

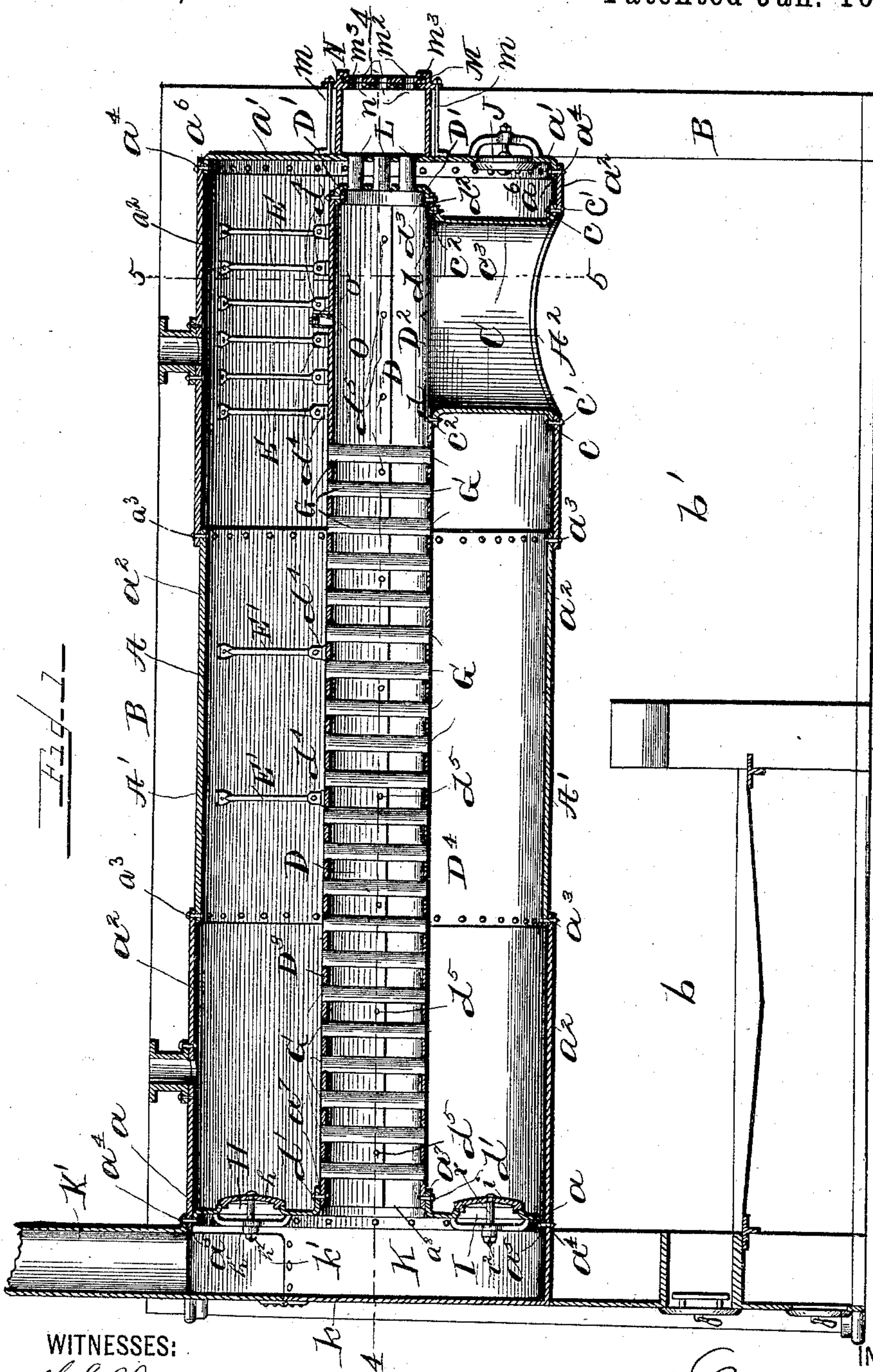
(No Model.)

2 Sheets—Sheet 1.

W. J. RAUTON.
STEAM GENERATOR.

No. 489,689.

Patented Jan. 10, 1893.



WITNESSES:

N. C. Chase,
C. Schoeneck.

INVENTOR

William J. Rauton

BY

Frederick Wilkins and Parsons
ATTORNEYS.

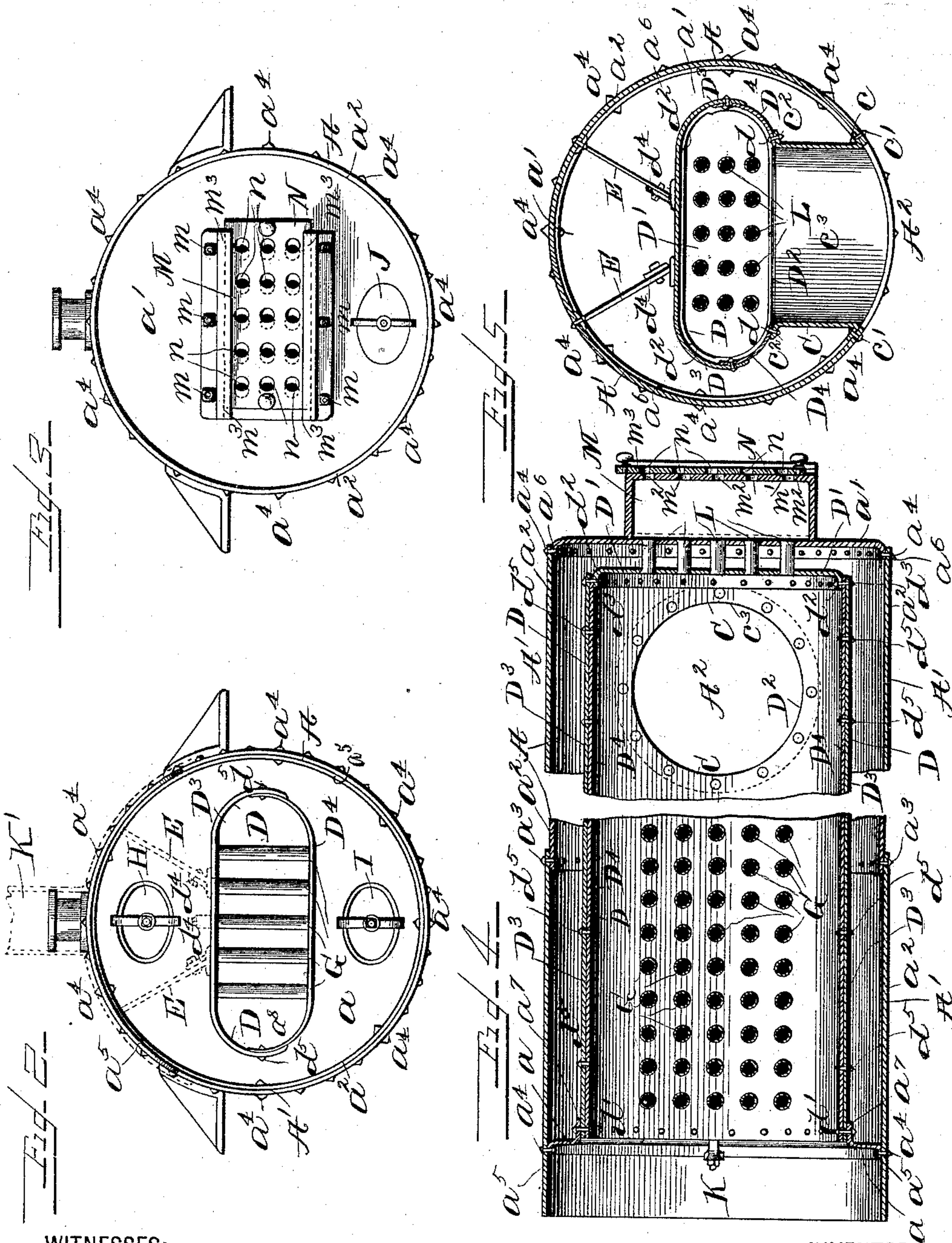
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UNITED STATES PATENT OFFICE.

WILLIAM J. RAUTON, OF SYRACUSE, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 489,689, dated January 10, 1893.

Application filed July 26, 1892. Serial No. 441,238. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. RAUTON, of Syracuse, in the county of Onondaga, in the State of New York, have invented 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, of somewhat similar construction to the generator shown in my pending application, Serial No. 424,262, and has for its object the production of a simple and practical device of great efficiency which is economically constructed and is durable in use.

To this end it consists, essentially, in a water containing shell supported above a combustion box and formed with a fire passage extending inwardly from one side of one of its extremities, a fire flue supported within the outer shell with one extremity arranged above the inner end of the fire passage and formed with an opening registered therewith, and the other discharging from the opposite extremity of the outer shell; 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 sectional view of my improved generator shown as in operative position within a suitable casing. Figs. 2 and 3 are, respectively, elevations of the front and rear end of the water containing shell of the generator. Fig. 4 is a horizontal sectional view, taken on line 4—4, Fig. 1, the central portion of the water containing shell being broken away for the purpose of increasing the scale; and Fig. 5 is a vertical transverse section taken on line 5—5, Fig. 1.

The water containing shell —A— of my invention may be of any desirable form, size and construction and is here illustrated as composed of an outer substantially circular tube —A'— and front and rear heads —a— a'—. The tube —A'— is composed of sec-

tions —a²—a²—a²— having their adjacent ends secured together by rivets —a³—. The opposite ends of the end sections —a²—a²— are secured by rivets —a⁴—a⁴— to the heads —a—a'—, the front head being formed with an outwardly turned flange —a⁵— and the rear head with an inwardly turned flange —a⁶— for receiving said rivets. As clearly seen at Fig. 1, the outer shell is operatively mounted within a suitable casing —B— of any desirable form and material, which is provided with a combustion chamber —b— arranged beneath the forward end of the water containing shell, and a fire passage —b'— arranged directly beneath the opposite end of said shell.

—A²— represents an opening in the base of the rear end of the tube —A'—, and —C— a pipe or fire passage formed at its lower end with an outwardly turned flange —c— secured by suitable rivets —c'— at the edge of the opening —A²—. The upper edge of the pipe —C— is formed with an out turned flange —c²— and the rear wall —c³— of said pipe is considerably separated from the rear head —a'— for permitting a circulation of water around the said tube.

The products of combustion ascend from the chamber —b'— through the tube or fire passage —C—, the sides of which are surrounded by water and form heating surfaces, and consequently, said tube forms, essentially, an inwardly extending fire passage opening inwardly or upwardly from the base or lower wall of one extremity of the water containing shell —A—.

—D— represents a fire flue arranged longitudinally within the water containing shell —A— with its rear extremity supported upon the flange —c²— of the tube —C— and rigidly secured thereto by rivets —d—, and its front extremity supported upon, and secured by rivets —d'— to, a flange a⁷— extending inwardly from the head —a— and surrounding a central oval opening —a⁸— in said head —a—.

At the rear end of the fire flue —D— is a head —D'— formed with a forwardly extending flange —d²— secured to the fire flue by rivets —d³—. This head closes the rear end of the fire flue, and its rear face is somewhat separated from the adjacent face of the head

—*a'*— for permitting a circulation of water between said heads —*D'*— and —*a'*—.

—*D*²— represents an opening in the lower wall of the rear end of the flue —*D*— registered with the pipe —*C*— whereby the products of combustion pass through the tube —*C*— from the fire passage —*b'*— and impinge directly against the head —*D'*— and the upper wall of the rear end of the fire flue, both of which surfaces are surrounded with water and add to the heating surface of my generator.

—*E*— represents braces having their lower ends secured to lugs —*d*⁴— upon the top wall of the rear end of the flue, and their upper ends provided with lugs attached to the adjacent face of the upper wall of the tube —*A'*— for firmly and practically supporting the upper wall of the rear end of the fire flue —*D*—. In order to additionally support this fire flue, I provide central braces —*E'*—*E'*— of similar construction to the braces —*E*— previously described.

As best seen at Fig. 2, the fire flue —*D*— is composed of two plates —*D*³—*D*⁴— having their central portions oppositely arranged and disposed in substantially horizontal planes and their longitudinal edges rounded toward each other and secured together by rivets —*d*⁵—. Extending vertically through the fire flue —*D*— are water passages or flues —*G*— having their opposite extremities flanged in the oppositely arranged central portions of the plates —*D*³—*D*⁴—.

As clearly seen at Figs. 1 and 2, the thickness of the flue —*D*— and also the length of the tubes —*G*— is less than a perpendicular line extending from the outer tubes —*G*— to the adjacent portions of the tube —*A'*—. Consequently, these tubes may be readily removed without the withdrawal of the fire flue —*D*—, by loosening their ends and drawing them upwardly or downwardly until they are free from the tube.

To permit access to the fire flue for the withdrawal of the tubes and for permitting cleaning of the water containing shell, I provide man-holes —*H*—*I*— arranged, respectively, above and below said fire flue and formed of any desirable construction. Plates —*h*—*i*— are arranged on the inner face of the man-holes —*H*—*I*—, and suitable bolts and nuts —*h'*—*h*²—, —*i'*—*i*²— are used for temporarily holding said plates in operative position. The cleaning of my generator is further facilitated by a hand-hole —*J*— in the rear head —*a'*— arranged beneath the fire flue.

The draft chamber —*K*— of my generator is preferably mounted directly above the combustion chamber —*b*— in front of the forward end of the fire flue —*D*— and is incased by the head —*a*—, a portion of the tube —*A'*— which projects in front of the head —*a*—, and a suitable wall —*k*—*k'*— composed of any desirable material, and secured to the projecting portion of the tube —*A'*—. A draft pipe

—*K'*— opens from the chamber —*K*— and serves to conduct therefrom the products of combustion passed through the fire flue —*D*—. This construction of generator is particularly effective since the fire flue —*D*— is sufficiently large to permit the combustion of the gases and the products of combustion impinge against the under face of the tube —*A'*—, the sides of the tube —*C*—, the sides of the fire flue —*D*— and the water containing tubes —*G*— passed therethrough. It will thus be noted that until the products of combustion are discharged into the draft chamber —*K*—, they impinge directly against heating surfaces constantly cooled by the water within the water containing shell and not against surfaces radiating to the outside of the generator.

To facilitate the action of my improved generator, I provide the same with air or combustion fluid inlet tubes or pipes —*L*— having their inner ends flanged to the head —*D'*— at the rear of the fire flue —*D*—, and their outer ends to the head —*a'*—. These pipes or tubes are of suitable number and extending outwardly therefrom from the rear wall of the casing —*B*— is a chamber —*M*— secured in position by bolts —*m*— and formed with an outer wall —*m'*— provided with openings —*m*²— registered with the tubes —*L*—. A suitable damper or other device is actuated to regulate the flow of air through the openings —*m*²— and as here illustrated, this damper consists of a flat bar or plate —*N*— provided with separated perforations —*n*— adapted to register with the perforations —*m*²— and having its upper and lower edges movable in guides —*m*³— on the plate —*m'*—. At Fig. 3 the damper is shown as partly open, and it may be either shifted to the right or to the left for closing or opening said apertures —*m*²— and permitting the entrance of air.

It is evident that the inlet of the air directly into the rear end of a large fire flue of the character described greatly aids the combustion of the gases within said flue and if desired, the air may be forcibly driven through said flues for accelerating the draft.

—*O*— represents a pipe or flue extending upwardly for a short distance from the wall of the fire flue directly above the opening —*D*²—. In the upper end of this pipe is a fusible plug —*o*— which is quickly fused as soon as the level of the water falls sufficiently near the plug to permit of its fusing, whereupon the steam and water are thrown downwardly through the tube —*C*—, and the fire passage —*b'*— into the combustion chamber —*b*— and effectually extinguish the fire and obviate the liability of the explosion which might otherwise occur.

My invention is preferably constructed by first forming the tube —*A'*—, securing the head —*a*— to the front end of said tube which may be readily done from the outside, securing the tube —*C*— in position, passing the flue

—D— within the tube —A'—, and lastly, securing the rear head —a'— to the tube —A'— and to the flues —L—.

It is evident, to one skilled in the art, that a steam generator constructed and assembled as described, is manufactured economically and practically and that the water surfaces of the joints may readily be calked with the greatest possible convenience and ease.

The construction and operation of my generator will be readily perceived from the foregoing description and upon reference to the drawings, and it will be particularly noted, that the products of combustion are caused to impart their heat to a great amount of effective heating surface, that in their progress the gases are not extinguished, that air may be readily admitted to the burning gases for accelerating their combustion, and that the entire generator is practical, efficient and durable. It is evident, however, that its detail construction and arrangement may be somewhat varied without departing from the spirit of my invention.

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 an outer water containing shell having a fire passage extending inwardly from one extremity of its base, a lengthwise fire flue supported within the outer shell with one end arranged above the inner extremity of the fire passage and formed with an opening registered therewith and the other discharging from the opposite extremity of the outer shell, and an air inlet pipe—L—discharging into the former end of said fire flue, substantially as and for the purpose specified.

2. In a steam generator, the combination with an outer casing formed with a combustion chamber at one end of its base, and with a fire passage leading from said combustion chamber to the opposite end of its base; of an outer water containing shell formed separable from and supported by said outer casing, and having its lower portion arranged within said outer casing above said combustion chamber and fire passage of the outer casing, and provided with a fire-passage extending inwardly from the extremity of its lower wall above the inner end of the former fire-passage, a lengthwise fire-flue supported within the water containing shell with one end formed with an opening in its lower wall connected to the fire-passage of said outer water containing shell and the other end discharging from the opposite extremity of the outer water containing shell, substantially as and for the purpose set forth.

3. In a steam generator, the combination with an outer casing formed with a combustion chamber at one end of its base, and with a fire-passage leading from said combustion chamber to the opposite end of the base of the outer casing; of an outer water containing tubular shell of rounding cross section formed

separable from and supported by said outer casing, and having its lower portion arranged within said outer casing above said combustion chamber and fire-passage, of the outer casing and provided with a fire-passage extending inwardly from the extremity of its lower wall above the inner end of the former fire-passage, a lengthwise fire-flue supported within the outer water containing shell with one end formed with an opening in its lower wall connected to the fire-passage of the outer water containing shell and the other end discharging from the opposite extremity of the outer shell, substantially as described.

4. In a steam generator, the combination with an outer casing formed with a combustion chamber at one end of its base, and with a fire-passage leading from said combustion chamber to the opposite end of its base; of an outer water containing shell arranged above said combustion chamber and fire-passage, and provided with a fire-passage extending inwardly from the extremity of its lower wall above the inner end of the former fire-passage, a lengthwise fire-flue supported within the water containing shell with one end formed with an opening in its lower wall connected to the fire-passage of said outer water containing shell and the other end discharging from the opposite extremity of the outer water containing shell, and an air inlet pipe—L—discharging into the former end of said fire-flue, substantially as set forth.

5. In a steam generator, the combination of an outer water containing shell provided with end heads and having an opening in one extremity of its lower wall, a lengthwise fire-flue arranged within the shell and formed of less length than the inner faces of said heads, said fire-flue having its front end rigidly secured to one head of the shell and having an opening in the lower wall of its opposite end registered with the opening in the lower wall of said shell, a supporting tube between said openings having outwardly turned flanges at its extremities secured respectively to the inner and outer faces of said shell and fire-flue, and an air inlet pipe—L—between the end of said fire-flue provided with said opening and the adjacent head of the outer casing, substantially as and for the purpose set forth.

6. In a steam generator, the combination of an outer casing formed with a combustion chamber at one end of its base and with a fire passage leading from the combustion chamber to the opposite end of its base, an outer water containing shell having one extremity supported above the combustion chamber and the other extremity supported above the fire passage and provided with a fire passage extending inwardly from its lower wall, a smoke box at the extremity of the outer shell supported above the combustion chamber, a fire flue supported within the water containing shell with one end formed with an opening in its lower wall connected to the inner end of the fire passage of said water containing shell

and the other end discharging into the smoke box, and an air inlet pipe —L— discharging into the former end of said fire flue, substantially as and for the purpose specified.

5 7. In a steam generator, the combination of a combustion chamber and a fire-passage leading from the combustion chamber, an outer water containing shell arranged above said chamber and passage, and formed with an
10 opening in one extremity of its lower wall, a head at said extremity of the shell, a second head formed with a central opening and arranged within said shell in a plane considerably within its outer edge, whereby the shell
15 extends beyond said head and partially incases a smoke-box in front of the second head, and a fire-flue having one end mounted in said opening in the second head and having its other end provided with an opening in its
20 lower wall connected to said opening in the lower wall of the water-containing shell, said fire-flue being composed of a pair of plates having their central portions disposed in substantially parallel planes and their adjacent
25 longitudinal sides rounded toward each other with their longitudinal edges lapped one upon the other, and rivets for securing said edges together, substantially as specified.

8. In a steam generator, the combination of
30 an outer water containing shell formed with an opening in the rear extremity of its lower wall and provided at its opposite extremities with heads, the front head being formed with a central opening and being arranged within
35 said shell in a plane considerably within its outer edge, whereby the shell extends beyond said head and partially incases a smoke-box in front of said head, a fire-flue having one end mounted in the opening in the front head,
40 and having its other end provided with an opening in its lower wall connected to the opening in said outer shell, said fire-flue being composed of a pair of plates having their central portions disposed in substantially parallel
45 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
50 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 withdrawn after removal of the fire-flue, substantially as
55 set forth.

9. In a steam generator, the combination of a combustion chamber and a fire-flue leading from the combustion chamber, an outer water containing shell arranged above said chamber and passage, and formed with an opening
60 in one end of its lower wall a head at said extremity of the shell, a second head formed with a central opening and arranged within the opposite end of said shell in a plane considerably within its outer edge, whereby the shell extends beyond said head and partially
65 incases a smoke-box in front of the second

head, and a fire-flue having one end mounted in said opening in the second head and having its other end provided with an opening
70 in its lower wall connected to said opening in the lower wall of the water-containing shell, said fire-flue being composed of a pair of plates having their central portions substantially parallel and their adjacent longitudinal edges
75 lapped one upon the other, rivets for securing said plates together, and tubes extending through the fire-flue with their ends secured to the central portions of the plates composing the fire-flue, substantially as described. 80

10. In a steam generator, the combination of an outer water containing shell formed with an opening in one extremity of its lower wall, a head at said extremity of the shell, a second
85 head formed with an oval opening and with man-holes above and below said opening and arranged within said shell at a point considerably within its outer edge, whereby the shell extends beyond said head and partially incases a smoke-box in front of the second head,
90 plates for closing said man-holes, means for holding the plates temporarily in place, an oval fire-flue having one end mounted in said opening in the second head and having its other end provided with an opening in its
95 lower wall connected to the opening in said outer shell, and tubes extending through the fire-flue and formed of less length than the vertical distance between their ends and the adjacent portions of the outer shell, whereby
100 said tubes may be removed from the fire-flue and through the man-holes, substantially as described.

11. In a steam generator, the combination of an outer water containing shell having a
105 fire passage extending inwardly from one extremity of its base, a lengthwise fire flue supported within the outer shell with one end arranged above the inner extremity of the fire passage, and formed with an opening registered therewith and the other end discharging
110 from the opposite extremity of the outer shell, an air inlet pipe —L— discharging into the former end of said fire flue, and a movable damper for varying the passage through said
115 pipe, substantially as and for the purpose specified.

12. In a steam generator, the combination of an outer casing formed with a combustion chamber at one end of its base and with a
120 fire passage leading from the combustion chamber to the opposite end of its base; of an outer water containing shell having one extremity supported above the combustion chamber and the other extremity supported
125 above the fire passage and provided with a fire passage extending inwardly from one extremity of its lower wall, a head secured to the rear end of the water containing shell, a head secured to the front end of said shell
130 and formed with an inwardly extending flange, a fire flue having its rear end mounted on the inwardly extending fire passage of the fire flue and the other engaged with the in-

wardly extending flange of the front head of the water containing shell, substantially as and for the purpose set forth.

13. In a steam generator, the combination
5 of an outer casing formed with a combustion chamber at one end of its base and with a fire-passage leading from the combustion chamber to the opposite end of its base; with
10 an outer water containing shell supported above the combustion chamber and fire passage and having a fire passage extending inwardly from one extremity of its lower wall, a lengthwise fire flue supported within the
15 outer shell with one end arranged above the inner end of the fire passage of the water containing shell and formed with an opening registered with said fire passage and the other discharging from the opposite extremity of the outer shell, a pipe extending upwardly
20 from the portion of the wall of said fire flue directly above said opening therein, and a fusible stop for said pipe, whereby, when said stop is exposed, it becomes fused and the water passes through said pipe and opening, into
25 the fire passages substantially as and for the purpose specified.

14. In a steam generator, the combination
of an outer water containing shell having a fire passage extending inwardly from one ex-
30 tremity of its base, a lengthwise fire flue supported within the outer shell with one end arranged above the inner extremity of the fire passage and formed with an opening regis-

tered therewith and the other end discharg-
ing from the opposite extremity of the outer 35 shell, an air inlet pipe —L— discharging into the former end of said fire flue, an air chamber aligned with said pipe and provided with an inlet opening and a damper for regulating the flow through said opening, substantially as 40 set forth.

15. In a steam generator, the combination
of an outer water containing shell having an opening in one extremity of its lower wall and heads at its opposite extremities, a lengthwise 45 fire flue having one end secured to one head and the other provided with a head and with an opening registered with the opening in the water containing shell, a pipe connecting said openings, a brace between the portion of said 50 fire flue directly above the said opening and the adjacent portion of the water containing shell, and an air inlet pipe having one extremity opening into the head of the fire flue and the other opening from the adjacent head 55 of the water containing shell, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attest-
ing witnesses, at Syracuse, in the county of 60 Onondaga, in the State of New York, this 15th day of July, 1892.

WILLIAM J. RAUTON.

Witnesses:

CLARK H. NORTON,
L. M. BAXTER.

Affidavit having been filed showing that the name of the patentee in Letters Patent No. 489,689, granted January 10, 1893, for an improvement in "Steam-Generators," should have been written and printed *William J. Ranton*, instead of "William J. Rauton," it is hereby certified that the proper correction has been made in the files and records pertaining to the case in the Patent Office, and should be read in the Letters Patent that the same may conform thereto.

Signed, countersigned, and sealed this 7th day of February, A. D. 1893.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

W. E. SIMONDS,
Commissioner of Patents.