J. A. WESTERMAN.

Improvement in Sectional Steam-Generators.

No. 130,092. Patented July 30, 1872.

FIG. 1.

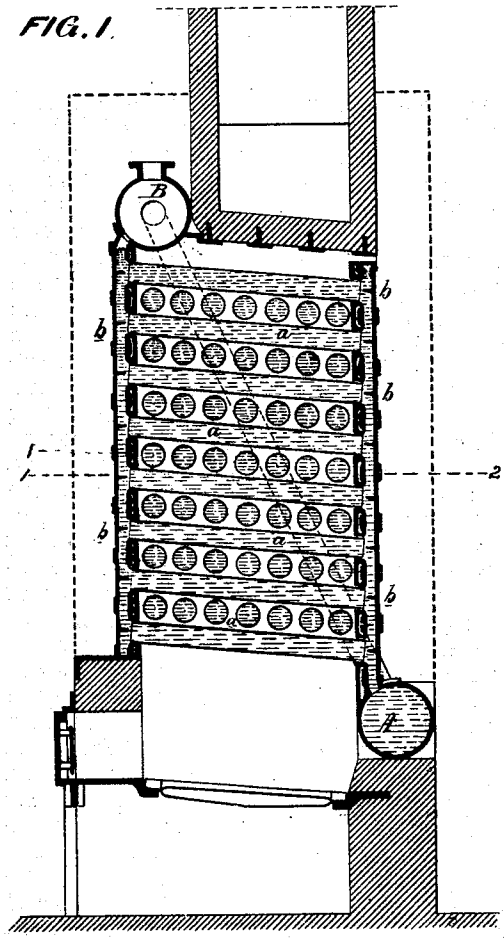


FIG. 2.

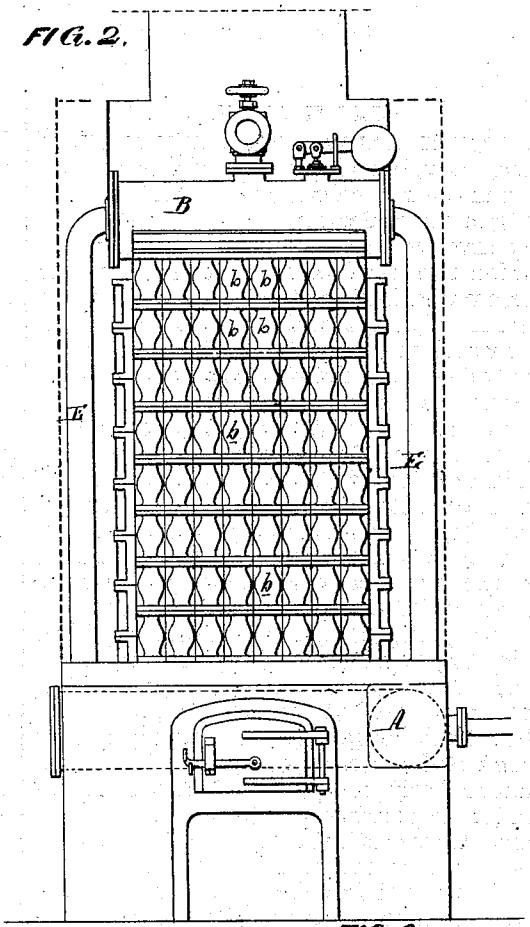


FIG. 3.

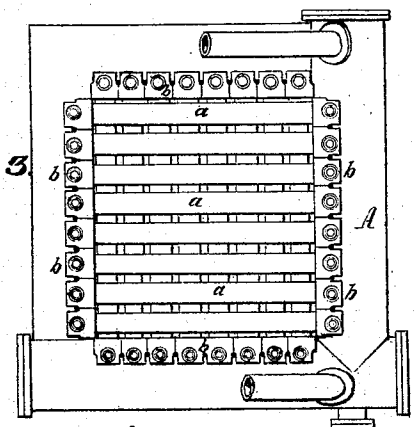


FIG. 4.

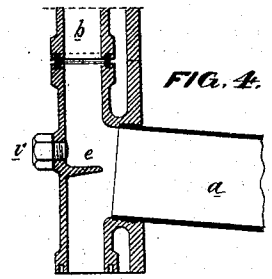


FIG. 5.

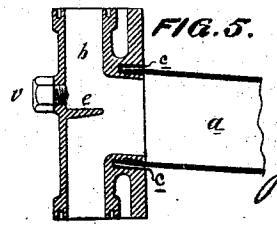


FIG. 6.

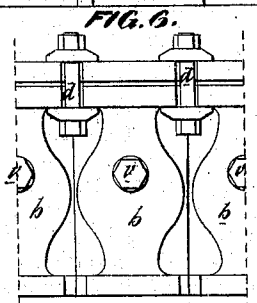
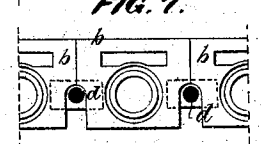


FIG. 7.



Witnesses: Thomas McIlvain
Harry Smith

J. A. Westerman
by his Attys
Newsom & Wilson

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

JOSEPH A. WESTERMAN, OF GENOA, ITALY.

IMPROVEMENT IN SECTIONAL STEAM-GENERATORS.

Specification forming part of Letters Patent No. **130,092**, dated July 30, 1872.

SPECIFICATION.

I, JOSEPH ALEXANDRE WESTERMAN, of Genoa, Italy, have invented certain Improvements in Steam-Generators, of which the following is a specification:

My invention relates to steam-generators in which two series of tubes, one above the other, cross each other at right angles, or at any other suitable angle; and consists in so connecting the said tubes, by means of suitable caps, as fully described hereafter, as to form walls inclosing the tubes, insure a rapid and unimpeded circulation, and permit a free expansion and contraction of the tubes without leakage or strain of any of the parts. My invention further consists of improvements, fully described hereafter, for facilitating the connecting or detaching of the parts of the generator.

In the accompanying drawing, Figure 1 is a vertical section through the middle of the generator; Fig. 2, a front elevation of the boiler; Fig. 3, a plan view, the upper portion of the boiler being removed; Figs. 4, 5, 6, and 7 are detailed views of the caps.

As I have above explained this generator is composed of series or ranks of tubes, *a*, arranged horizontally, or with any slight inclination, to permit the easy evacuation of the steam. These ranks cross each other at right angles, or at any other angle, and the ends of the tubes *a* open into the hollow caps *b*, which are collected together and form communication between the tubes. Each cap is provided with a screw-plug, *v*, which may be unscrewed, at will, to clean the interior tubes, and with a division, *e*, which serves to separate, as much as possible, the steam from the water. The generator is completed by two large pipes, A and B, situated one above the other, below the tubular series. The lower pipe, A, which serves as a feed-reservoir, is bent at right angles and extends around two sides of the generator, as shown in Fig. 3, and the caps *b* of the two first ranks of tubes *a* are arranged together over the pipe and form a communication between the latter and the said tubes. The upper pipe, B, serves as a steam-reservoir, and communicates by the caps *b* with the upper rank of tubes *a*, and also with the pipe A by the two tubes E E. The collection of tubes *a* with the hollow caps *b*, and the collection of caps themselves, are shown in detail—Figs. 4, 5, 6, and 7. The caps may be of brass, or of cast or malleable iron, and the tubes *a* are screwed into the same, either as indicated in Fig. 4, where the tube has an exterior thread, or as shown in Fig. 5, where the tube has an interior thread, and is furnished outside with a metallic ring, *c*, driven into the annular space in the cap. The caps are arranged in relation to each other and secured together, as shown in Figs. 6 and 7, by means of bolts *d*, adapted to notches in the flanges of the said caps, and the joint is rendered hermetic by inserting washers of caoutchouc or soft metal into recesses formed for their reception at each joint. These washers are, by the screwing of the bolts, compressed sufficiently to make a perfectly tight joint, and they are of such height or thickness as to leave to the tubes the capacity of expanding and contracting without injuring either the tubes or the joints. The caps *b* and pipes E establish a direct communication between all the tubes *a* and the reservoirs A and B; there is, consequently, a thorough circulation of the liquid contained in the generator—a condition most favorable to rapid and economical evaporation. When water, greatly charged with lime, is used, the deposits naturally take place in the feed-reservoir A; the latter, therefore, is made of sufficiently large diameter to receive such deposits. The tube A is perfectly independent and free in the movements, caused by expansion and contraction, to which it is exposed by variations of temperature; these movements are transferred by an imperceptible gliding upon the washers forming the joints between the said tube and the caps *b*. The caps being independent of each other, and the fastening devices being readily accessible, any particular tube or rank of tubes damaged, or stopped by deposit, may be extracted without serious loss of time. The bolts for connecting the caps, fitting notches instead of passing through openings as usual, can be inserted or removed without removing the nuts and washers, thus greatly facilitating the connecting or detaching of the parts of the generator.

I claim as my invention—

1. A steam-generator consisting of two series of tubes crossing each other, and commu-

nicating at their opposite ends with independent caps or boxes, which form walls completely inclosing said tubes.

2. The combination of the said two series of tubes *a a* and caps *b*, communicating with each other so as to connect each vertical, or nearly vertical, row of parallel tubes.

3. The combination of the two series of cross-tubes *a*, communicating boxes *b*, steam-drum B, and water-drum A, substantially as described.

4. The combination in a sectional boiler of adjacent boxes or caps *b*, having coinciding recesses, and rings or washers of caoutchouc or its equivalent inserted in said recesses and bearing against each other between the caps, substantially as described.

5. The caps *b* of a sectional boiler, having flanges notched and connected by bolts extending through said notches, substantially as specified.

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

JOSEPH ALEXANDRE WESTERMAN.

Witnesses:

EMILE RICHARD,

EDMOND THIBAULT, JR.