J. E. BELL.

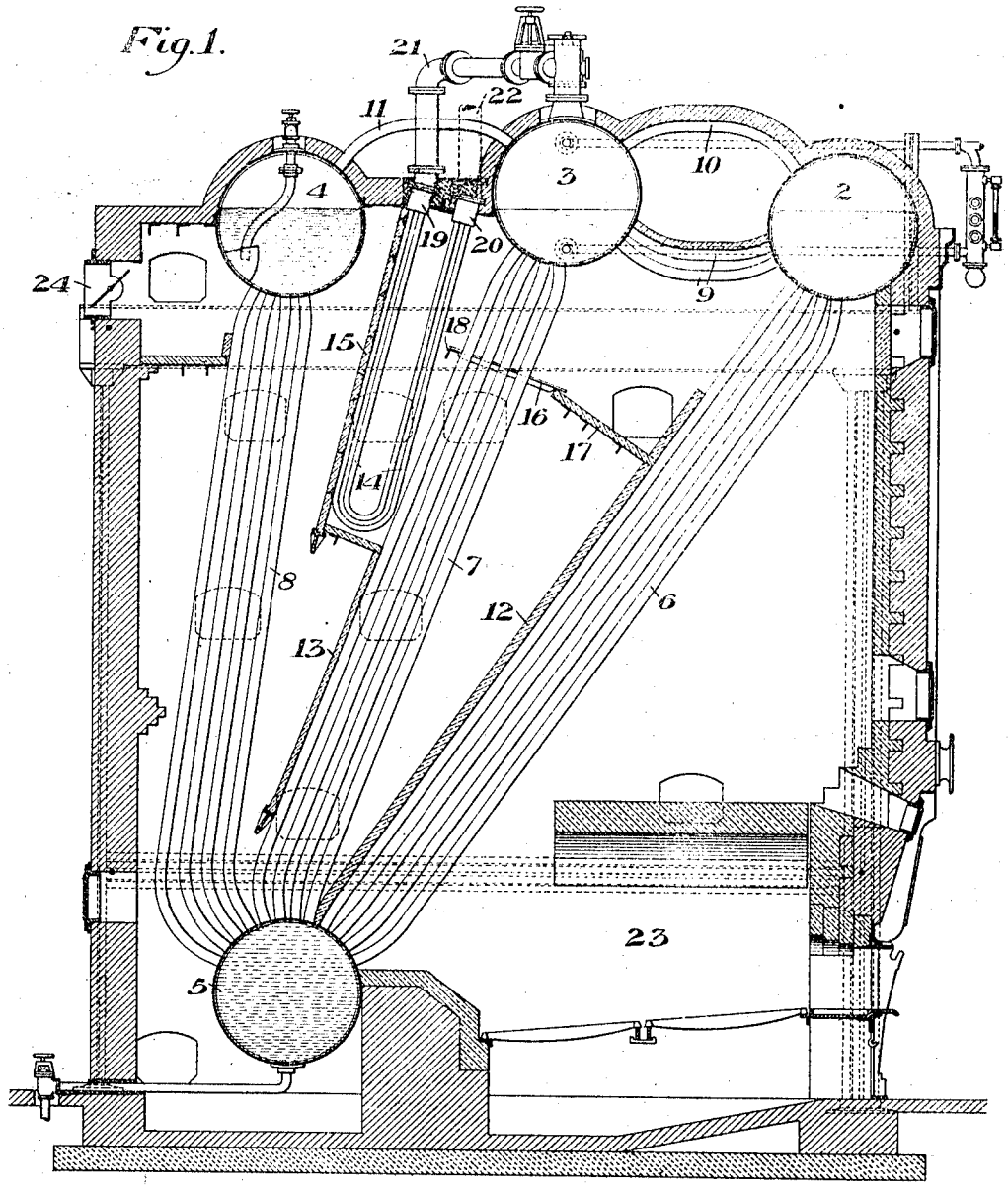
SUPERHEATER BOILER.

APPLICATION FILED MAY 21, 1906.

1,051,829. Patented Jan. 28, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

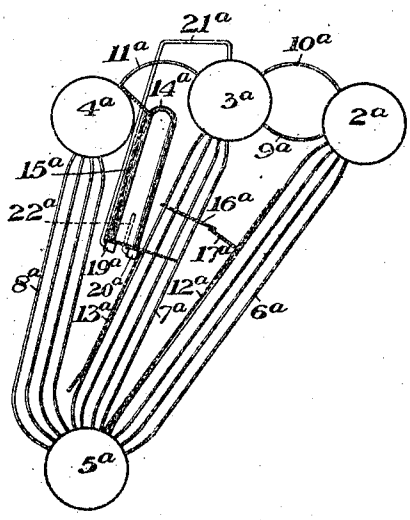
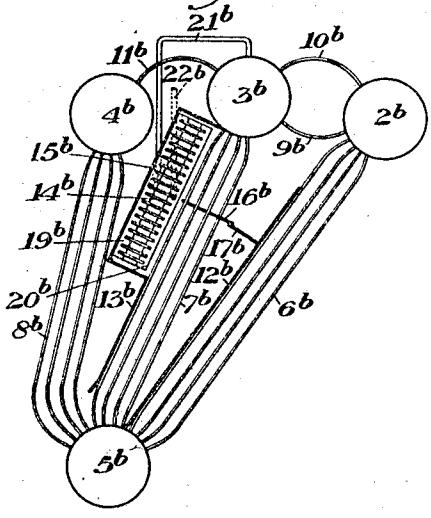


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN E. BELL, OF NEW YORK, N. Y., ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SUPERHEATER-BOILER.

1,051,829. Specification of Letters Patent. Patented Jan. 28, 1913.

Application filed May 21, 1906. Serial No. 317,856.

To all whom it may concern:

Be it known that I, JOHN E. BELL, of New York, county and State of New York, have invented a new and useful Superheater-Boiler, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation showing one form of boiler constructed in accordance with my invention; and Figs. 2 and 3 are side elevations of boilers showing modified forms of the invention.

My invention relates to superheater boilers, wherein superheaters are combined in the setting with boilers having transverse steam and water drums connected by banks of tubes to a lower transverse mud drum or drums, the gases coming from a source of heat in front of the front bank, and having successive up and down passes through and across the banks.

The object of the invention is to provide a simple, efficient and practical superheater boiler of this type which will properly protect the superheater from the intense heat of the flame and gases, while at the same time imparting the desired degree of superheat.

The invention consists in placing the superheater in a pocket in the rear of one of the banks of tubes so that the gases must pass through the bank before reaching the superheater, although the superheater is in the same pass with such bank.

The invention further consists in the combining a U-shaped superheater with a boiler of the above type, and further in the construction and arrangement of parts as hereinafter more fully described and claimed.

In the drawings, referring to the form of Fig. 1, 2, 3 represent transverse parallel steam and water drums, and 5 a lower transverse mud drum connected with the steam and water drums by the banks of tubes 6, 7 and 8. 9 represents water circulating tubes between the drums 2 and 3, and 10 are steam tubes which lead the steam into the middle drum 3 from which it is taken off. A baffle 12 extends along the back of the front bank, while another baffle 13 extends along the back of the second bank to hold the gases in the second bank during the second or down pass. The superheater 14 is placed in the rear of the second bank 7, and the baffle 13 is provided with a stepped extension 15 which extends back of the superheater. In order to compel the gases to pass over the superheating tubes in their second pass, I preferably employ baffle devices 16 which extend rearwardly from the baffle shelf 17 of the front bank, and extend between the tubes of the second bank 7. These baffle devices 16 may be in the form of recessed bars resting on the shelf 17 and a transverse angle 18 at their rear ends; and they compel the gases to pass at least in part back through the water tubes 7 before descending. By changing the form and number of these baffles 16 I can regulate the amount of superheat by controlling the portion of the gases which must flow back over the superheating tubes. The superheater preferably consists of U-shaped tubes extending between the boxes 19 and 20. These boxes are suitably supported in the top wall or roof of the setting, and one of them is suitably connected by pipe 21 with the steam space of the middle steam and water drum. The off-take steam pipe 22 leads from the other boxes.

In the operation of the boiler, the gases rise from the furnace 23 and pass up among the tubes 6. They then pass back over the top of the baffle 12 and are directed by the shelf 17 among the tubes 7. They are also at least in part forced back through the upper parts of the tubes 7 and into the pocket containing the superheater. The gases then descend in the second pass from the superheating tubes and the water tubes, and then rise through the bank 8 to the outlet flue 24. Steam may pass through the superheater in the ordinary manner, and during this double pass through the superheater tubes will be subjected to the heat of that part of the gases entering and flowing through said pocket.

In Fig. 2 I show a form similar to that of Fig. 1, except that the superheater is inverted, the boxes 19^a and 20^a being at the lower end of the superheater and preferably below the stepped part of the baffle. The steam connections will in this case lead from the middle upper drum 3^a down to one box, the steam outlet being taken from the other box.

In Fig. 3 I show another form similar to Fig. 1, except that the superheater is in-

serted through the side wall of the setting. In this case the boxes 19^b and 20^b are set in the side wall and the U-shaped tubes project across the second bank. In this case the U-shaped tubes may extend practically across the whole bank, or the superheater may be duplicated in the opposite side walls, each set of tubes extending not over half way across the bank.

The advantages of my invention result from the combining of the U-shaped superheater with this type of boiler; also from the peculiar locating of the superheater in the bank pocket. The supplemental baffles through the bank may be used to adjust the amount of superheat and the construction is simple and efficient. The superheater may also be applied to existing boilers without materially changing the setting.

The boiler may be provided with any desired number of steam and water drums and mud drums, two or more banks of tubes may be used, the tubes may be vertical or inclined and either straight or curved, and many other variations may be made in the form and arrangement of the parts without departing from my invention. It will therefore be understood that in certain of the claims the terms "advance" and "rear" as applied to the banks of tubes, designate the relation of two banks, irrespective of their position with relation to other banks, or in fact whether or not other banks of tubes are employed.

I claim:—

1. In a superheater boiler, the combination with a plurality of steam and water drums, a transverse mud drum, and two spaced banks of tubes connecting the same, of a baffle located longitudinally in front of the advance bank, a superheater located in the space between the banks of tubes, a continuous baffle also located in said space and separating the rear bank of tubes from the superheater and the bank in advance thereof, to cause the gases to first pass substantially the full length of said advance bank of tubes and also heat the superheater, and afterward pass to the rear bank of tubes, and a baffle located in front of the advance bank of tubes.

2. In a superheater boiler, the combination with a plurality of steam and water drums, a transverse mud drum and spaced banks of tubes connecting the same, of a superheater located in the space between adjacent banks of tubes, a continuous baffle also located in said space, said baffle separating the rear bank of tubes from the superheater and from the advance bank of tubes, and baffling means for causing gases to pass transversely through the advance bank of tubes to the superheater, and after traversing the same to return to said advance bank of tubes.

3. In a superheater boiler, the combination with a plurality of steam and water drums, a transverse mud drum and spaced banks of tubes connecting the same, of a superheater located in the upper portion only of the space between the adjacent banks of tubes, and a continuous baffle also located in said space and separating the rear bank of tubes from the superheater and the advance bank, said baffle having a pocket in which the said superheater is located, and said pocket being open to the gases passing across the advance bank of tubes, but preventing the gases passing therethrough directly to the rear bank, and a baffle in front of the advance bank for causing the gases to pass to the pocket.

4. In a superheater boiler, the combination with a plurality of steam and water drums, a transverse mud drum and spaced banks of tubes connecting the same, of a superheater located in the upper portion only of the space between the adjacent banks of tubes, a baffle also located in said space, said baffle separating the rear bank of tubes from the superheater and the advance bank of tubes, said baffle having a pocket in which the said superheater is located and said pocket having a rear wall, a transverse baffle for deflecting the gases across the upper portion of the advance bank into the upper portion of the pocket, the bottom of said pocket causing the gases to return to the advance bank of tubes.

5. In a superheater boiler, the combination with a plurality of upper steam and water drums, a lower mud drum and a first and second bank of tubes connecting the upper and lower drums, a baffle extending behind the first bank of tubes and terminating short of the upper end thereof, a baffle arranged behind the second bank of tubes and terminating short of the lower end thereof, said latter baffle being continuous and having a rearwardly extending pocket therein, a superheater located in the pocket behind the second bank of tubes, and a transverse baffle extending from the first baffle transversely of the second bank of tubes between the ends of the pocket and the superheater to cause the gases from the upper end of the first pass to pass transversely across the upper end of the second bank of tubes, into the pocket, said pocket causing such gases to pass from the superheater back to the second bank of tubes.

6. In a superheater boiler, the combination with a plurality of upper steam and water drums, a lower mud drum and at least three banks of tubes connecting the upper and lower drums, a baffle located behind the first bank of tubes and terminating short of the upper end thereof, a second continuous baffle located in the space between the second and third banks of tubes and terminating

short of the lower ends thereof, said baffle having a rearward offset forming a pocket, a superheater located in said pocket and a transverse baffle extending from the first baffle transversely of the second bank of tubes between the upper and lower ends of the pocket and superheater, said baffles causing an upward draft of gases in the first pass and longitudinally of the first bank of tubes, a transverse passage across the upper end of the second bank of tubes into the pocket and into engagement with the superheater, a return from said pocket and superheater into the second pass and downwardly therethrough, and an upward passage through the third pass.

In testimony whereof, I have hereunto set my hand.

JOHN E. BELL.

Witnesses:
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CHAS. B. KNUDSON.