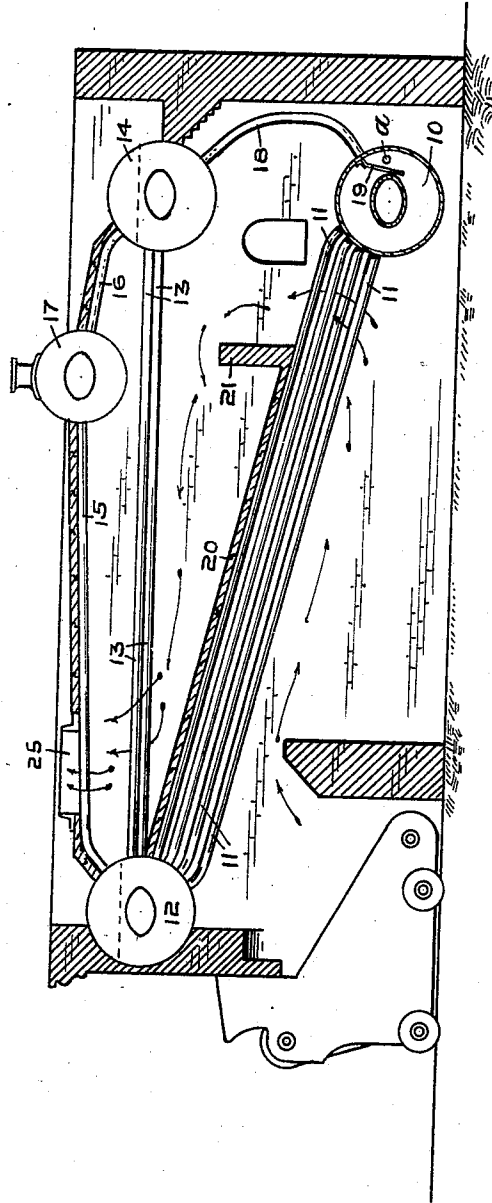


No. 861,255.

PATENTED JULY 30, 1907.

E. & H. R. BRETNEY.
STEAM GENERATOR.
APPLICATION FILED OCT. 13, 1905.



Witnesses.

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UNITED STATES PATENT OFFICE.

EUGENE BRETNEY AND HARRY R. BRETNEY, OF INDIANAPOLIS, INDIANA.

STEAM-GENERATOR.

No. 861,255.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed October 13, 1905. Serial No. 282,537.

To all whom it may concern:

Be it known that we, EUGENE BRETNEY and HARRY R. BRETNEY, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

Our invention relates to improvements in steam generators of that class more especially designed for high pressure, whereby a highly effective and economical heating of the water is obtained, facility of erection and access for repairs is afforded, and continuous unobstructed circulation insured, and the construction of which by reason of the arrangement and connection of the various parts is rendered simple and durable, no unusual or special bracing being necessary for sustaining the structure. By this construction the water tubes are subjected to the maximum heating capacity of the furnace, while the steam passing through the steam ejection pipes above said tubes becomes superheated by the products of combustion in the path of which said pipes are located; and, further, the heated water which has circulated through the heating and equalizing tubes is returned to the supply reservoir where it mingles with the cooler inflow water therein, the temperature of the feed water being thus equalized before entering the generating tubes, and such suspended matter in the incoming cold water which is rendered precipitable by the amount of heat imparted from the return hot water remains in the bottom of said reservoir where it is conveniently accessible for removal, all as will hereinafter appear.

The accompanying drawing, which illustrates our said invention, is a side elevation of the generator, with the furnace structure in section, suitable supporters (not shown) being secured to the sides of the furnace to which the ends of the reservoir and drums are attached.

The feed water reservoir, 10, having a supply pipe, as *a*, leading thereinto, is preferably located at the rear lower side of the furnace, and connecting with said reservoir is a group of generating tubes, 11, which communicate with steam drum, 12, and leading from said steam drum 12 are the equalizing tubes, 13, which communicate with the opposite steam drum, 14, said equalizing tubes entering below the water line in said drums. Also leading from said drums are the steam tubes, 15 and 16, which convey the steam from said steam drums 12 and 14 to the steam dome, 17. Leading from steam drum 14 are the circulating tubes, 18, which communicate with reservoir 10, a deflector, 19, being located in said reservoir in the path of discharge of the returning hot water from said circulating tubes 18, the said deflector being of a desired design (that indicated being in the form of a rectangular plate), and preferably extending longitudinally through and suitably se-

cured in said reservoir. Above the generating tubes 11 we prefer to place a fire floor, as 20, which partially covers said tubes, an opening being left at one end of said floor, as indicated, through which the draft from the furnace travels, and thence over wall, 21, and along the fire floor, by means of which, as will be readily understood, the greater volume of flames and gases will bodily pass over and follow the path of draft along said fire floor. Access to the fire floor, tubes, etc., for cleaning or other purposes is provided for in the furnace structure in any suitable manner.

In the arrangement shown, it will be understood, that the groups of generating, equalizing, steam, and circulation tubes, consist of several of these elements lying in a row, and as many rows as desired may be employed; and while we have shown one group of generating tubes, we do not wish to be understood as limiting ourselves to this precise arrangement for, as is obvious, where increased capacity is required we may employ a number of such generating groups, connecting the same by drums intermediate the water reservoir and the steam drums, thus employing such a multiplicity of generating tubes and drums as the increased capacity of the generator may warrant. The tubes and drums connected together as indicated insures a tight, strong and durable structure as a whole, which is self sustaining without the employment of expensive and obstructive bracing commonly necessary in ordinary types of boiler construction.

In operation, the feed water is supplied from reservoir 10 to the generating tubes, circulating to drum 12, steam escaping to the space above the water line in said drum and thence through the steam pipes 15 to the steam dome, the steam laden hot water circulating through the equalizing tubes 13 to the rear steam drum, steam therein escaping to the space above the water line in said latter drum and thence through the steam pipes 16 to the steam dome, the steam in these upper tubes being superheated by the arising products of combustion which are circulating in the furnace structure and discharging through the outlet, 25, of the furnace. The hot water flowing into the rear steam drum is then carried by way of the circulating tubes, as 18, to the feed water reservoir 10, and, as before indicated, said hot water coming in contact with the deflector in said reservoir, is caused to scatter and mingle with the inflow of cooler water, the feed water being thereby given a high degree of warmth before discharging into the generating tubes. Each of the reservoirs or drums is provided with manholes by which access may be had for securing the tubes in position and for cleansing or repairing purposes.

By the arrangement described, as will be readily understood, the water from its entrance to the supply reservoir to its final return in said reservoir has an entirely free passage, whereby we produce a steam generator capable of giving a continuous unobstructed circula-

tion of steam and water uniformly in one direction, and one in which the generating and steam tubes and drums afford a route for the water and steam entirely within the path of the products of combustion, which insures rapid circulation and efficient steam creative power.

By this construction and arrangement we are enabled to successfully utilize hard water, for the reason that by the rapid circulation produced suspended matter is practically prevented from lodging in the tubes, being quickly carried to the drums where it is precipitated and retained, the tubes being thereby kept virtually cleaned and therefore longer lived for, as is well known, in practice, boiler tubes quickly burn out when clogged by scaly incrustations.

We claim as new:

1. In a steam generator, the combination, of the furnace, the feed-water reservoir located at the rear lower side of said furnace, the feed-water supply pipe leading into said reservoir, a drum located near the upper corner at each end of said furnace, generating tubes leading from said reservoir to the drum in the upper portion of the opposite end of said furnace, equalizing circulation tubes leading from one to the other of the two drums at each end of said furnace in its upper portion, circulation tubes leading from the drum in the upper portion of the furnace in the same end with the reservoir back to said reservoir, a deflector placed in said reservoir to deflect the discharge from said tubes to mingle with the incoming feed-water from the feed-water supply pipe, a steam drum in the top of said furnace between the two end drums and above the

mean level thereof, and pipes leading from both of said end drums at points above their respective water levels into said steam drum, whereby a constant circulation of the water is maintained in operation from the reservoir through the generating tubes to the drum at the top of the opposite end of the furnace, then to the other drum in the other end of the furnace, then back to said reservoir to mingle with the feed-water coming thereinto, and the steam is superheated and conducted to the steam drum in the top of said furnace, substantially as set forth.

2. In a steam generator, the combination, of the furnace, the feed-water reservoir, the drums above said reservoir and connected thereto by generating and circulation tubes and also with each other, the outlet circulation from said reservoir being through tubes along in an upwardly inclined direction under a fire-floor arranged in said furnace and the discharge from said circulation into said reservoir being at a point adjacent to the discharge of the feed-water supply pipe thereinto, a deflector arranged in said reservoir to direct said return water to mingle with said incoming feed-water, the steam drum in the top of the furnace between the other drums and above the level thereof, and pipes connecting said steam drum with said other drums at points above their water lines, substantially as set forth.

In witness whereof, we have hereunto set our hands and seals at Indianapolis, Indiana, this 7th day of October, A. D. one thousand nine hundred and five.

EUGENE BRETNEY. [L. s.]
HARRY R. BRETNEY. [L. s.]

Witnesses:

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