

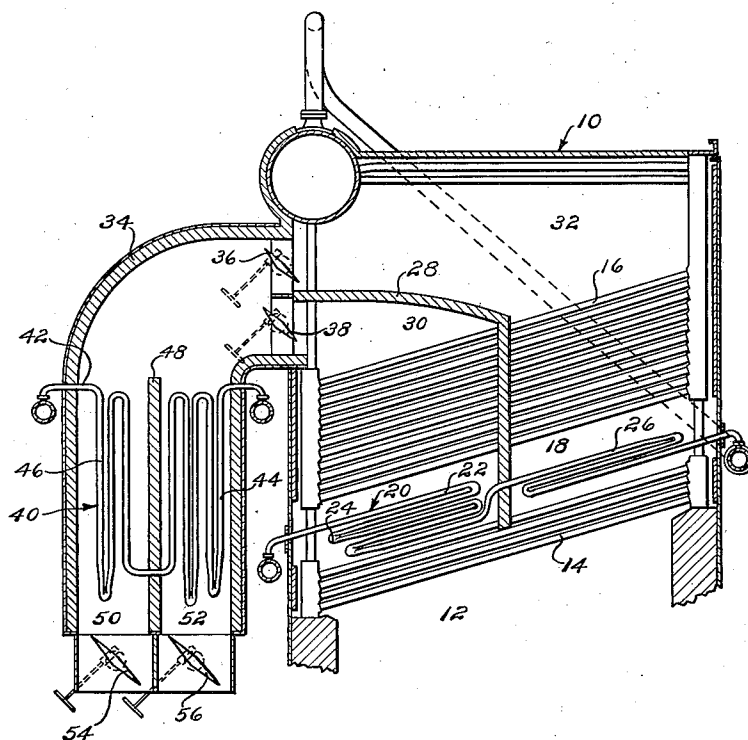
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COMPENSATING REHEATER AND SUPERHEATER

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COMPENSATING REHEATER AND SUPER-
HEATERCharles W. Gordon, Munster, Ind., assignor to
The Superheater Company, New York, N. Y.Original application September 8, 1934, Serial
No. 743,175. Divided and this application
February 8, 1936, Serial No. 62,951

2 Claims. (Cl. 122-480)

My invention relates to superheating steam and aims to provide an arrangement whereby the temperature of the steam may be readily and accurately controlled.

5 Superheated steam is used in practically all steam turbines, but in most turbine installations the steam is reheated between certain expansion stages so that a reheater is employed as well as a superheater. In such installations, there is a
10 natural tendency for the temperature of the superheated steam and of the reheated steam to vary with the load. For best efficiency of the turbine, however, such temperatures should be maintained constant at or near the prescribed
15 maximum.

It is an object of my invention to provide an arrangement whereby such variations are minimized.

In accordance with my invention, the superheating surface and the reheating surface is divided into two unequal sections, each one arranged in a different gas path, and the percentage flow of gases in the different gas paths is regulated to maintain the superheat and/or reheat temperature as nearly at the desired constant temperature as may be.

In order that my invention, together with its objects and advantages, may be fully and readily understood, I will now describe in detail a boiler having a superheater and a reheater, an exemplification of my invention which is illustrated in the accompanying drawing and which has been selected by way of example from a number of possible embodiments thereof. This application
35 is a division of my copending application, Serial No. 743,175, filed September 8, 1934, now Patent No. 2,053,429, issued September 8, 1936. In the drawing,

The figure is a vertical sectional view of an installation in accordance with the invention.

In the arrangement illustrated, 10 is a boiler of a conventional type having a furnace chamber 12, a slag screen bank 14 immediately above said furnace chamber, and a main bank of generating tubes 16 above and spaced from said bank 14. The chamber 18 lies between banks 14 and 16 and the superheater 20 preferably is placed in such chamber. The gas touched surface of the superheater 20 is composed of a number of
50 units one of which appears at 22, and each unit is divided into two sections 24 and 26 in such manner that the heating surface of one section is very considerably greater than that of the other. Furthermore, baffling means 28 is provided forming two gas paths 30 and 32 so ar-

ranged that section 24 lies in one path 30 and section 26 lies in the other path 32, the baffle 28 extending between the two sections. In the arrangement illustrated, the baffling 28 extends continuously from the upper edge of the slag screen bank 14 vertically upward through the bank 16 and laterally to one edge of the boiler setting, where the gas is discharged into a flue 34. At the inlet of the flue 34, two independently hand controlled dampers 36 and 38 are placed so that the percentage flow of gases in the paths 30 and 32 can be regulated at will within wide limits. However, it is obvious that dampers 36 and 38 can be automatically controlled if so desired. By throwing more of the gases over the larger section 24, the temperature of the steam delivered by superheater 20 can be increased beyond that normally expected at a given load and this fact is taken advantage of to maintain the steam temperature delivered by the boiler to an operation at as nearly the prescribed maximum as possible. Also, in the arrangement illustrated, a reheater 40 is placed in the flue 34. Reheater 40 is composed of a number of units one of which is illustrated at 42. The gas touched surface of each of units 42 is divided into two sections 44, 46, one having materially more active surface than the other and a baffle wall 48 extends between the sections 44 and 46 so as to divide the flue 34 into two gas paths 50 and 52 which extend longitudinally of flue 34 at least as far as the units 46. Near one end of the flues 50, 52 independently controlled dampers 54, 56 are placed so that the percentage flow of gases over the sections 46 and 44 may be controlled as desired to regulate the temperature of steam delivered from reheater 40. As illustrated, the baffle wall 48 does not connect up with the baffling 28 so that there is a section of the flue 34 between the adjacent ends of such baffles within which the gases from paths 30 and 32 may mingle.

It is thereby possible to maintain one percentage division of gases as between paths 30 and 32 and another percentage division of the gases as between paths 50 and 52. The part of the flue between the ends of paths 30 and 32 and the beginning of the paths 50 and 52 is not divided by a partition and the flues 50 and 52 are considered continuing parts of the paths 30 and 32, respectively, inasmuch as the gases entering the flue from both paths 30, 32 in a certain ratio ordinarily exit in a different ratio through flue paths 50 and 52. As an illustration, adjustment of the dampers 36, 38 causes a certain percentage of the total amount of gases to flow

over the larger section 24 of the superheater and adjustment of dampers 54, 56 causes a different percentage to flow over the larger section 52 of the reheater. Accordingly, if the percentage of flow through flue path 50 over the smaller reheater section is greater than the percentage through path 32 the difference is made up by gas entering the flue from path 30 so that flue path 50 thus acts as a part of path 30. Conversely, where the percentage flowing through flue path 50 is less than the percentage through path 32 the excess quantity from path 32 exits through flue path 52 which thus becomes a continuing part of path 32. I prefer to provide such an arrangement for the reason that the variation of the temperature of the heating gases with load is different at the location of the superheater 20 from what it is at the location of the reheater 40. Also, the temperature of the steam entering the reheater 40 varies more with the load than does the temperature of steam entering the superheater 20, the latter temperature being presumably almost constant. It follows that the load-temperature curves of the two heaters are naturally materially different, assuming similar division of heater surfaces and of gases between the gas paths. Changing the ratio of flow of gas over the large surface side of superheater 20 to that over its small surface side as compared to such ratio for the reheater 40, assists in maintaining a nearly constant temperature at the outlet of each heater. However, I do not limit myself to an undivided flue or section between the ends of paths 30 and 32 and the beginning of paths 50 and 52 but, as shown in my co-pending application, may extend baffling 28 to meet the baffling 48, one of the pairs of dampers 46 and 48 or 54 and 56 thereby becoming unnecessary.

Furthermore, a different division may be made of the heating surface in the superheater 20

as compared to that in reheater 40. Such an arrangement is shown in said application but is applicable here also. Each of the two heaters is thereby enabled to approach the optimum steam temperature under varying loads with a minimum of variations in settings between dampers 36, 38 and dampers 54, 56 in the average installation.

What I claim is:

1. In a boiler having a reheater and superheater and having two gas paths in which said superheater and reheater lie, said superheater and reheater each having sections in both paths but each having its surface unequally divided between said paths and having its larger section in a given path, and means whereby the ratio of gas flow over one section of the superheater to that over the other may be varied as compared to the ratio of gas flow over one section of the reheater to that over the other.

2. In a boiler having a reheater and a superheater both arranged to be contacted by the gases for heating the boiler, both said heaters composed of units each having its active surface in two sections, one such section materially greater than the other in each heater, a partition between the section of the units of said superheater forming two paths for said gases, means whereby the percentage flow of gases on opposite sides of said partition may be regulated to control the superheat temperature, a partition between the sections of the reheater units forming two paths for said gases through the reheater, and other means for regulating the percentage flow of gases on opposite sides of said second partition to control the reheat temperature independently of the adjustment of said first mentioned regulating means to regulate the distribution of gases over said superheater.

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