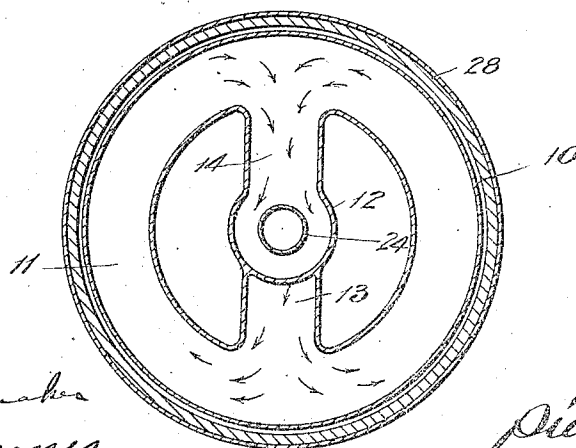
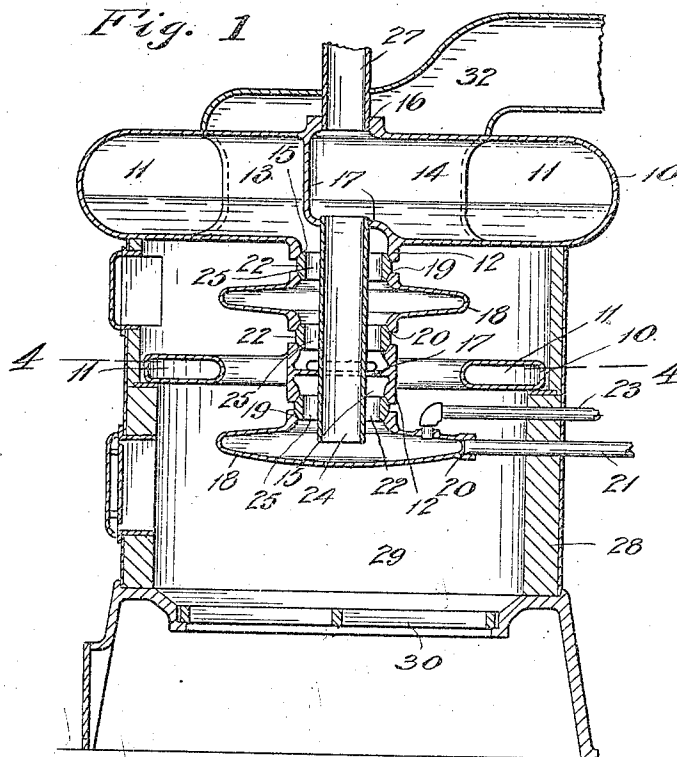


P. BARNES.
WATER HEATER OR STEAM GENERATOR.
APPLICATION FILED JAN. 21, 1909.

1,027,975.

Patented May 28, 1912.



WITNESSES:
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INVENTOR.
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Fig. 2

UNITED STATES PATENT OFFICE.

PIERRE BARNES, OF SEATTLE, WASHINGTON.

WATER-HEATER OR STEAM-GENERATOR.

1,027,975.

Specification of Letters Patent.

Patented May 28, 1912.

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To all whom it may concern:

Be it known that I, PIERRE BARNES, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Water-Heaters or Steam-Generators, of which the following is a specification.

This invention relates to that class of heaters which are designed to be utilized for warming the apartments of a building by the circulation of a body of water or steam through a system of pipes and radiators and its object is to improve the construction of such heaters to provide one having exceptional efficiency.

The invention consists in the novel construction and combination of parts, as will be hereinafter described and claimed.

The accompanying drawings illustrate heaters and parts thereof constructed in accordance with my invention.

Figure 1 is a vertical cross sectional view of an embodiment of the invention; and Fig. 2 is a horizontal section of one of the heating members thereof.

The reference numerals 10 designate the main, or circulating, water-heating members. These members are each comprised of a shell having a circular outer portion to afford an annular chamber 11, and a centrally disposed boss, or hub, 12 communicatively connected therewith from diametrically opposite sides by radially disposed hollow arms 13 and 14. The boss of each member has an inlet opening 15 at the bottom and an outlet opening 16 above, which are arranged in alinement with each other and axially with respect to the peripheries of the respective circular portions. Intermediate the boss-openings of each such members is a partition 17 arranged to afford an independent communication through the arm 13 between the opening 15 and the circular chamber upon the one side and a like connection through the arm 14 between the other opening 16 and the chamber from the other side. These members may be employed alternately with ancillary heating members 18. The members 18 severally consist of a lenticular shell of less diameter than that of said circulating members and having a centrally disposed outlet opening 19 at the top and an inlet opening 20 below, the latter being located centrally or otherwise according to the location of the mem-

ber in the series to conveniently accommodate the water-supply pipe 21 which enters the lowermost member. Said members are communicatively connected by tubular fittings 22 which are socketed in the respective openings.

Where the heater is constructed to be used for the generating of steam, a blow-off pipe 23 would desirably be connected with the lower member, and a down-flow pipe 24 would be utilized to make communication between the upper and lower compartments of the correspondingly disposed members by being extended through apertures provided in the intervening partitions 17. This down-flow pipe is of less diameter than the tubular fittings 22 between the several members to afford annular passages 25 for the upflow of the water between the adjacent heating members. The upper of said members is advantageously made of greater diameter and depth than the circulating members therebelow to furnish an extended water surface to facilitate the disassociation of the steam from the water and also to provide ample storage capacity for the liberated steam.

27 represents a pipe connected with the top member of a series for the outflow of hot water or steam, as the case may be.

The furnaces 28 and casings 29 for the heaters may be made in various ways and require no special description. The illustration shows a furnace adapted for burning fuel, such as coal or wood, and is provided with a grate, denoted by 30.

The operation of the heaters may be explained as follows: a suitable fire being had within the furnace will act most directly upon the lower heating-member of a group and thence the flames and other hot combustion products pass upwardly through the spaces of the circulating members 10 and will, after parting with a large proportion of its heat, escape through the smoke outlet 32. The ancillary heating members 18 serve as baffles to cause the hot gases to be directed to effectively subject the exposed surfaces of the heating members 10 to the action of the heating agent. The members being thus affected will heat the water causing it have a movement upwardly from the lowest to the highest heating-members, passing freely through the ancillary ones, but retarded in the flow through the circulating members. The manner in which the water is directed in its passage through the said

circulating members will be understood from an inspection of Fig. 2 wherein is represented by darts the current courses. More particularly, the water enters the boss of such a member from below and is diverted by the partition 17 to first flow radially outward through the hollow arm 13 into the annular chamber 11 wherein the body of water is caused to flow in two semi-circular branches to the diametrically opposite side of the member whereat it reunites and flows as a single stream through the other arm 14 to the cavity in the boss which is above the partition, whence it flows from the member. In the adaptation of the devices to the uses of a steam heater, the circulation of the water is established between said upper and lower members by the downflow pipe 25 which being more remote from the direct action of the heating agent than the surrounding fillings 20, thus causing a difference in the temperatures of water within the pipe from that outside with a corresponding difference between the specific gravities and thus insure a descent of the water within the pipe while the water returns upwardly within the successive members and their connecting tubular fittings. It will be observed that said down-flow pipe opens on the opposite side of the partition 17 in the boss of the highest member 10 from that to which the water circulating upwardly from the lower members is delivered. Because of this construction, the water which enters said highest member is compelled to circulate through one of the two oppositely extending arms, through the circular shell and through the other arm before it can pass down through the pipe 25. This circulation of the water insures a perfect separation of the steam from the water and thereby gives the heater a maximum capacity for generating steam. The pipe 27, which carries off the steam, communicates with the boss of the highest member at the side of the partition on which the pipe 25 opens in order to further insure the complete separation of the steam from the water.

What I claim, is—

1. A heater comprising a series of superposed water-holding members having centrally arranged connections for the upflow of water between the successive members, the upper of said members being arranged to afford a horizontal circulation of water therein, and a connection disposed axially of the aforesaid connections and making an independent communication between the upper and lower members, so as to effect the return of the water to the latter after a circulation thereof has ensued in said upper member.

2. In a water heater of the character described, the combination, with a plurality of superposed horizontal water-circulating

members, of a plurality of water-holding members arranged alternately of said circulating members, each of said circulating members comprising a continuous outer tubular shell, a centrally disposed boss, and two oppositely extending arms connecting said boss and shell, each boss having a partition therein with a passage at one side thereof leading from its lower end to one of said arms, and a passage at its other side leading from its upper end to the other arm, axially disposed tubular connections between said water-holding members and the bosses of said circulating members, said series of superposed members terminating at the bottom with a water-holding member and at the top with a circulating member, a pipe arranged concentrically of said connections and extending from the bottom member to the top member, the upper extremity of said pipe being fitted in an opening in the partition in the boss of the top member, all for the purposes specified, a water-supply pipe communicating with the bottom member, and a delivery pipe communicating with the top member.

3. In a heater of the character described, the combination, with a plurality of superposed water circulating members each having a central boss, of axially disposed tubular connections between said bosses, the highest member constituting a water and steam chamber and comprising a continuous outer tubular shell and two oppositely extending arms leading to its central boss, means for supplying water to the lowest member, a partition in the boss of the highest member separating the two arms and confining the delivery of the water which circulates upwardly from the lower members to one of said arms, a pipe arranged concentrically of the bosses and tubular connections between the several members, said pipe opening at its lower end in the lowest member and at its upper end in the highest member on the opposite side of the partition therein from that on which the upwardly circulating water is delivered, and means for drawing off steam from said highest member.

4. In a heater of the character described, the combination, with a series of superposed horizontal water-circulating members, each comprising a continuous outer tubular shell, a centrally disposed boss and two oppositely extending tubular arms connecting said boss and outer shell, each boss having a partition therein with a passage at one side thereof leading from its lower end to one of said arms and a passage at its other side leading from its upper end to the other arm, of lenticular water-holding members arranged alternately with said water circulating members, axially arranged tubular connections between said members, the highest

member being a water circulating-member
and constituting a water and steam chamber,
the partition in the boss of said highest
member confining the delivery of the water
5 which circulates upwardly from the lower
members to one of its arms, a pipe arranged
concentrically of the bosses and tubular con-
nections between the several members, said
pipe opening at its lower end in the lowest
10 member and at its upper end in the highest

member on the opposite side of the partition
therein from that on which the upwardly
circulating water is delivered, means for
supplying water to the lowest member, and
means for drawing off steam from the 15
highest member.

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Witnesses:

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