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K. L. MARTIN

1,777,674

WATER TUBE BOILER

Filed Sept. 5, 1929

Fig. 1.

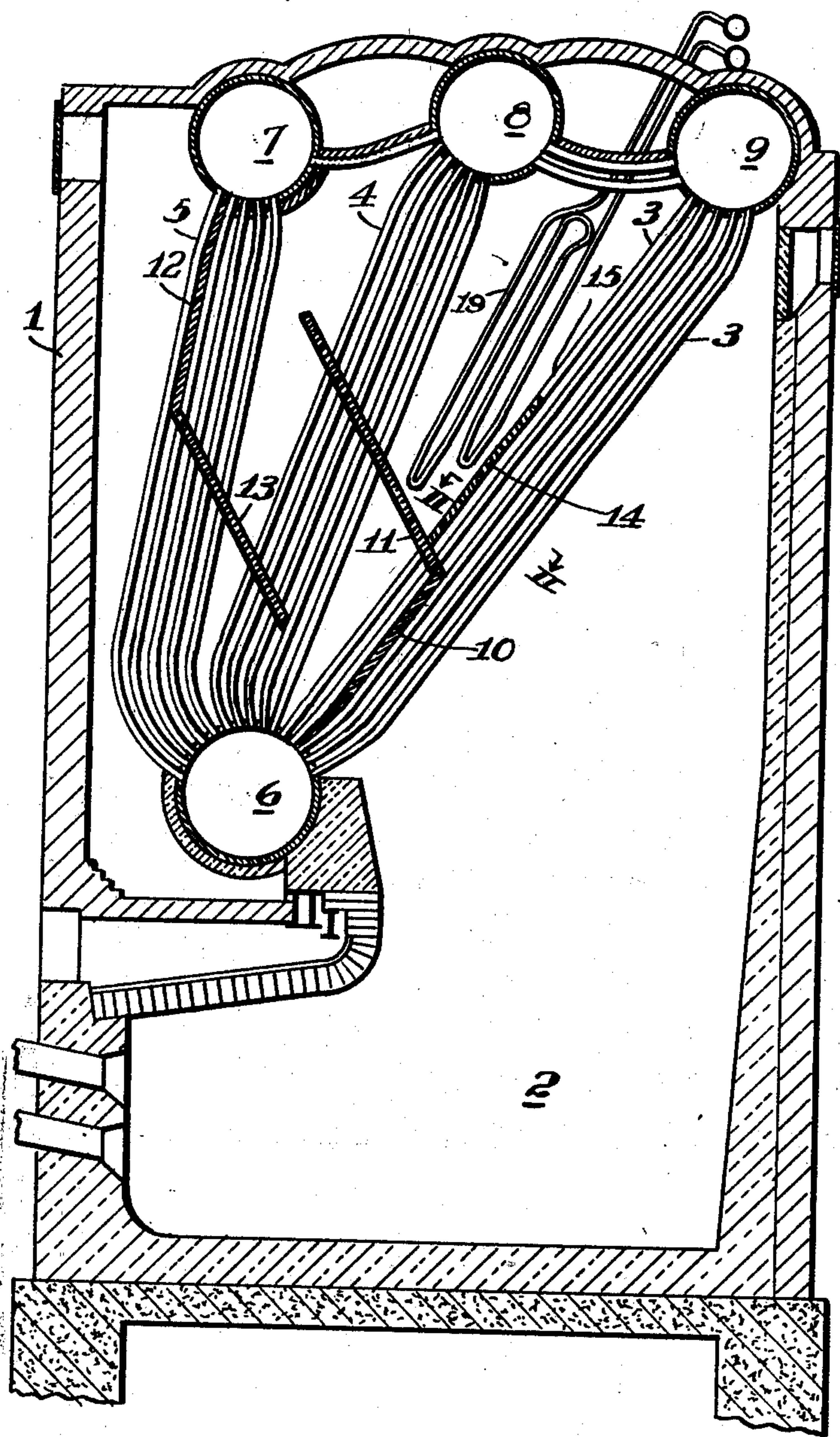


Fig. 3.

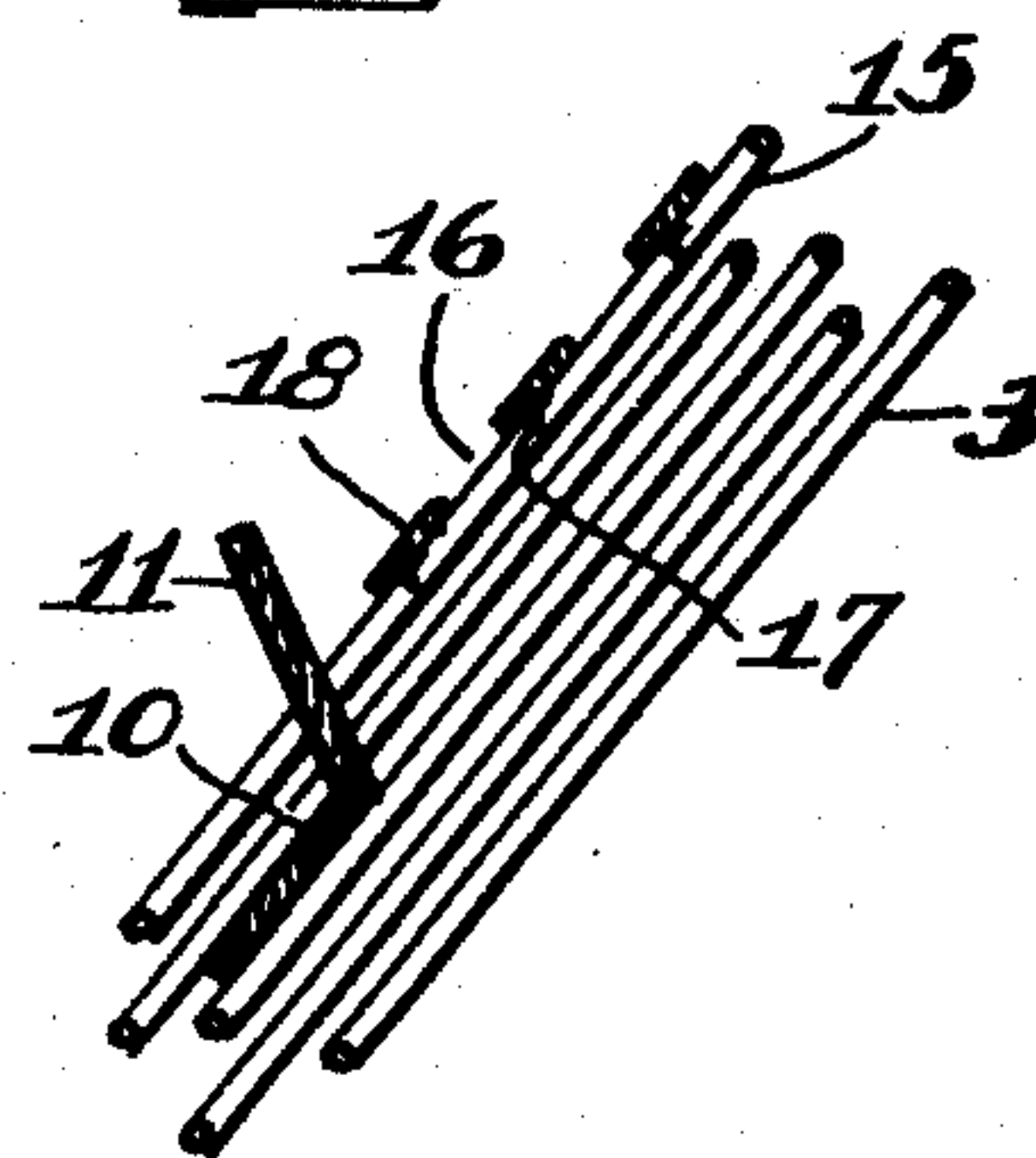
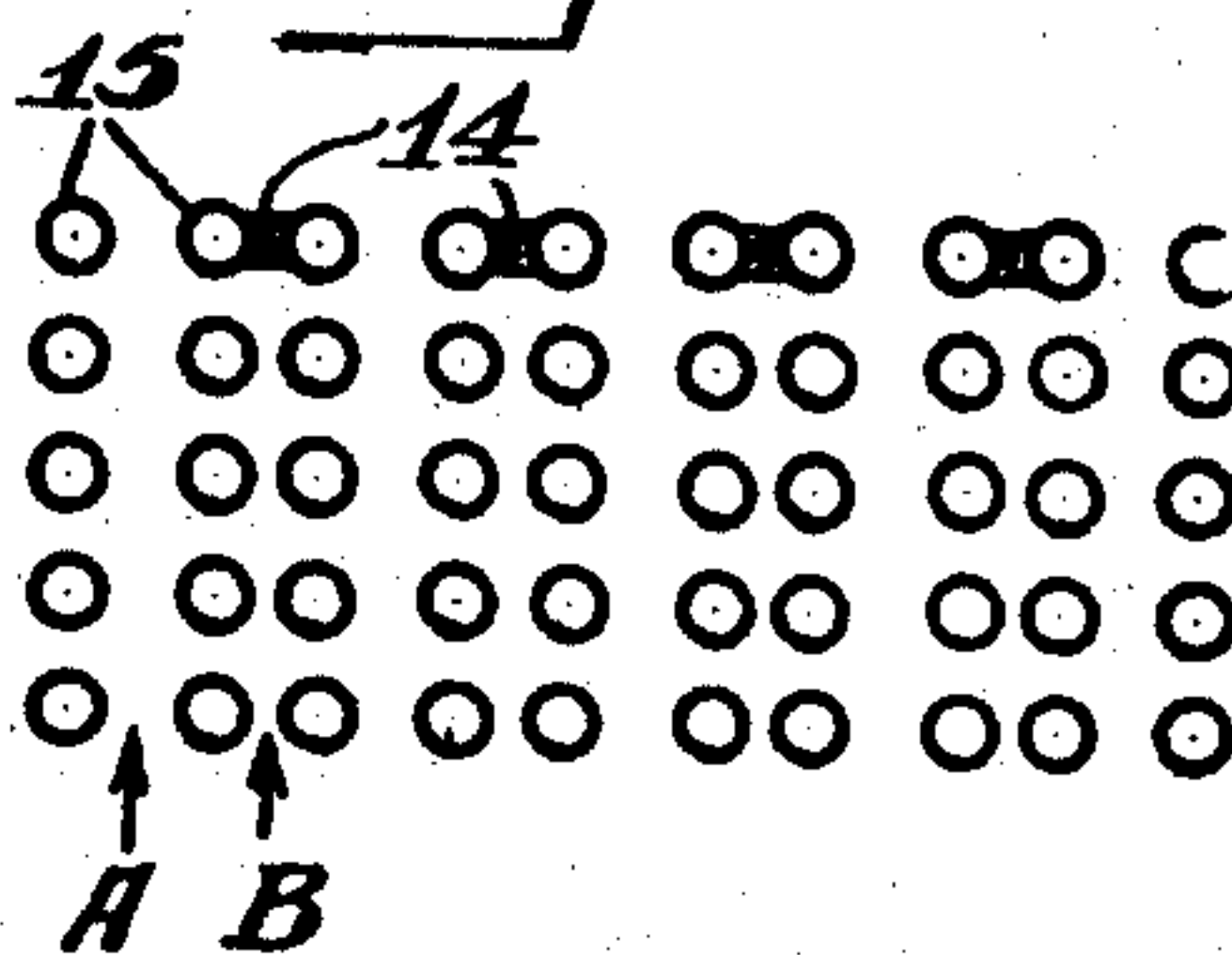


Fig. 2.



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WATER-TUBE BOILER

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This invention relates to water tube boiler construction and particularly to baffle walls as used in vertical boilers. The invention has for its primary object the provision of an interrupted baffle wall (1) which will improve the efficiency and increase the capacity of the boiler by securing the best distribution of the gases of combustion over the heating surface of the boiler, and (2) which will provide a means of readily modifying a baffle installation to suit the working conditions of the boiler as developed in operation. The invention is used to best advantage in vertical boilers having cross baffles built in accordance with Patent No. 1,702,933 issued to Alfred C. Danks and Kingsley L. Martin. Certain embodiments of the invention are illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical section through a vertical water tube boiler showing the location of the interrupted baffle walls to which the invention is applicable. Fig. 2 is a detail cross section through the interrupted baffle and the first bank of tubes in which it is customarily located as on the line II—II of Fig. 1. Fig. 3 is a detail elevation of one bank of tubes showing an alternate method of constructing the interrupted baffle with horizontal instead of vertical open spaces.

By way of illustration, the baffles are shown as applied to a Stirling boiler, but it will be understood that the invention is applicable to the other types of vertical boilers and that the claims are applicable to all types unless otherwise limited by their terms.

The boiler shown comprises the setting 1, firebox 2, the three banks of tubes 3, 4 and 5, the drums 6, 7, 8, and 9, the front baffle comprising the sections 10 and 11 and the rear baffle comprising the sections 12 and 13, the sections 10 and 12 extending longitudinally of the tubes and the sections 11 and 13 extending transversely of the tubes.

The interrupted baffle 14 also extends lengthwise of the tubes in an upward direction from the cross baffle wall 11 and may be located either on the first bank 3, as shown in Fig. 3, or between the tubes as shown in Fig. 2.

Fig. 2 shows the construction of the interrupted baffle with longitudinal spaces as it extends longitudinally of the tubes above the upper cross baffle 11. As shown in this figure, the alternate spaces A and B between the tubes are made wide and narrow, respectively, in accordance with the regular practice; the wide spaces being designed to give room for the removal of tubes when it becomes necessary to take them out for replacement or repair.

The interrupted baffle is here shown constructed of molded refractory material preferably in two symmetrical pieces of convenient length fitting back to back between the tubes in a transverse row. These may be placed in the narrow alleys leaving free the wide alleys for the passage of gas and the removal of tubes or in any suitable way.

This construction is very flexible as the molded blocks may be readily removed or added to in order to decrease or increase the length of the baffle as may prove desirable to meet varying operating conditions.

Fig. 3 shows the interrupted baffle constructed with horizontal spaces 16, the preferred method being to use horizontal angles 17 clamped to a row of tubes and supporting molded refractory blocks 18. The distance between the angles and the width of the blocks may be designed originally to meet expected conditions and later changed without undue expense if found desirable.

The advantages of the interrupted baffle will be readily apparent to those skilled in the art. With certain boilers having superheaters similar to 19 of unusual length, it is necessary to locate the cross baffle 11 low down on the tube banks 3 and 4 to avoid curtailing the superheater area. In such cases, the gases do not flood the upper end of tube bank 3, but may follow the cross baffle 11 and render the valuable heating surface at the upper end of the tube bank 3 ineffective. A marked improvement in boiler operation is obtained by the use of an interrupted baffle, as shown, which permits part of the gas to pass through the open spaces to the lower end of the superheater and to that part of the second tube bank 4 immediately above cross

baffle 11, but forces the remainder of the gas to the upper end of the first bank of tubes 3, the upper end of superheater 19 and the upper end of the second bank of tubes 4.

5 The distribution of the gas more evenly over the superheater instead of permitting heat concentration on its lower end, is also a marked advantage in securing higher superheat and longer life of the superheater elements. It has been found in practice that the
10 momentary draft restriction is not sufficient to be objectionable, while the decrease in temperature of the gases leaving the boiler is materially lower, effecting a very substantial
15 saving in fuel.

What I claim is:

1. In combination in a vertical water tube boiler, comprising a plurality of steam and water drums, a mud-drum and a plurality of
20 banks of tubes connected between said steam and water drums and said mud-drum, a superheater located between the first and second banks of tubes and a baffle wall built in part longitudinally of the lower portions of the
25 tubes of the first bank and in part transverse of the said tubes and an extension of the longitudinal baffle extending part way to the upper drum and in front of a portion of said superheater and comprising a plurality of
30 spaced portions to provide openings therebetween whereby some of the gases pass through said openings and all of the furnace gases are distributed more evenly over the elements of the superheater.

35 2. In combination in a water tube boiler of the vertical type having upper drums and a lower drum, and a plurality of banks of tubes extending between the upper drums and the lower drum, a baffle wall having a section
40 of imperforate construction extending upward from the lower drum longitudinally of the tubes of the first bank and a section extending transversely of such tubes, a superheater located between the first and second
45 banks above the second section of baffle, and an extension of the baffle also extending upward longitudinally of the tubes part way to the upper drum and in front of a portion of such superheater and comprising a plu-
50 rality of spaced portions to provide openings therebetween.

In testimony whereof, I have hereunto subscribed my name this 28th day of August, 1929.

KINGSLEY L. MARTIN.