

(No Model.)

2 Sheets—Sheet 1.

J. JOHNSON.

STEAM BOILER.

No. 381,791.

Patented Apr. 24, 1888.

Fig. 1.

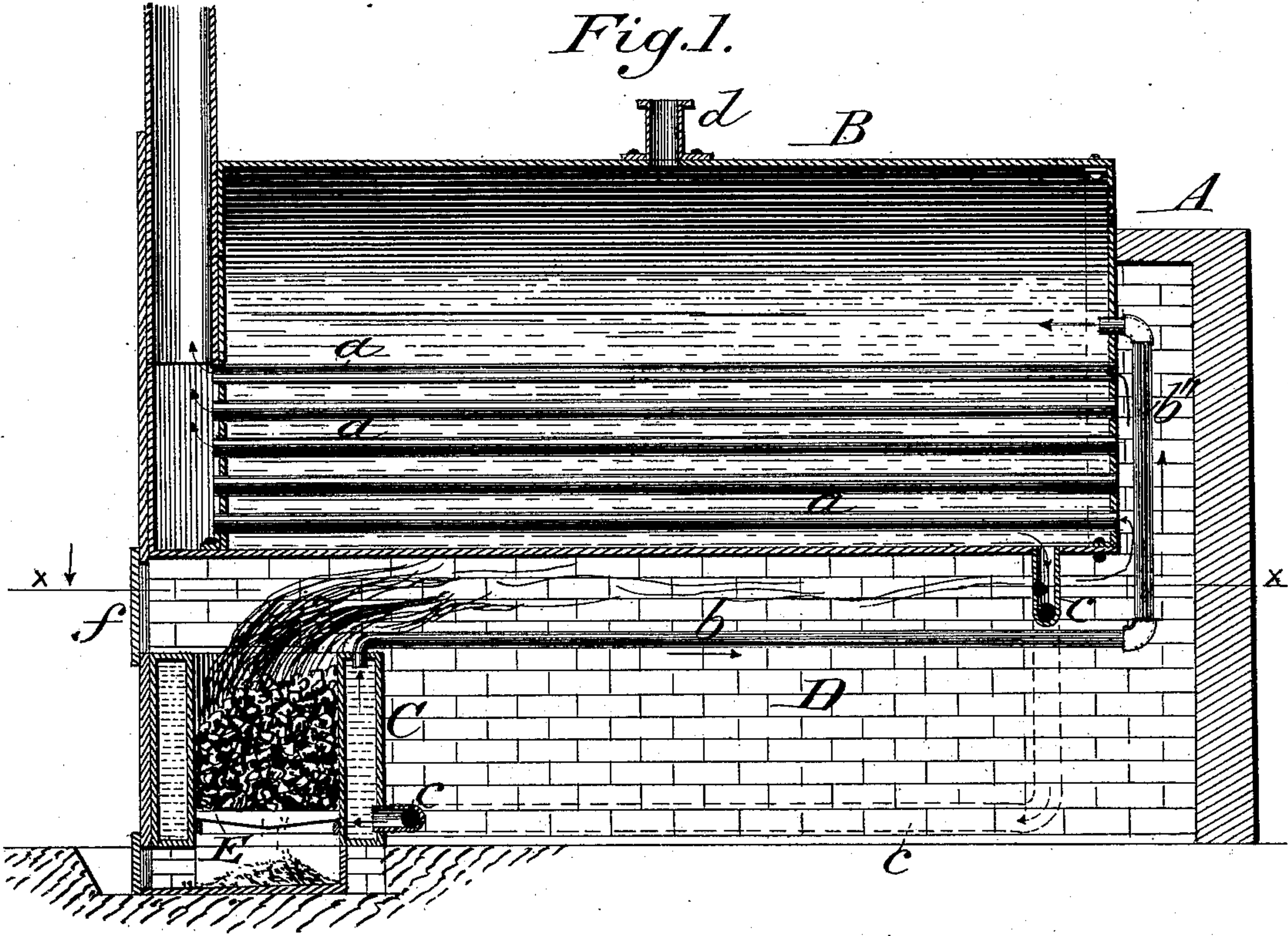
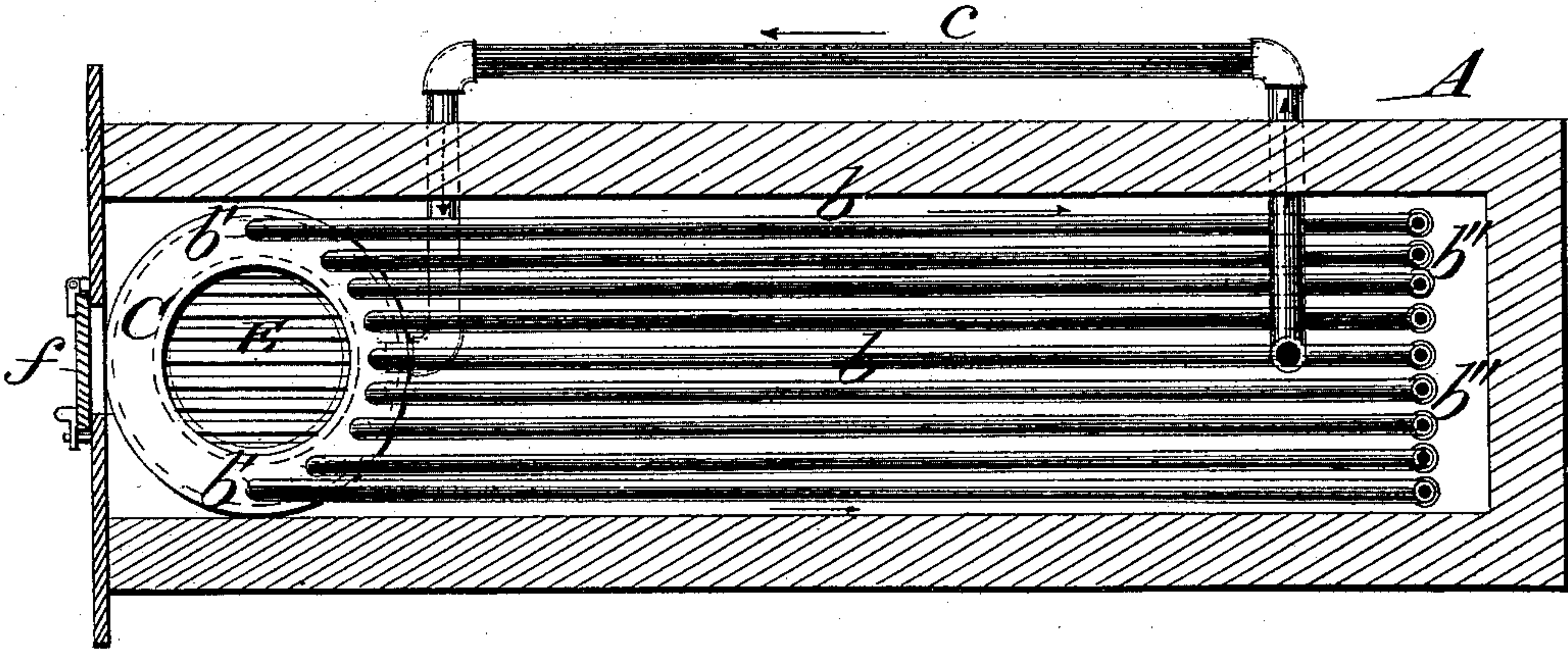


Fig. 2.



Witnesses.

J. H. Schott.
W. Burroughs.

Inventor.

J. Johnson.
 By his Attorney,
 W. E. Chandler.

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Fig. 3.

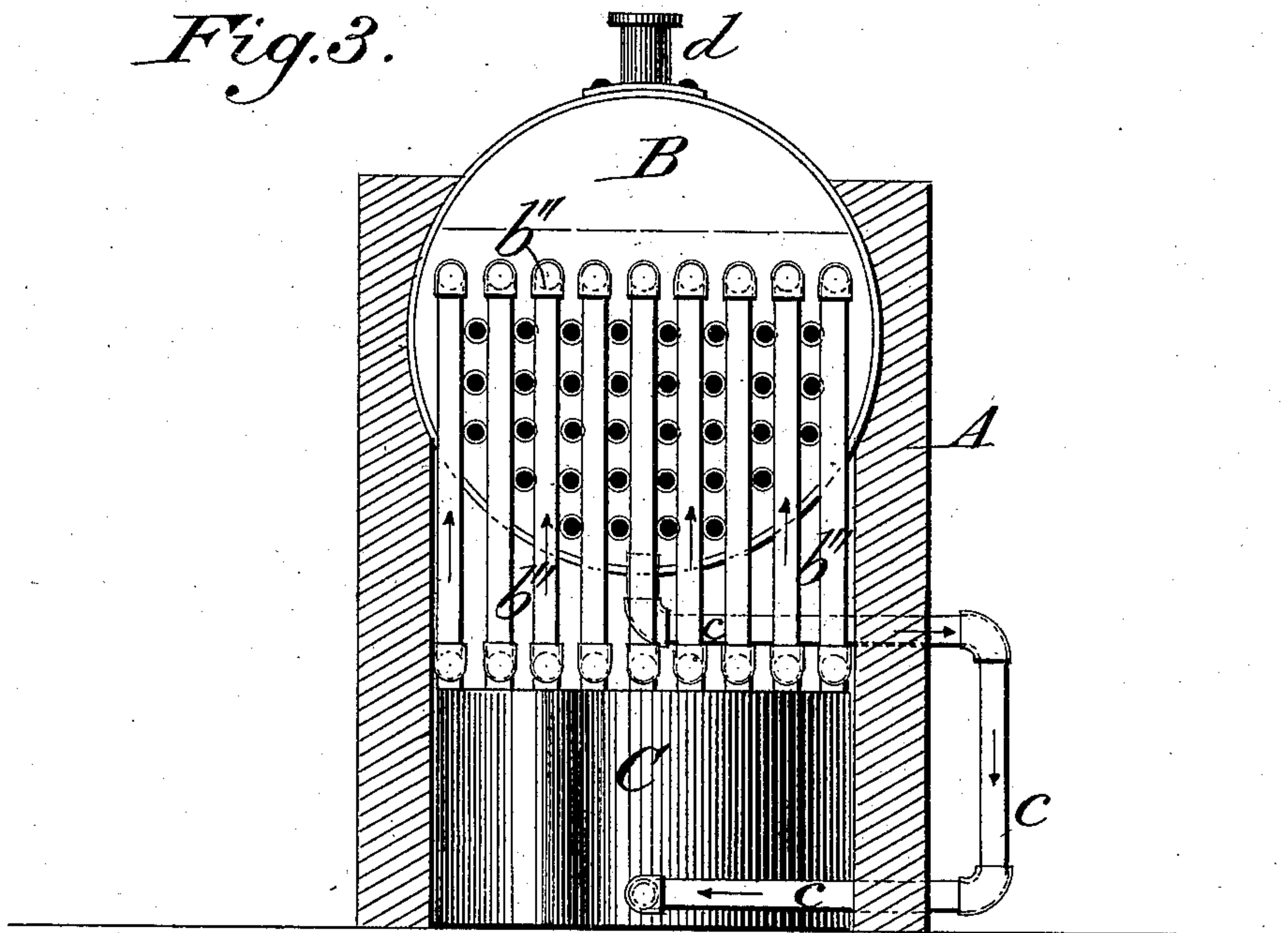
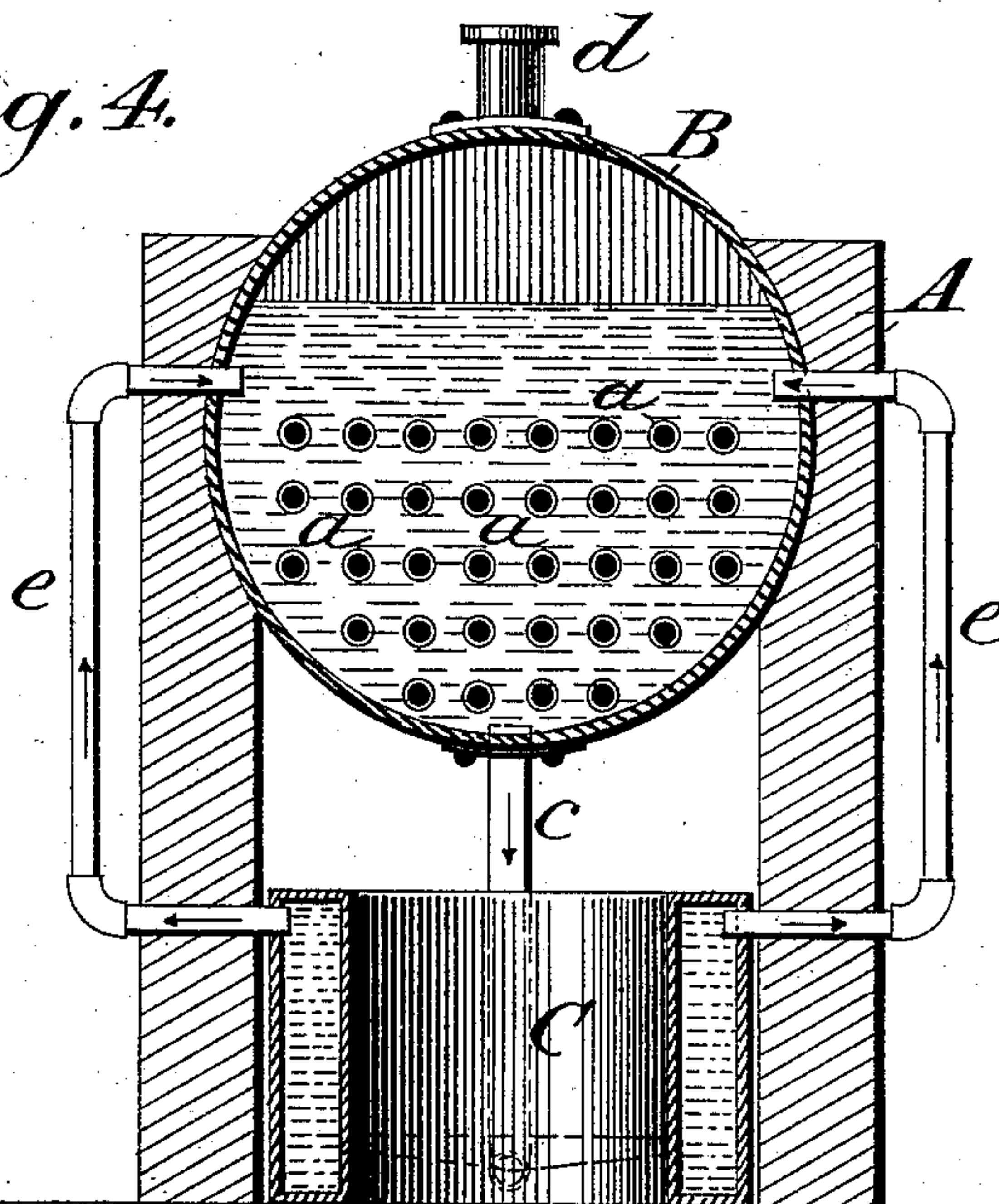


Fig. 4.



Witnesses.

J. H. Schott
W. Burroughs.

Inventor.

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UNITED STATES PATENT OFFICE.

JONATHAN JOHNSON, OF LOWELL, MASSACHUSETTS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 381,791, dated April 24, 1888.

Application filed September 19, 1887. Serial No. 250,086. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN JOHNSON, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in that class of steam and hot-water boilers especially designed for heating purposes, although they may be used as power-generators, if desired, and is an improvement on the boilers for which Letters Patent have been granted to me, said patents being No. 274,785, dated March 27, 1883, and No. 338,670, dated March 23, 1886, the object being to so connect a water-heating chamber surrounding the grate and forming the receptacle for fuel with the ordinary tubular horizontal boiler, by means of suitable pipes, as to insure a perfect circulation of the water through both heating-chamber and boiler.

A further object is to improve the general construction and arrangement of the several parts, so as to produce a boiler which shall be durable, safe, and give out the maximum effect to be obtained from the combustion of fuel in a steam-generating apparatus.

To carry out this invention I provide a heater formed as a chambered ring or annulus. If a circular grate be used, or if the grate be rectangular, the heating-chamber surrounding it will have the same general form. This heater I prefer to make of cast-iron in a single piece, cored out to form the internal chamber, although, if desired, it may be made of boiler-plate iron, but at a considerable increase of expense, and as the cast-iron heating-chamber has proved perfectly reliable, as well as more durable, I prefer it in the manufacture of the boilers. This heating-chamber may be connected with the boiler above it by a series of tubes, the lower ends of which are inserted in the fire-box or heating-chamber near its top. They then pass through the

combustion chamber under the boiler and enter said boiler at the rear near the water-line. Another tubular connection is formed between the bottom of the horizontal portion of the boiler near its rear end and the lower rear side of the heating-chamber. The pipe forming this connection is carried down to a position where it will not be directly affected by heat, and is inclosed by masonry or outside pipes with packing to protect it and keep it comparatively cooler than the water in the boiler, so that there may be an uninterrupted return-flow through it from the horizontal part of the boiler to the heating-chamber to supply the deficiency of water in the latter caused by the upward flow through the side or horizontal pipes when the fuel upon the grate is in an active state of combustion, thus insuring a thorough circulation through the boiler and preventing the deposit of scale or dangerous increase of heat at any point.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through the boiler, fire-box, and casing. Fig. 2 is a horizontal section on the line *xx*, Fig. 1. Fig. 3 is a rear elevation showing the position of the pipes which connect the upper part of the heater with the horizontal boiler. Fig. 4 is a vertical section on a line in rear of the heater, illustrating the relative arrangement of the grate, heater, connecting-pipes, and horizontal boiler.

In the several figures, A represents the outer casing which surrounds the boiler, and which may be of metal or brick, as best suited to the size and location of the apparatus.

B is the horizontal boiler, provided with the series of tubes *a a*, through which the products of combustion pass on their way to the chimney, said tubes passing through the water in the boiler, the upper surface of which is carried above the top of the tubes.

C represents the water-heating chamber or fire-box placed beneath the horizontal boiler B, and connected therewith by means of the tubes *b* and *c*, the tubes *b* being connected at their lower ends to the upper part of the heating-chamber C by elbows *b'*, and to the tubular boiler by the arms *b''*, said arms projecting vertically at right angles from the horizontal portion of the tubes, and being of sufficient length to connect with the boiler B near its

water-line. These tubes, passing through the combustion-chamber in rear of the fire-box, are in a position to take up heat quickly and impart it to the contents of the boiler by the steady flow through them of water passing from the fire-box to the boiler. Additional pipes, as *e*, may be placed, if desired, at the sides of the boiler, passing out from the fire-box through the casing at their lower ends, and returning through the same to the boiler at their upper ends.

Connected to the outside and rear of the heating-chamber, near its bottom, by any suitable connection, is the circulating-pipe *c*, which may be carried to one side by bending or by suitable elbows, so as to remove it from the direct action of the fire, and provided with a vertical extension, *c*, by which it is connected with the lower part of the horizontal boiler. Through this pipe the water descends from the horizontal boiler B to the lower part of the boiler or chambered fire-box C to supply the place of that which ascends through the pipes *b* and *e*, and should therefore be protected from the heat to obviate any tendency to rise on the part of its contents.

If desired, the water-supply pipe for replenishing any loss of water in the boiler may be connected with the pipe *c*, and will be found to operate in a perfect manner, as it introduces the cold water at the best point to enable it to assist in the circulation, as well as receive heat from the fire through the walls of the heating-chamber.

d represents a steam exit pipe.

The grate E, as shown in the drawings, is placed at the bottom of the heating-chamber C. The latter therefore serves as a fire pot or box to receive the fuel, its upper edge being so far beneath the boiler as to leave room beneath them for the introduction of fuel through the fire-door *f*. It also acts as a bridge-wall between the fuel and combustion chamber D at the rear of said heating-chamber beneath the tubular boiler, from which the products of combustion pass through the tubes and into

the chimney after having imparted to the water in the boiler nearly all the available heat produced by the combustion of the fuel.

This boiler will be found very efficient and durable as a steam-generator or for hot-water circulation where anthracite coals are used for fuel, although other fuels may be used therein without detriment, as the tubes are easily cleaned, when their heating qualities deteriorate owing to an accumulation of soot, by passing a brush through them.

I am aware that it is not new to employ a fuel-receptacle constructed to act as a heater detached from but in connection with a horizontal tubular boiler, and do not, therefore, broadly claim such a construction.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. As an improvement in steam-generators, the tubular horizontal boiler, in combination with the detached heating-chamber forming a fuel-receptacle, and the series of circulating-pipes *b*, passing through the combustion-chamber and connecting the top of said heater with the rear of the boiler, for the purpose of conveying water from the heater to the boiler and assist in maintaining a circulation between them, as set forth.

2. As an improvement in steam-generators, the combination of the outer casing, the horizontal tubular boiler, the detached heater, the circulating-pipes *b*, connecting the top of the heater with the rear of the boiler, and the pipe *c*, connecting the bottom of the boiler with the bottom of the heater, said pipe being deflected to one side, so as to be protected from the direct action of the heat, all as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

JONATHAN JOHNSON.

Witnesses:

GEO. H. STEVENS,
SAMUEL B. WYMAN.