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J. S. WALLIS ET AL
STEAM GENERATING SYSTEM

2,362,108

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2 Sheets-Sheet 1

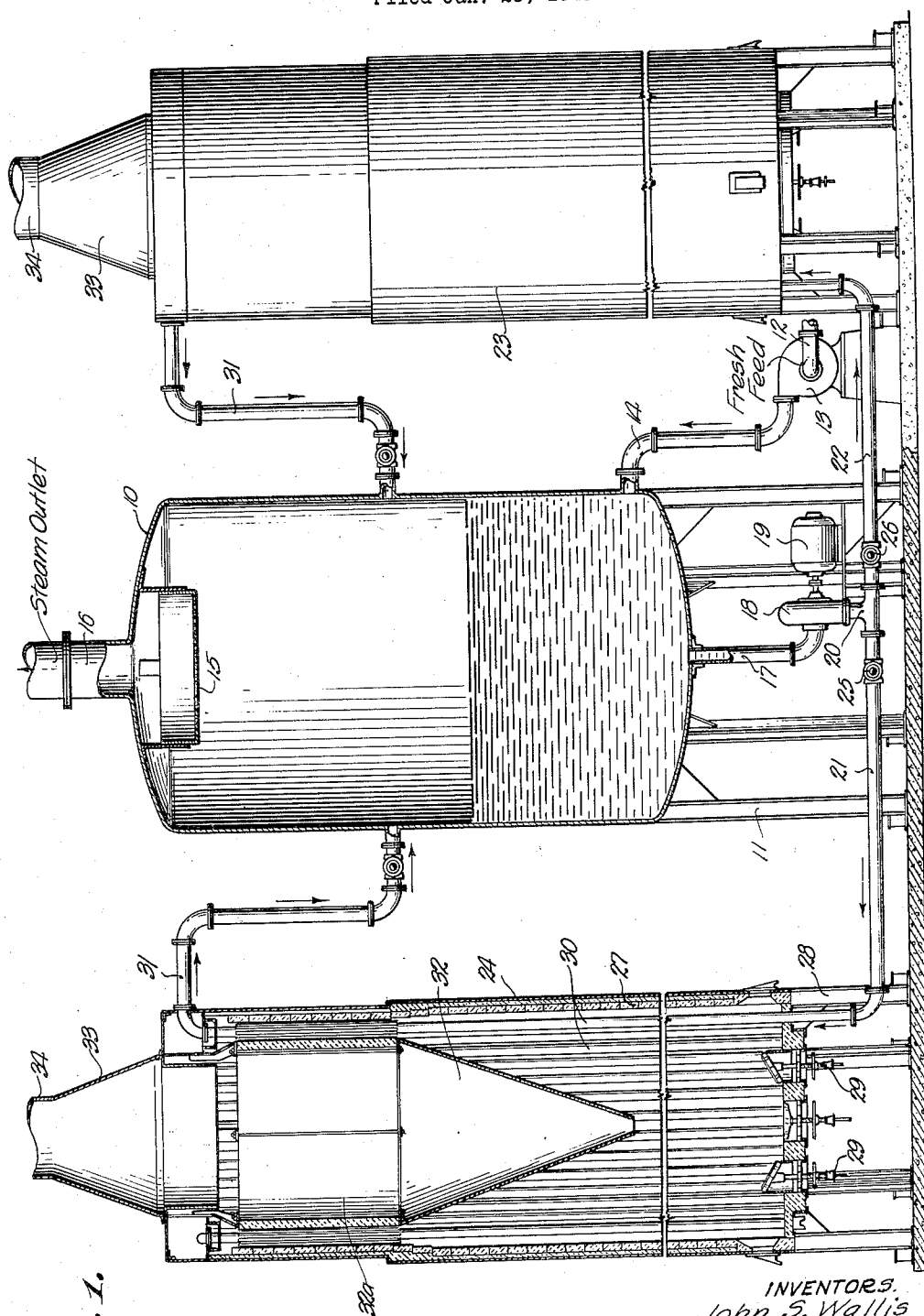


Fig. 1.

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Fig. 2.

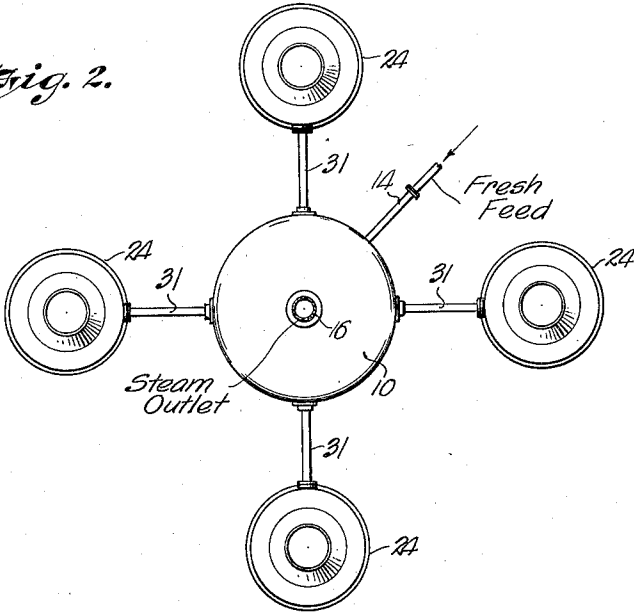
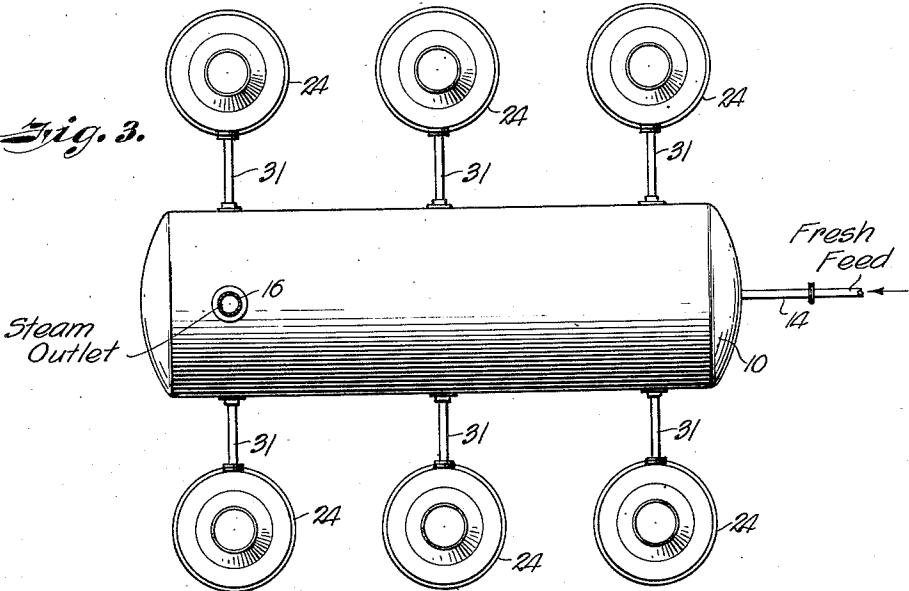


Fig. 3.



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STEAM GENERATING SYSTEM

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Application January 23, 1943, Serial No. 473,370

1 Claim. (Cl. 122-406)

Our invention relates to improvements in a steam generating system, and refers more particularly to a system employing a common steam liberating drum or receptacle to which the feed water is supplied and from which steam is discharged, the system including a plurality of separate heaters connected to the system in a manner that the heating of the water is effected as a separate operation.

An advantage of the system is the provision of a forced circulation steam generating boiler in which a plurality of heaters are connected to a single steam liberating receptacle, eliminating the necessity of providing separate feed pumps, safety valves, gauge glasses and other auxiliaries.

A further object of the invention is to provide a system in which one or more of the heaters may be cut out of the system for repair or for cleaning, permitting the remainder of the system to be continued in operation.

By the use of a single steam liberating drum, a more efficient heat economy is provided by pre-heating the feed water charged to the separate heaters and liberating the steam from the heaters in a single vessel.

Other objects and advantages of the invention will be readily apparent from the following description.

In the accompanying drawings which form part of the instant specification and are to be read in conjunction therewith, and in which like reference numerals are used to designate like parts in the various views,

Fig. 1 is an elevational view of the system with parts in section.

Fig. 2 is a plan view of a modified type of construction.

Fig. 3 is a second modification of the system shown in Figs. 1 and 2.

Referring to Fig. 1 of the drawings, there is shown therein a system in which a single liberating drum is employed with two separate heaters.

The liberating receptacle or drum 10 is mounted upon suitable standards 11. Feed water from any convenient source is supplied to the drum through pipe 12, pump 13 and pipe 14. In the top of the drum is located a mist extractor 15. Steam outlet 16 is also connected into the top through which is withdrawn steam generated in the system. This steam outlet is connected to suitable piping through which the steam is diverted to services where it is to be used.

In to the bottom of the drum is connected a liquid withdrawal pipe 17 which supplies feed water to the suction side of pump 18 driven by

any suitable source of power, such as a motor, shown at 19.

The discharge of pump 18 is connected to a Y 20, which in turn supplies the feed water through pipes 21 and 22 to the heaters 23 and 24.

Valves 25 and 26 in lines 21 and 22 may be used to cut out either of the heaters, as will hereinafter be described.

Heaters 23 are identical in construction and are of the general type shown and described in our Patent No. 2,276,527, issued March 17, 1942.

The heaters comprise a vertical cylindrical casing 24 lined with suitable insulation and fire resistant ceramic material, shown at 27. The cylindrical heater is supported on I-beams 28 and in the bottom of the combustion chamber are directional burners 29, to which are supplied fuel through suitable pipe connections.

Around the interior of the cylindrical combustion chamber are a plurality of vertical tubes 30, which are connected in series, the water to be heated being introduced through pipe 21 to one of the vertical tubes and circulated continuously through the heater to the discharge line 31. Return bends at the bottom and top of the combustion chamber serve to connect the tubes and produce a continuous flow.

Centrally of the combustion chamber is supported a baffle consisting of a lower conical section 32 and an upper cylindrical section 32a. This baffle causes the combustion gases to be diverted outwardly near the top of the chamber through an annular space between the cylindrical portion of the baffle and the inner wall of the heater.

Those sections of the tubes located within this annular space are equipped with extended surface or fins, which renders more efficient the heat exchange between the flue gas and medium being circulated through the tubes in this section of the heater. Combustion gases are discharged from the top of the heater through a breeching 33 and stack 34.

In the radiant section of the heater below the cylindrical portion of the baffle, the tubes are bare or without extended surface.

As previously suggested the heaters 23, shown in Figs. 1, 2 and 3, are preferably identical in construction. Each heater has a pipe connection to the feed line 17, and a discharge connection 31 through which the heated water is returned to the liberating drum for separation of the steam and unvaporized liquid.

In the system shown in Fig. 2 a vertical lib-

erating drum 10, similar to that shown in Fig. 1, is located centrally of four separate heaters.

In the modification shown in Fig. 3, a horizontal liberating drum is located between two banks of heaters positioned on opposite sides of the liberating drum.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of our claim. It is further obvious that various changes may be made in details within the scope of our claim without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, we claim:

A steam generating system comprising a plurality of separate vertical cylindrical heating units each having a bank of vertical tubes ar-

ranged about its interior wall, said units fired centrally from below and having top flue gas outlets, central baffles in the units for diverting the combustion gases outwardly toward the tubes, a common steam liberating receptacle, separate vapor and liquid connections for circulating water from the liberating receptacle to the separate heaters and back to the liberating receptacle, a pump for supplying water to the liberating receptacle below the water level maintained therein and a discharge for withdrawing steam therefrom, located above the water level, a discharge from the receptacle constituting the sole means for withdrawing steam from the system, a single mechanical means in the connections between the liberating receptacle and heaters for simultaneously setting up forced feed circulation through the separate heaters, and means for cutting out the respective heaters from the system

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