

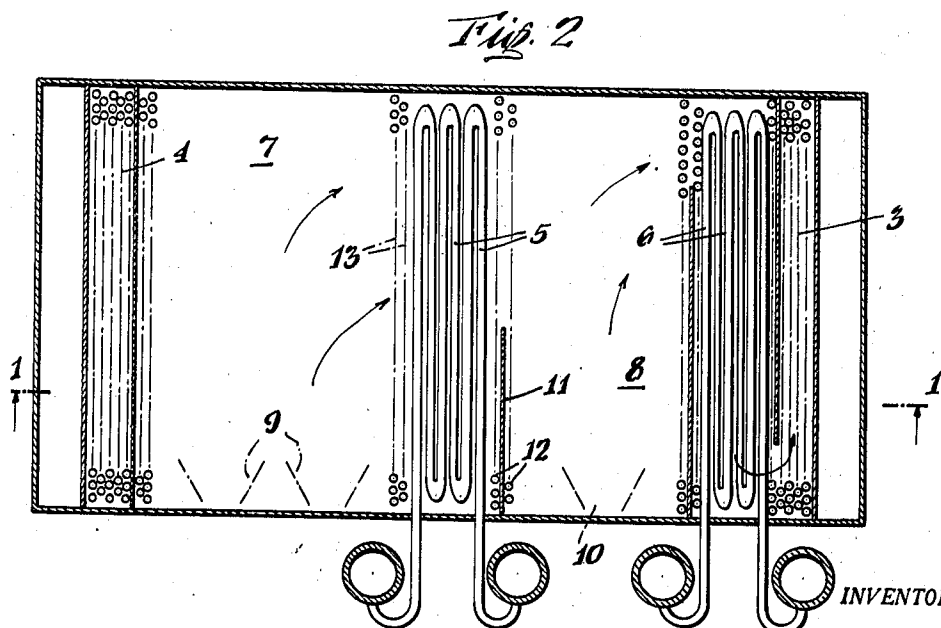
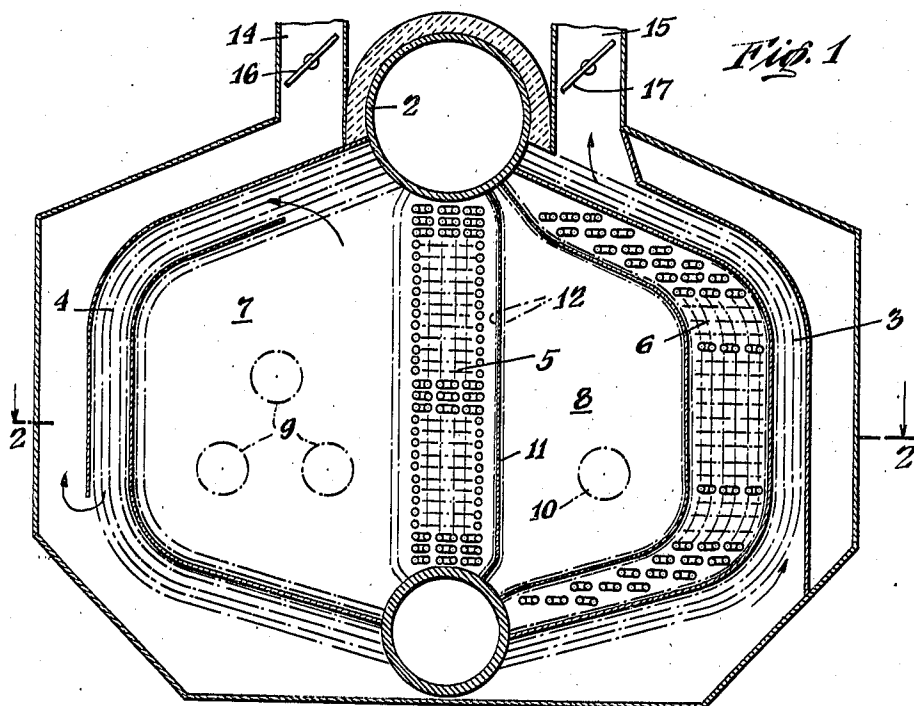
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L. C. SOUTHCOTT

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STEAM GENERATING AND SUPERHEATING INSTALLATION

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INVENTOR.

BY Leonard C. Southcott

James J. Whelan
ATTORNEY

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STEAM GENERATING AND SUPERHEATING
INSTALLATION

Leonard Clement Southcott, Bowdon, Altrincham,
England, assignor to The Superheater Com-
pany, New York, N. Y., a corporation of Dela-
ware

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1 Claim. (Cl. 122—473)

This invention is concerned with steam gener-
ating and superheating installations.

Steam generating and superheating installa-
tions are known in which the generator has upper
and lower drums connected by appropriately
baffled banks of bent water tubes with the space
between the banks comprising two water cooled
furnaces, there being uptakes at each side of the
upper drum or drums, with convectively heated
superheating elements suitably disposed in the
boiler. Such a boiler may be termed double-
sided.

Single-sided bent tube boilers also are known
having a single bank of water tubes appropriately
baffled and connecting upper and lower drums,
with a single furnace bounded by water cooled
walls and the said tube bank, such a boiler hav-
ing a convectively heated superheater associated
with its tube bank.

Boilers of the general kind indicated above are
noted for their rapid steaming, and the present
invention seeks to provide a bent tube boiler of
such general kind in which a high degree of
superheat, or both superheat and reheat, may be
obtained and the superheat temperature, or both
superheat and reheat temperatures, be controlled
in a simple and efficient manner.

Broadly stated the invention consists in a
boiler having upper and lower drums connected
by water tubes arranged to form main and sub-
sidiary banks with two water cooled furnace
chambers between them, each with its own up-
take, and between the furnaces a superheater
adapted to be heated by products of combustion
passing from the main furnace remote from the
main bank into the auxiliary furnace nearer the
said bank, there being another vapour heater
disposed in the said main tube bank, and the
steam temperature being controlled by regulating
by means of dampers in the respective uptakes
the proportion of the gases from the main fur-
nace which flows over the superheater between
the furnaces and into the auxiliary furnace and
main tube bank, relatively to the proportion
which flows to the uptake directly associated with
main furnace.

In carrying the present invention into practice,
the vapour heater located in the main tube bank
of the boiler may be either a superheater in series
with that between the furnaces, or a reheater;
where a second superheater constitutes said va-
pour heater, control of the final steam tempera-
ture may be effected partly by proportioning the
flow of gases from the main furnace to the respec-
tive uptakes, and thus varying the quantity flow-

ing over the superheater between the furnaces,
and partly by regulating the firing of the aux-
iliary furnace to control the gas flow over such
second superheater.

To define the two furnaces in the furnace space
of the boiler a division baffle is provided, the
superheater disposed between the furnaces be-
ing arranged at the main furnace side of the
baffle. This baffle, while being arranged to permit
the flow of gases from the main furnace into the
auxiliary furnace, is also such as to cause the
gases to flow over the elements of the superheater
lying between the furnaces on their way to the
auxiliary furnace and main tube bank.

In the accompanying drawing—

Figure 1 is a sectional elevation and

Figure 2 a sectional plan of a boiler with super-
heating arrangements according to a selected em-
bodiment of the invention, the illustrations being
more or less diagrammatic and Fig. 1 being a sec-
tion on the line 1—1, Fig. 2, while the latter figure
is a section on the line 2—2, Fig. 1.

Referring to the drawing, the steam and water
drum 2 is connected to a water drum disposed
beneath it by bent water tubes forming a main
tube bank 3 and a subsidiary tube bank 4. A
superheater 5 lies in the furnace space between
the tube banks, and another vapour heater 6,
for example a reheater, is disposed in the main
tube bank 3.

The furnace space is divided by a water cooled
baffle into two chambers constituting a main fur-
nace 7 remote from the main tube bank 3 and
an auxiliary furnace 8 nearer said bank, the fur-
naces being fired by burners at 9 and 10 respec-
tively, in one end wall of the furnace space.
The end walls would be cooled by any convenient
arrangement of water tubes (not shown).

In the embodiment of the invention illustrated
the division baffle 11 between the furnaces is
formed of refractory material supported by ver-
tical water tubes 12, such baffle extending from
one end of the boiler an appropriate distance to-
wards the other end, and between the convect-
ively heated superheater 5, lying adjacent said
baffle, and the main furnace 7 one or more rows
of spaced vertical water tubes 13 is or are ar-
ranged, the latter water tubes and those support-
ing the baffle being available to afford support
to the superheater elements. Alternatively, water
tubes in contact may be employed, instead of re-
fractory material, to form the division baffle.

Associated with the furnaces 7, 8 are uptakes
14, 15 respectively, controlled by dampers 16, 17.
Gases from the furnaces can flow directly to

the respective uptakes, but when the boiler is under load the whole or a desired proportion of the gases from the main furnace 7 will flow over the superheater 5 into the auxiliary furnace 8 and thence to the uptake 15, the proportion flowing over the superheater being regulated by means of the dampers 16, 17 to obtain and maintain the desired temperature of steam delivered by the superheater 5.

The firing of the furnace 8 would also be regulated to control the temperature of steam delivered by the reheater 6.

Usually to obtain maximum steam temperature damper 16 would be closed and damper 17 fully opened, whereby the whole of the products of combustion from the main furnace 7 would flow over the superheater 5.

To raise pressure in the boiler the main furnace 7 only would be fired and the products of combustion therefrom would be passed over the subsidiary tube bank 4 to the uptake 14 associated therewith, the damper 17 in the uptake 15 associated with the main tube bank 3 being closed. When sufficient steam is available to protect the elements of the superheaters, or superheater and reheater 5, 6 from overheating the damper 17 associated with the main tube bank 3 will be opened and gases from the main furnace will flow over the main bank, the damper 16 appertaining to the subsidiary bank 4 being closed, or partially closed. At the appropriate time the auxiliary furnace 8 would be fired and the final steam temperature, or the final steam and reheat temperatures, will be controlled as already indicated by regulating the gas flow over the superheaters, or superheater and reheater, by adjusting the dampers, and also by regulating the firing of the auxiliary furnace.

A boiler and vapour heating installation constructed as described enables the boiler to oper-

ate to give a relatively large output of saturated or low temperature steam by firing only the main furnace 7 and passing all the products therefrom over the subsidiary tube bank 4, the damper 17 associated with the main tube bank 3 being closed.

What I claim is:

In a boiler having two separate gas offtakes; means forming communicating main and auxiliary furnace chambers below said offtakes each communicating directly with one of the latter; a superheater located between said furnaces; banks of steam generating tubes located between the respective furnaces and the offtake adjacent thereto; baffle means positioned between said superheater and said auxiliary furnace chamber so arranged as to shield the superheater from said auxiliary chamber while permitting gases from said main chamber to enter said auxiliary furnace chamber and pass over the tube bank and to the offtake which are related thereto; fuel burning means associated with said main furnace chamber providing the major portion of the heat utilized in generating steam in both said tube banks and all of the heat absorbed by said superheater to superheat the steam; other fuel burning means associated with said auxiliary furnace chamber providing the remainder of the heat required for absorption in the tube bank between it and its offtake for generating steam in said boiler; and damper means in said offtakes operable to regulate the amount of gases passing from said main furnace chamber to the offtake therefor in relation to the amount passing from said chamber over said superheater into said auxiliary chamber to be discharged through the offtake for the latter.

LEONARD CLEMENT SOUTHCOTT.