No. 828,498. PATENTED AUG. 14, 1906.

C. D. MOSHER.

AIR FEEDING DEVICE FOR STEAM GENERATORS.

APPLICATION FILED JULY 17, 1903.

2 SHEETS—SHEET 1.

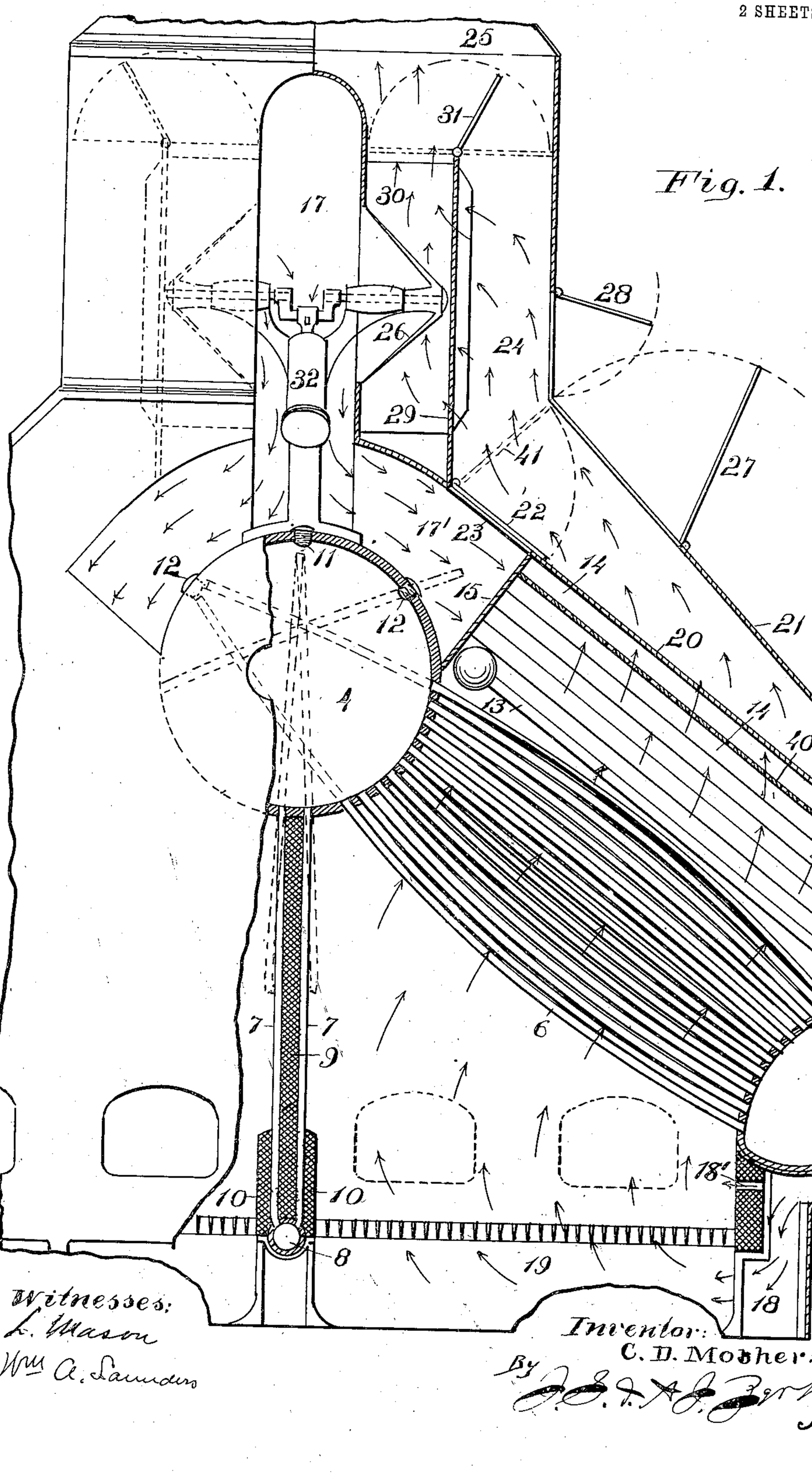

Fig. 1.

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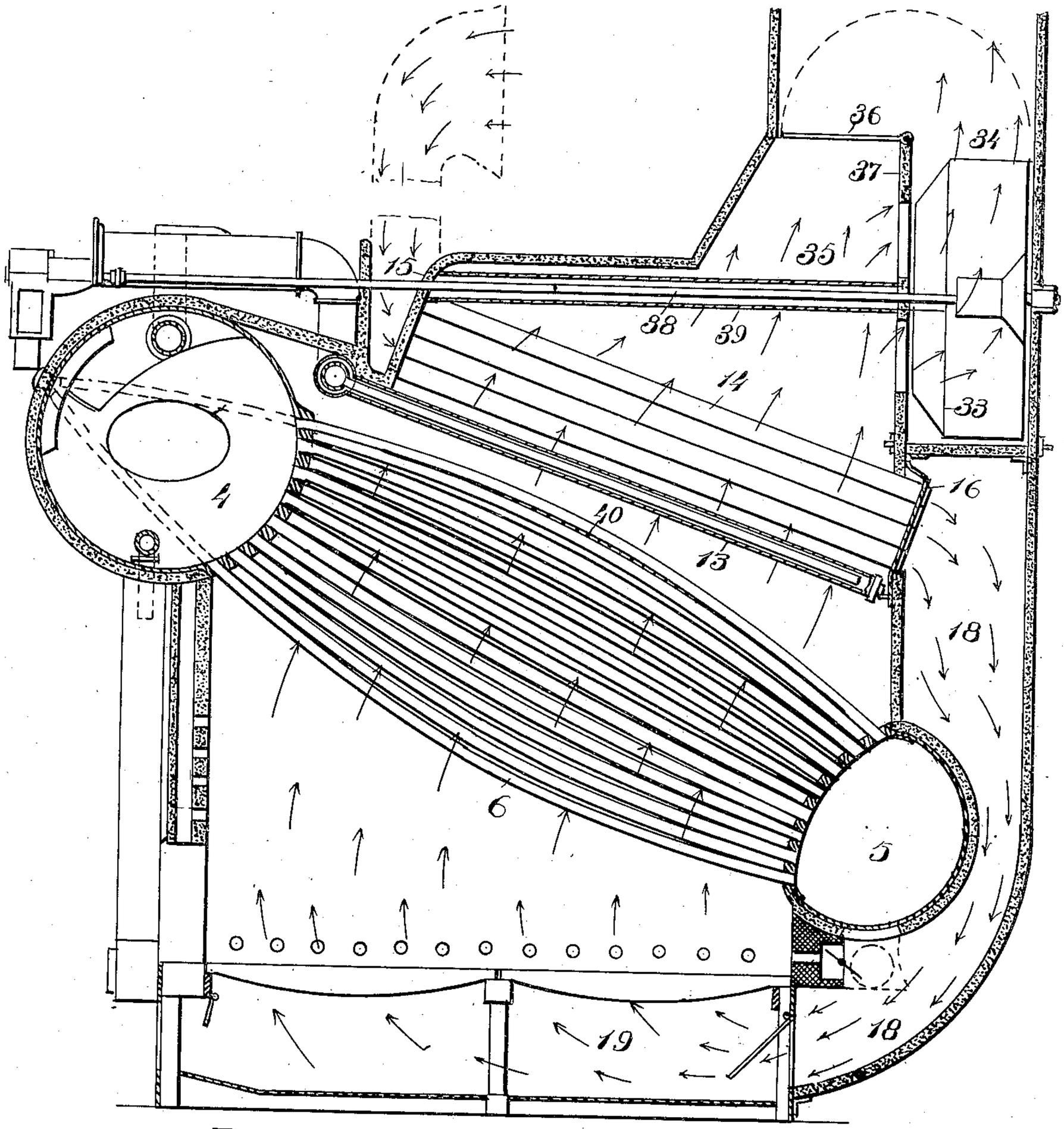

Fig. 2.

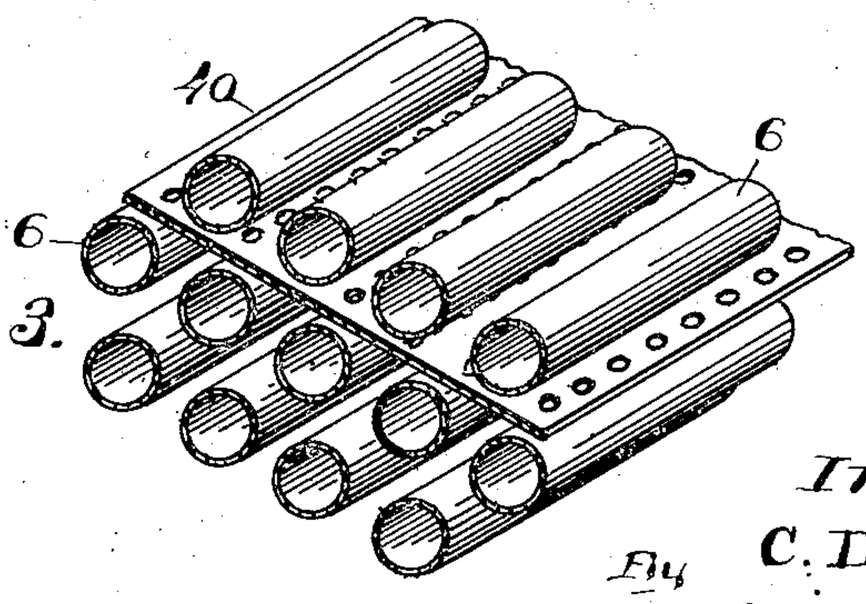

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES D. MOSHER, OF NEW YORK, N. Y.

AIR-FEEDING DEVICE FOR STEAM-GENERATORS.

No. 828,498. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed July 17, 1903. Serial No. 166,055.

To all whom it may concern:

Be it known that I, CHARLES D. MOSHER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Air-Feeding Devices for Steam-Generators, of which the following is a specification.

My invention relates to water-tube boilers, and it has special reference to the manner of disseminating the air-supply and controlling the same and by means of which the heated gases may more readily be distributed along the generating-tubes and means for holding a baffle-plate in position.

It also has reference to the particular manner of constructing the combustion-chamber and dividing the same and means for withdrawing the tubes which constitute the division-walls between the combustion-chambers.

The invention further provides a means whereby the tubes may be withdrawn through special openings in the shell or casing where the construction requires a water-drum on each side of the steam-drum or where twin furnaces are employed, as will now be set forth in detail.

In the drawings, Figure 1 is a front view of a boiler, partly in section, having twin combustion-chambers. Fig. 2 is a cross vertical section of a boiler with a single combustion-chamber; and Fig. 3, perspective view of portion of the generating-tubes with a section of the baffle-plate located below the upper tier of generating-tubes.

In constructing my invention I provide an elevated steam-drum 4 and one or more water-drums 5 on each side of the steam-drum on a lower plane, said water-drums being connected with the steam-drum by generating-tubes 6 in the ordinary manner.

In the form of construction shown in Fig. 1, where twin combustion-chambers are used, the steam-drum has two rows of vertical generating-tubes 7, extending down to and connected with a smaller water-drum 8, these generating-tubes being separated so as to allow fire-brick 9 between them, and which are thus held in position by the tubes. The lower ends of the tubes adjacent to the fuel are protected by a layer of fire-brick 10.

The upper side of the steam-drum 4 has a row of holes closed by plugs 11, through which holes the vertical generating-tubes 7 are withdrawn. The generating-tubes 6 are withdrawn through holes in opposite sides of the steam-drum, these holes being closed normally by plugs 12.

Above the generating-tubes I place a series of steam-superheating tubes 13, and above the superheating-tubes is a plurality of air-inlet tubes 14, held in place at their upper ends by a header 15 and at their lower ends by a header 16. The chamber 17′ at the upper end of the air-inlet tubes connects with an opening 17 through the boiler-casing fore and aft, and the lower ends of the inlet-tubes communicate with a channel-way 18, which extends around the rear side of the water-drum 5 and connects with the ash-pit 19. The rear wall of the fire-box has ducts 18′, which communicate with the combustion-chamber.

An interior wall or casing 20 is placed over the air-inlet tubes, and above this casing is the outer wall or casing 21. The interior casing has an outwardly-opening door or damper 22, which on opening the aperture 23 of the interior casing closes up the channel or conduit 24, which leads to the stack 25, and also the suction-fan 26, located in the base of the stack. The outer casing also has a pair of outwardly-swinging doors 27 28, so arranged in position that when the several doors are opened the tubes 6 may be removed therefrom after being withdrawn from the steam-drum.

In the base of the stack is a central vertical division-wall 29, the suction-fan being located in the inner chamber 30 thus formed, above the fan being a damper 31, adapted to swing and cover the chamber 30 or the channel 24. A similar fan is placed on each side above the steam-drum, which fans are operated by a pair of motors 32, located in the longitudinal opening 17 through the casing.

In boilers having a single combustion-chamber I observe the same arrangement of the generating, superheating, and air-inlet tubes; but the fan 33 in this instance is located in the outer space 34, and the air is drawn by the fan from the chamber 35 above the air-inlet tubes 14. A similar damper 36 is hinged to the central position wall 37 above the fan, so as to close either of the channels 34 35. As the shaft 38 of the fan and motor pass through the channel 35 I prefer to have it protected by a tube 39, as shown.

As it is necessary to have a baffle-plate above the series of tubes it is important it should be held in position firmly, since the

action of the forced draft, operating against the large baffle-plate surface, will raise it causing it to be injured. To provide against this, I locate the baffle-plate 40 below the upper tier of tubes, as shown, for instance, in Figs. 2 and 3, this baffle-plate being of suitably-perforated material and may extend from end to end of the generating-tubes or only along the central or middle portion of the sets of tubes. I may locate this baffle-plate directly below the upper tier of air-inlet tubes, as shown at 40′ in Fig. 1, thus obtaining the advantage of holding it in place without making special holding appliances for this purpose.

The system is operated as follows: In case forced draft is required the suction-fan 26 is set in motion, which causes the air to pass downwardly through the air-inlet tubes 14, thence through the channel 18, ash-pit 19, and combustion-chamber, thence in between the generating, superheating, and air-inlet tubes, and out to the stack through the channel 24 and fan 26. It is obvious that the damper 31 is in the meantime closed over the channel 24. If, on the other hand, natural draft is used, the damper 31 is turned to close the chamber 30, and the products of combustion will pass out the stack through the channel 24 without going through the fan.

The door 22 in the interior casing 20 has a double function. While it is used as a means for closing the opening 23, it also acts as a damper when thrown up to the position shown by the dotted line 41. When in that position, the products of combustion cannot pass up to the stack, and when the fire-doors of the furnace on the corresponding side are opened the closing of the channel 24 prevents the fan from drawing air into the combustion-chamber through the fire-doors. In practice means (not shown) are provided for closing the door 22 whenever the furnace is fired.

It will be seen that the central opening 17 through the casing above the steam-drum permits a ready means for removing the vertical generating-tubes 7, while the generating-tubes 6 can readily be removed through the openings in the interior and outer casing.

What I claim as new is—

1. In a steam-generator, a steam and a water drum parallel with each other and connected by a plurality of generating-tubes, a combustion-chamber and an ash-pit below said tubes, a plurality of air-inlet tubes in the path of the heated gases from the combustion-chamber, parallel with and directly above the generating-tubes, a channel around the water-drum communicating with said air-inlet tubes and combustion-chamber, and means for forcing air through said air-inlet tubes, channel and into the ash-pit.

2. In a steam-generator, a steam and a water drum parallel with each other and connected by a plurality of generating-tubes, a plurality of air-inlet tubes parallel with and directly above said generating-tubes, in the path of the heated, gases, a combustion-chamber and an ash-pit below the generating-tubes, an air-channel around the water-drum, communicating with the air-inlet tubes and ash-pit, and a stack having a suction-fan therein.

3. In a steam-generator, a steam and a water drum parallel with each other, and connected by a plurality of generating-tubes, a plurality of air-inlet tubes parallel with and directly above said generating-tubes, an ash-pit, an air-channel around the water-drum communicating with the air-inlet tubes and ash-pit, a combustion-chamber having its wall provided with air-ducts which communicate with the air-channel and discharge air above the fire-surface, and a stack having therein means for drawing air into the fire-box, and discharging the products of combustion.

4. In a steam-generator, a steam and a water drum connected together by a plurality of generating-tubes, in combination with a combustion-chamber and ash-pit below said generating-tubes, a plurality of air-inlet tubes parallel with and above the generating-tubes, a channel around the outer drum connecting the air-inlet tubes with the combustion-chamber and ash-pit, a stack having in its base a suction-fan, a channel leading from the air-inlet tubes to the fan for the gases of combustion, a channel from the fan to the air-inlet tubes for the air, and a casing between the two last said channels having means of communication at the upper end of said air-inlet tubes.

5. A steam-generator, comprising a steam and a water drum, connected by generating-tubes, a combustion-chamber below said tubes, having ducts in its front and rear walls, air-inlet tubes above and parallel with the generating-tubes, a channel around the water-drum communicating with the air-inlet tubes and combustion-chamber through said ducts, a suction-fan in the stack for supplying air to the combustion-chamber through the air-inlet tubes, channels and ducts, and a partition-wall above the fan provided with adjustable openings, as set forth.

6. In a steam-generator, a steam and a water drum connected by generating-tubes, a combustion-chamber below said tubes, a plurality of superheater-pipes above and parallel with the generating-tubes, a suction-fan, a casing surrounding said fan and extending transversely across the generator, above the superheater-pipes, a top casing connected with the transverse casing, sloping downwardly to the rear, and an inner transverse casing extending downwardly from the fan to the upper end of the air-inlet tubes, forming channels for air and gases of

combustion, respectively, below and above said inner transverse casing.

7. A steam-generator, comprising a single steam-drum with a parallel water-drum on each side, connected by a set of generating-tubes, and a separate combustion-chamber below each set of generating-tubes, a plurality of steam superheater-tubes above and parallel with each set of generating-tubes, a casing above said superheater, to form a channel for the air of combustion, an outer casing to form a channel for the gases of combustion, a stack having a central wall communicating with the division wall or casing between the two channels, having a suction-fan therein, and a damper in said division-wall in the stack adapted to close either outlet in said stack, as set forth.

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

CHARLES D. MOSHER.

Witnesses:

THOMAS W. MORRISON,

WILLIAM MOLLOY.