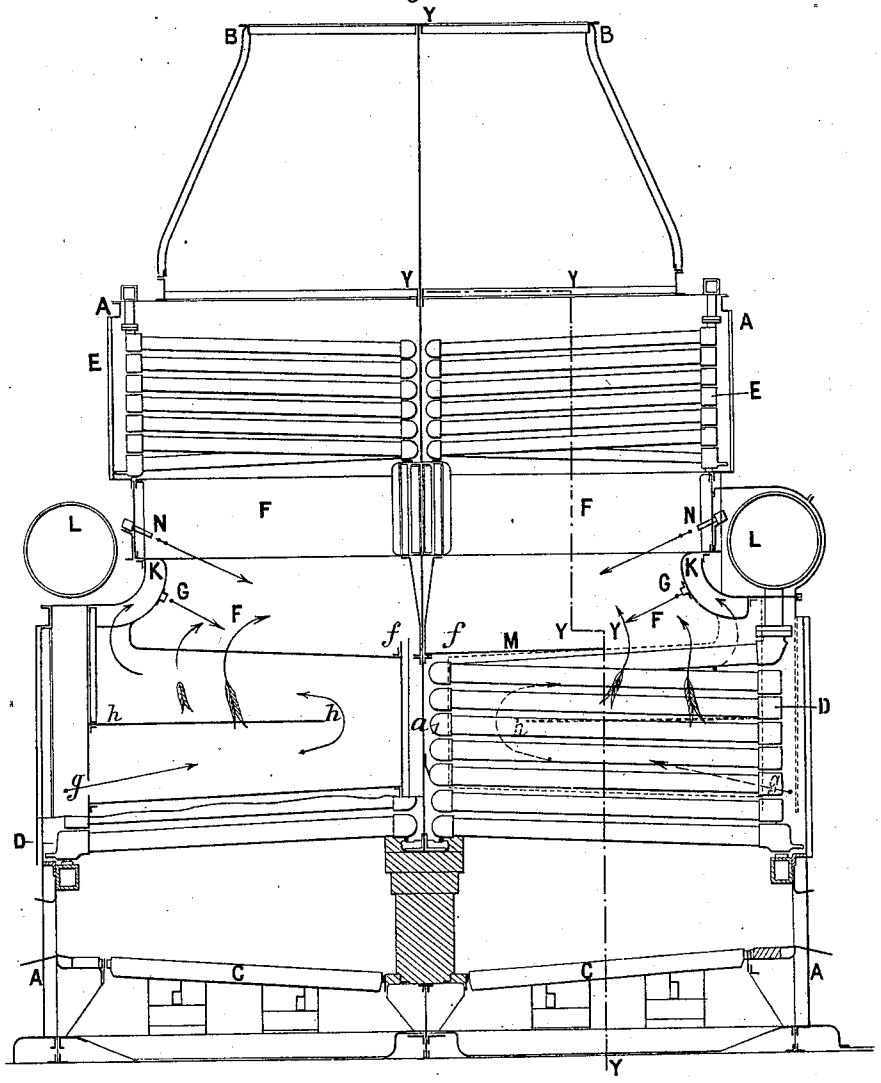
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L. M. G. DELAUNAY-BELLEVILLE.

STEAM GENERATOR.

No. 590,829. Patented Sept. 28, 1897.

Fig. 1



Witnesses

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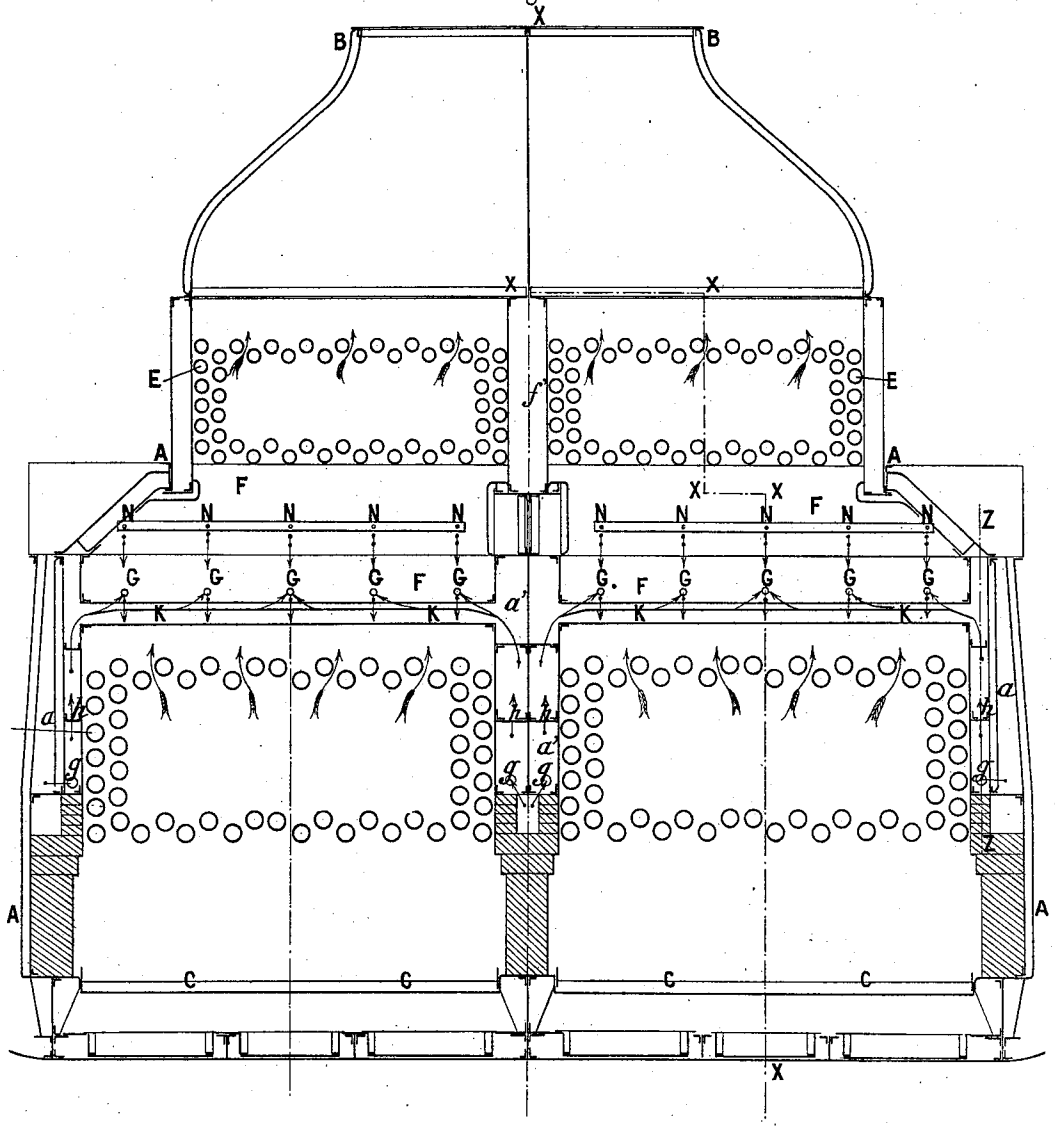
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L. M. G. DELAUNAY-BELLEVILLE.

STEAM GENERATOR.

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Fig. 2



Witnesses

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UNITED STATES PATENT OFFICE.

LOUIS MARIE GABRIEL DELAUNAY-BELLEVILLE, OF PARIS, FRANCE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 590,829, dated September 28, 1897.

Application filed September 24, 1896. Serial No. 606,827. (No model.)

To all whom it may concern:

Be it known that I, LOUIS MARIE GABRIEL DELAUNAY-BELLEVILLE, a citizen of France, and a resident of Paris, in the Department of the Seine, France, have invented a new and useful Improvement in Steam-Generators, of which the following is a specification.

In the specification of my British Patent No. 1,729, dated January 24, 1895, I have described certain improvements in steam-generators of the Belleville type, in which the gases after leaving the steam-generating elements or tubes flow through a supplemental combustion-chamber and thence pass to the feed-water-heating elements or tubes.

The principal object of my present invention is the application of the aforesaid combustion-chamber to any arrangement of steam-generator in which steam-generating and feed-water-heating elements or tubes are employed in combination.

I will refer to the feed-water-heating arrangement as the "economizer."

The groups of tubes by which steam is generated and the groups of tubes by which the feed-water is heated are separated from each other by a space which constitutes a combustion-chamber into which air (preferably heated air) or steam or both is introduced.

The economizer may be arranged in any suitable position relatively to the boiler-tubes—for example, at the side thereof or at the rear thereof, this constituting a very satisfactory arrangement for torpedo or other boats—or the economizer may be arranged beneath the boiler-tubes when the flues are beneath the furnace or when the economizer has otherwise to be placed at a lower level than that of the boiler, or the economizer may be arranged at the end beneath the generators, which is an arrangement especially applicable, for example, in the case of large installations, such as those at central electrical supply-stations or for sea-going vessels or in other cases where economy of ground-space is important.

My invention solves a very important problem—viz., the application of economizers and the necessary gas-combustion chamber without increasing the ground-space occupied by the generators.

An arrangement according to my invention is shown in sections at right angles to each other in Figures 1 and 2 of the accompanying drawings. It includes inlets for supplementary supplies of hot air into the combustion-chamber to consume the combustible gases therein. Four generators are shown placed side by side, as is frequently the case with marine boilers, and each generator is furnished with its economizer, according to my invention.

The arrangement of economizers given by way of example and shown in Figs. 1 and 2 is applicable to a group of any number of generators, whether placed side by side or not, since each generator has its corresponding combustion-chamber and an economizer placed above.

In Figs. 1 and 2, A represents the shell or envelop of the boilers.

a are the outer casings of the generators, and *a'* are the partitions between the individual generators.

B is the connection with the smoke conduits or funnel, and C are the fire-grates.

D are the tubes of the generators, and E are the tubes of the economizers, through which the feed-water passes and is heated on its way to the generators. This water may be passed by the force-pumps from top to bottom or from bottom to top, or in any other manner convenient for the installation.

F F F are chambers for the mixing and combustion of the gases between the generator-tubes and those of the economizer. There is such a chamber for each generator, separated from the others by the partitions *f' f'*.

G G G are pipes for the admission of hot air to the said chambers. This air is induced by the draft and enters at the bottom of the partitions or walls *a' a a* of the generators through orifices *g g g*, horizontal partitions or casings *h h h* causing the said air to pass in contact with and be heated by contact with the boiler-plates near the economizer-tubes. The hot air then enters the chamber K, which extends over the whole width of the generator behind the sediment-collectors L.

The pipes G G G G are mounted on the inner wall of the chamber K and are inclined in order that the air may be directed almost at right angles to the gases which issue from between the economizer-tubes and which all

pass over the obturator M. This arrangement facilitates the mixing of the gases and the hot air.

N N N are pipes for the injection of air or steam, but preferably air for ships, in order not to lose fresh air. These pipes N are placed directly above the pipes G G G and may be placed in the axes of the pipes G, so as to make them assist in the introduction of the hot air into the combustion-chamber. The air should be supplied to the combustion-chambers at a pressure such as to penetrate the gases with sufficient force and strongly stir them up and force them toward the angles *f f* of the combustion-chambers and produce eddies by means of which the combustible gases are brought into intimate contact with the oxygen of the hot air introduced through the pipes G G, and the said gases are burned and the heat developed is very efficiently utilized by the economizer.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

In a steam-generator the combination with economizer-tubes E, located at the upper part of the generator, of generator-tubes D, above the fire-chamber, a mixing and combustion chamber F between the economizer-tubes and the generator-tubes, vertical hot-air pipes G having apertures *g* for the entrance of outside air, said pipes being near the front portions of the generator-tubes, and means for forcing air from the exterior into the mixing and combustion chamber, under pressure, and for heating said air on its way to said chamber, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS MARIE GABRIEL DELAUNAY-BELLEVILLE.

Witnesses:
HIPPOLYTE TOSSE,
LEON BROWNE.