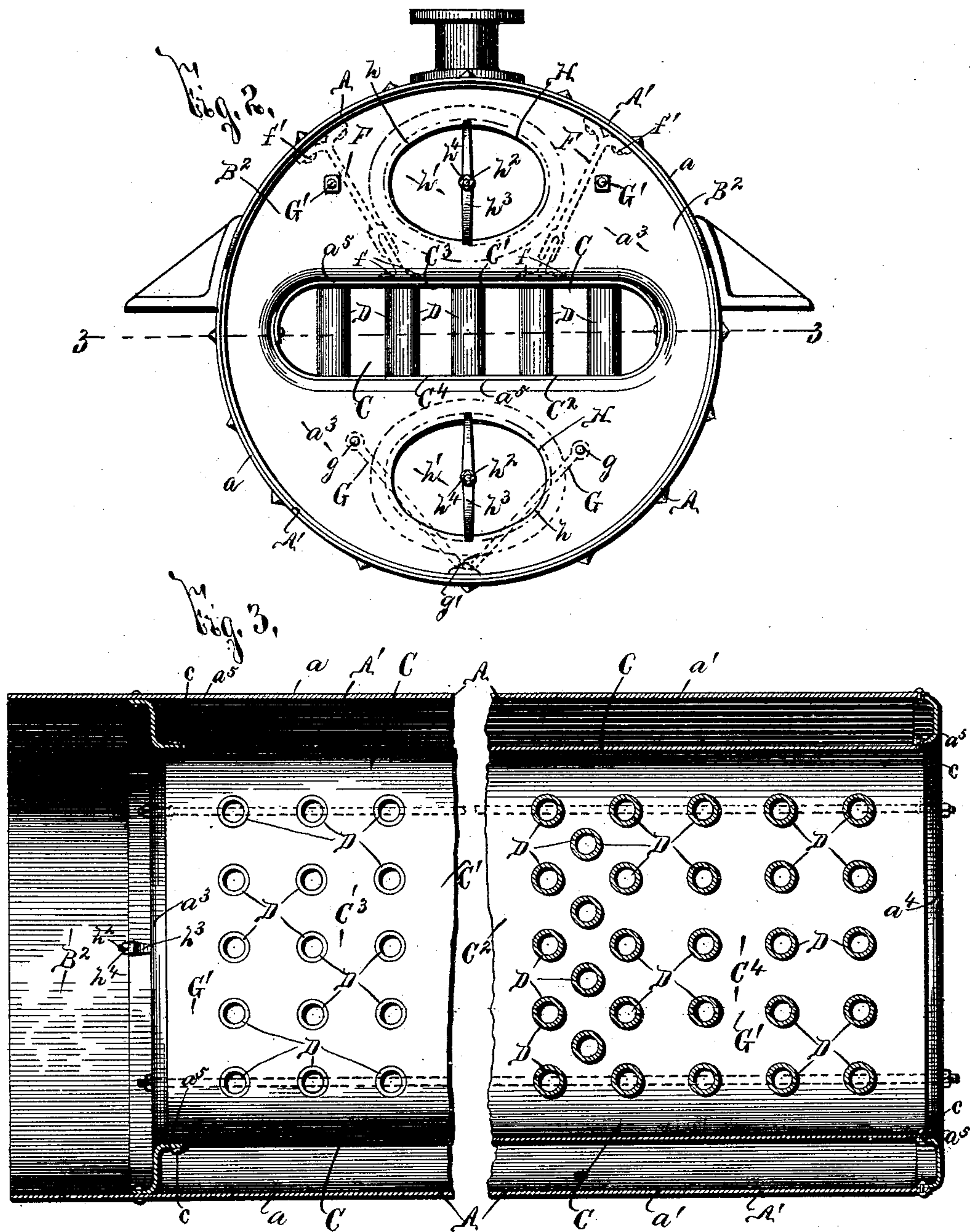
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# UNITED STATES PATENT OFFICE.

WILLIAM J. RANTON, OF SYRACUSE, NEW YORK.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 484,339, dated October 11, 1892.

Application filed March 9, 1892. Serial No. 424,262. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. RANTON, of Syracuse, in the county of Onondaga, in the State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in steam-generators particularly adapted to be supported in a suitable casing of brick or other material, and has for its object the production of a simple and effective device which is economically constructed and is extremely durable and efficient in use.

To this end it consists, essentially, in a water-containing shell, a fire-flue supported within the water-containing shell, and water-circulating tubes extending through the fire-flue, and in the detail, construction, and arrangement of the parts, all as hereinafter more particularly described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a longitudinal section of my improved generator, shown as in operative position within a suitable casing. Fig. 2 is a front elevation of the detached generator; and Fig. 3 is a longitudinal horizontal sectional view taken on line 3 3, Fig. 2, a portion of the fire-flue being shown in elevation and a portion broken away.

A represents the water-containing shell, which is of any desirable form, size, and construction, being here illustrated as composed of an outer tube  $A'$ , circular in cross-section, and formed of the plates  $a$   $a'$ , secured together at their adjacent ends by rivets or other suitable means  $a^2$  and the heads  $a^3$  and  $a^4$ , arranged at the opposite extremities of the tube  $A'$ . The water-containing shell is at Fig. 1 shown as operatively mounted within a casing B, which is of suitable form and construction and is composed of any desirable material. The casing B is provided with a combustion-chamber  $b$ , arranged beneath the forward end of the steam-generator and with the rearwardly-extending fire-passage  $b'$ ,

having the upturned extremity  $b^2$ , suitably closed at its top by a wall  $b^3$ .

C represents a fire-flue arranged within the water-containing shell A with its opposite extremities secured by rivets  $c$  to the opposite heads  $a^3$   $a^4$ , which are preferably formed with inwardly-extending integral flanges  $a^5$ , encircling the ends of the fire-flue. By forming the heads  $a^3$   $a^4$  with inwardly-extending flanges and securing the opposite ends of the fire-flue thereto the joints between said parts are protected by the water, and all leakage is prevented by calking said joints from the inside, which operation is readily permitted by manholes above and below the fire-flue, as presently described.

As readily seen in the drawings, the front head  $a^3$  of the water-containing shell A is somewhat separated from the front plate  $B'$  of the casing B, for forming a draft-chamber  $B^2$ , and in front of said head is the upwardly-extending draft-pipe  $B^3$ . It will thus be evident that, as indicated by the arrows at Fig. 1, the gases and products of combustion generated and highly heated within the combustion-chamber pass through the passage  $b'$  and its upturned end  $b^2$ , and then through the fire-flue into the draft-chamber  $B^2$ , and through and out the draft-pipe  $B^3$ . The fire-flue is sufficiently large to permit combustion of the gases within the same instead of checking the combustion, as is usually the case when heated products of combustion are passed from a large chamber through small tubes. Moreover, this combustion-flue is of such form and construction as to present to the heated products of combustion a great amount of surface and cause the absorption of the heat and generation of a great amount of steam.

As best seen at Fig. 2, the fire-flue is formed of two plates  $C'$  and  $C^2$ , secured together at their adjacent ends, is arranged centrally within the water-containing tube A, and is of greater width than thickness in order that its extremities may closely approximate the adjacent surfaces of said tube, and thereby heat as great a quantity of water as possible. The upper and lower walls  $C^3$  and  $C^4$  of the fire-flue, which are formed by the central portion of the central plates  $C'$  and  $C^2$ , are preferably flat, in order to facilitate the securement to said plates  $C'$  and  $C^2$  of water-circulating



tubes running through the fire-flue. These tubes may be of desirable form, size, and construction, and may be suitably arranged.

At Fig. 3 I have shown certain of the tubes as arranged in the same longitudinal planes and others as arranged alternately with those next in front or at the rear. It is evident that the heated gases and other products of combustion passing through the flue C when encountering the tubes D transmit their heat thereto and produce an efficient circulation of water through said tubes. Moreover, this circulation tends very effectively to agitate the water above the fire-flue and to prevent any accumulation of sediment thereupon.

In generators of considerable length I prefer to support the central portion of the fire-flue by braces F, having one end secured at  $f$  each to the fire-flue and the other at  $f'$  to the inner face of the tube A'. I also prefer to tie the central portion of the separate heads to the tube A' by means of braces G, having one end secured at  $g$  to the head and the other at  $g'$  to the adjacent outer plate  $a a'$ .

Instead of using inclined braces G, as described, I may use a rod G', extending lengthwise of the water-containing shell A', with its opposite extremities secured to the opposite heads.

For the purpose of permitting replacement of one of the water-containing tubes or cleaning of the boiler, I provide in one of the heads of the water-containing shell, as the head  $a^3$ , manholes H, above and below the fire-flue C. The head is formed with the inwardly-extending integral flange  $h$ . A plate  $h'$  is arranged within the water-containing shell and is drawn firmly against the adjacent edge of the flange  $h$  by a bolt  $h^2$  passed through a cross-bar  $h^3$  on the opposite side of the head  $a^3$  and provided with an adjusting-nut  $h^4$ . The removal and replacement of the flues D is rendered practical by forming the flue C of less thickness and the flues D of less length than the vertical distance between the flat upper and lower walls  $C^3 C^4$  of the flue and the adjacent portions of the tube A', as clearly seen at Figs. 1 and 2.

In constructing my generator the tube of the water-containing shell is rolled and formed in the usual manner and provided with a single head. The fire-flue is then suitably formed and secured to the opposite head and forced lengthwise within the outer tube A, whereupon the head secured to the fire-flue is then secured to the outer tube of the water-containing shell.

The flues are easily repaired or replaced, and owing to the peculiar construction and arrangement of the fire-flue, the water-circulating tubes, and the manholes but a minimum amount of sediment is deposited upon the upper side of the fire-flue, and this may be readily removed at will.

The operation of my invention will be readily understood upon reference to the specification and the accompanying drawings, and

it will be particularly noted that the same is simple, practical, efficient, and durable, and is economically manufactured and readily repaired, and that the peculiar construction of the fire-flue and water-circulating tubes permits combustion of the heated gases within said fire-flue and insures the absorption of the heat therefrom, thus greatly increasing the efficiency of the generator.

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

1. In a steam-generator, the combination of a combustion-chamber and a fire-passage leading from the combustion-chamber, an outer water-containing shell above said chamber and passage, a head at one extremity of the shell, formed with a central opening connected to the fire-passage, a head formed with an opening aligned with the former opening, said head being secured to said shell at a point considerably within its outer edge, whereby the shell extends beyond the latter head, forming in front of the latter head a draft-chamber, which is partially incased by the projecting portion of the shell, and a fire-flue having its opposite extremities registered with said openings for conducting the products of combustion from the fire-passage to the draft-chamber, said fire-flue being composed of a pair of plates having their central portions disposed in substantially-parallel planes and their adjacent longitudinal sides rounded toward each other with their longitudinal edges lapped one upon the other, and rivets for securing said edges together, substantially as set forth.

2. In a steam-generator, the combination of an outer water-containing shell provided near its opposite extremities with heads formed with openings in their central portions, said shell being extended beyond the front head to form a smoke-box, a fire-flue having its extremities mounted in said openings and composed of a pair of plates having their central portions disposed in substantially-parallel planes and their adjacent longitudinal sides rounded toward each other with their longitudinal edges lapped one upon the other, rivets for securing said edges together, and tubes extending through the fire-flue and formed of less length than the vertical distance between the ends of said tubes and the adjacent portions of the water-containing shell, whereby the tubes may be removed without removal of the fire-flue, substantially as and for the purpose described.

3. In a steam-generator, the combination of a combustion-chamber and a fire-passage leading from the combustion-chamber, an outer water-containing shell above said chamber, and a passage provided at its opposite extremities with heads formed with openings in their central portions, a fire-flue having its extremities mounted in said openings and composed of a pair of plates having their central portions substantially parallel and their adjacent lon-



gitudinal edges lapped one upon the other, rivets for securing said edges together, tubes extending through the fire-flue with their ends secured to the central portions of the plates  
5 composing the fire-flue, and a draft-chamber formed by extending the outer shell beyond the front head for receiving the products of combustion discharged from the fire-flue, substantially as set forth.

- 10 4. In a steam-generator, the combination of an outer water-containing shell provided near its opposite extremities with heads having oval openings in their central portions, said shell being extended beyond the front head  
15 to form a smoke-box, an oval fire-flue having its extremities mounted in said openings, the front head having manholes above and below said fire-flue and opening into said smoke-box,

plates for closing said manholes, means for holding the plates temporarily in place, and 20 upright tubes extending through the fire-flue and of less length than the vertical distance between their ends and the adjacent portions of the outer shell, whereby said tubes may be removed from the fire-flue and through the 25 manholes, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of 30 Onondaga, in the State of New York, this 26th day of February, 1892.

WILLIAM J. RANTON.

Witnesses:

CLARK H. NORTON,  
E. A. WEISBURG.