

No. 624,606.

Patented May 9, 1899.

D. ARMY.

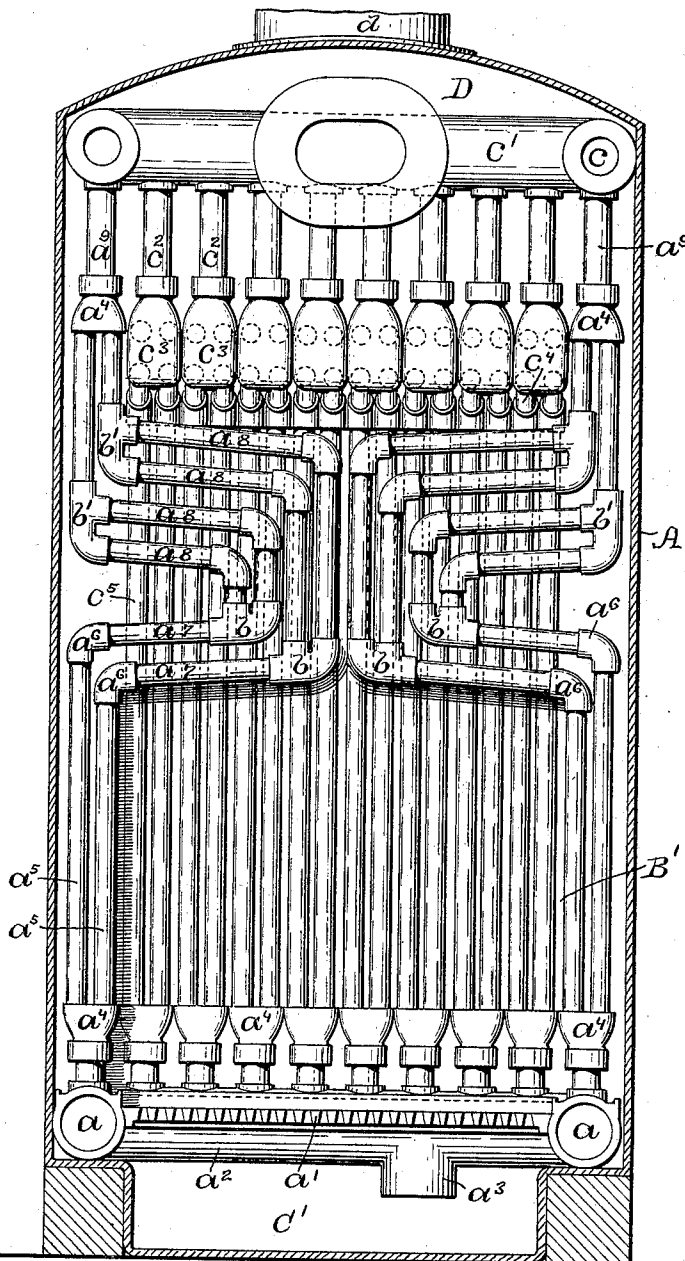
WATER TUBE STEAM GENERATOR.

(Application filed Oct. 18, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

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UNITED STATES PATENT OFFICE.

DARWIN ALMY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE ALMY
WATER TUBE BOILER COMPANY, OF SAME PLACE.

WATER-TUBE STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 624,606, dated May 9, 1899.

Application filed October 18, 1898. Serial No. 693,867. (No model.)

To all whom it may concern:

Be it known that I, DARWIN ALMY, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and
5 useful Improvements in Water-Tube Steam-Generators; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

In water tube or pipe steam-generators the tubes or pipes exposed to the fiercest action of the heat of the fire are liable to generate steam so rapidly that their temperature constantly varies, being heated to a temperature
15 much above the temperature of the steam which they at times contain and suddenly reduced to the temperature of the water in the same when the steam escapes and the water takes its place. In this class of boilers the largest possible area of heating-surface requires to be crowded into the smallest possible space directly over the fire, where conditions of the highest efficiency of the generator
25 exist.

One object of this invention is to so construct a pipe-boiler that the heating-surface exposed to the direct action of the fire is made up of the largest possible series of short pipes
30 and fittings connected to form a series of elbows flexibly connected with the upper and lower manifolds.

Another object of the invention is to unite the series of pipes forming the elbows by fittings adapted to facilitate the separation of the steam from the water.

The invention consists in the peculiar and novel construction of the special fittings and the combination of the parts whereby the
40 above-mentioned objects of the invention are secured, as will be more fully set forth hereinafter.

Figure 1 is a vertical transverse section of my improved water-tube boiler. Fig. 2 is a
45 side view of the same as seen when the side of the casing is removed.

Similar marks of reference indicate corresponding parts in both figures.

In the drawings, A indicates the casing by
50 which the boiler is inclosed; B, the door giving access to the furnace B'; C, the ash-pit

door, giving access to the ash-pit C'; D, the uptake, from which the products of combustion are conducted by the flue or chimney d.

The generator is built up of pipes and fittings connected with the chambers *a a*, extending on each side of the grate *a'*, and with the chamber *a''*, extending along the rear of the grate *a'* and provided with the mud-collecting chamber *a'''*, extending below the chamber *a''* and usually connected with the blow-off pipe. The chambers *a a* and *a''* are provided with a number of short nipples, to which the fittings *a''* are secured. These fittings are four-branch fittings, as will be seen by the
55 drawings, which show two sides of the same. Four of the vertical pipes *a'' a''* are connected with each of the fittings *a''*, which form the two sides of the furnace. The elbows *a''* connect each one of the four pipes *a'' a''* with the
60 pipes *a'' a''*, to each of which a three-branch fitting *b* is secured, and from two of the branch outlets of the three-branch fittings extend pipes varying in length, provided with an elbow and connected, through the pipes *a'' a''*,
65 with the three-branch fittings *b' b'*. These fittings are connected by pipes with the upper four-branch fitting *a''*, and these are connected by the pipe *a''* with the upper manifold, consisting of the chambers *c c*, extending
70 on each of the two sides of the boiler and connected with the front manifold *c'*. By this construction in each section eight pipes connect, through the three-branch fittings, with the four pipes connected with the upper
75 and lower four-branch fitting. All the pipes are short, and the steam made in the pipes *a a*, exposed to the highest temperature of the furnace, may escape through either of the two vertical pipes connected with the
80 three-branch fitting *b*, so as to insure solid water in these pipes *a'' a''* to protect them against the great heat of the fire.

The front manifold *c'* is connected by the pipe *c''* with the series of chambers *c'' c''*, from
85 each of which four pipes *c'' c''* extend to the rear of the generator and connect by elbow-fittings with the rear vertical pipes *c'' c''*, the lower end of which connect with the four-branch fittings *a''*, connected by nipples with
90 the rear manifold *a''*, thus forming passages for the return water exposed to less heat than

the pipes extending upward on the sides and over the furnace.

Having thus described my invention, I claim as new and desire to secure by Letters

5 Patent—

1. In a water-tube steam-generator, the combination with the lower manifolds extending along the sides and the rear of the furnace, the upper manifolds extending along the sides
10 and the front of the boiler and the four-branch fittings connected with the same, of a series of sections, each consisting of four pipes extending vertically from one of the lower four-branch fittings, connected with pipes extending
15 inward over the furnace and provided with the three-branch fittings, substantially as herein described, eight pipes connecting the four three-branch fittings with four three-branch fittings on four vertical pipes connected
20 with the upper four-branch fittings and return-water pipes connecting the upper front manifold with the lower rear manifold; whereby the separation of the steam from the water in the part of the generator exposed to the
25 greatest heat is facilitated, as described.

2. In a water tube or pipe steam-generator, the combination with the pipes forming the side and the roof of the furnace, of the three-branch fittings *b* and *b'* and connecting-pipes;
30 whereby the heating-surface and the quantity of water exposed to the fiercest heat is increased, as described.

3. In a water-tube steam-generator, the combination with the upper and lower manifolds,
35 of sections consisting of an upper and a lower four-branch fitting, four pipes extending from the lower four-branch fitting to form one side and part of the roof of the furnace and terminating in the three-branch fittings, herein
40 described, four pipes extending from the up-

per four-branch fitting and connected each with a four-branch fitting, eight pipes connecting the three-branch fittings on the upper and the lower pipes, and connections between the four-branch fittings and the manifolds;
45 whereby the most active steam-generating surface and the efficiency of the generator are increased, as described.

4. In a steam-generator, the combination with the lower manifolds *a a* and *a²* inclosing
50 the sides and the upper manifolds *c c* and *c'* extending along the sides and the front of the generator, of the upper and lower four-branch fittings *a⁴ a⁴* connected with the manifolds, the pipes *a⁵ a⁵* extending from the lower four-branch fittings and connected by the elbows
55 *a⁶ a⁶* with the pipes *a⁷ a⁷*, the three-branch fittings *b b*, the three-branch fittings *b' b'* connected by pipes with the upper four-branch fittings *a⁴*, the pipes *a⁸ a⁸* forming practically
60 rectangular connections with the three-branch fittings *b b* and *b' b'*, and the return-water connections, consisting of the chambers *c³ c³* and the pipes *c⁴ c⁴* and *c⁵ c⁵* connected by elbow-fittings and with the chambers *c³ c³* and the
65 lower four-branch fittings *a⁴*; whereby the water in the generator is caused to circulate through the pipes, the circulation of the water being retarded in the part of the generator extending over the fire, while the separation of the steam from the water in this portion of the generator is facilitated, as described.
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In witness whereof I have hereunto set my hand.

DARWIN ALMY.

Witnesses:

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