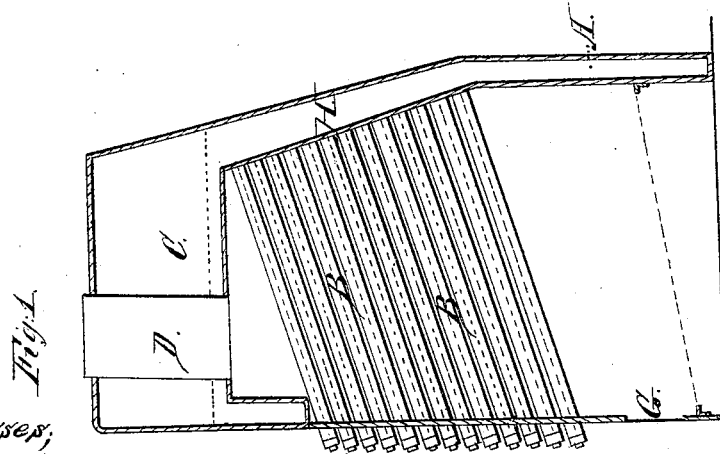
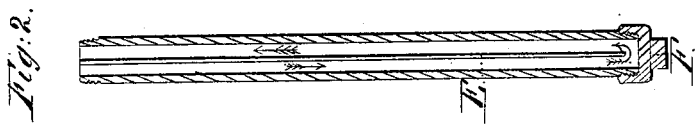
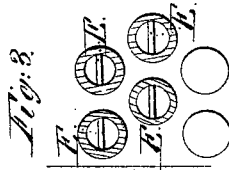


*H. C. Sergeant,*  
*Steam-Boiler Fire-Tube.*  
*N<sup>o</sup> 53,493.                      Patented Mar. 27, 1866.*



*Witnesses,*  
*Sam. Curtis,*  
*J. M. Carl.*

*Inventor,*  
*Henry C. Sergeant.*

# UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF NEW YORK, N. Y.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 53,493, dated March 27, 1866.

*To all whom it may concern:*

Be it known that I, HENRY C. SERGEANT, of the city and State of New York, have invented a new and Improved Mode of Constructing Steam-Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of the invention is the arrangement of the tubes in the boiler and the mode of constructing the tubes to be used so as to allow free circulation through the tubes; also, so arranged that they can be cleaned from the outside of the boiler by taking off the plug or cap at the outer ends of tubes, and, if found necessary, a new one replaced by merely unscrewing and screwing them into the flue-sheet.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure 1 is intended to represent a vertical cross-section of my boiler, showing the back water-leg, steam-dome, fire-flue, and the position the tubes are set. Fig. 2 represents a section of one of the tubes, showing the screw at each end and the cap or plug on one end. Fig. 3 shows a cross-section of several tubes, with the position of the partition inside of the tubes, and the way they are set in the flue-sheet, so as to cause the greatest amount of heat to act on the lower half of the tubes below the partition.

Letter A is intended to represent the water-leg, which, in a boiler for manufacturing purposes, (used as a stationary boiler,) need not be used only on one side, the other sides being constructed of brick.

B B represent the nest of tubes with one end screwed into the flue-sheet, (shown at H,) the other ends passing out through the opposite side through a plate of iron with holes

through it to correspond with the tubes used. On this end of the tubes is screwed a cap or plug, (shown in Fig. 2 at F.)

Letter D represents the fire-flue passing out through the steam-dome, (shown at C.) Through this fire-flue passes the offal from combustion after it has passed through the nest of tubes.

Letter E represents the partition through the tubes. At the outer end it is about one-half inch shorter than the tube, so as to allow the water to pass, as shown by the arrows in in Fig. 2.

The operations: After the water is pumped up in the boiler, through the water-leg A, to the desired level, (shown by the dotted line,) the fire is started. As the flame and heat pass up they act with the greatest intensity upon the lower half of the tubes, which causes the water in that half to become heated first; consequently it passes out into the water-leg, and that which was in the upper half passes down into the lower half, and the upper half is supplied from the water-leg, and so continues the circulation through each tube. One or more fire-flues can be arranged to carry off the smoke, &c.

What I claim, and desire to secure by Letters Patent, is—

1. A tube with a partition in it, when so arranged that the fire will operate with the greatest intensity on one side of the tube, so as to cause a circulation of the water in opposite directions in the tube.

2. The combinations and arrangement of the above-described tubes, with the inclined water-leg and plate for holding the outer ends of tubes in position, substantially as shown and described.

Witnesses:

HENRY C. SERGEANT.

JNO. EARL,

JOHN CURTIS.