May 2, 1944. D. M. SCHOENFELD 2,347,848

SEPARATELY FIRED SUPERHEATER

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Fig. 1

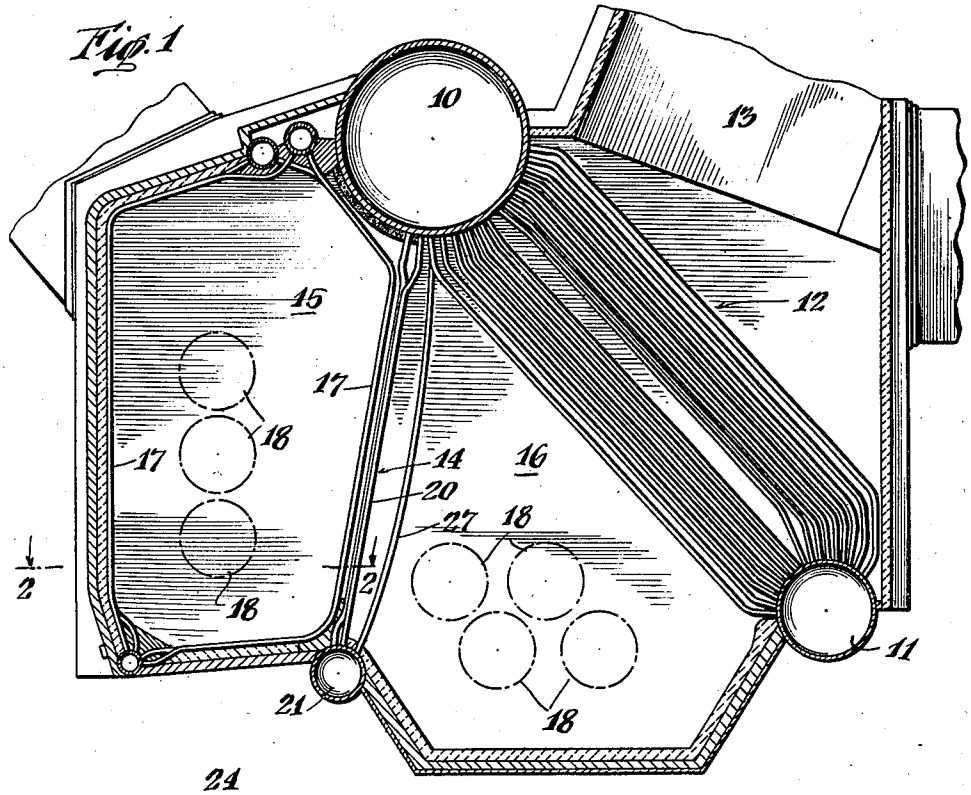
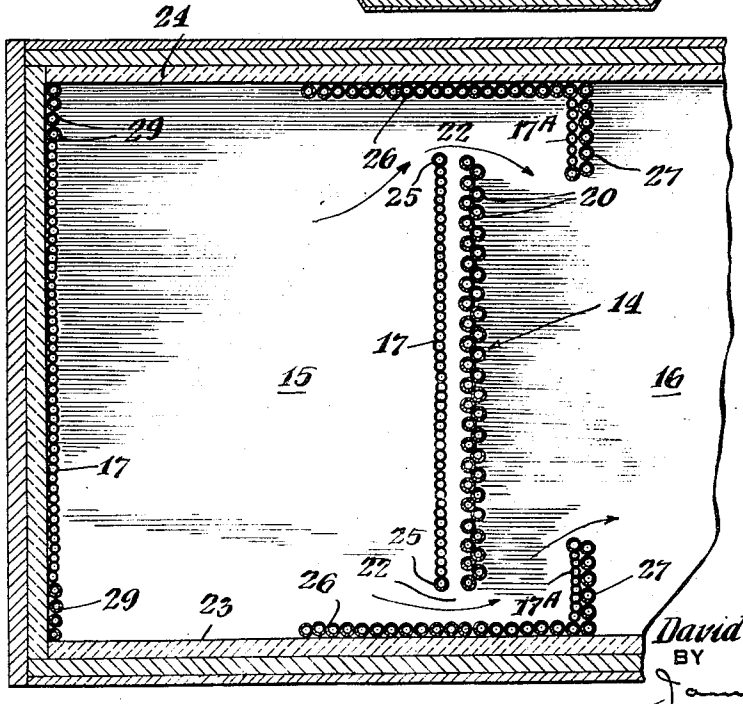


Fig. 2



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Fig. 3

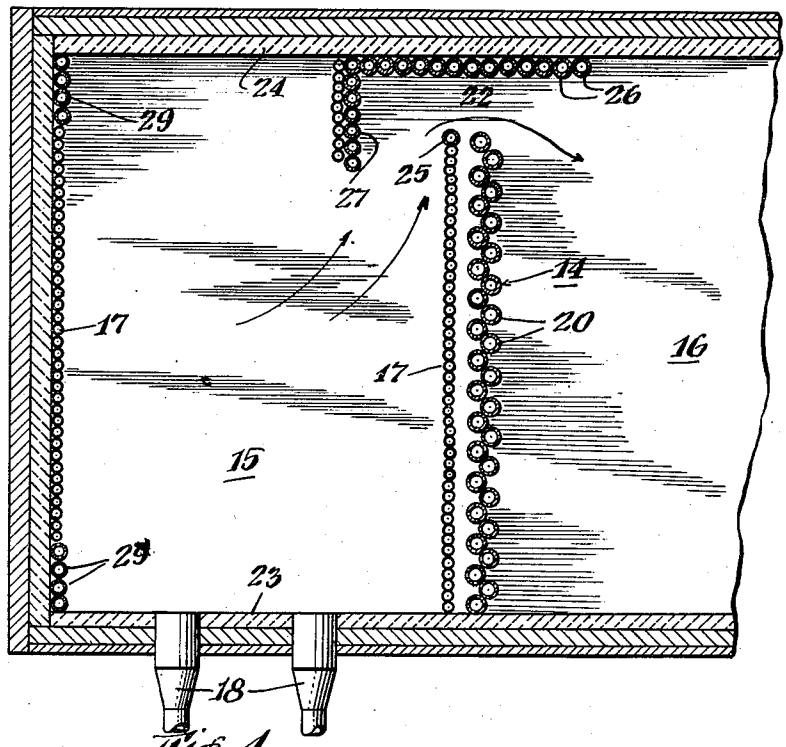


Fig. 4

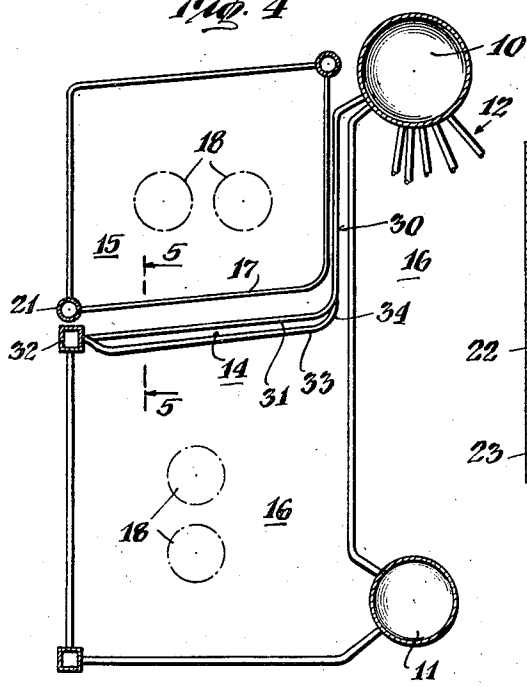
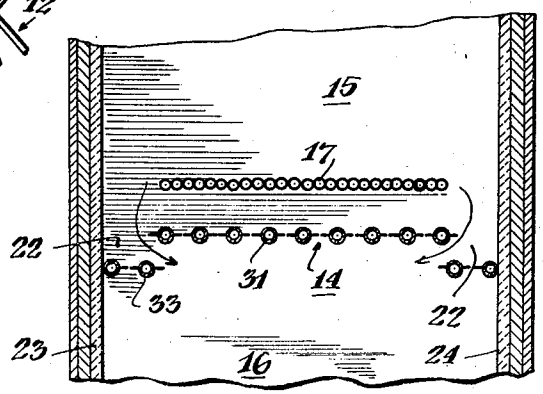


Fig. 5



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UNITED STATES PATENT OFFICE

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SEPARATELY FIRED SUPERHEATER

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Application October 21, 1939, Serial No. 300,543

7 Claims. (Cl. 122—473)

The present invention relates to improvements in boilers and particularly to boilers provided with superheaters.

The invention contemplates a boiler having separately fired superheater and boiler furnace chambers so arranged that projection is afforded to the superheater when starting up, providing means for regulating the superheat temperature and allowing operation with production of little or no superheat as sometimes required, particularly for marine purposes.

The invention will be best understood upon consideration of the following detailed description of several illustrative embodiments thereof when read in conjunction with the appended claims and the accompanying drawings in which:

Fig. 1 is a diagrammatic elevational view, partly in section, of one form of boiler construction embodying the present invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a similar sectional view illustrating a modified form of construction;

Fig. 4 is a diagrammatic elevational view of a further modification; and

Fig. 5 is a sectional view on the line 5—5 in Fig. 4.

In the boiler shown in Fig. 1 the steam and water drum 10 extends across the upper part of the boiler and is connected to the water drum 11 disposed therebelow by a bank 12 of generating tubes. The furnace space at the side of bank 12 opposite the boiler offtake 13 is divided by a substantially vertical wall 14 extending transversely thereof and perpendicular or normal to the boiler walls so as to form superheater and boiler furnace chambers 15 and 16, respectively. Radiantly heated superheater tubes 17 are located in chamber 15 and individual sets of fuel feeding burners 18 are provided for the two furnace chambers.

As shown, the wall 14 is formed by one or more rows of generating tubes 20 connected between steam and water drum 10 and a lower drum 21. The tubes 20 are so arranged as to preclude the flow of gases thereover from superheater furnace chamber 15 to boiler furnace chamber 16, as for example by arranging the tubes in contact, providing them with fins or applying refractory material. The dividing wall 14 occupies less than the full depth of the furnace space so as to provide one or more passages for the flow of gases from the chamber 15 to the chamber 16. As indicated in Fig. 2, passages 22 are provided at both ends of the wall 14 which extends from a point spaced from the front wall 23 to a point short of the rear wall 24. The passage may be at one end as shown in Fig. 3 where a single passage 22 is provided near the rear wall 24. Alternatively, passage 22 may be centrally located with the ends of wall 14 abutting or closely adjacent walls 23 and 24.

Some of the superheater tubes 17 are arranged in a row closely parallel to the row of tubes 20 and preferably located between the ends of wall 14. The furnace wall 23 and/or 24 forming one side of the gas passage 22 may be provided with generating tubes 26 arranged in a row opposite the end of dividing wall 14. For the purpose of shielding the superheater furnace chamber 15 from radiant heat in the boiler furnace chamber 16 a short wall of generating tubes 27 may be provided opposite the passage 22 either in the boiler furnace chamber 16 as shown in Fig. 2 or in the superheater furnace chamber 15 as shown in Fig. 3. When such shielding walls are provided, additional superheater tubes 17A may be arranged in a row parallel and closely adjacent the generating tubes 27 forming the wall opposite the end of a gas passage 22. To protect the superheater tube 17 around which the gases flow at either end of the row one or more generating tubes 25 may be placed next to the end tube of the row of superheater tubes. The side wall of the boiler may be provided at its central portion with superheater tubes 17 and near its ends with a number of generating tubes 29 for absorbing the relatively high radiant heat that, at times, may enter chamber 15 through a passage 22 when screening tubes 27 are not utilized. In Fig. 1 the tubes 26 and 29 are not shown in order to avoid the confusion that their representation might produce with the tubes 17, 20, 27 etc.

The dividing wall may extend horizontally across the furnace space instead of substantially vertically as described above. For example, in Figs. 4 and 5 the wall 14 is formed of the substantially horizontally extending portions 31 of generating tubes 30 connected between the steam and water drum 10 and a header 32 located at a point between the top and bottom of the furnace wall opposite the generating bank 12. The passages 22 may be screened as in Figs. 1 to 3 by horizontal parts 33 of generating tubes 34. With this arrangement the gases from the superheater chamber 15 flow downwardly through the passage or passages 22 at the end or ends of wall 14 to the chamber 16.

Although illustrative embodiments of the in-

vention have been illustrated and described in detail herein, there are many changes and variations that may be made without departing from the invention and accordingly it is desired and intended to include all such changes and variations within the scope of the appended claims.

What I claim is:

1. In a boiler having upper and lower drums interconnected by a bank of generating tubes, and means including front and rear walls defining a furnace space at one side of said bank; a wall dividing said space into a superheater furnace chamber and a boiler furnace chamber including generating tubes disposed in a substantially vertical row extending across said space and so arranged as to preclude gas flow thereover with the ends of said row spaced from said walls to provide passages adjacent both walls for the flow of gases from said superheater chamber to the other; a superheater in said superheater chamber having tubes arranged adjacent to said row of generating tubes and located between the ends thereof; fuel feeding means for said boiler furnace chamber located in the front wall thereof; and other fuel feeding means positioned to introduce fuel into the front portion of said superheater furnace chamber.

2. In a boiler having upper and lower drums interconnected by a bank of generating tubes; means including two facing walls defining a furnace space at one side of said bank; other generating tubes arranged in a row substantially perpendicular to said walls for dividing said space to form a superheater furnace chamber and a boiler furnace chamber, the tubes in said row being so arranged as to preclude gas flow across the latter between said chambers and the last tube at least at one end of said row being spaced from the adjacent wall to provide a passage for gases to flow from said superheater furnace chamber; a superheater located in said superheater chamber and having tubes arranged in a row parallel to and closely adjacent tubes of said dividing row; individual fuel feeding means for said chambers; and a generating tube parallel to a tube in said dividing row and located contiguous to the end tube of said row of superheater tubes for shielding it from gases flowing around the ends of the row of superheater tubes and through said passage.

3. In a boiler having upper and lower drums interconnected by a bank of generating tubes; means including two facing walls defining a furnace space open to said bank along one entire side thereof; other generating tubes arranged in a row substantially perpendicular to said walls for dividing said space into a superheater furnace chamber and a boiler furnace chamber, the tubes in said row being so arranged as to preclude gas flow thereover between said chambers and the last tube on at least one end of said row being spaced from the adjacent wall to provide a passage for gases to flow from said superheater furnace chambers; a superheater located entirely within said superheater chamber; fuel feeding means individual to said chambers; and generating tubes arranged in a screening row extending part-way across said furnace space located at one side of and extending parallel to said first mentioned row of generating tubes opposite said passage.

4. In a boiler having upper and lower drums interconnected by a bank of generating tubes; means including two facing walls defining a furnace space open to said bank along one entire side thereof; other generating tubes arranged in a row substantially perpendicular to said walls for dividing said space into a superheater furnace chamber and a boiler furnace chamber, the tubes in said row being so arranged as to preclude gas flow thereover between said chambers and the last tube on at least one end of said row being spaced from the adjacent wall to provide a passage for gases to flow from said superheater furnace chamber; a superheater located entirely within said superheater chamber; fuel feeding means individual to said chambers; and generating tubes arranged in a row located in said boiler furnace chamber in parallel relation to said first mentioned row and extending part-way across said furnace space opposite the exit end of said passage for screening it to preclude radiation from said boiler furnace chamber to said superheater chamber.

5. In a boiler having upper and lower drums interconnected by a bank of generating tubes; means including two facing walls defining a furnace space open to said bank along one entire side thereof; other generating tubes arranged in a row substantially perpendicular to said walls for dividing said space into a superheater furnace chamber and a boiler furnace chamber, the tubes in said row being so arranged as to preclude gas flow thereover between said chambers and the last tube on at least one end of said row being spaced from the adjacent wall to provide a passage for gases to flow from said superheater furnace chamber; a superheater located entirely within said superheater chamber; fuel feeding means individual to said chambers; and generating tubes arranged in a row located in said superheater furnace chamber in parallel relation to said first mentioned row and extending part-way across said furnace space opposite the exit end of said passage for screening it to preclude radiation from said boiler furnace chamber to said superheater furnace chamber.

6. In a boiler having upper and lower drums interconnected by a bank of generating tubes, and means including front and rear walls defining a furnace space at one side of said bank; a wall dividing said space into separate furnace chambers including generating tubes arranged in one or more substantially vertical rows extending across said space with the ends of said wall spaced from both front and rear walls to provide passages adjacent thereto for the flow of gases from one of said chambers to the other; a superheater in said one chamber having a row of tubes arranged parallel to said row of generating tubes and located between the ends thereof; fuel feeding means individual to said chambers; and a generating tube contiguous to each end tube in said row of superheater tubes and parallel to a tube in said row of generating tubes.

7. In a boiler having a bank of spaced generating tubes arranged in parallel rows connected to superposed drums and extending between two facing walls defining a furnace space that is adjacent said tube rows and bounded thereby at one side; other generating tubes disposed in a substantially horizontal row located midway between said drums to form a partition dividing said space into superposed superheater and boiler furnace chambers, the tubes in said row being arranged and disposed to provide an opening adjacent one of said furnace walls through which gases flow from the superheater furnace chamber into the boiler furnace chamber and across one end of the latter to flow over said tube bank;

other, substantially vertical, partition means located at said side of said superheater furnace chamber between it and said tube bank for precluding direct flow of gases from the latter into said bank; a superheater in said superheater furnace chamber; and fuel feeding means individual to said furnaces located in the walls of the respective furnace chambers remote from said opening, the arrangement being such that gases from the superheater furnace chamber flow along said one wall and traverse only a minor portion of said furnace chamber adjacent thereto in their passage to said generating tubes so as to avoid substantial interference with the combustion of fuel therein.

DAVID M. SCHOENFELD.