No. 784,730. PATENTED MAR. 14, 1905.

J. P. BLAUVELT.

BOILER.

APPLICATION FILED DEC. 8, 1902.

Fig. 2.

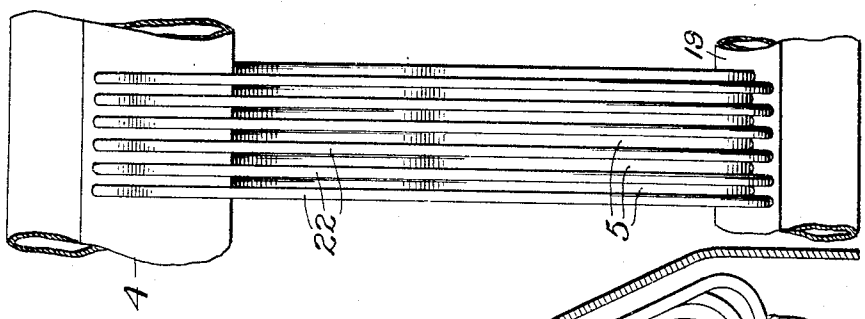


Fig. 1.

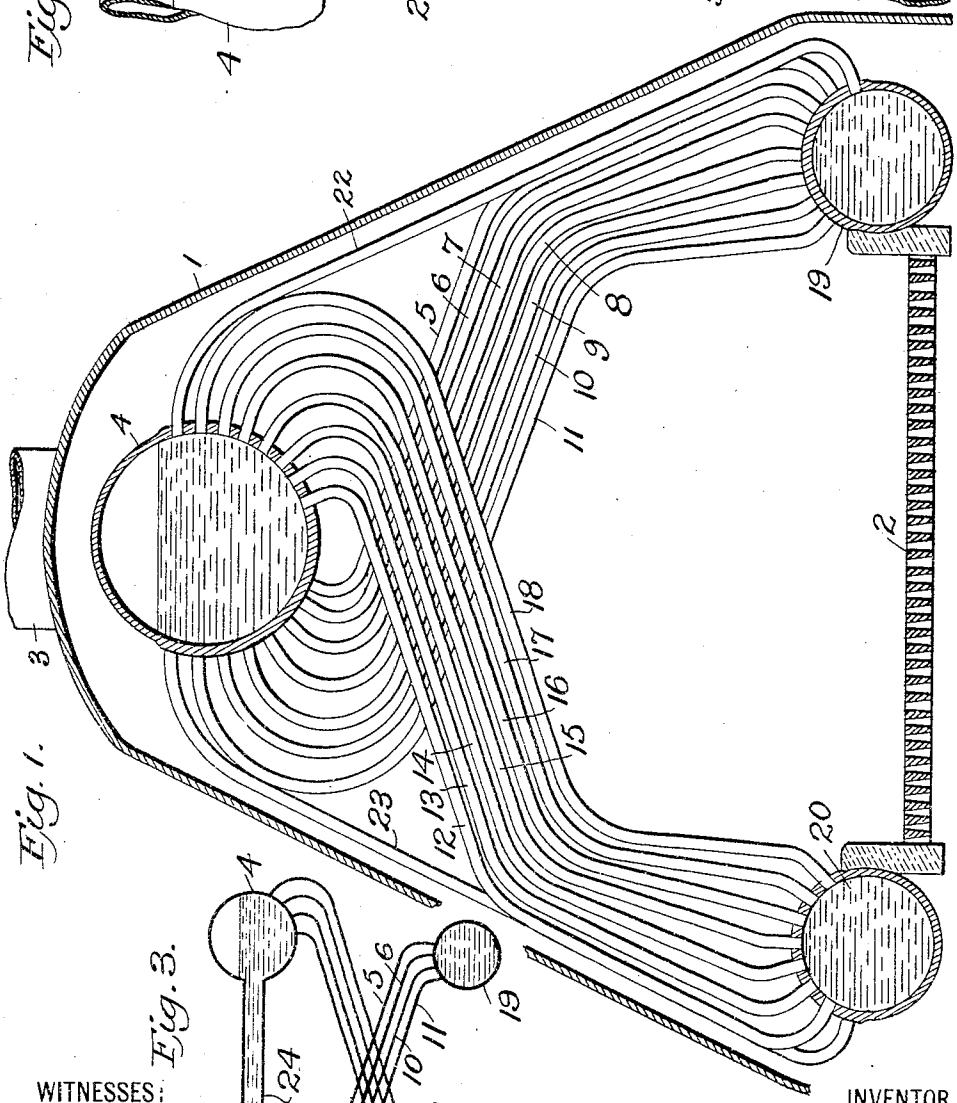


Fig. 3.

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No. 784,730. Patented March 14, 1905.

UNITED STATES PATENT OFFICE.

JAMES P. BLAUVELT, OF NYACK, NEW YORK.

BOILER.

SPECIFICATION forming part of Letters Patent No. 784,730, dated March 14, 1905.

Application filed December 8, 1902. Serial No. 134,276.

To all whom it may concern:

Be it known that I, JAMES P. BLAUVELT, a citizen of the United States, residing at Nyack, Rockland county, New York, have invented certain new and useful Improvements in Boilers, of which the following is a clear, full, and exact description.

My invention relates to improvements in water-tube boilers—that is, boilers which have small water-containing tubes heated by the furnace for more quickly and efficiently generating steam; and my object is to improve the construction of the same.

One object is to provide a construction in which some of the tubes will tap cooler water in the steam-drum or water-supply device than others of the tubes and to keep the tubes which tap the cooler water in the drum farther removed from the heat than those tubes which tap warmer water. Cool water tends to sink and warmer water to rise, and if the tubes which tap the cooler water are subjected to a less degree of heat than those which tap the warmer water then the cool water will continually tend to flow down through the cooler tubes, and as the water in the hotter tubes continually rises through them a regular and continuous circulation is maintained from the steam-drum through the cooler tubes and back again through the hotter tubes.

My invention will be defined in the claims.

In the preferred embodiment of my invention shown in the drawings, Figure 1 is a transverse vertical section. Fig. 2 is a partial side elevation, and Fig. 3 is a modification.

In the above preferred embodiment, 1 is a shell forming a heat-chamber and provided with grate-bars 2, and 3 is a stack.

4 is a device to contain a supply of water and in which steam may be generated. This water-supply device is preferably a single drum; but in Fig. 3 I have shown an equivalent arrangement in which the water-supply device is a plurality of drums.

By "drum" I do not mean to limit myself to a cylindrical shape.

5 to 11 are a set of water-tubes connected to the drum and extending downwardly in the heat-chamber, and preferably, but not necessarily, for the entire length of the set lying in the chamber, one above another with respect to the direction of movement of the heat through said chamber. The direction of movement of the heat in the embodiment illustrated is vertical, and the pipes of the set therefore preferably lie in a vertical plane; but by "one above another" I mean that they are so located merely with respect to the direction of movement of the heat through the chamber that some of the tubes will be farther removed from the source of heat than others of that set. The "upper" or farthest-removed tubes 5 6 are therefore somewhat protected from the heat and are cooler than the tubes 10 11.

The tubes are connected to the drum 4 so as to tap the water therein at points of different temperatures, the temperature of the water at the bottom of the drum where pipes 5 and 6 enter it being cooler than that where pipes 10 and 11 enter. Any cool water in the drum 4 will therefore tend to enter pipes 5 and 6 and flow downward therein.

19 is one form of water-conducting means, preferably a second drum, for connecting the lower ends of some or all of the pipes, so that a circulation can be set up, for example, from drum 4 down pipe 5 and up pipe 9 or 10 to the drum.

Pipes 9 to 11 will obviously be hotter than pipes 5 to 7, and this will start and continue the regular circulation of the water in the manner specified.

12 to 18 are a second set of tubes and are preferably similarly connected to drum 4 and arranged in the heat-chamber for the same purpose. They may also connect at their lower ends with another drum, 20. These two sets of tubes preferably cross each other in the chamber in the form of an X, as shown, and the two sets preferably lie close together or touch, as shown in Fig. 2. This space where they cross therefore forms a baffle or covering which protects the bottom of the drum 4 from the direct action of the heat when they cross underneath the drum.

In Fig. 3 the modification is shown diagrammatically in part, the tubes being shown by merely single lines. 24 is a connection between the two drums, which may be provided if it is desired to connect the drums.

22 and 23 are tubes which may be provided, if desired, tube 22 being in the plane of the first set and 23 in the plane of the second set.

I am aware that many variations from the embodiment heretofore set forth may be made without departing from my invention as claimed, and I therefore do not limit myself to the construction herein shown and described.

What I claim is—

1. In a boiler in combination, a heat-chamber, a steam-drum therein, a plurality of sets of water-tubes opening into said steam-drum longitudinally along one side of the same above the lowest point in said drum, the pipes of each set lying in a substantially vertical plane and the upper pipes of each set tapping said steam-drum nearer its lowest point than the lower pipes of that set whereby the upper pipes tap cooler water, said pipes curving downwardly in a continuous course and across said chamber underneath said steam-drum and tapping a water-drum located in said chamber below and on the other side of said steam-drum, a plurality of similar sets of pipes similarly arranged and similarly tapping said steam-drum on the other side of its lowest point and similarly curved downwardly across said chamber and other pipes and tapping a second water-drum located below and on the other side of said steam-drum, a fire-box below said pipes, and a stack leading out of the top of said heat-chamber, whereby the heat passes substantially vertically through said chamber, said two sets passing directly across said heat-chamber, whereby those pipes which tap the lower part of said drum are at all points farther removed from the fire than those pipes which tap the upper portions of said drum.

2. In a boiler in combination, a heat-chamber, a steam-drum, two sets of water-tubes connected to the same and extending downwardly and crossing and touching each other in said chamber directly underneath said drum to form a shield for the bottom of the same, the tubes of each set lying one above another in respect to the direction of movement of the heat through said chamber, whereby said upper tubes of each set are farther removed from the source of heat than said lower tubes, the upper tubes of each set being connected to said drum at a point to tap cooler water than said other tubes of that set, and water-conducting means connecting the ends of the upper and lower tubes of each set.

3. In a steam-generating boiler in combination, a heat-chamber, a steam-drum, two sets of water-tubes connected to the same and extending downwardly and crossing each other in said chamber, the tubes of each set lying at all points one above another with respect to the direction of movement of the heat through said chamber, the upper tubes of one set being connected to said steam-drum at a point to tap cooler water than said other tubes of that set, and water-drums on either side of said chamber connecting the ends of the upper and lower tubes of each set.

4. In a steam-generating boiler in combination, a heat-chamber, a steam-drum, two sets of water-tubes connected to the same at opposite sides of said drum, each set extending downwardly and crossing over to the side of said chamber opposite to the side at which they are tapped into said drum, said sets crossing each other in said chamber, the tubes of each set lying at all points one above another with respect to the direction of movement of the heat through said chamber, the upper tubes of one set being connected to said steam-drum at points farther up on the side of said drum than are the lower tubes of that set, and water-drums located on opposite sides of said heat-chamber and lower down than said steam-drum, said tubes being tapped into said water-drums.

5. In a steam-generating boiler in combination, a heat-chamber, a steam-drum, two sets of water-tubes connected to the same at opposite sides of said drum, each set extending downwardly and crossing over to the side of said chamber opposite to the side at which they are tapped into said drum, said sets crossing each other in said chamber, the tubes of each set lying at all points one above another in the same plane, with respect to the direction of movement of the heat through said chamber, the upper tubes of one set being connected to said steam-drum at points farther up on the side of said drum than are the lower tubes of that set, and water-drums located on opposite sides of said heat-chamber and lower down than said steam-drum, said tubes being tapped into said water-drums.

Signed at New York, N. Y., this 5th day of December, 1902.

JAMES P. BLAUVELT.

Witnesses:
EMERSON R. NEWELL,
WILLIAM W. SCHUPNER.

Correction in Letters Patent No. 784,730.

It is hereby certified that in Letters Patent No. 784,730, granted March 14, 1905, upon the application of James P. Blauvelt, of Nyack, New York, for an improvement in "Boilers," an error appears in the printed specification requiring correction, as follows: In line 21, page 2, the word "course" should read *curve;* and that said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of March, A. D., 1905.

[SEAL.]

F. I. ALLEN,

Commissioner of Patents.