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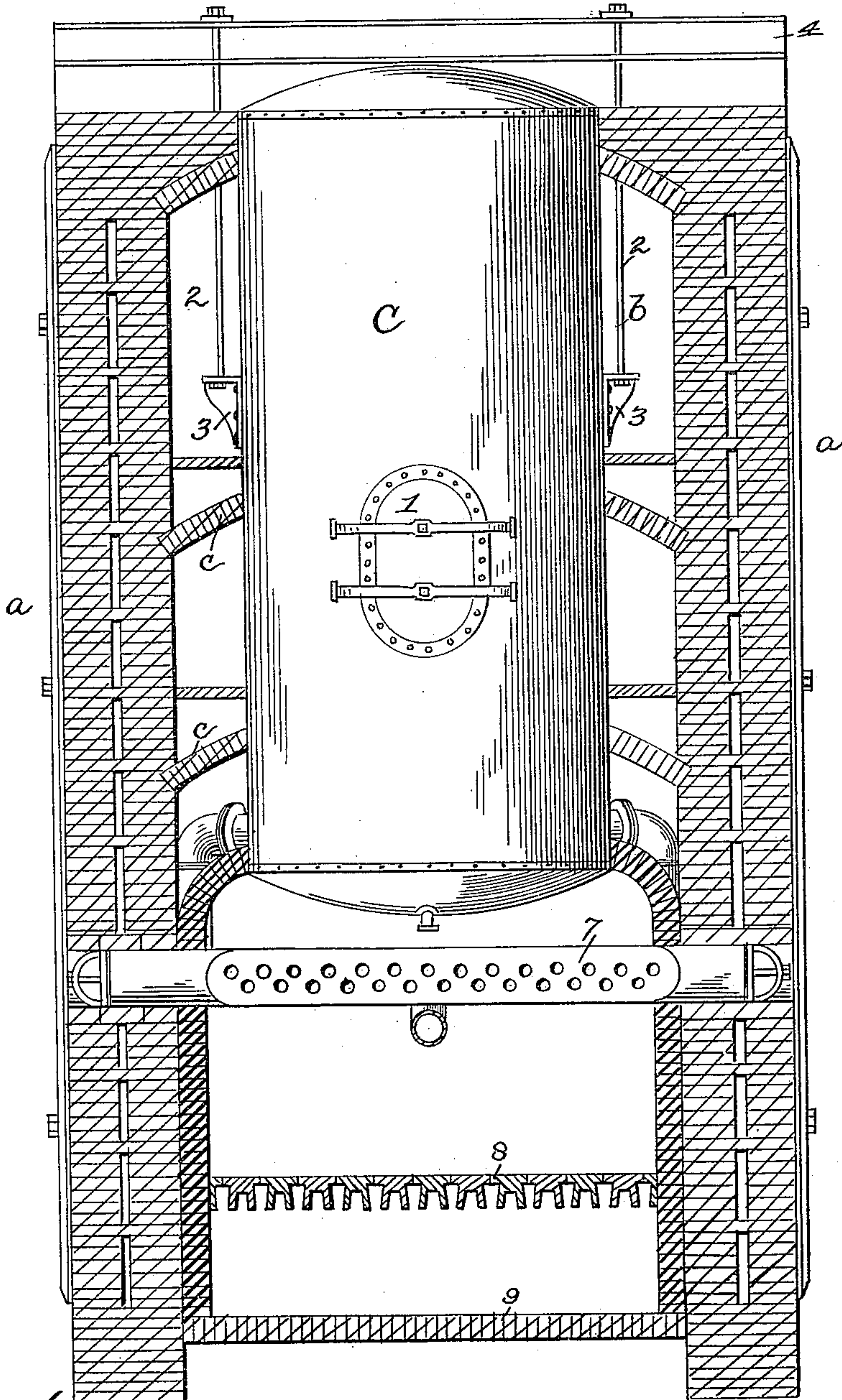
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A. D. LINN & G. R. DEVOE.  
STEAM BOILER AND PRECIPITATOR.

No. 547,081.

Patented Oct. 1, 1895.

*Fig. 1.*



*Attest*  
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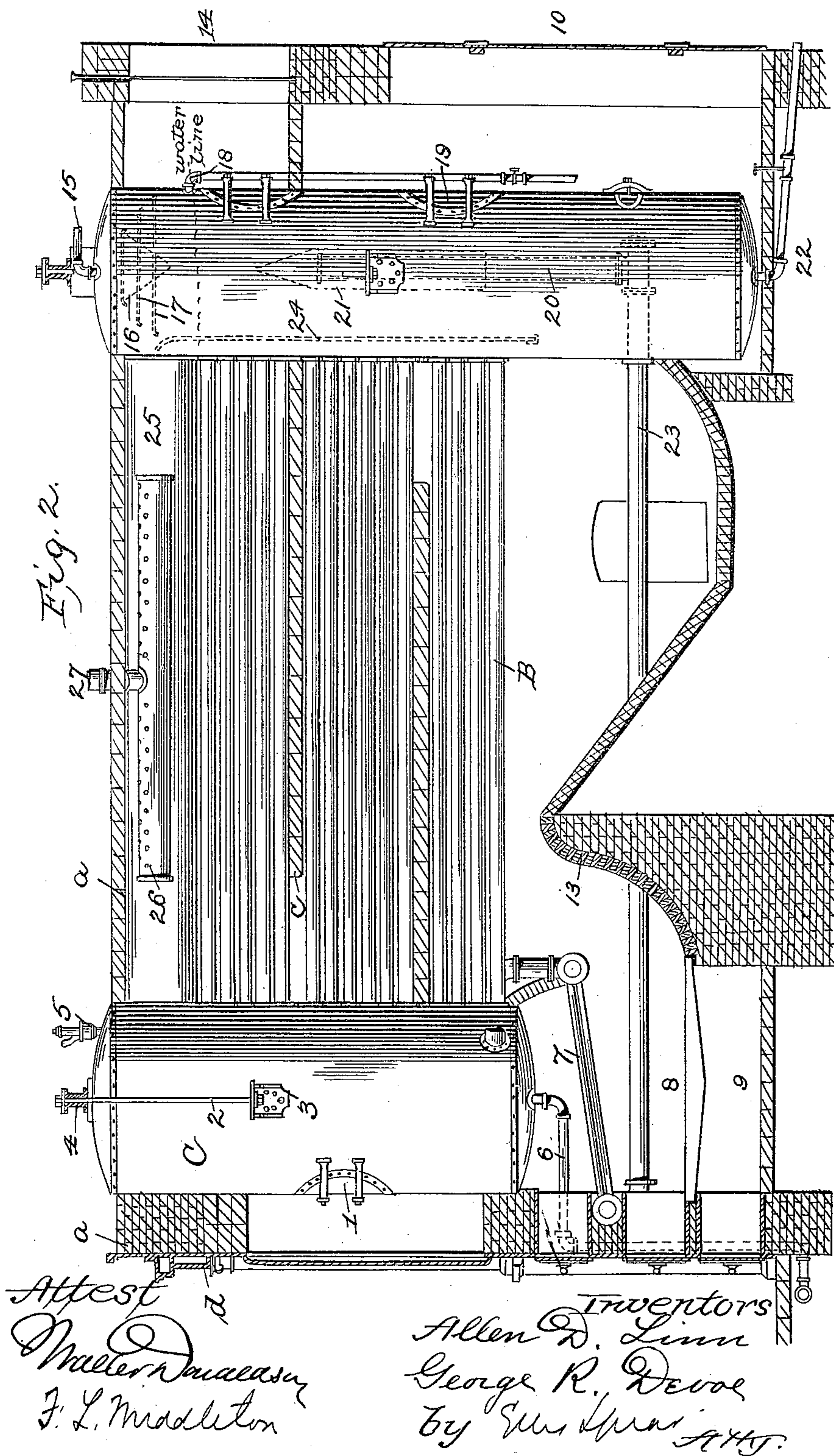
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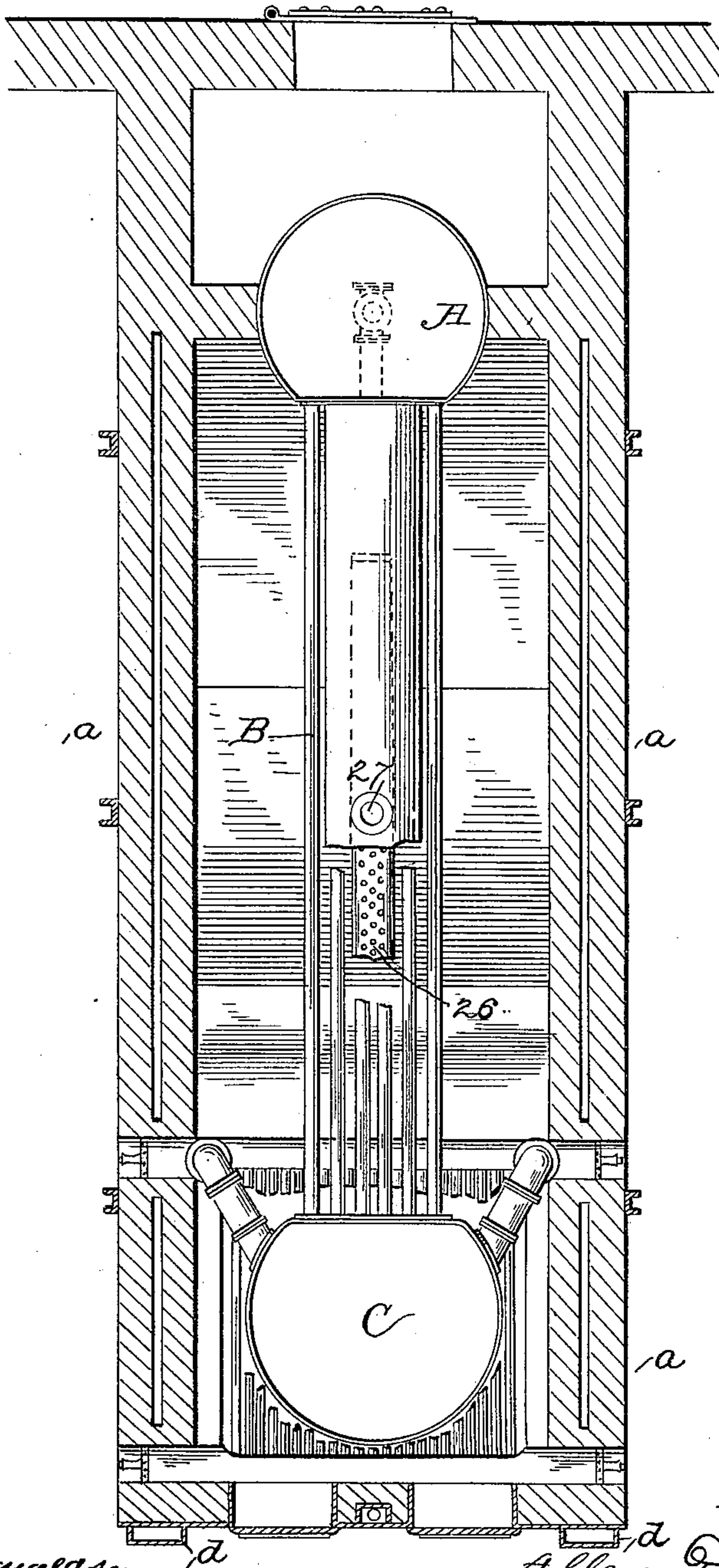
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Fig. 3.



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# UNITED STATES PATENT OFFICE.

ALLEN D. LINN AND GEORGE R. DEVOE, OF GRAND RAPIDS, MICHIGAN;  
SAID DEVOE ASSIGNOR TO WILLIAM T. HESS, OF SAME PLACE.

## STEAM-BOILER AND PRECIPITATOR.

SPECIFICATION forming part of Letters Patent No. 547,081, dated October 1, 1895.

Application filed June 29, 1895. Serial No. 554,445. (No model.)

*To all whom it may concern:*

Be it known that we, ALLEN D. LINN and GEORGE R. DEVOE, citizens of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Steam-Boilers and Precipitators, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention is an improved water-tube boiler, and includes vertically-arranged drums at each end communicating with each other through connecting water-tubes, the rear drum receiving the feed-water and provided with precipitating devices for purifying the water.

Our invention consists in the devices and combinations of devices and in the construction and arrangement of the various parts, both generally and specifically, all as hereinafter fully described and particularly claimed.

In the accompanying drawings we have illustrated our invention, showing, in—

Figure 1, an elevation of the boiler with the front removed, the brickwork being in section. Fig. 2 is a longitudinal section of Fig. 1. Fig. 3 is a plan of Fig. 1.

In the accompanying drawings the brickwork is shown at *a* and consists of side walls bridged at the top to form the boiler-space, as shown at *b*, and suitably arched, as at *c*, to strengthen the walls. An ornamental front of metal is shown in section at *d* in Fig. 2, and we prefer to have this metal front provided with air-spaces between it and the front wall of the furnace of the boiler, so as to prevent too great expansion under the action of the heat. The front drum is shown at C and is vertically arranged, being provided with a door 1, so that access can be gained thereto, and it is suitably braced by rods 2, secured to brackets 3 and extending to a cross-beam 4. A safety-valve is provided at 5. The lower part of this drum forms a settling-chamber and its bottom is made concave, with a blow-off pipe 6 extending therefrom. Hollow grate-bars are located immediately beneath the drum C, as shown at 7, these being of ordinary construction, and between

these are the regular grate-bars 8, with an ash-pit 9 underneath. The rear drum A is of greater length than the front drum C and extends from the top to the bottom of the space, as shown in Fig. 2. A division-wall rises centrally on each side of this drum, inclosing one half of it in the boiler-space, while the rear half is exposed to the outer air, though it is partially inclosed, as shown in Fig. 2, the rear part being accessible through a door 10 in the rear wall. Between the front and rear drums C A are located the communicating tubes B, and these are divided into groups by means of the arches C C, (shown in Fig. 2,) which form a circuitous passage for the products of combustion, these products passing over the bridge-wall 13 to the rear, then round the lower arch to the front and around the upper arch to the rear, and out to the stack through the opening 14. The feed-water from the pump enters the pipe 15, Fig. 2, to the top of the drum A, and is there discharged into an inverted conical receptacle 16, which is provided with a turned-over upper edge, over which the water falls when the receptacle is full. Below the turned-over edge is arranged a horizontal disk having a like edge, the disk being of greater circumference than the edge of the receptacle, and a second disk is arranged beneath the first of still greater circumference and having a like turned-over edge. These disks are shown at 17, and the water drops from one to the other, and by reason of the turned-over edges scale is prevented from forming on the disks. The water drops through the steam-space in the upper part of the drum, and is thus heated in its passage through the steam. The water-line is shown by dotted lines, and we provide a scum blow-off pipe 18, extending downward from this point. In the length of the drum we provide doors, so that access may be had to the interior. These doors are shown at 19. As the water passes down it enters a stand-pipe 20, which is covered by a cap 21, extending a distance down the sides of pipe 20, so that the water has to descend below the mouth of the cap or cover in order to enter the stand-pipe, and this allows of the precipitating, the purer water rising around the pipe 20 to the open



end thereof, while the sediment settles to the bottom of the drum A, where it is blown off through the pipe 22. The feed-water passes through the pipe 20 to the lower part of the chamber A, and thence by pipe 23 to the front of the furnace above the grate 8, and through the hollow grate-bars to the drum C. From thence the water passes through the groups of boiler-tubes to the chamber A again. The openings of the boiler-tubes into the chamber A are covered by a deflecting-plate 24, which deflects the water downwardly, while the steam arises to the chamber 25, from whence it passes into the dry pipe 26 and out at 27.

By exposing a part of the chamber A the heat is caused to strike the shell of the chamber a distance from the bottom, and this leaves the bottom and rear side exposed to the atmosphere, forming a settling-chamber.

What we claim is—

1. A water tube boiler, consisting of a front drum C, a precipitator drum A having one side exposed to the heat and its bottom and rear exposed to the atmosphere, connecting tubes between the drums, a feed pipe to the precipitator drum and a feed pipe between the drum A and the drum C, substantially as described.

2. In combination with the drum C, the drum A, the connecting water tubes, said drum A having an exposed rear and bottom to the atmosphere and a hooded discharge

pipe for the feed water located therein, substantially as described.

3. In combination with the drum A, an inverted conical receptacle for the feed water located in said drum and provided with a series of distributing disks having turned-over edges, substantially as described.

4. In combination with a drum A, the feed water delivery pipe located centrally therein and a hood covering the open end of said pipe and extending down the sides thereof with a space between for the passage of the water, substantially as described.

5. In combination with the drums A and C hollow grate bars beneath the drum C, a grate below said bars and a feed water pipe extending from the drum A above the grate 8, and through the hollow grate bars to the chamber C, substantially as described.

6. In combination a drum A, a distributor in the upper part thereof, a covered feed water discharge in said drum, a front drum C with a feed pipe extending thereto from the drum A, and connecting water tubes, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ALLEN D. LINN.  
GEORGE R. DEVOE.

Witnesses.

L. T. GIBSON,  
J. HOWARD MEGREW.