

(No Model.)

G. W. JOHNSON.
STEAM BOILER.

No. 559,583.

Patented May 5, 1896.

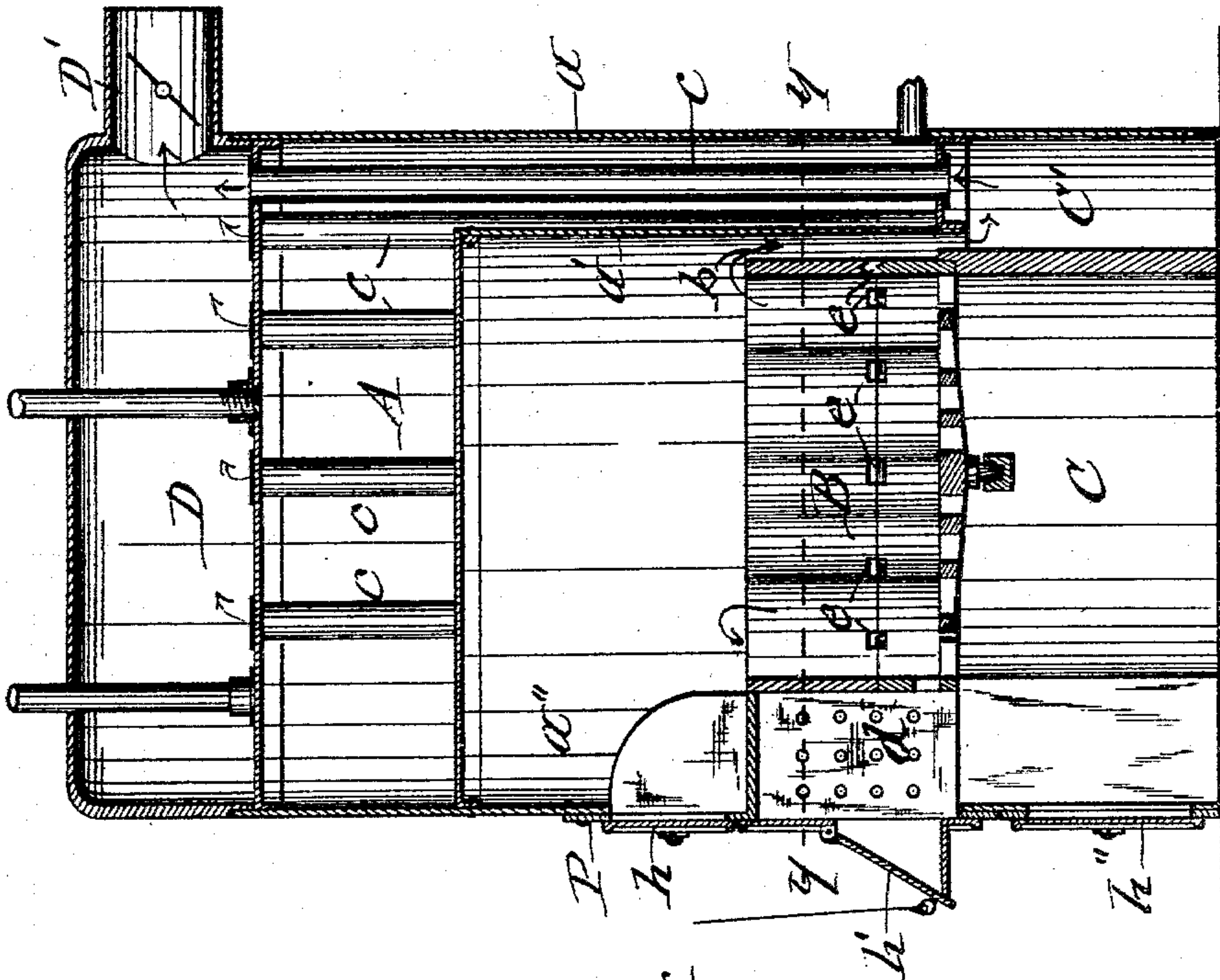


Fig. 1

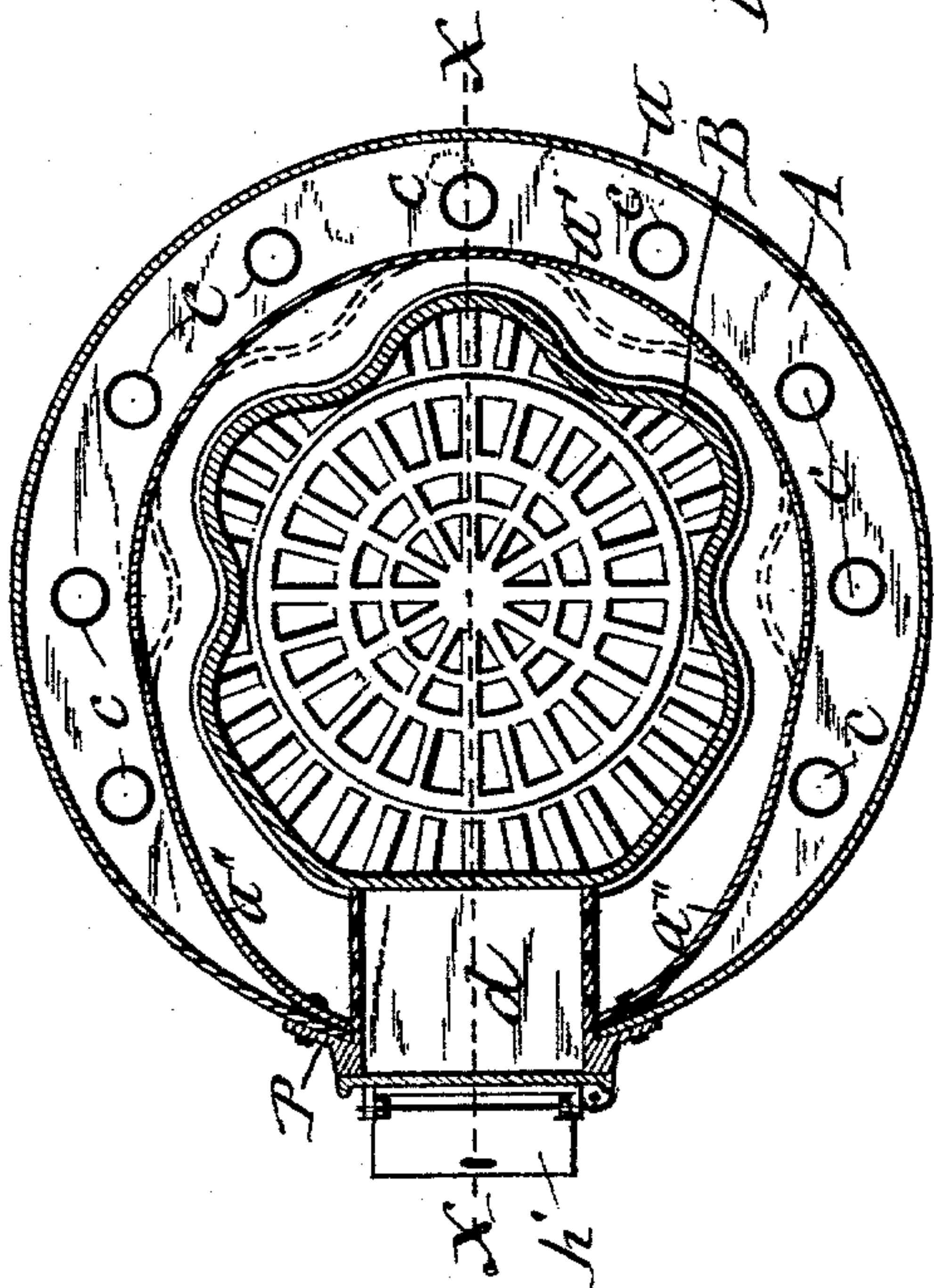


Fig. 2

WITNESSES:

E. L. Bendixon
J. J. Laass

INVENTOR:

George W. Johnson
By E. Laass
his ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE W. JOHNSON, OF GENEVA, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 559,583, dated May 5, 1896.

Application filed January 10, 1894. Serial No. 496,349. (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 annular-shaped and placed upright and have the fire-box situated inside of the boiler and communicating with a smoke-flue under the boiler, from whence the products of combustion pass through vertical flues extending through the boiler to the smoke-box on top of the boiler.

The object of this invention is to promote the combustion of the fuel and bring the products of combustion in such intimate contact with the boiler as to increase the efficiency thereof; and to that end the invention consists in the improved construction and combination of parts hereinafter fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a vertical transverse section on line X X in Fig. 2, and Fig. 2 is a horizontal transverse section on line y y in Fig. 1.

Similar letters of reference indicate corresponding parts.

A represents the annular boiler, which is placed upright, as shown in Fig. 1 of the drawings, said boiler being formed of the cylindrical outer shell *a* and an inner shell *a'*, the main portion of which is concentric with the outer shell and terminated with outwardly-flaring portions *a''*, which are joined to the outer shell along the edges of an opening in the front of the latter, across which opening extends the plate P, which is fastened to the boiler and is provided with a feed-door *h*, draft-door or damper *h'*, and ash-pit door *h''*.

B denotes the fire-box, which is situated inside of the lower portion of the boiler.

C is the adjacent ash-pit, which is surrounded by the smoke-flue C', and *c c c* are the vertical flues, which extend through the boiler and communicate at opposite ends respectively with the smoke-flue C' and with the smoke-box D on top of the boiler, where the products of combustion escape through

the exit-pipe D'. The fire-box B communicates with the lower smoke-flue C' by down-draft-flues *b b*, extending from the top of the fire-box to the bottom thereof, and being interposed between the fire-box and boiler contiguous to the latter causes the products of combustion to effectually impinge the boiler and increase the efficiency thereof. These down-draft-flues I preferably form by corrugating the fire-box, with the indentations of the corrugation extending from the top to the bottom of the fire-box, the spaces at the exteriors of these indentations forming the aforesaid down-draft-flues. By corrugating also the inner shell of the boiler or outer wall of the down-draft-flues, as indicated by dotted lines in Fig. 2, the heating-surface of the boiler is augmented.

To promote the combustion of the gases escaping from the fire-box through the said flues, I form on the front of the fire-box an air-heating chamber *d*, to which leads the cold-air inlet controlled by the damper or draft-door *h'*. The bottom of the chamber *d* communicates with the ash-pit C, and the two side walls of said chamber are perforated to allow air to pass from the chamber to the down-draft-flues *b b*. The effect of this air-heating chamber and its aforesaid communications is as follows: The air admitted through the open draft-door *h'* impinges the inner wall of the chamber, which wall constitutes part of the fire-box, and thus thoroughly heats the admitted air. A portion of this heated air escapes to the ash-pit, from whence it ascends through the grate to the fire-box, while the remainder of the heated air passes from the chamber *d* through the perforated sides thereof and mingles with the gases descending through the down-draft-flues *b b*. This mingling of the heated air with the products of combustion promotes the combustion, and thus enhances the efficiency of the boiler. To further increase this efficiency, I provide the sides of the fire-box with ports *e e*, extending laterally through said sides at a sufficient distance from the top of the fire-pot to allow flames or jets of fire to pass through said ports and ignite the gases descending in the flues *b b*.

To facilitate and cheapen the construction of the fire-pot with its said ports *e e* and at

the same time form the ports so as to prevent their becoming clogged with ashes or cinders, I form the fire-box of two or more rings mounted one upon the other and with the ports *ee* in the joint or joints and with the top and bottom of each port sloped downward, as shown in Fig. 1 of the drawings.

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

1. The combination with the boiler and ash-pit, of the fire-box arranged within the boiler with a downdraft-flue between them, said fire-box having fire-escaping ports through its wall, an air-heating chamber provided with a rear wall separating it from the fire-box and having cold-air inlet, said air-heating chamber being open to the ash-pit, substantially as described.

2. The combination with the fire-box and ash-pit, of an air-heating chamber, separated from the fire-box by an imperforate wall and being open to the ash-pit, whereby said air-heating chamber has no direct communication with the fire-box, and a cold-air inlet leading to the air-heating chamber, as set forth.

3. The combination, with the annular upright boiler and ash-pit, of the fire-box arranged within said boiler with a downdraft-flue between them, an air-heating chamber extending from the front of the fire-box to the exterior of the boiler and communicating with the ash-pit, said air-heating chamber being separated from the fire-box by its rear wall and a cold-air inlet leading to said heating-chamber as set forth.

4. The combination, with the annular upright boiler and ash-pit, of the fire-box arranged within the boiler with a downdraft-flue between them, an air-heating chamber extending from the front of the fire-box and having in its sides air-passages leading to the aforesaid downdraft-flue, said air-heating chamber having no direct communication with the fire-box and a cold-air inlet leading to said heating-chamber as set forth.

5. In a boiler, the combination of the fire-box, a downdraft-flue contiguous to said fire-box with which the latter communicates through its upper end, and fire-escaping ports in the side wall of the fire-box opening into said flue, substantially as described.

6. The combination, with the annular upright boiler and ash-pit, of a smoke-flue surrounding the ash-pit, the fire-box situated in-

side of the boiler with a downdraft-flue surrounding the fire-box and extending from the top thereof to the aforesaid smoke-flue, and fire-escaping ports through the wall of the fire-box and an air-heating chamber contiguous to the fire-box, and having openings leading to said flue and ash-pit as set forth.

7. The combination, with the annular upright boiler and ash-pit, of a smoke-flue surrounding the ash-pit, the fire-box situated in the boiler with a downdraft-flue between them extending from the top of the fire-box to the aforesaid smoke-flue, said fire-box being formed of rings mounted one upon the other and with lateral fire-escaping ports in the joint as and for the purpose set forth.

8. The combination with the upright boiler, and the ash-pit, of a small flue surrounding the ash-pit, the fire-box situated in the boiler and surrounded by downdraft-flues leading to said smoke-flues, said fire-box having ports through its sides through which fire escapes to downdraft-flues, and an air-heating chamber separated from the fire-box by its rear wall and opening at its bottom into said ash-pit, the side walls of said air-heating chamber having ports opening to said downdraft-flues.

9. The combination, with the annular upright boiler and ash-pit, of a smoke-flue surrounding the ash-pit, the fire-box situated in the boiler and formed with indentations externally extending from the top to the bottom of the fire-box to form downdraft-flues leading to the aforesaid smoke-flue, and fire-escaping ports through the sides of the fire-box substantially as and for the purpose specified.

10. The combination, with the annular upright boiler and ash-pit, of a smoke-flue surrounding the ash-pit, the fire-box situated in the boiler and formed with indentations externally extending from the top to the bottom of the fire-box to form downdraft-flues, fire-escaping ports through the sides of the fire-box, an air-heating chamber extending from the front of the fire-box and communicating with the downdraft-flues and with the ash-pit, and a cold-air inlet leading to the aforesaid heating-chamber as set forth.

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

GEORGE W. JOHNSON. [L. S.]

Witnesses:

JOHN J. LAASS,
C. L. BENDIXON.