March 27, 1934. M. EHLINGER 1,952,542

SUPERHEATING DEVICE

Filed Aug. 12, 1932

Fig. 1.

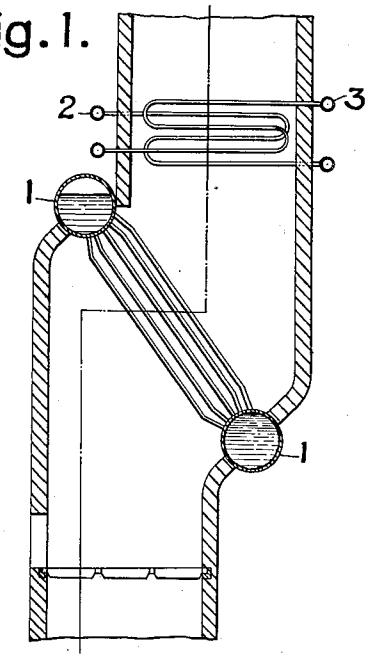


Fig. 2

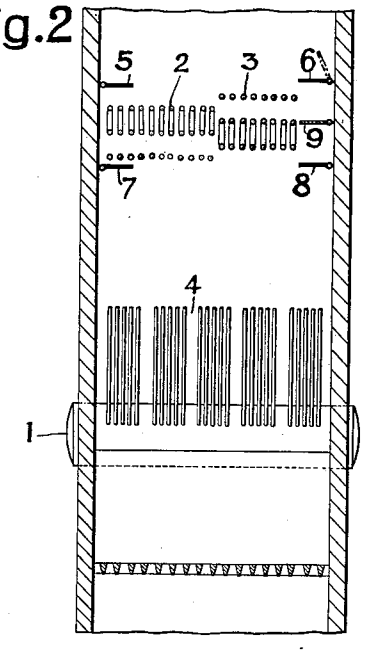


Fig. 3.

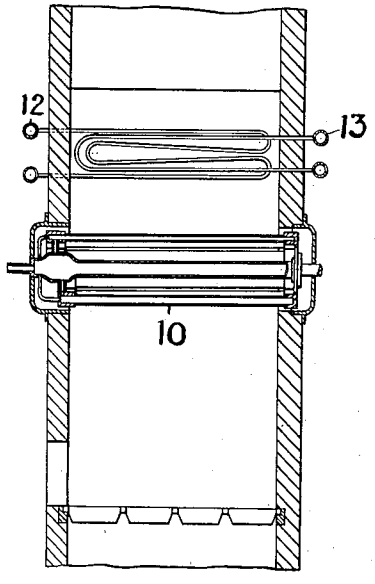
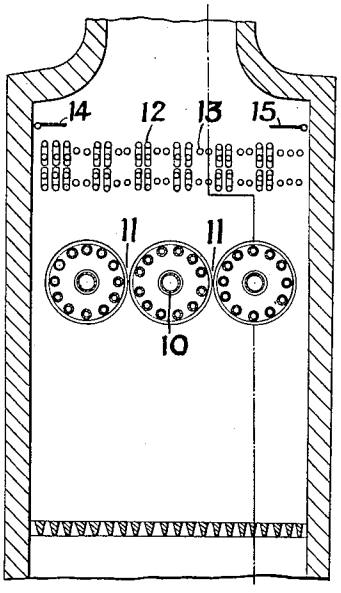


Fig. 4.



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SUPERHEATING DEVICE

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2 Claims. (Cl. 122—480)

When steam at very high pressure is used for driving engines or steam turbines it is very desirable to obtain the maximum thermic efficiency of resuperheating the steam after it has already done work in one part of the engine or steam turbine. One of the means of resuperheating or secondary superheating is to return the steam to the boiler in which it is passed through coils heated externally by the combustion gases. In lieu of returning the expanded steam to the boiler it may be reheated by means of live steam which after cooling is again returned to the boiler for a second superheat. Thus, the boiler includes a superheating device comprising a primary superheater and a secondary superheater.

In order that the operation of the boiler should be satisfactory it is necessary that the temperature of the steam leaving the two superheaters of the device should be practically constant whatever the load on the boiler may be. It is necessary that the steam should leave always at such a temperature that the materials used will not be brought to an excessive temperature having regard to their strength.

Experience has, however, shown that without special precautions the temperature of the steam leaving the superheater or re-superheater increases with the load. Various means have been utilized, inter alia the injection of water into the steam to cool it and to bring it back to the temperature which it is calculated should not be exceeded.

The present invention relates to a superheating device of the kind having a primary and secondary superheater and provides an arrangement permitting of maintaining the superheat and the resuperheat constant. It consists essentially in placing the primary superheater and the secondary superheater of the device at the same region in the path of the hot boiler gases, exposing them both to the radiant heat of the furnace and to the convection heat of the gases and to provide dampers or baffles permitting of excluding as desired a part of one or other of the superheaters or of both from the heating action by the hot gases in order to regulate the final temperature of the steam in each of the heat exchangers.

It is known in fact that a superheater exposed only to the radiant heat of the furnace gives a superheat temperature which decreases when the load increases, and that a superheater exposed only to convection heat of the gases gives a superheat temperature which increases when the load increases. By combining the effects of radiant heat and of convection heat a practically constant superheat may be obtained.

The present invention is illustrated in the accompanying drawing in which Figs. 1 and 2 show by way of example a stationary boiler by two sectional views at right angles to one another, whilst Figs. 3 and 4 show by similar views a boiler with a rotary steam generator.

In Figs. 1 and 2 of the drawing, 1 and 1^a indicate respectively the steam and water drums, 2 the primary superheater designed to be connected in the steam circuit for a first superheating and 3 the secondary superheater designed to be connected in the steam circuit for a second superheating. The primary and the secondary superheater are located in horizontal position at substantially the same height and within the same room above the bank of boiler tubes connecting the drums 1 and 1^a. This bank provides gaps 4 free from tubes by which the radiant heat emanating from the furnace may reach the superheaters, the bank of tubes being thus divided into several units placed apart from one another to form said gaps 4. A suitable width of these gaps is selected according to the circumstances. Pivoted baffles 5 and 7 when for example being in their outstanding position shown in Fig. 2 cause the gases to be deviated from certain tubes of the superheater 2 and consequently give rise to less superheat therein.

These baffles or dampers may also be turned upwards or downwards so as to give free passage for the gases over all of the tubes of the superheater 2 in order to increase the superheat therein. Instead of two baffles, one single may be sufficient. For the superheater 3 the arrangement is somewhat different. Here, when the baffles 6, 8 and 9 are in transverse position, they cause the gases to flow over the tubes of the superheater 3; when they are, however, turned upwards or downwards, the gases will be allowed to pass in part directly through a free lateral passage thus created and consequently reheat the tubes to a less extent. These baffles, which can be replaced by flaps or other controlling members are preferably arranged beyond the superheaters, as indicated at 5 and 6, an arrangement which is favorable to the life of the baffles, but they may be placed also beneath the superheaters as indicated at 7 and 8 or midway thereof as indicated at 9.

In Figs. 3 and 4 the generator is indicated at 10. It is for example of the known type composed of a number of tube rotors leaving between them a gap 11 through which passes the radiant heat

from the furnace. The primary and secondary superheaters 12, 13, respectively, are partly interlaced so that certain tubes of the superheater 13 are placed between or alternate with certain tubes of the superheater 12. This interlacing takes place only over a middle portion of the combined structure presented to the gases, whilst on the sides the superheaters remain independent from each other for a certain amount towards the mid-portion.

In this manner the amount of exposure to radiant heat and to convection heat is similar in both structures. Baffles or dampers 14, 15 are located in such manner that they may produce an effect on the parts which are not interlaced of these superheaters. It will be understood that by operating these baffles the superheat may be varied to a certain extent as in the preceding example. These baffles may be located in any desired position. The essential point is that by their operation certain tubes of the superheater 12 and/or of the superheater 13, these tubes being in each case the lateral ones, may be excluded from the action of the gases.

The invention is applicable of course to a number of boilers supplying a single engine or steam turbine and whether the primary or secondary superheaters are traversed in series or in parallel. By the present invention the final superheat of the steam can be regulated.

What I claim is:—

1. In a steam generator, having a primary and a secondary superheater in combination with steam generating units, the arrangement wherein said superheaters are placed in horizontal position partly interlaced with one another at substantially the same height and within the same chamber above said steam generating units, free gaps being provided between the latter and the superheaters being so arranged relatively to said gaps as to be exposed to the radiant heat of the furnace traversing said gaps and by the convection heat of the combustion gases, baffle-like gas controlling means being provided adjacent to said primary and secondary superheaters in the path of the combustion gases for regulating their heating action on the superheaters.

2. In a steam generator, having a primary and a secondary superheater in combination with steam generating units, the arrangement wherein said superheaters are placed in horizontal position partly interlaced with one another at substantially the same height and within the same chamber above said steam generating units, free gaps being provided between the latter and the superheaters being so arranged relatively to said gaps as to be exposed to the radiant heat of the furnace traversing said gaps and by the convection heat of the combustion gases, baffle-like gas controlling means being provided adjacent to said primary and secondary superheaters at the points where they are not interlaced and in the path of the combustion gases to permit of excluding from the action of the gases a portion of one or other superheater or of both at the parts which are not interlaced.

MARCEL EHLINGER.