

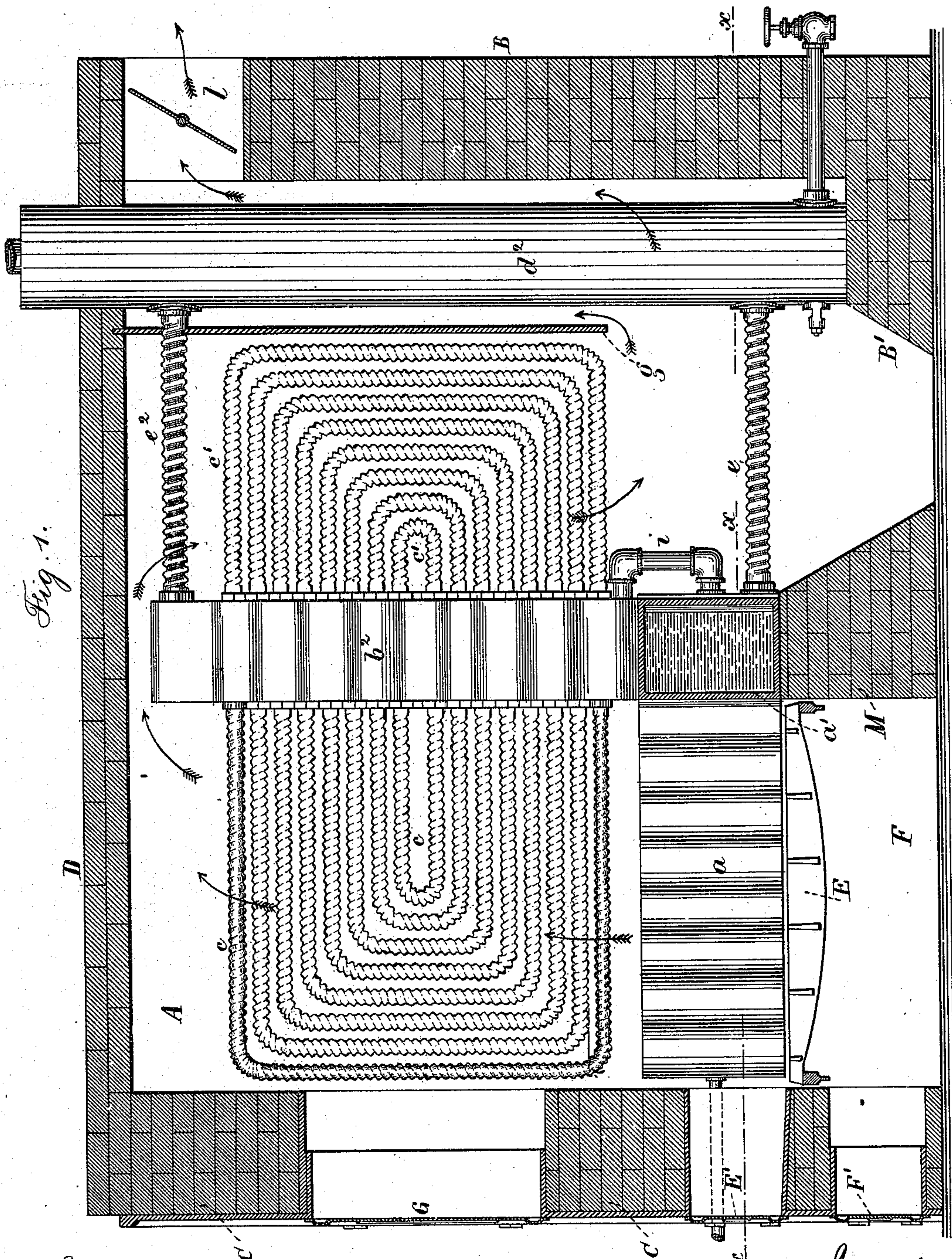
(No Model.)

3 Sheets—Sheet 1

J. SHACKLETON.
STEAM BOILER.

No. 402,356.

Patented Apr. 30, 1889.



Witnesses:
J. Stail
Chas. H. Smith

Inventor:
Joseph Shackleton
per Samuel W. Perrell atty

(No Model.)

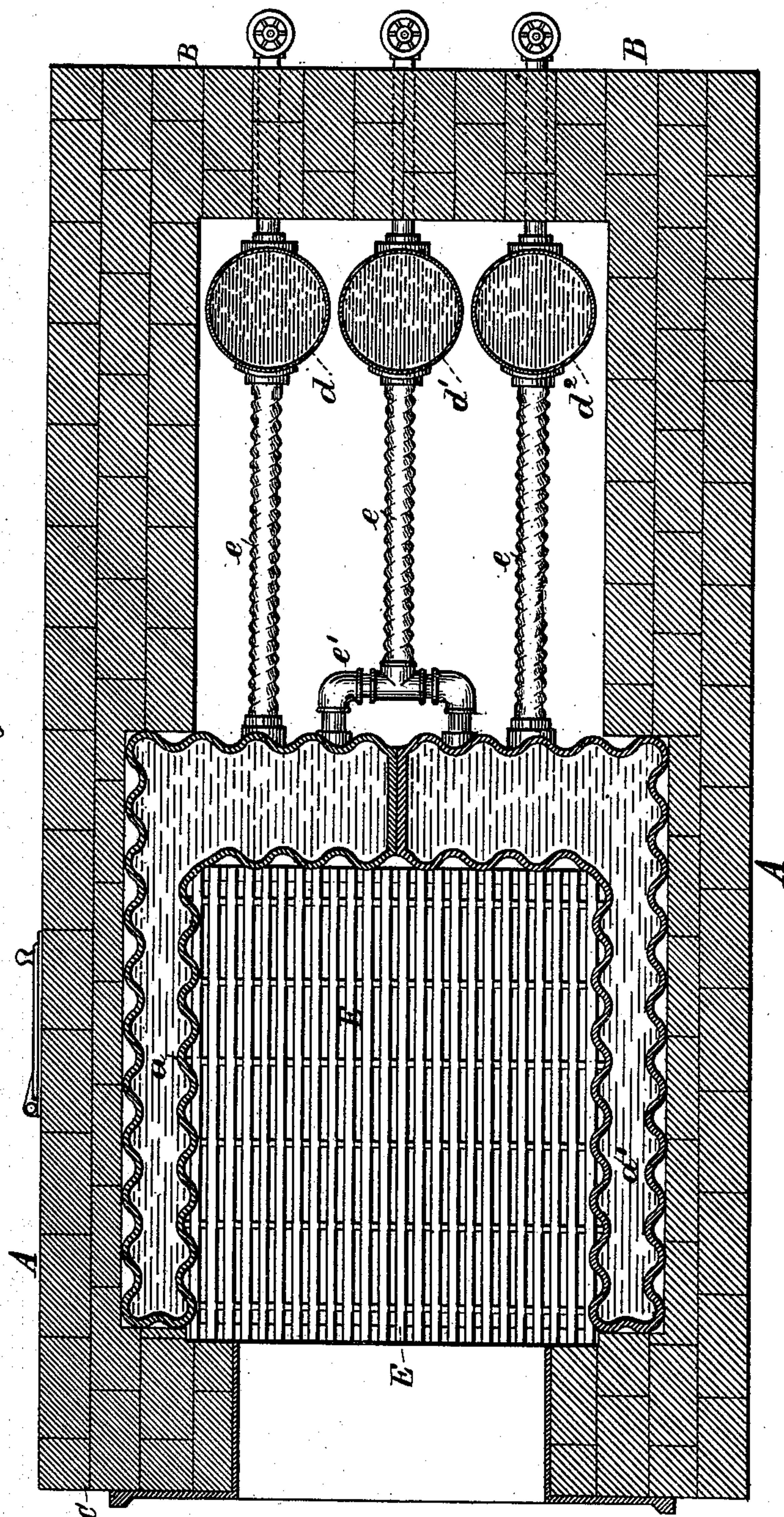
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Fig. 2.



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Chas H. Smith

Inventor:
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per Lemuel W. Perrell atty

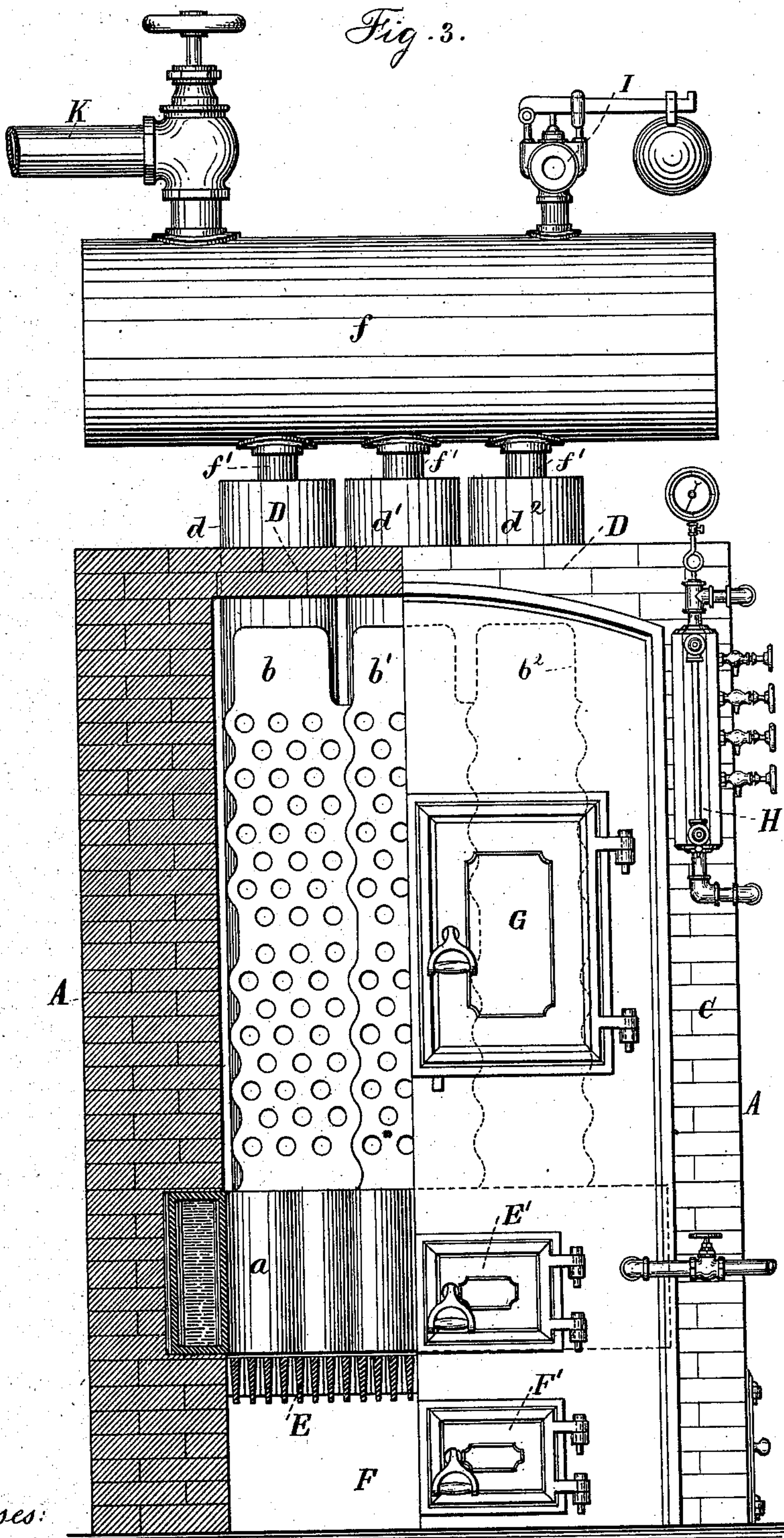
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UNITED STATES PATENT OFFICE.

JOSEPH SHACKLETON, OF NEW YORK, N. Y., ASSIGNOR TO THE SHACKLETON
CAR HEATING AND VENTILATING COMPANY, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 402,356, dated April 30, 1889.

Application filed October 11, 1888. Serial No. 287,856. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SHACKLETON, of the city and State of New York, have invented an Improvement in Steam-Boilers, of which
5 the following is a specification.

My invention relates to an improvement in steam-boilers in which there is a circulating water system, the steam being formed in a boiler or receptacle at the highest point of the
10 circulating system.

In my improvement I employ, in connection with the usual surrounding walls and fire and ash chambers, corrugated water-bases, L-shaped in sectional plan, which bases surround
15 the fire-chambers on three sides and are adapted to contain water. I also employ vertical corrugated water-chambers, that are set upright and edgewise upon the main portion of the bases, and from each side of these vertical corrugated water-chambers there are cor-
20 rugated circulating water-pipes, and I employ stand-pipes connected at their upper and lower ends with the aforesaid bases and upright chambers, and supported by the stand-
25 pipes. There is a water or steam receptacle. The parts are so arranged that the products of combustion and heated gases from the fire pass up between one series of corrugated cir-
30 culating-pipes and against one side of the upright chambers and over the top of said chambers, and down between the second series of corrugated circulating-pipes upon the other side of the upright chambers, and said products of combustion further pass beneath
35 a vertical deflecting-plate and up and around and between the stand-pipes, and so away to the chimney, thus thoroughly heating the various parts of the apparatus and their circulating-pipes.

40 In the drawings, Figure 1 is a vertical section and partial elevation of my improved steam-boiler. Fig. 2 is a sectional plan at the line *xx* of Fig. 1, and Fig. 3 is a partial cross-section and front elevation of the same.

45 The side walls, A, end walls, B, and front wall, C, and the top D are preferably of brick, as is usual in such steam-boilers; and E represents the grate-bars, F the ash-pit, F' the ash-door, E' the coal-door, G the upper doors,
50 H the water-gage, I the safety-valve, and K

the steam-pipe. These parts are of usual and well-known construction in all steam-boilers of this type, and do not require any further description, as they may be made in any well-known or usual manner.

55 *a a'* represent the corrugated water-bases, which are at the sides and back of the fire-chamber above the grate-bars E, and said water-bases are L-shaped, as shown in the plan, Fig. 2, and the same take the place of fire-
60 brick, so that no fire-brick is employed around three sides of the fire. These two water-bases have flat top and bottom plates, and are corrugated vertically all around their sides. The longer arms of said bases are narrower than
65 the shorter arms and the shorter arms form the back of the fire-chamber, and their ends abut against each other, and said short arms are supported by a central brick partition, M, and the longer side arms rest on the side
70 walls, A.

b b' b² represent three vertical corrugated water-chambers, which are set upright and edgewise, their lower ends resting on the top of the short arms of the water-bases *a a'*, the
75 corrugations of said upright chambers *b b' b²* being along their vertical opposing edges, as will be seen in Fig. 3, where they set together, and said upright chambers extend across and fill the space between the side walls of the
80 boiler. Each one of said upright chambers *b b' b²* has connected to its vertical sides a series of U-shaped corrugated water-pipes, *c c'*, these pipes each having, as shown in Fig. 1, two horizontal arms and one vertical arm,
85 and forming a water-conduit from the lower to the upper portion of said upright chambers, and these corrugated pipes *c c'* are securely fastened to the upright chambers in any usual or well-known manner to form a
90 water-tight joint.

d d' d² represent stand-pipes, and said stand-pipes are supported upon the ledge B' of the back wall, and the upper ends of said stand-pipes extend outside of the top wall, D,
95 and there are pipes *e* and a branch, *e'*, connecting the lower ends of each of the stand-pipes with the back of the water-bases *a a'*, and there are pipes *e²* connecting the upper ends of the stand-pipes with the upper ends
100

of the upright chambers $b\ b'\ b^2$, and there are branch pipes i connecting the back of the water-bases $a\ a'$ with the lower portion of each of the vertical chambers $b\ b'\ b^2$.

5 f represents a boiler or receptacle in which the steam is collected, and the same is connected to the stand-pipes $d\ d'\ d^2$ by the short branch pipes f' . The water-bases $a\ a'$, the upright chambers $b\ b'\ b^2$, the series of corrugated pipes $c\ c'$, the stand-pipes $d\ d'\ d^2$, the pipes and branches $e\ e'\ e^2$, the branch pipes f' , and the lower portion of the receptacle f are all supposed to be filled with water, which
10 water circulates by the branches i from the corrugated bases $a\ a'$ into the upright chambers $b\ b'\ b^2$, from the lower portion of said upright chambers through the lower horizontal arms of the corrugated pipes $c\ c'$, up
15 the vertical arms of said pipes, and through their upper horizontal arms into the upper part of said upright chambers, through the pipes e^2 to the upper part of the stand-pipes $d'\ d^2$, down to the stand-pipes, and back into the corrugated water-bases $a\ a'$ by the pipes
20 and branches $e\ e'$, the steam as formed filling the receptacle f , or filling both the upper part of the stand-pipes and receptacle, and said steam can pass away for use by the steam-pipe K , and should the pressure become too
25 great said steam can escape by the valve I .

A plate of metal, g , extends across between the side walls, A , and down from the top D directly in front of the stand-pipes $d\ d'\ d^2$, and this plate acts to divert the products of
30 combustion. The path of said products of combustion and heated gases is shown by the arrows, Fig. 1, the same passing up between the inner surface of the water-bases $a\ a'$, up through the series of corrugated pipes c , over
35 the top of the upright chambers $b\ b'\ b^2$, and down between the pipes e^2 and the series of corrugated pipes c' , around the lower edge of the plate g , and up between the stand-pipes $d\ d'\ d^2$ and away by the flue l to a chimney,
40 thus heating all the parts of the apparatus effectually.

My improved apparatus is adapted for the quick and economical making of steam, and the different parts of its construction are preferably made of cast or malleable cast metal,
45 and the parts of said apparatus are made interchangeable, so that any one or more parts

when worn or burned out can be readily or quickly replaced.

I claim as my invention—

55

1. In a steam-boiler, the combination of corrugated water-bases surrounding the fire-chamber on three sides, and upright corrugated chambers set edgewise and resting upon the water-bases and extending across between
60 the side walls of the boiler, and pipes connecting the water-bases with the upright chambers, substantially as set forth.

2. In a steam-boiler, the combination, with the fire-chamber and grate-bars, of corrugated
65 water-bases surrounding the fire-chamber on three sides, the upright water-chambers set edgewise and corrugated on their contiguous faces and resting on the water-bases, and pipes connecting the water-bases and upright cham-
70 bers together, and series of U-shaped corrugated pipes connected upon each side of the upright water-chambers, substantially as set forth.

3. The combination, in a steam-boiler, with
75 the L-shaped corrugated water-bases $a\ a'$, and the upright water-chambers resting thereon, and pipes connecting the bases and chambers, of the stand-pipes $d\ d'\ d^2$, and a steam-receptacle connected therewith, and pipes connect-
80 ing the lower portion of the stand-pipes to the water-bases and the upper portion of the stand-pipes to the top of the vertical water-chambers, substantially as and for the pur-
85 poses set forth.

4. In a steam-boiler, the combination, with the L-shaped water-bases, the upright water-chambers, and the series of U-shaped corrugated circulating-pipes $c\ c'$, connected to the opposite sides of the upright water-chambers,
90 of a deflecting-plate, g , back of the circulating-pipes c' , whereby the products of combustion passing up between the pipes c and over the upright chambers are caused to pass down
95 between the pipes c' before reaching a chimney, substantially as set forth.

Signed by me this 27th day of September, 1888.

JOSEPH SHACKLETON.

Witnesses:

GEO. W. DITHRIDGE,
G. W. ETTINGER.