

L. M. G. DELAUNAY-BELLEVILLE.
STEAM GENERATOR.
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1,031,776.

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Fig.1.

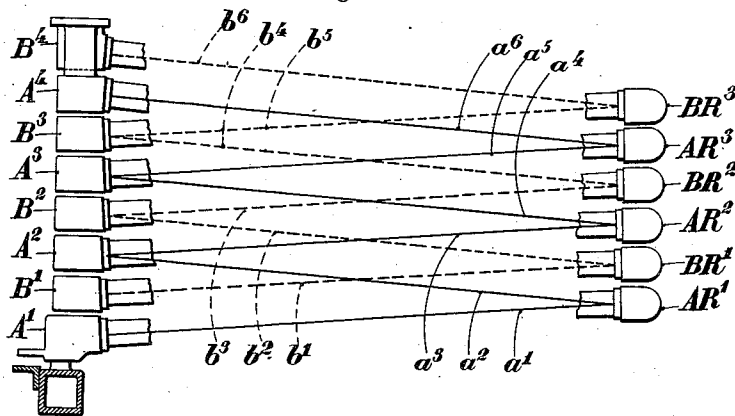


Fig.2.

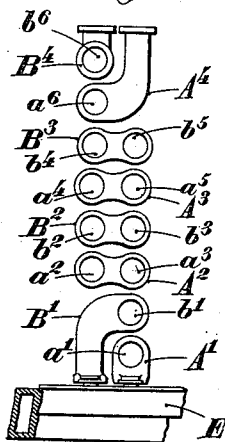
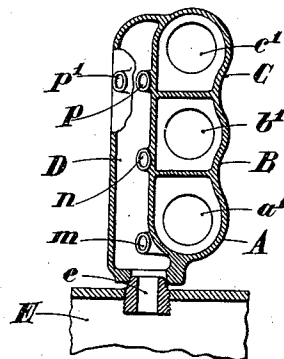


Fig.3.



Witnesses.

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UNITED STATES PATENT OFFICE.

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STEAM-GENERATOR.

1,031,776.

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To all whom it may concern:

Be it known that I, LOUIS MARIE GABRIEL DELAUNAY-BELLEVILLE, citizen of the French Republic, residing at St. Denis, Department of the Seine, in France, have invented certain new and useful Improvements in and Relating to Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Boiler elements have been constructed of two or more coils with the object of increasing the inclination of the tubes but the lower tubes of the several coils have always been united in a box or chest common to them all which renders the system unpractical and even dangerous because the rapid vaporization which takes place in the lower tube of the lower coil serves to force the water from this tube into those located above and less exposed to the fire and thus cause the lower tube of the first coil to become empty and be damaged by burning.

The present invention has for its object to render independent the two coils of which a double coil element is composed by giving each of them a separate intake from the lower collector and a steam exhaust which is also independent on the upper purifier. This arrangement renders it impossible for a lower convoluation of the first coil which is more highly heated to discharge itself into the lower convoluation of the second coil which is far less heated because they only communicate with the chamber of the lower collector as in the ordinary element of a Belleville boiler. Furthermore this arrangement permits of proportioning the sections of the lower and upper communications of each coil and in particular of the feed coil in proportion to the evaporating power of these coils.

A modification of the same invention consists in prolonging the chamber of the lower collector in a compartment of a separate box which by means of orifices of appropriate section communicate separately with other compartments of the same box into which the lower tubes of each coil are also heated. This arrangement permits of combining any desired number of coils in a single element.

The arrangements in question are represented by way of example in the accompanying drawing, in which:

Figures 1 and 2 represent a boiler element comprising two coils; Fig. 3 represents the lower box of an element comprising three coils. Fig. 1 is a side elevation of an element comprising two coils. Fig. 2 is an end elevation of the same element. Fig. 3 is a section parallel with the face of a lower box upon which the first tubes of three coils combined to form a single element are mounted.

The element comprising two coils represented in Figs. 1 and 2 is formed by the two coils A and B each of which may be composed of three branches for example. A branch comprises two tubes *a* or *b* and two rear boxes AR or BR; one of the tubes carries a front box A or B to which the first tube of the following branch is united. A branch of the coil A and a branch of the coil B is united alternately in such a manner that these branches are alternated in the element without any communication existing between the two coils. The coil A comprises the boxes A¹ . . . A⁴ the rear boxes AR¹ . . . AR³ and the tubes *a*¹ *a*² . . . *a*⁶. The coil B comprises the front boxes B¹ . . . B⁴ the rear boxes BR¹ . . . BR³ and the tubes *b*¹ *b*² . . . *b*⁶. The lower boxes A¹ and B¹ of each coil communicate separately with the feed collector E. The upper boxes A⁴ and B⁴ communicate separately with the upper water and steam purifying collector (not shown); nevertheless the discharge sockets can be united by a cap arranged in such a manner that the two currents remain separate and do not impede each other. With this device for a given height of the boxes and a given length of the tubes the inclination of the tubes is doubled; for a given total number of branches per element the length of each of the fresh circuits is one half the length of the circuit of the element formed by a single coil. The total heating surface is the same in both cases. This novel arrangement permits of burning a larger quantity of fuel per hour and per square meter of grate and of increasing the power of the generator while at the same time retaining the economic advantages and the guarantees of safety afforded by mounting the tubes into elements. It is not indis-

pensable that the coils should comprise the same number of branches; thus for example the coil A might comprise a fourth branch arranged above the third branch of the coil

5 B. The rear box AR^4 would be upon BR^3 , the front box A^4 would present the same form as A^3 , the box B^4 would have the same form as A^4 and the fresh box A^5 would be of the same form as B^4 .

10 Fig. 3 represents a modified feed for the coils which necessitates only one communication with the feed collector. For example it may be constructed for an element which comprises three combined coils; in
15 this case the first box in front of the third coil is mounted upon the first front box of the second coil and the first rear box of the third coil is mounted on the first rear box of the second coil and so on in succession.

20 This box comprises three superposed chambers $A^1 B^1 C^1$ with which are connected the lower tubes $a^1 b^1 c^1$ of the first three convolutions and a lateral chamber D with which the three chambers referred to above are in

25 communication through sockets $m n p$; finally, the chamber D communicates at its base e with the feed collector E. The section of the communication e is calculated for the total vaporization of the element; each of the sockets $m n p$ is of a section
30 proportional to the vaporization of the coil

that it serves. The box D comprises examination plugs such as p^1 opposite each supply sockets $m n p$.

I claim:

35 1. A water tube boiler element composed of two or more coils, the convolutions of which are superposed and alternated, characterized by the fact that the coils comprise distinct communications both with the lower
40 collector for supplying it and with the upper collector for the liberation of the steam each of these communications being thus enabled to present exactly the section suited to the intensity of the heating and the steam
45 production of the corresponding coil.

2. In an element with multiple coils, the arrangement at the lower part of a box with a plurality of compartments, one of these compartments communicating on the
50 one hand with the steam collector and on the other hand by means of apertures of appropriate section with the other compartments of the box off which the lower tubes of the several coils are branched.
55

In testimony whereof I affix my signature, in presence of two witnesses.

LOUIS MARIE GABRIEL

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Witnesses:

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EMILE KLOTZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."