E. CONNELLEY.

STEAM GENERATING PLANT.

APPLICATION FILED MAR. 6, 1919.

1,331,240.

Patented Feb. 17, 1920.

3 SHEETS—SHEET 1.

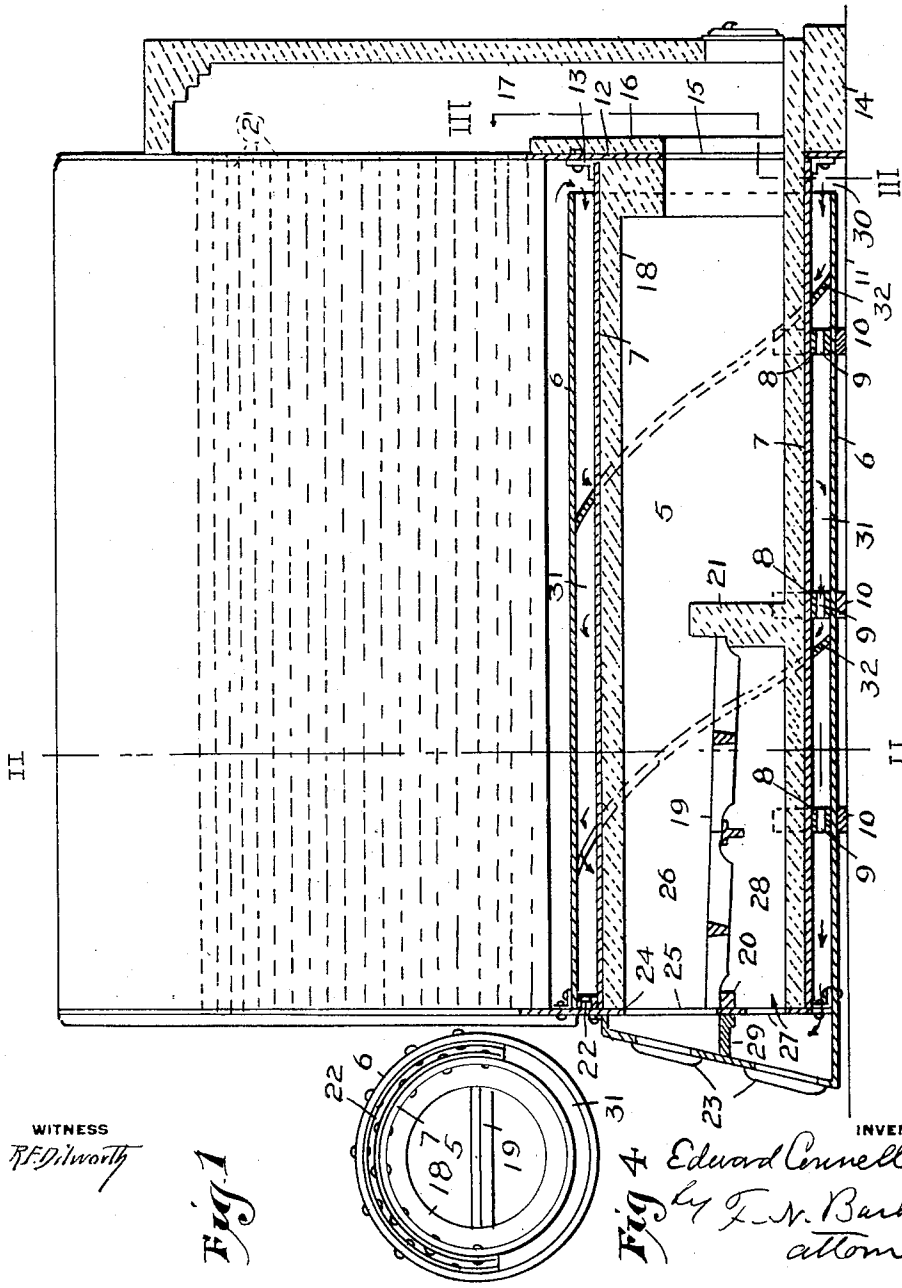


Fig. 1

Fig. 4

WITNESS

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3 SHEETS—SHEET 2.

Fig. 2

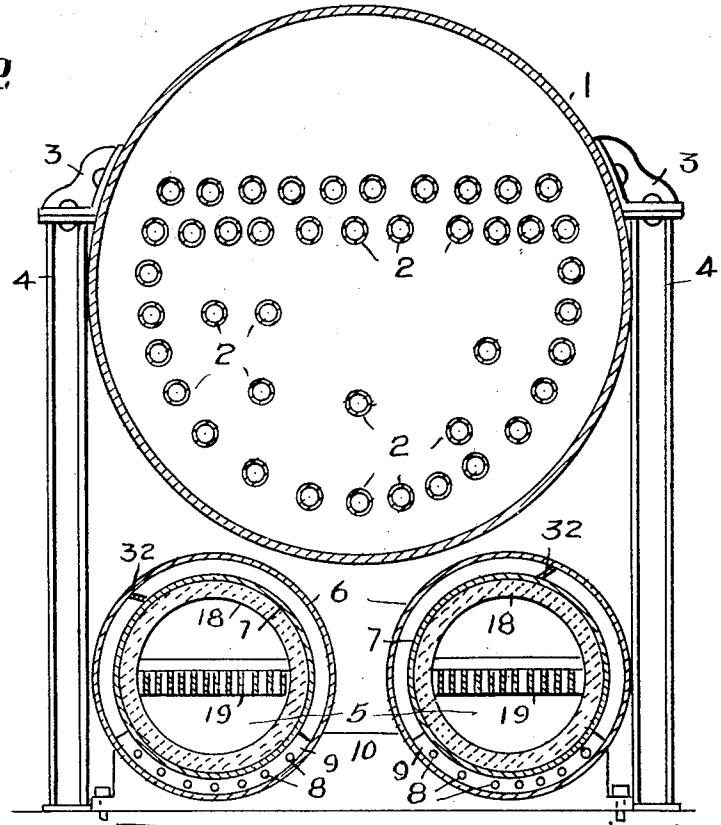
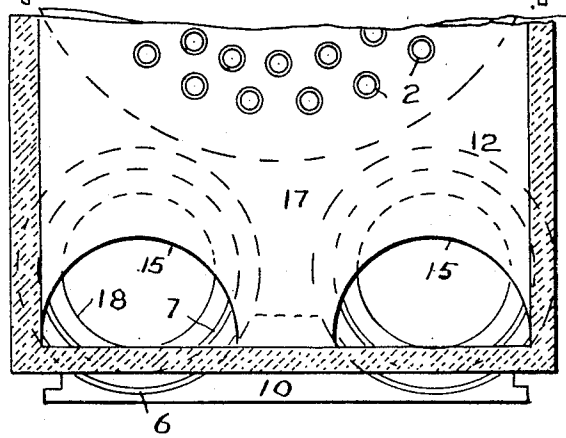


Fig. 3



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3 SHEETS—SHEET 3.

Fig 5

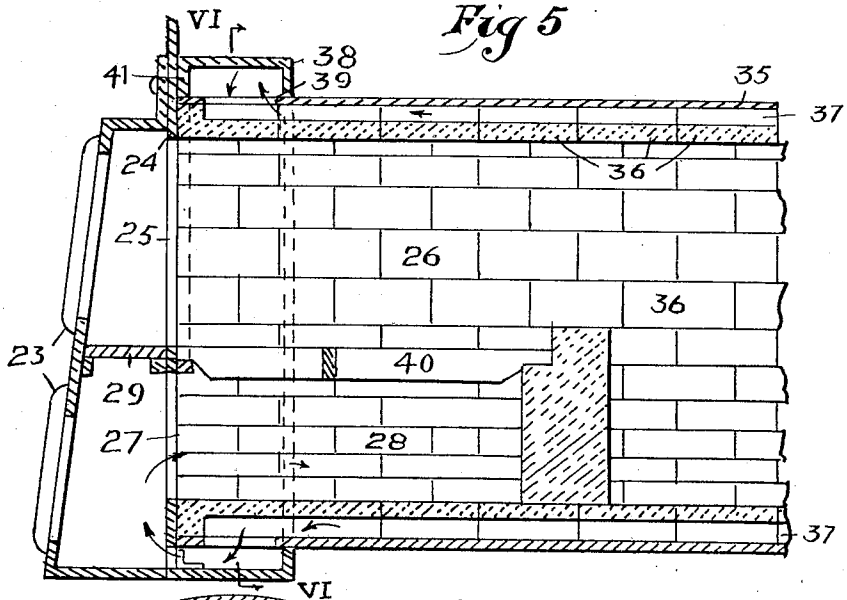


Fig. 6

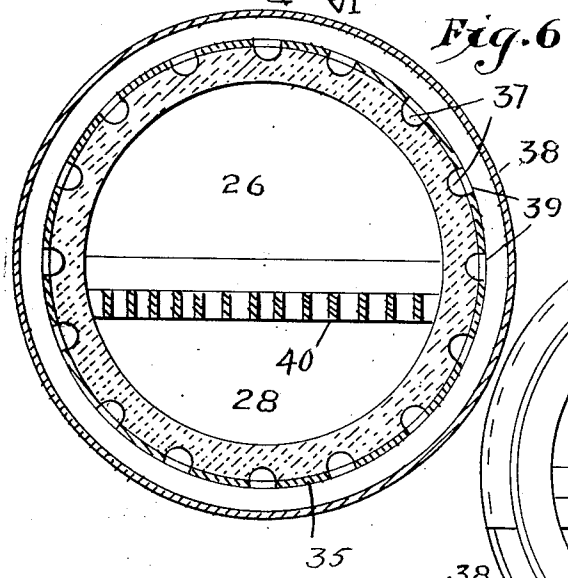
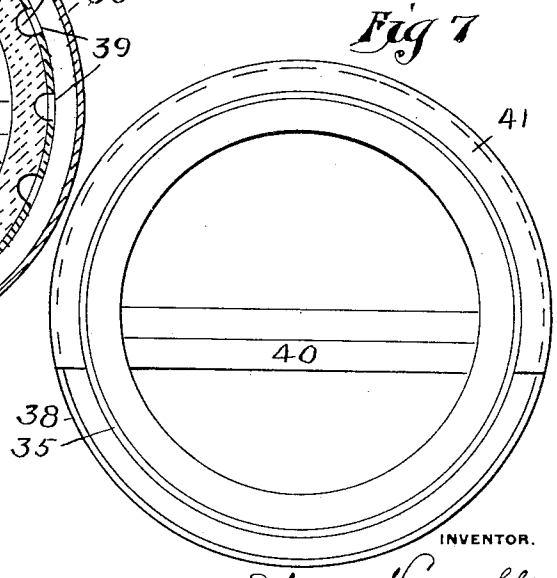


Fig 7



WITNESS

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UNITED STATES PATENT OFFICE.

EDWARD CONNELLEY, OF HOUSTON, TEXAS.

STEAM-GENERATING PLANT.

1,331,240. Specification of Letters Patent. Patented Feb. 17, 1920.

Application filed March 6, 1919. Serial No. 280,907.

To all whom it may concern:

Be it known that I, EDWARD CONNELLEY, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented new and useful Improvements in Steam-Generating Plants, of which the following is a specification.

My invention relates to steam generating plants, and has reference both to what is known as "the setting" or the general relation of the principal elements, and to the details thereof.

The object of this invention is to provide a steam generating plant, in which the boiler proper does not contain the furnace proper, but is used entirely to contain the water, steam, and fire-tubes, or other means of bringing the heat into contact with the water. Another object is to provide the furnace proper, with an external circulation of air which not only prevents the heat of the furnace from escaping into the furnace room and making it uncomfortably warm, but also supplies the furnace with preheated air for combustion. Another object is to lead the products of combustion away from the external surface of the boiler proper and as directly as possible into the fire tubes or into contact with equivalent heat transferring means. Other objects will appear hereinafter.

Referring to the accompanying drawings, Figure 1 is partly a side elevation and partly a longitudinal vertical section of a steam generating plant embodying the principles of my invention; Fig. 2, a section on the line II—II, Fig. 1; Fig. 3, a section on the line III—III, Fig. 1; Fig. 4, a front view of one of the furnace elements with the interior parts omitted; Fig. 5, a vertical longitudinal section of a modified form of my invention; Fig. 6, a transverse section of Fig. 5 on the line VI—VI; and Fig. 7, a front view of Fig. 5 with the door omitted.

On the drawings, 1 designates a horizontal cylindrical boiler of the fire-tube type, as shown by the fire-tubes 2 (only a few shown) extending in parallel relation through the same, but I do not limit the boiler to this type. The boiler is supported by the lateral lugs 3 resting on the steel or other columns 4. The boiler 1 is shown with capacity only for water, steam, and the tubes, the steam occupying the space above the top row of tubes.

I provide a suitable number of furnaces for generating the heat required for generating the steam. I have for illustration shown two horizontal furnaces, or furnace units 5, constructed alike, placed side by side beneath the boiler and parallel therewith. This arrangement frees the boiler from the furnaces and utilizes some of the space which is wasted when the furnace units are incorporated in the boiler.

Only one furnace unit will be described. The furnace unit comprises two concentric steel cylinders 6 and 7 spaced apart by the arc-shaped spacers 8 having numerous transverse openings 9 extending entirely through them. The outer cylinder 6 rests on several saddles 10 lying on a suitable foundation 11.

A vertical metal plate 12 is secured to the rear end of the cylinder 7 by the angle pieces 13 and extends from the lower side of the rear end of the boiler 1 down to the foundation 14 except for the arched passage 15. This plate is lined on the rear face with fire brick 16. A passageway 17 leads from the arched passages 15 up to the tubes 2 at the rear ends of the furnace units and the boiler.

The inside of the cylinder 7 and the front face of the plate 12 within the said cylinder are lined with fire-brick 18. Grates 19 are set in the forward ends of the cylinders 7 resting on suitable supports 20 and the bridge-wall 21.

The arc-shaped spaces between the forward ends of the cylinders 6 and 7 are closed down to the lower sides of the grates by the channel pieces 22 riveted to the cylinders. One or more doors 23 close the front of the furnace units from about the top of the cylinder 7 to the lower side of the cylinder 6, as shown on Fig. 1. A plate 24 covers the front end of the cylinder 7 and extends up past the top of the cylinder 6 to the lower side of the front of the boiler 1. This plate has the opening 25 to the top of the grate, or fire-box 26, and the opening 27 to the lower side of the grate, or the ash-pit 28. The cylinder 6 is extended forwardly so as to be engaged by the door 23. A horizontal partition 29 closes the space between the door 23 and the front plate 24 to prevent air from entering the fire-box through the opening 25.

The cylinder 6 terminates in front of the plate 12 in order to provide an annular inlet 30 for air. The air in traveling from the inlet 30 to the opening 27 is caused to travel around the passageway 31 between the cyl-

inders 6 and 7 by the use of a baffling means. I prefer the spiral baffles 32 which prevent the air from short-circuiting along the lower side of the passageway 31.

It is seen that the air for combustion with fuel on the grates 19 enters by the inlets 30 and takes spiral courses in the passageways 31 and finally enters the ash-pits 28, whence it must, owing to the bridge-walls 21 closing the spaces at the rear of and below the grates, pass up through the grates and the fuel thereon. The hot products of combustion pass through the arches 15 and up the passage 17 to the fire-tubes 2, through which they pass in any preferred manner to the stack not shown. The fire-brick lining 18 would radiate a large amount of heat into the boiler-room and make it exceedingly hot, if it were not for the passageway 31 which obstructs the heat and carries it to the fire-box to assist the combustion. The heated gases of combustion do not engage the boiler along its sides, where it would cause it to become burned out.

On Figs. 5, 6, and 7, I show a furnace unit with only a single metal cylinder 35 lined with fire-brick 36 having longitudinal grooves on their outer faces arranged to register to form longitudinal air passages 37 to take the place of the air passageway 31 of Figs. 1 to 4. The front end of the cylinder 35 is surrounded by the air flue 38 into which the air in the passages 37 enters through the holes 39 in the cylinder. This flue is closed at its forward end down to the level of the grate 40 by the front wall 41, so that the air will be compelled to enter the furnace chamber through the grate.

I claim:

1. The combination of a horizontal steam-generating boiler, a furnace unit external thereto, and means for leading the products of combustion to the heat-absorbing surfaces of the boiler, the said furnace unit comprising a horizontal combustion chamber, an air-jacket surrounding the same and having provision for admitting air thereto, and means leading the air from the air-jacket to the combustion chamber and causing the air to circulate in all portions of the air-jacket.

2. The combination of a horizontal steam-generating boiler, a furnace unit external thereto, and means for leading the products of combustion to the heat-absorbing surfaces of the boiler, the said furnace unit comprising a horizontal combustion chamber, an air-jacket surrounding the same and having provision for admitting air thereto, means leading the air from the air-jacket to the combustion chamber, and spirally arranged baffling means in the air-jacket.

3. The combination of a horizontal boiler having horizontal fire-tubes arranged longitudinally thereof, vertical metal plates extending downwardly from each end of the boiler and at right angles thereto, a metal tubular combustion chamber having its ends connected to said end plates, a grate across the forward portion of the chamber, a bridge-wall cutting off the space below the grate from the rear portion of the said chamber, means including a passage through the rear plate for leading the products of combustion to the fire-tubes, a fuel supply passage through the front plate above the grate, an air supply passage through said front plate below the grate, a tubular member surrounding the combustion chamber and spaced therefrom, means leading air to the space between the combustion chamber and the tubular member, and thence to the said passage in the front plate below the grate, and means preventing air from passing through the passage in the front plate above the grate.

Signed at Pittsburgh, Pa., this 3rd day of March, A. D. 1919.

EDWARD CONNELLEY.