

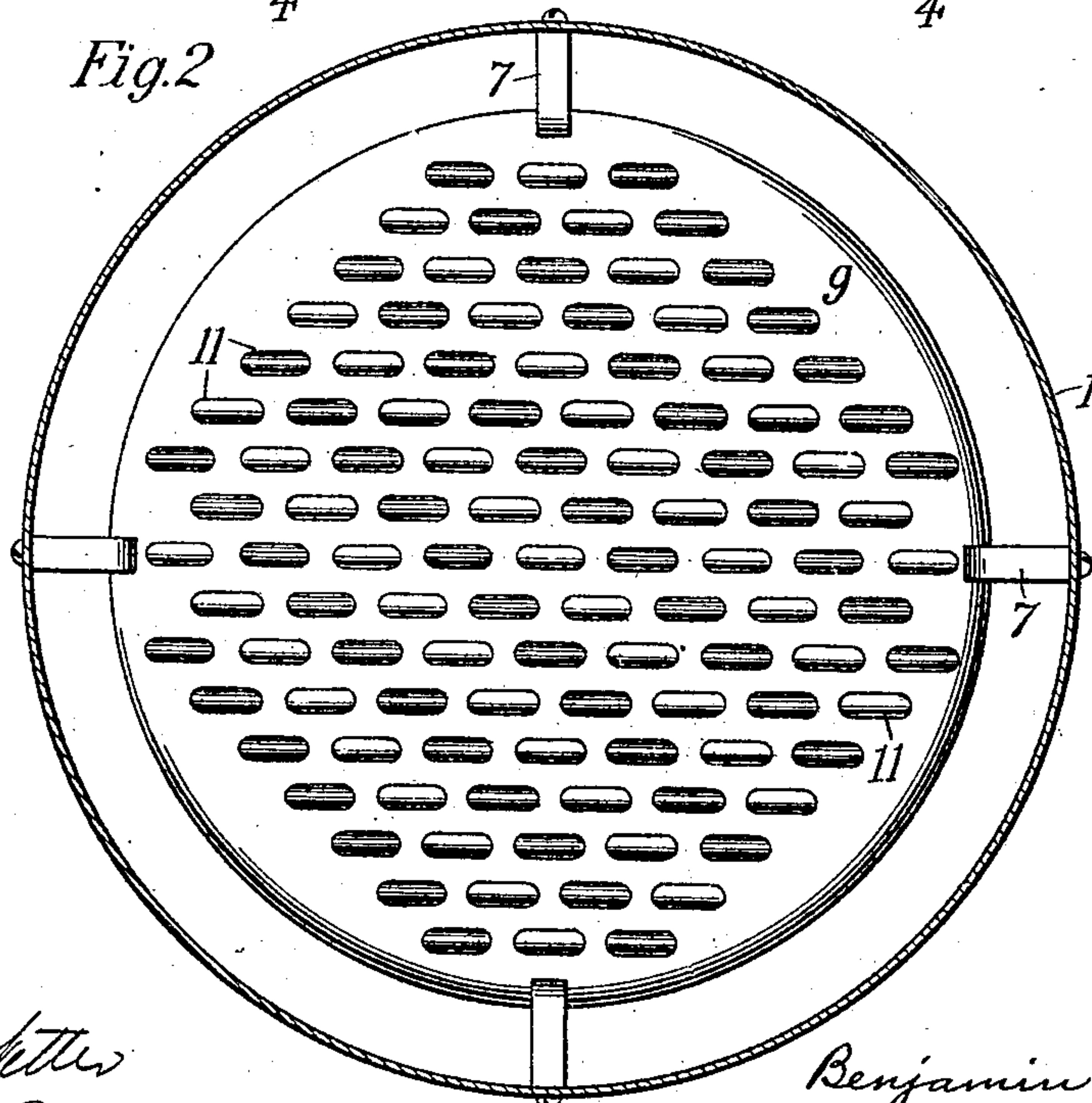
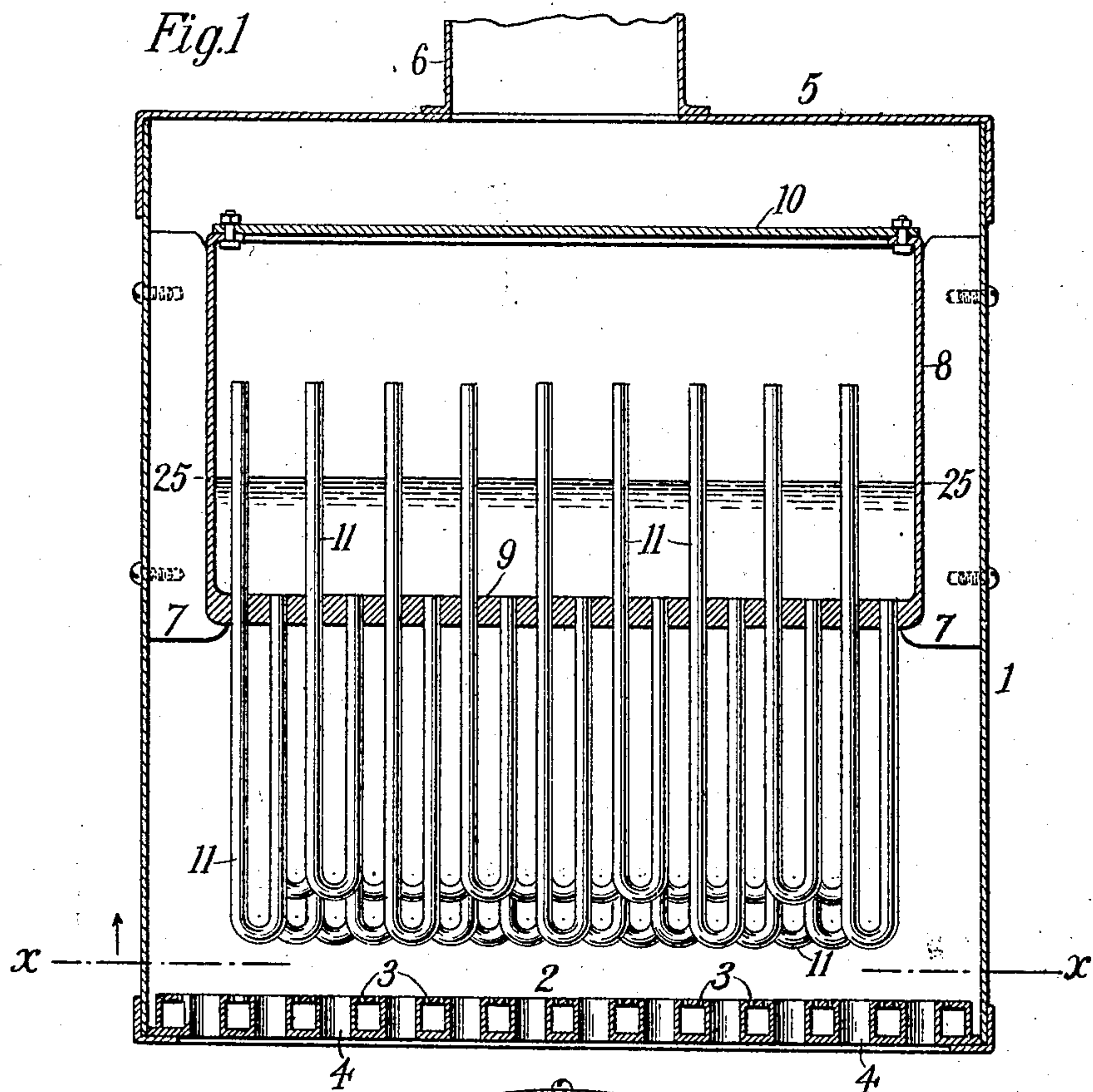
No. 764,761.

PATENTED JULY 12, 1904.

B. S. PEARD.  
STEAM GENERATOR.

APPLICATION FILED JAN. 23, 1903.

NO MODEL.



Witnesses:  
*Raphael Miller*  
*Henry Barnes*

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# UNITED STATES PATENT OFFICE.

BENJAMIN S. PEARD, OF NEW YORK, N. Y., ASSIGNOR TO GEORGE A. WALTON, OF NEW YORK, N. Y.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 764,761, dated July 12, 1904.

Application filed January 23, 1903. Serial No. 140,212. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN S. PEARD, a citizen of the United States, residing in the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to steam-generators, and more particularly to that type of steam-generators wherein generator-tubes are provided, extending downward in close proximity to the heating-burner or fire. According to my invention such generator-tubes are constructed and arranged with the depending portions of adjacent generator-tubes of different lengths, so that their lower portions terminate at different heights above the burner or heater.

My invention also includes various improvements in construction and arrangement.

I will now describe the construction of steam-generators shown in the accompanying drawings and will thereafter point out my invention in claims.

Figure 1 is a vertical central section of a steam-generator embodying my invention. Fig. 2 is a horizontal section of the same on the line *xx*, Fig. 1, looking upward.

The generator is shown as inclosed within a casing 1, at the lower part of which is held a hydrocarbon-burner 2, having flame-orifices 3 and air-passages 4, these air-passages being the only openings from the outer air into the combustion or heating chamber. The casing terminates at its upper end in a cap-piece 5, having a centrally-arranged stack 6, through which the products of combustion escape. The boiler is shown as supported in the casing by means of inwardly-projecting vanes 7 and comprises a shell composed of a side wall 8, a lower crown-sheet 9, and an upper crown-sheet 10. A plurality of generator-tubes 11 is provided, these tubes depending from the lower crown-sheet 9, and each of these tubes is looped or U-shaped and has ends of unequal lengths, one end terminating below the water-line 25 25 and as shown at the lower

crown-sheet and the other end terminating above such water-line. According to my invention the depending portions of the adjacent looped generator-tubes are of unequal lengths, and I have found in practice that this arrangement of the lower or flashing points of adjacent generator-tubes at different heights above the burner results in a more effective generation of steam in the apparatus, inducing the currents of heated gases to more evenly flow about the generator-tubes and insuring a penetration of the heated gases between the generator-tubes. As shown, there is a central row of generator-tubes in a substantially diametrical line with adjacent tubes having depending portions of the same lengths and an adjacent row of tubes with the depending portions of different lengths and of alternate tubes in such row of the same length and arranged so that their looped portions or flashing-points are opposite the spaces between the generator-tubes of the adjacent row of tubes, and this arrangement is adhered to throughout all the generator-tubes, and thus the looped portions or flashing-points in any one row are adjacently of different heights and alternately of the same height and the looped portions or flashing-points of the tubes of adjacent rows are staggered or break joints with those of the adjacent rows. The consequence of this construction is that the surface presented to the fire contains a plurality of flues through which currents of heated gases are induced, and thereby a penetration of the heated gases among the generator-tubes is effected, resulting in a highly-effective utilization of the heated gases and greatly increasing the steam-generating power of the boiler.

It is obvious that various modifications may be made in the construction and arrangement shown and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. A steam-generator comprising a casing provided with a heating-chamber and a source of heat therein, a boiler provided with looped generator-tubes depending therefrom into the heating-chamber and exposed on all sides to



the heated gases in such chamber and terminating in the boiler above and below the water-level and having their flashing-points directly exposed to the source of heat at different heights therefrom in adjacent tubes and  
5 at the same height therefrom in alternate tubes.

2. A steam-generator comprising a casing provided with a heating-chamber, a boiler provided with looped generator-tubes depending therefrom, each of such looped tubes having  
10 ends of unequal length terminating in the boiler respectively above and below the water-level, the depending looped portions of adjacent tubes being of different lengths and of  
15 alternate tubes of the same length directly exposed to the source of heat.

3. A steam-generator comprising a casing provided with a heating-chamber, a boiler provided with looped generator-tubes depending therefrom, each of such looped tubes having  
20 ends of unequal length terminating in the boiler respectively above and below the water-level and such generator-tubes being arranged in rows, the depending portions of adjacent  
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tubes in the same row being of different lengths and of alternate tubes of the same length, and the looped portions of the tubes in one row being adjacent to the openings between the tubes in adjacent rows, substantially  
30 as set forth.

4. A steam-generator comprising a casing provided with a heating-chamber, a boiler provided with generator-tubes depending therefrom and looped at their lower ends, such  
35 tubes being arranged closely together and with the depending portions of a number of tubes of greater length than the depending portions of the other tubes to form a plurality of openings between the looped portions  
40 of the longer tubes such openings being greater than the space between the looped portions of the tubes at the lower ends of the tubes.

In testimony whereof I have affixed my signature in presence of two witnesses.

B. S. PEARD.

Witnesses:

LIVINGSTON EMERY,  
HENRY D. WILLIAMS.