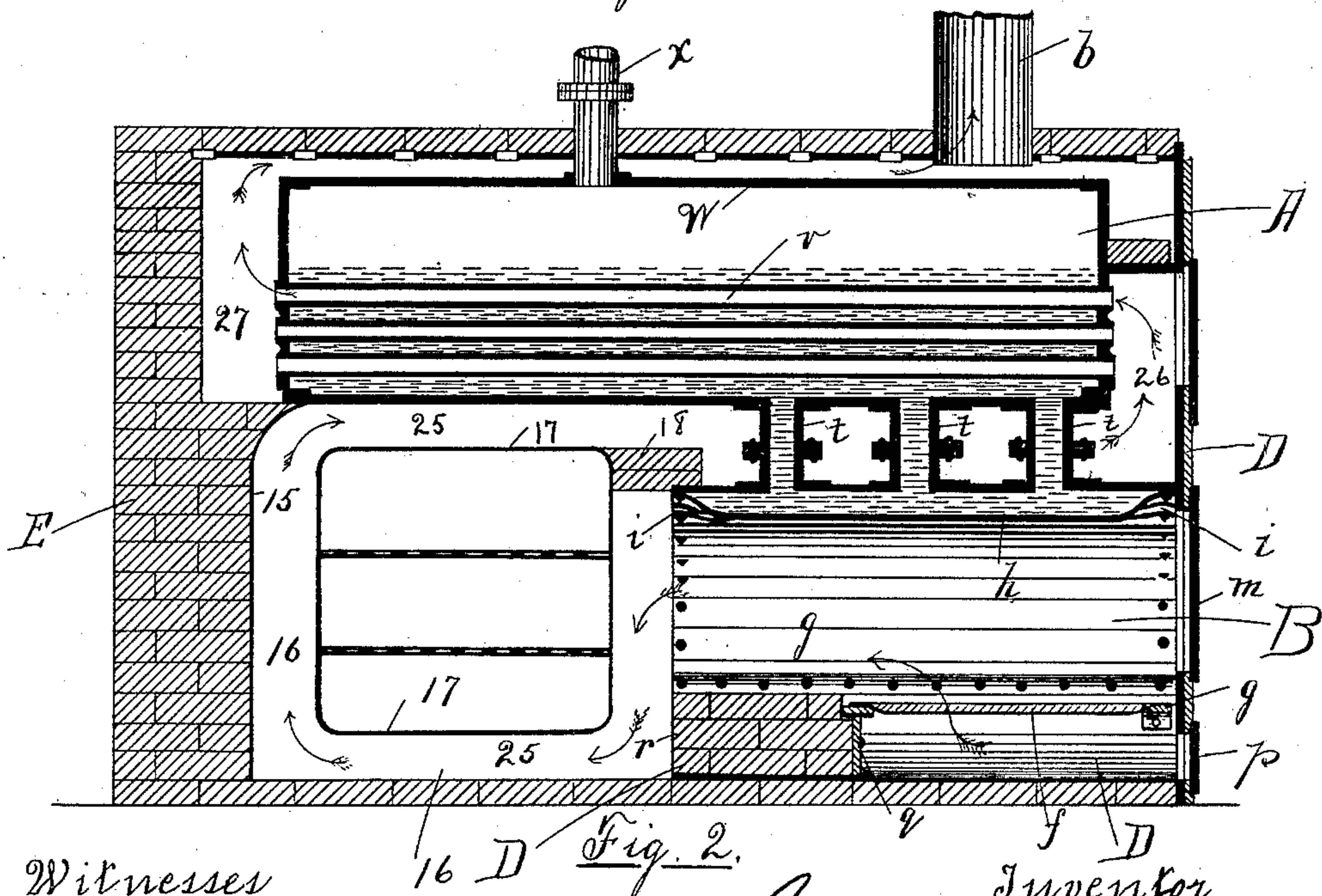
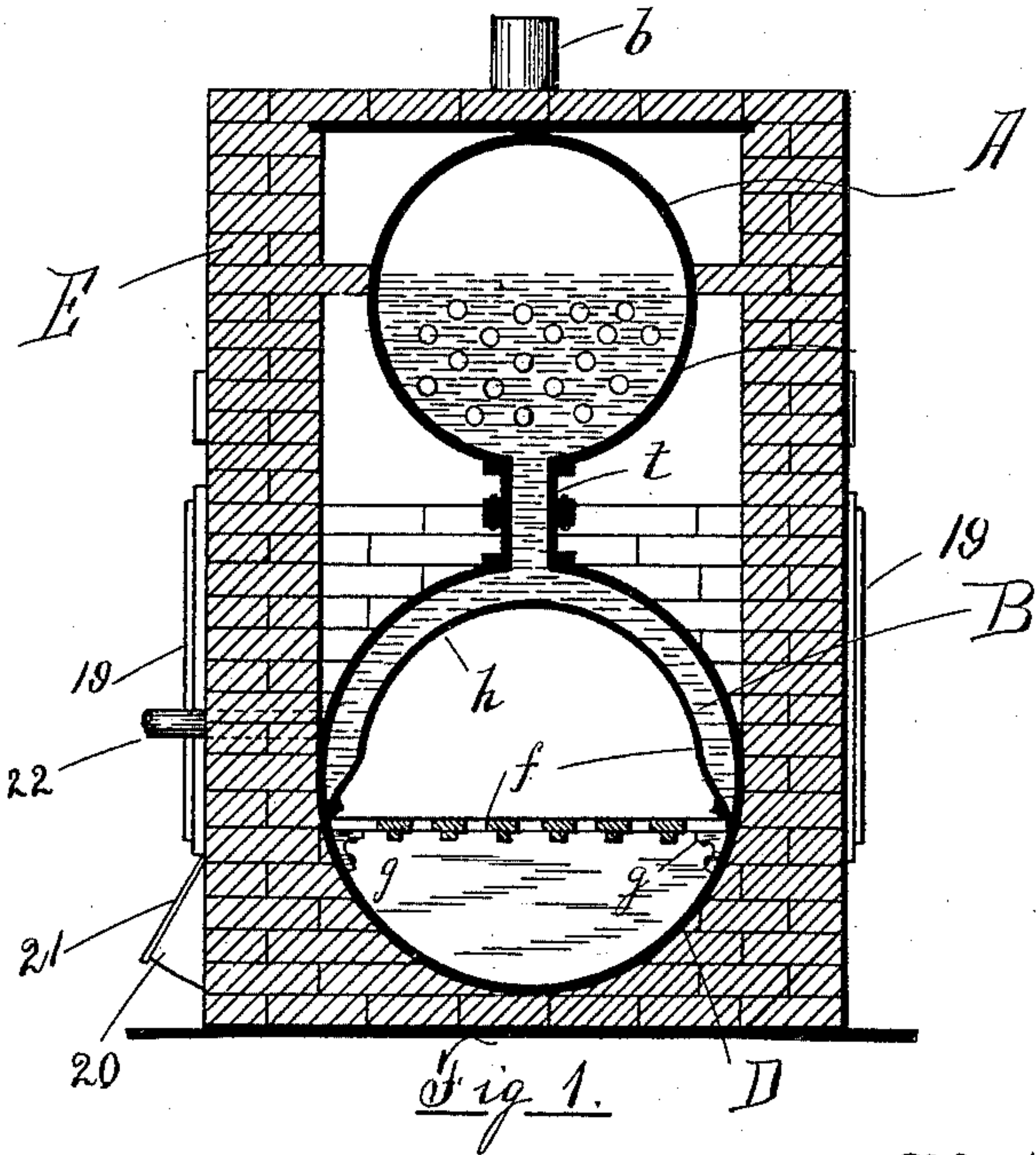


(No Model.)

J. F. GRAY.
STEAM BOILER.

No. 433,405.

Patented July 29, 1890.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN F. GRAY, OF PROVIDENCE, RHODE ISLAND.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 433,405, dated July 29, 1890.

Application filed January 20, 1890. Serial No. 337,482. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. GRAY, of Providence, in the county of Providence, State of Rhode Island, have invented certain new and
5 useful Improvements in Boilers, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention
10 appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical transverse section of my improved boiler, and Fig. 2 a central vertical longitudinal section of the same.

Like letters and figures of reference indicate corresponding parts in both figures of the drawings.

My invention relates especially to improvements in water-jackets for steam-heating apparatus, being designed as an improvement on the boiler shown in United States Letters Patent No. 394,852, dated December 18, 1888, granted to me for new and useful improvements in boilers; and it consists in certain
20 novel features hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents the main
35 boiler, and B the supplemental boiler or water-jacket. A cylinder D is incased in brick-work E, which forms a furnace provided with a chimney *b* at its forward end. The cylinder D forms the fire-box and ash-pit and the
40 outer wall of the jacket B. A horizontally-arranged grate *f* is supported on lugs *g*, disposed centrally in the cylinder. A metallic plate *h*, nearly semicircular in cross-section, is secured to the inner walls of the cylinder
45 at the lugs *g*, and forms the inner wall of the water-jacket B, the ends of said jacket being closed by the ends of said plate, which are bent or curved upward to meet the cylinder D and form heads *i* for the jacket. The
50 mouth of the fire-box and ash-pit above and below the grate *f* is closed by doors *m p*. The

inner end of the grate rests on a back piece *q*, and the space between said back piece and the inner end of the cylinder is bricked in at
55 *r* to cause the heat to be directed upward against the jacket.

The main boiler A is mounted in the furnace E, directly above the jacket B, and is connected therewith by a series of vertical circulation-pipes *t*, any desired number of
60 which may be employed.

The boiler A has a series of horizontal tubes *v* in the usual manner, and a steam-chamber *w*, into which a steam-education pipe *x* opens. A transversely-arranged wall 15 in the rear
65 of the furnace supports the inner end of the boiler proper. The space between the inner end of the jacket B and said wall forms a chamber 16, in which metallic oven 17 is disposed in such manner that the hot air
70 from the fire-box will pass completely around said oven. A horizontal partition 18, connecting the top of the oven and jacket, prevents the air from passing directly over the jacket, a flue 25 being thus formed around
75 said oven.

The oven is designed to be used for baking or cooking purposes and opens through the furnace-walls, being provided with a door 19 at each end. A draft-flue 20 opens through
80 the side of the furnace into the ash-pit of the fire-box, and is provided with a door 21. A feed-pipe 22 leads into the jacket for supplying it with water, which passes through the connecting-pipes *t* into the boiler A.
85

In the use of my improvement water is introduced into the jacket through the feed-pipe, and passing through the circulation-pipes *t* rises into the boiler A. Fire being
90 started in the fire-box, the hot air and products of combustion pass through the rear end thereof and impinge against the adjacent wall of the oven, and being deflected downward thereby passes through the flue 25 over the oven and water-jacket into the smoke-
95 box 26, thence through the boiler-tubes into smoke-box 27 and over the boiler A into chimney *b*. The oven being directly in the path of the hot air is rapidly heated thereby.

The circulation-pipes *t* are formed in sections coupled together, so that they may
100 readily be detached when it becomes neces-

sary to replace the water-jacket or repair the boiler.

It will be seen that the evaporation-surface in my improved boiler is greatly in excess of
5 those of ordinary construction.

By forming the outside plate of the jacket and the fire-box of a continuous cylinder and riveting the inner plate of said jacket thereto, as described, these parts are greatly strengthened and rendered less liable to leak or open
10 out by pressure. Moreover the inner plate can be readily replaced on the cylinder when burned away, and thus avoid the necessity of substituting an entirely new jacket.

15 Having thus explained my invention what I claim is—

1. A combined fire-box and water-jacket, comprising a metallic cylinder having a semi-cylindrical inner plate secured to the upper half thereof forming a water-jacket with said
20 cylinder, substantially as described.

2. The cylinder D, provided with the grate *f*, in combination with the plate *h*, riveted to the cylinder and forming the jacket B, the circulation-pipes *t*, and feed 22, arranged sub-
25 stantially as and for the purpose set forth.

JOHN F. GRAY.

Witnesses:

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