

(No Model.)

2 Sheets—Sheet 1.

G. W. JOHNSON.
STEAM BOILER.

No. 516,816.

Patented Mar. 20, 1894.

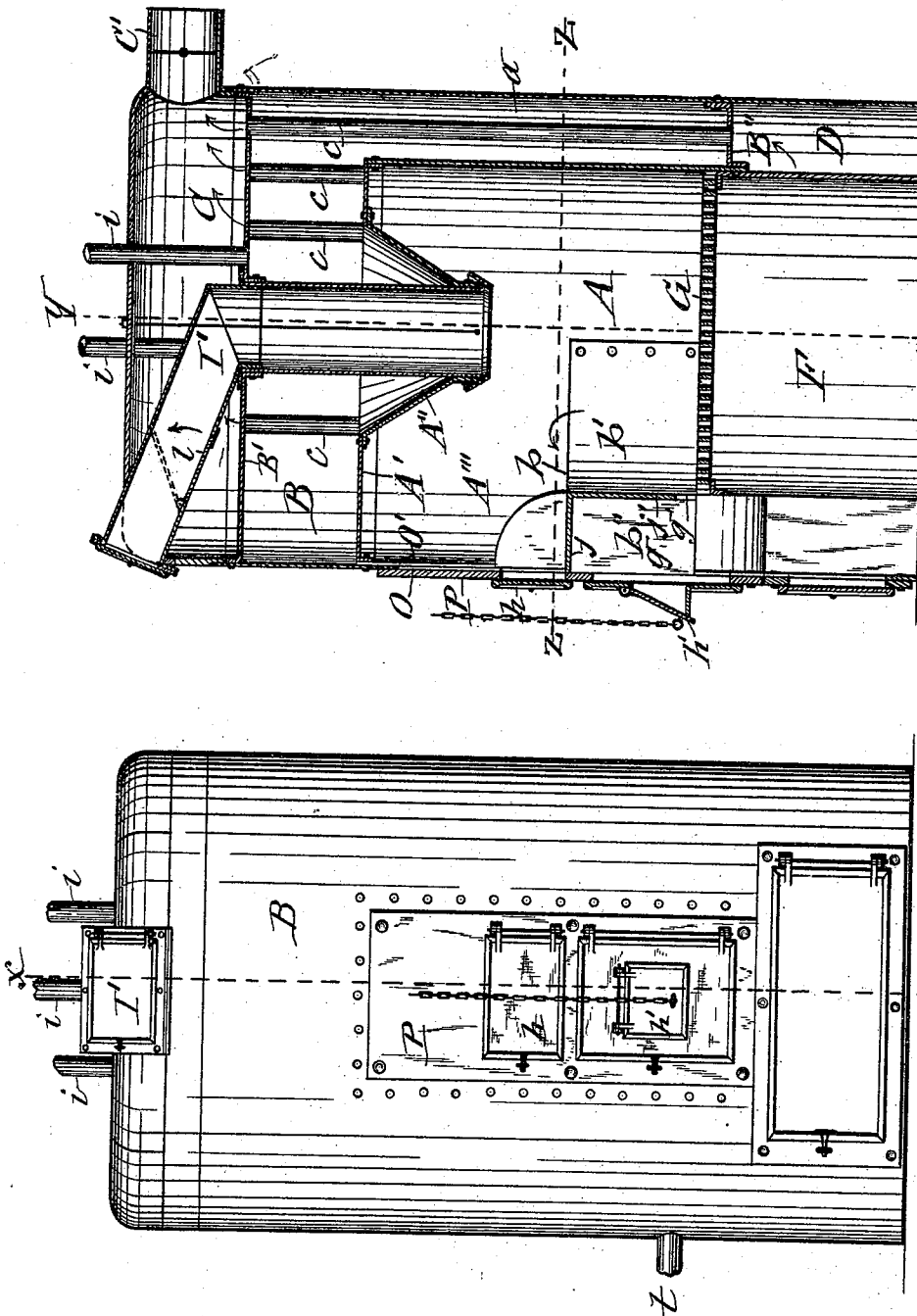


Fig. 2

Fig. 1

WITNESSES:

C. L. Burdixon
J. J. Saass

INVENTOR:

George W. Johnson
By E. Laass
his ATTORNEY.

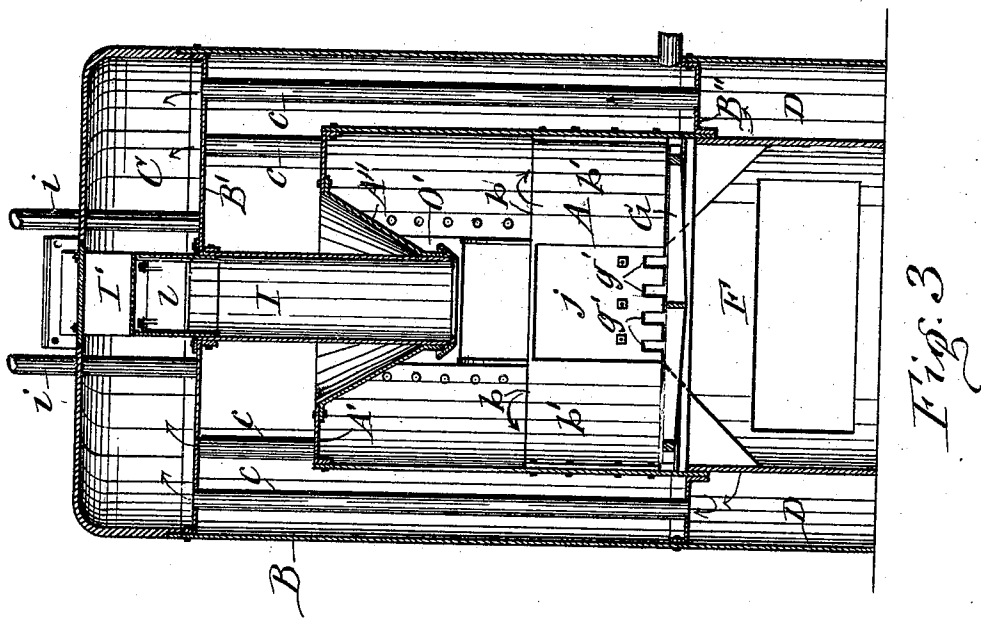
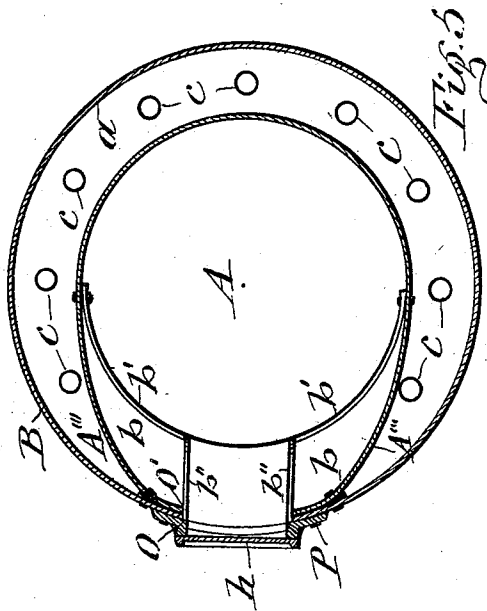
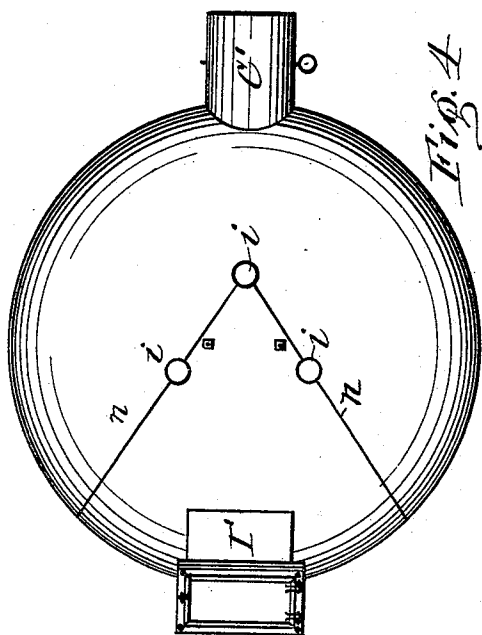
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C. L. Bendixen
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UNITED STATES PATENT OFFICE.

GEORGE W. JOHNSON, OF GENEVA, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 516,816, dated March 20, 1894.

Application filed July 3, 1893. Serial No. 479,434. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. JOHNSON, 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 steam boilers which are placed in an upright position and have the fire-box arranged inside of the boiler with a water space surrounding the fire box.

The object of my present invention is to render the boiler more efficient and more convenient in its operation, and to that end the invention consists in the improved construction and combination of parts hereinafter described and set forth in the claims.

In the annexed drawings, Figure 1 is a front elevation of a boiler embodying my improvements. Fig. 2 is a vertical transverse section on line *x x* in Fig. 1. Fig. 3 is a vertical transverse section on line *y y* in Fig. 2. Fig. 4 is a top plan view of the boiler, and Fig. 5 is a horizontal transverse section on line *z z*, in Fig. 2.

Similar letters of reference indicate corresponding parts.

—B— represents the boiler-shell which is of cylindrical form placed in an upright position, and provided with the fluesheets—B'— and —B''— respectively at its upper and lower ends.

—A— denotes the fire box which is located inside of the boiler shell, and extends from the bottom partway the height thereof. The shell of said fire box is formed with a semi-cylindrical main portion which is concentric with the boiler-shell as shown in Fig. 5 of the drawings. Said semi-cylindrical main portion is terminated with outwardly deflected portions—A'''——A'''— having an opening —O'— between the vertical edges thereof where they are riveted to the boiler shell along the edges of a corresponding opening —O— in the same.

To the exterior of the boiler shell is fastened the plate—P— which is provided with the door—h— through which to introduce the

fuel into the fire-box, and with a draft door —h'— beneath the said feed door.

—G— denotes the grate which is circular in shape and may be of any suitable or well known construction, and —F— is the ash-pit which is cylindrical and concentric with the grate and of about the same diameter. Said ash-pit is surrounded by an annular flue —D—, the outer wall of which may be formed of a downward extension of the boiler-shell, the top of said flue being formed of the annular bottom flue sheet of the boiler.

—b—b— represent two down draft flues which are arranged at opposite sides of the draft-door —h'— and extend from the bottom of the fire-box partway the height thereof, and are formed of upright segmental walls —b'—b'— disposed concentric with, and joined to the main portion of the fire-box-shell at its junction with the outwardly deflected portions—A'''—A'''—. Said segmental walls terminate with outwardly extending walls —b''—b''— at opposite sides of the draft-door —h'—. A horizontal plate —j— extending across the space between the two walls —b''—b''— at the top thereof, and a vertical plate —j'— extending across the same space at the inner ends of said walls, forms a chamber —g— opposite the draft-door —h'—. Said vertical plate is provided with ports —g'—g'— through which to introduce a poker for cleaning the grate or stirring the fire. The flues —b—b— are open at the top and bottom and thus lead from the fire-box to the annular flue —D—.

The chamber —g— has its bottom open to the ash-pit to allow the air, admitted by opening the draft-door —h'—, to enter the ash-pit, and also allow the ashes or clinkers which may enter said chamber through the ports —g'—g'— to drop into the ash-pit. Said communication of the chamber —g— with the ash-pit is very important inasmuch as it obviates the falling of the clinkers and ashes from the ports —g'—g'— to the exterior of the ash pit, and the wall —j'— which constitutes part of the fire box and is thus heated, heats the air which enters through the open draft-door —h'— and descends to the fire-box and thence passes through the grate. The heating of said air promotes the combustion of the fuel.

This air-heating chamber —*g*— and its means of communicating with the ash-pit is not claimed in this application, but is reserved as a subject for another application for patent intended to be filed by me.

The fire-box-shell is of such a diameter and disposed in such a position in relation to the boiler-shell —*B*— as to form a water space —*a*— between their vertical walls, and through this water space extend vertical flues —*c-c-c*— which are secured in the top and bottom flue sheets —*B'*— and —*B''*— of the boiler and communicate at their lower ends with the annular flue —*D*—, and at their upper ends with the smoke-box —*C*— which latter is mounted on top of the boiler.

—*i-i-i*— represent the steam-pipes which conduct the steam from the boiler to the place or places where the steam is to be used. Said pipes pass through the top of the smoke-box, and in order to permit the cap of said smoke-box to be removed to obtain access to the top of the flue-sheet —*B'*—, and to the flues —*c-c*— for cleaning the same or calking the upper ends of the flues, without disturbing the steam-pipes —*i-i-i*—, I divide the cap of the smoke-box on lines —*n-n*— intersecting the holes through which the steam-pipes pass as shown in Fig. 4 of the drawings.

—*t*— designates the feed water pipe of the boiler, —*I*— represents the fuel-magazine, and —*I'*— the coal-chute which extends from the top of the magazine ascendingly through the top of the front portion of the smoke-box —*C*—.

In order to protect the magazine —*I*—, from the fire in the fire-box, I form the crown sheet —*A'*— of the latter, with the depression —*A''*—, through which the magazine passes and to the bottom of which the lower end of the magazine is secured water-tight. The water of the boiler entering the depression —*A''*—, protects the magazine —*I*— as aforesaid.

To obtain a direct draft in starting the fire in the fire-box, I provide the coal-chute with a draft-hole, preferably in its bottom, and with a damper —*l*— for opening and closing said hole as may be desired. By opening said damper the products of combustion are allowed to ascend in the magazine —*I*— and pass through the draft hole in the coal-chute —*I'*—, to the interior of the smoke-box —*C*— from whence they escape through the exit pipe —*C'*—. The air is admitted into the fire-box by opening the draft-door —*h'*—, which permits the air to enter the chamber —*g*— from whence it descends through the bottom of said chamber into the ash-pit, and then ascends through the grate —*G*— and fuel resting thereon. When the direct draft damper —*l*— in the coal-chute is closed the products of combustion pass down through the flues —*b-b*— into the annular flue —*D*—, from whence they ascend through the flues —*c-c*— into the smoke-box —*C*— as indicated by arrows in Figs. 2 and 3 of the drawings.

It will be observed that in my improved boiler the arrangement of the fire-box occupying the lower and main portion of the boiler and forming between their vertical walls a water-space through which the smoke-flues pass, and the smoke-box —*C*— directly over the boiler furnishes the boiler with a large amount of effective heating surfaces, which are further augmented by the depression —*A''*— of the crown sheet of the fire-box.

What I claim as my invention is—

1. The combination with the boiler-shell, provided with the feed-door in its side, of the fire-box shell disposed in the boiler-shell with a water space between their main portions and terminated at opposite sides of the feed-door by the junction of said shells, an annular smoke-flue under the aforesaid water-space, down-draft flues at opposite sides of the feed-door and leading from the fire-box to the aforesaid annular flue, a smoke-box over the boiler, and smoke-flues extending through the aforesaid water space and communicating at opposite ends with the annular flue and smoke-box as set forth.

2. The combination, with the upright cylindrical boiler shell provided with a feed door and a draft door, of the fire box seated with its main portion concentric in the boiler shell and having its shell united therewith around the feed-door, the flues —*b-b*— formed of segmental walls —*b'-b'*— concentric with and joined to the main portion of the fire-box shell, and with outwardly extending walls —*b''-b''*— at opposite sides of the draft-door, the ash-pit —*F*—, and annular flue —*D*— respectively under the fire-box and water-space —*a*—, the smoke-box —*C*— over the boiler, and the vertical flues —*c-c*— extending through said water-space and communicating at opposite ends with the flue —*D*—, and the smoke box —*C*— substantially as set forth and shown.

3. In combination with the upright cylindrical boiler shell —*B*— provided with the vertical opening —*O*—, the fire-box —*A*— seated in the boiler-shell and having a corresponding vertical opening —*O'*— and joined to the boiler shell around the aforesaid openings, the ash-pit —*F*—, annular flue —*D*—, flues —*b-b*— extending from the fire-pot to the annular flue and formed with the intermediate chamber —*g*— having ports —*g'-g'*—, and the plate —*P*— secured to the exterior of the boiler shell around the opening —*O*— thereof and provided with doors, —*h*— and —*h'*— substantially as described and shown.

4. The improved upright boiler consisting of the cylindrical boiler shell —*B*—, the fire-box shell —*A*— extending partway the height of the shell —*B*— and formed with a semi-cylindrical portion terminating withoutwardly deflecting portions, —*A'''-A'''*—, riveted to the boiler shell and having the crown sheet —*A*— formed with the depression —*A''*—, the ash-pit —*F*—, annular flue —*D*— sur-

rounding the ash-pit, the flues —b—b— extending partway the height of the fire-box and formed with the segmental walls —b'—b'— concentric with and riveted to the ends
5 of the semi-cylindrical portion of the fire-box shell and leading from the fire box to the aforesaid annular flue, the smoke-box —C— over the boiler, the vertical flues —c—c—c— extending from the flue —D— to the smoke-
10 box, and the fuel magazine —I— extending through the depression —A''— substantially as described and shown.

5. In combination with the upright boiler

—B— provided with vertical flues —c—c—c— and steam-pipes —i—i—, the smoke-box 15
—C—, mounted on said boiler and divided on lines passing through the holes receiving through them the aforesaid steam-pipes as set forth.

In testimony whereof I have hereunto 20
signed my name this 21st day of June, 1893.

GEORGE W. JOHNSON. [L. S.]

Witnesses:

JOHN J. LAASS,
M. L. MAGUIRE.