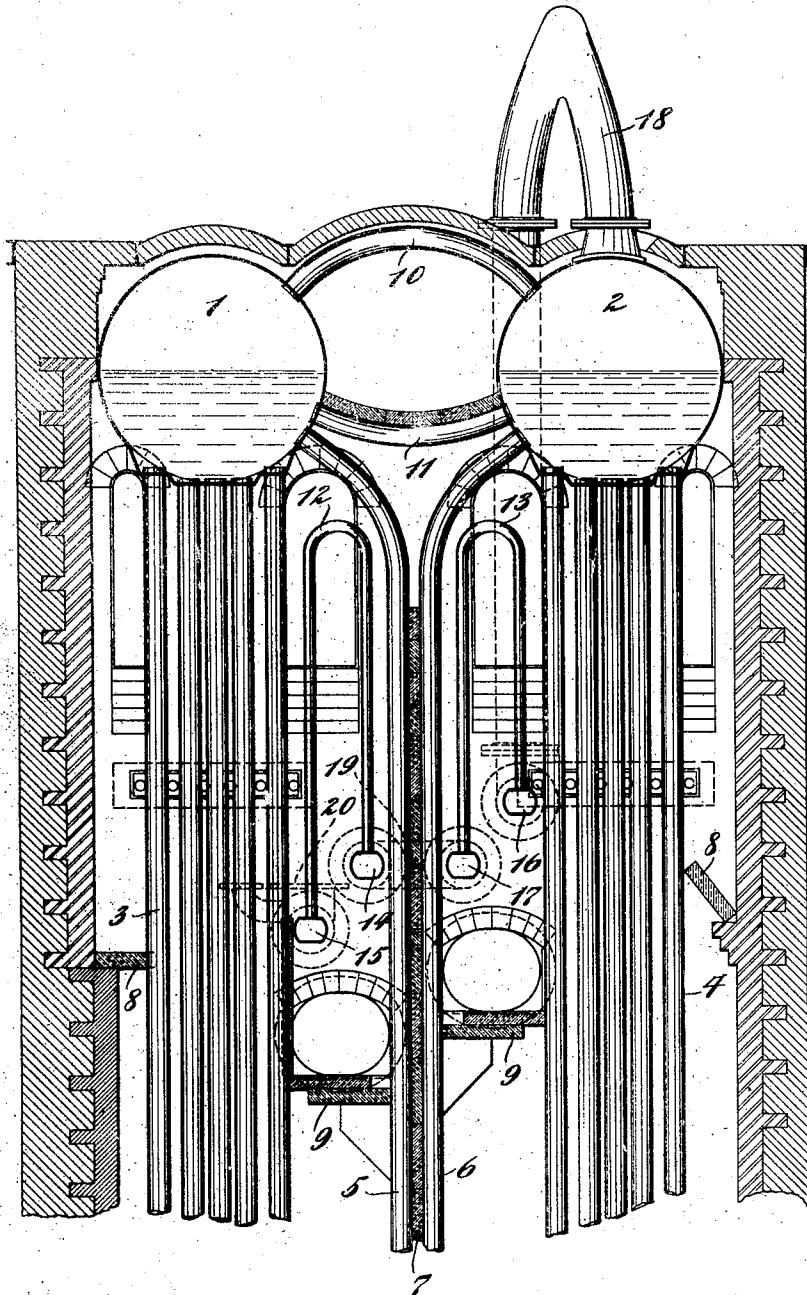


A. D. PRATT.
 SUPERHEATER BOILER.
 APPLICATION FILED JUNE 18, 1912.

1,047,698.

Patented Dec. 17, 1912.



WITNESSES:

Charles S. Jones
P. W. Morgan

INVENTOR

Arthur D. Pratt

BY *Gifford Buell*
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

ARTHUR D. PRATT, OF NEW YORK, N. Y., ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SUPERHEATER-BOILER.

1,047,698.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed June 18, 1912. Serial No. 704,278.

To all whom it may concern:

Be it known that I, ARTHUR D. PRATT, a citizen of the United States, residing at New York city, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Superheater - Boilers, of which the following is a specification.

My invention relates to superheater boilers, and more particularly to that form of water tube boiler in which there are two or more banks of tubes either straight throughout their length or with curved or bent ends, and which extend vertically or in a vertically inclined direction.

For the purpose of illustrating one application of my invention I have shown it in connection with a boiler of standard construction, the drawing being a vertical longitudinal section through the upper part of the boiler.

Referring to the drawing, the numerals 1 and 2 designate upper transverse steam and water drums connected by banks of tubes 3 and 4 with transverse mud drums, not shown. The bank 3 comprises a row of tubes 5, and the bank 4 a row of tubes 6, the tubes of both of said rows being curved or bent at their ends to enter the drums radially. Supported between the tubes 5 and 6 is a baffle 7. The gases from the furnace are directed through the uptake pass in which the tubes 3 are located, across the top of baffle 7 and then through the downtake pass, in which the tubes 4 are located, to the stack outlet. Baffle shelves 8 and 9 direct the gases along and across the water tubes. The drums 1 and 2 may be connected by the usual pipes 10 and 11.

Between the banks of tubes I place a superheater comprising two sets of U-shaped tubes 12 and 13 with their legs extending upwardly above the top of the baffle 7, the tubes 12 being in the uptake pass and the tubes 13 in the downtake pass. The tubes 12 are expanded into cross boxes 14 and 15, and the tubes 13 into cross boxes 16 and 17. These boxes preferably extend through the side walls, and the box 16 is connected by pipe 18 with the steam space of the rear drum 2. The boxes 17 and 14 are connected by a pipe 19 so that the steam from drum 2 enters box 16, and passes upwardly through the right hand legs and down the left hand legs of tubes 13 to box 17, through

the connecting pipe 19 to box 14, upwardly through the right hand legs and downwardly through the left hand legs of tubes 12 to box 15, and thence out through connection 20. It will be seen from this that the steam is first passed through the section of the superheater where the gases are relatively cool, and then into a section where the temperature is relatively high. Although in both sections of the superheater the steam travels both in the same direction and in a direction opposite to that of the other of the gases, the general flow of the steam is from the coolest to the hottest part of the boiler. That is, boxes 16 and 17 are in the coolest part of the boiler, and the boxes 14 and 15 in the hottest part, the steam leaving by a connection from the latter box. It will also be observed that the steam flows from box 16 in a direction opposite to the direction of flow of the gases through the downtake pass, and flows to the outlet box 15 in a direction opposite to that of the direction of flow of the gases in the uptake pass. That is, the steam flows through the incoming legs of tubes 13, and the outgoing legs of tubes 12, counter to the direction of flow of the gases.

By the method above described, it will be seen that the principle of counterflow of steam and gases which is used successfully in separately fired superheaters is carried out to an extent greater than is possible in other superheaters integral with a boiler, and a resulting high superheater efficiency will be secured. This arrangement of the superheater tubes enables me also to obtain a higher degree of superheat than has been possible heretofore with this form of boiler.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A superheater boiler having two banks of tubes, a baffle between the banks, and a superheater comprising two connected sets of U-shaped tubes, said sets being on opposite sides of said baffle, one in the uptake pass and the other in the downtake pass.

2. A superheater boiler having two banks of tubes, a baffle between the banks, and a superheater comprising two connected sets of U-shaped tubes with their legs directed upwardly, said sets being on opposite sides of said baffle, one in the uptake pass and the other in the downtake pass.

3. A superheater boiler having two banks

- of tubes, a baffle between the banks forming uptake and downtake passes for the gases, a superheater comprising two connected sets of U-shaped tubes, one set being in the uptake pass and the other in the downtake pass, and inlet and outlet connections for the superheater whereby the inlet and outlet flow of the steam is in a direction opposite the direction of flow of the gases.
4. A superheater boiler having two banks of tubes, a baffle between the banks forming uptake and downtake passes for the gases, U-shaped superheater tubes located in both passes, boxes into which the legs of the superheater tubes are expanded, a steam inlet connection to one of the boxes in the downtake pass, a steam outlet from one of the boxes in the uptake pass, and a connection between the other two boxes one in the uptake pass and the other in the downtake pass.
5. A superheater boiler having two banks of tubes, a baffle between the banks forming uptake and downtake passes for gases, a superheater comprising two connected sets of U-shaped tubes, one set being in the uptake pass and the other in the downtake pass, said superheater sections being so arranged that the steam enters the section in the downtake pass in the direction opposite

to the flow of the gases in the downtake pass, and leaves the section in the uptake pass in a direction opposite to the flow of gases in the uptake pass.

6. A superheater boiler having two banks of tubes, each bank including an inner row of tubes having their ends bent and separated from the main body of the bank, a baffle between the said rows of bent tubes forming uptake and downtake passes for the gases, a superheater comprising two connected sets of U-shaped tubes one set being in the uptake pass in the space between the main body of the bank of tubes and its inner row of tubes, and the other section being in the downtake pass in the space between the main body of tubes and its inner row of bent tubes, boxes into which said superheater tubes are expanded, and a steam inlet to one of the boxes in the downtake pass and a steam outlet connection from one of the boxes in the uptake pass.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ARTHUR D. PRATT.

Witnesses:

E. P. TERRY,

JOHN A. W. DIXON.