(No Model.)

L. & C. STEINMÜLLER.

STEAM GENERATOR.

No. 418,825. Patented Jan. 7, 1890.

Fig. 1.

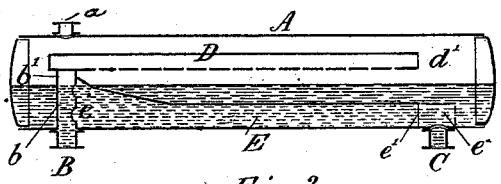


Fig. 2.

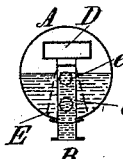


Fig 3.

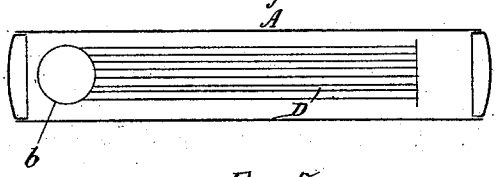


Fig 4

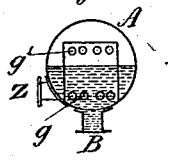


Fig 5.

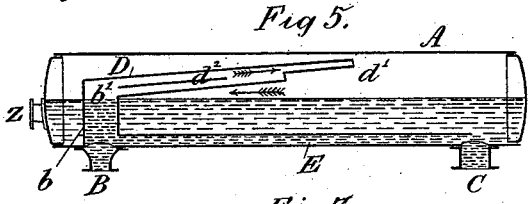


Fig 6.

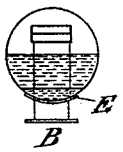


Fig 7.

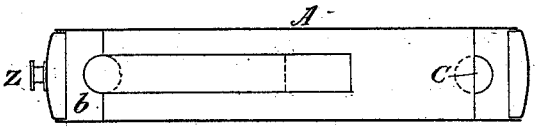


Fig 8.

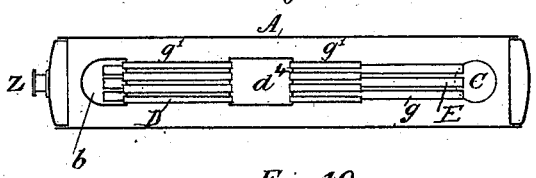


Fig 9

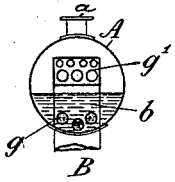


Fig 10.

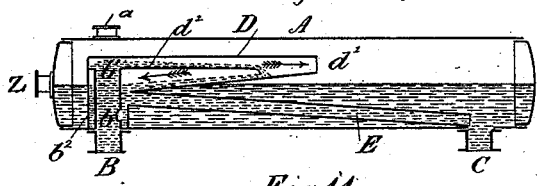
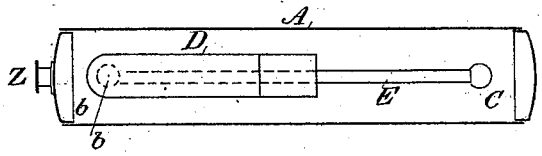


Fig 11



Witnesses:-
Henry A Pryor
Horace J. Coddington

Inventors
Liebrecht Steinmüller
Carl Steinmüller
By Joseph. C. Chapman.
their Attorney

UNITED STATES PATENT OFFICE.

LEBRECHT STEINMÜLLER AND CARL STEINMÜLLER, OF GUMMERSBACH, GERMANY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 418,825, dated January 7, 1890.

Application filed April 13, 1889. Serial No. 307,082. (No model.) Patented in England August 9, 1884, No. 11,105.

To all whom it may concern:

Be it known that we, LEBRECHT STEINMÜLLER and CARL STEINMÜLLER, subjects of the Emperor of Germany, residing at Gummersbach, in the German Empire, have invented certain new and useful Improvements in Steam-Generators; and we 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.

A British patent, No. 11,105, dated August 9, 1884, has been obtained for a portion of this invention.

This invention relates to steam-generators in which the steam is separated from the liquid in a separate receiver from the boiler proper in which the liquid is heated, and it is specially applicable to the evaporation of condensed lyes as formed in soda-recovery processes in the manufacture of cellulose.

This invention consists in the novel construction and combination of the parts, as hereinafter fully described and claimed, whereby the steam is more perfectly separated from the liquid.

In the drawings, Figure 1 is a vertical longitudinal section through a steam-generator, and Fig. 2 is a cross-section through the same. Figs. 3 and 4 are respectively a sectional plan view and a cross-section showing a modification. Figs. 5, 6, and 7 show, respectively, a vertical longitudinal section, a cross-section, and a sectional plan view of a second modification. Figs. 8 and 9 show, respectively, a sectional plan view and a cross-section of a third modification. Figs. 10 and 11 are respectively a vertical longitudinal section and a sectional plan view of a fourth modification in the construction of the steam-generator.

B is the inlet for the hottest liquid into the receiver A, and C is the outlet, both inlet and outlet being at the bottom of the receiver and adapted for connection with the boiler proper, in which the liquid is heated, and which is not shown in the drawings, as it does not form any part of the present invention. An outlet *a* for the steam is provided at the top of the receiver above the level of the liquid. A vertical chamber *b* is secured inside the receiver A, immediately over the inlet B, and a longitudinal chamber D is secured to the top *b'* of the chamber *b*, above the level of the liquid in the receiver, and is provided with openings for the escape of steam and liquid. A second longitudinal chamber E is formed in the lower part of the receiver below the level of the liquid. One end of this chamber communicates with the chamber *b* by means of holes *e*, and the other end is placed in communication with the outlet C. The operation of the various modifications is the same. The hottest liquid rushes upwardly through the vertical chamber *b* and the steam separates from the liquid in chamber D. Portions of the liquid also pass through chamber E toward the outlet C, and the steam is also liberated from the surface of the liquid in the receiver. The internal chambers prevent the frothing up of the liquid in the vicinity of the steam-outlet *a* and permit the generation of dry steam.

In Fig. 1 the chamber D consists of a rectangular box having perforations in its under side for the escape of liquid and an open end *d'* for the escape of steam. The chamber E is provided with an open end *e'* in front of the outlet C, or it may be extended beyond the said outlet, as shown by the dotted lines e^2.

In Figs. 3 and 4 the chambers D and E are shown formed of a series of pipes *g'* and *g*, which are equivalent to the rectangular chambers.

In Figs. 5, 6, and 7 the chamber D is upwardly inclined and diminished in size at its rear end *d'*. A longitudinal diaphragm d^2 is secured in the chamber to facilitate the separation of the steam from the liquid.

In Figs. 8 and 9 series of tubes *g'* and *g* are used as the equivalents of chambers D and E, and a chamber d^4 is inserted in the series of pipes *g'* for the same purpose as the said diaphragm.

In Figs. 10 and 11 the chamber E is downwardly inclined toward the outlet C, and is connected to the vertical chamber *b* by the concentric chamber b^2. The chamber D is connected to the top *b'* of chamber *b* and has

an inclined bottom for the liquid to run down, while the steam escapes through the open end d' in the direction of the arrow.

Z is a branch for removing the still liquid or for blowing off the receiver.

What we claim is—

1. In a steam-generator, the combination, with the receiver provided with an inlet and an outlet for the liquid at the lower part of it, of a vertical chamber over said inlet, a longitudinal chamber provided with openings for steam and liquid and secured to the said vertical chamber above the level of the liquid in the receiver, and a second longitudinal chamber below the level of the liquid and communicating with the said vertical chamber and the outlet, substantially as and for the purpose set forth.

2. In a steam-generator, the combination, with the receiver provided with an inlet and an outlet for the liquid at the lower part of it, of a vertical chamber over said inlet, a longitudinal chamber formed of a series of tubes provided with openings for steam and liquid and secured to the said vertical chamber above the level of the liquid in the receiver, and a second longitudinal chamber below the level of the liquid, formed of a series of tubes and communicating with the said vertical chamber and the outlet, substantially as and for the purpose set forth.

3. In a steam-generator, the combination, with the receiver provided with an inlet and an outlet for the liquid at the lower part of it, of a vertical chamber over the said inlet, a longitudinal chamber provided with openings for steam and liquid and secured to the said vertical chamber above the level of the liquid in the receiver, a separator inserted in said chamber for assisting the separation of the steam from the liquid, and a second longitudinal chamber below the level of the liquid and communicating with the said vertical chamber and the outlet, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

LEBRECHT STEINMÜLLER.
CARL STEINMÜLLER.

Witnesses:
JUL. OVERTROFF,
FRIEDR. WILH. VORMSTEIN.