

UNITED STATES PATENT OFFICE.

LEBRECHT STEINMÜLLER AND CARL STEINMÜLLER, OF GUMMERSBACH,
GERMANY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 418,826, dated January 7, 1890.

Application filed August 6, 1889. Serial No. 319,864. (No model.) Patented in England August 9, 1884, No. 11,105, and in Germany May 13, 1886, No. 37,442.

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 and connected with Steam-Generators, (for which we have obtained patents in England, No. 11,105, dated August 9, 1884, and in Germany, No. 37,442, dated May 13, 1886;) 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.

Our invention relates to certain improvements in and connected with steam-generators of the "water-tube" type, wherein a group of tubes is fixed at both ends into junction-boxes forming water-chambers, which are so connected together that the contained liquid circulates throughout the combined structure on the application of external heat.

Our invention relates to the construction of the tube end junction-boxes or water-chambers, to the arrangement of stays therefor, and to the method of fixing the covers of the tube access-holes.

In the annexed drawings, Figure 1 is a half front elevation to the left of a tube-plate and to the right of a front plate. Figs. 2 and 3 are respectively a vertical section and a sectional plan of a junction-box and tubes. Figs. 4 and 5 are respectively a front elevation and cross-section on a larger scale of part of a box. Fig. 6 is a front elevation, and Fig. 7 a section, of part of a box connected to two upper boilers. Figs. 8 and 9 are the same views, but with only one upper boiler. Figs. 10 and 11 are the same views, but showing a different method of connection.

Similar letters indicate similar parts in all the figures.

In order to insure the freest and best circulation in any chamber or vessel, it is essential that as few obstructions as possible be presented to the circulating liquid, and to this end instead of riveting or bolting together the wrought-iron plates or cast-iron sections, as heretofore, according to our in-

vention we weld together all the wrought iron or steel plates, which together form the tube-end junction-box, into one homogeneous chamber of the desired shape, preferably rectangular, and shallow from front to back, as illustrated. Thus there is neither joint nor seam nor any obstruction to free circulation, while great strength and durability are insured.

The manufacturing of the welded junction-box or water-chamber is done in the following way: Plate A, forming the top base and sides, is beaten exactly into the form of the water-chamber which is to be manufactured, and the tube-plate T and the front plate S, after having been cut into the same form, are connected with plate A by screws in such a way that the three parts T A S cannot alter their position against each other, and T and S lie flat upon the edges of A. The plates T and S are then joined to A by ordinary welding, the three parts thus forming one welded piece.

The connection between the welded boxes or water-chambers and the top boiler C can be effected in different ways: first, either by riveting the water-chamber direct to the top boiler by means of an angle-iron, as in Figs. 1, 2, 8, and 9, or by flanging the plates T A S, as in Figs. 6 and 7; second, by riveting the water-chamber to a joint-piece J, which is connected with the top boiler C by riveting; third, in providing the water-chamber and the joint-piece J with angle-irons *a a*, which have then to be screwed together, as in Figs. 10 and 11.

Boilers which are provided with two or more top boilers C C' require water-chambers, the plate A of which has to be made of different parts A A', as illustrated in Figs. 6 and 7.

The water-tubes *t t* are fixed in the usual manner in the tube-plate T, and in the front plate S, opposite each tube end, access-holes *s* are drilled of rather larger diameter than the tubes, and for each hole *s* a cover or lid *l* is provided of circular or other convenient shape, either flat or convex, and adapted to make steam-tight joints.

The stays *u u* are arranged in horizontal lines and between each tube *t*, and we utilize these stays *u u* to fix the covers *l l* as follows: The stays are extended through the front
5 plate *S*, and have screwed ends provided with nuts *u' u'*. To each stay a plate or clip *V* is applied, of such shape as to overlie the covers *l* at either side, and by the nuts and clips the said covers *l* can be screwed up against
10 the plate *S*, and steam-tight joints can readily be made, while at the same time the tubes are easily accessible for cleaning and removal, when required.

What we claim as our invention, and desire
15 to secure by Letters Patent, is—

The combination, with the tube end junction-box provided with tube-holes and with access-holes opposite said tube-holes, of the covers for the access-holes, the stays between the tube-holes, and the clips removably secured to the projecting ends of said stays and bearing against the adjacent covers, 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,

P. VISSEUR.