E. H. GRAHAM.

SECTIONAL STEAM BOILERS.

No. 190,966. Patented May 22, 1877.

Fig. 1.

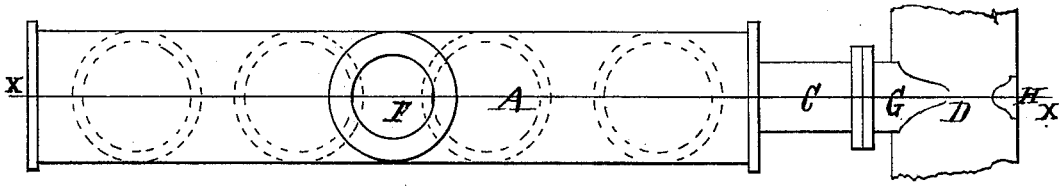


Fig. 2.

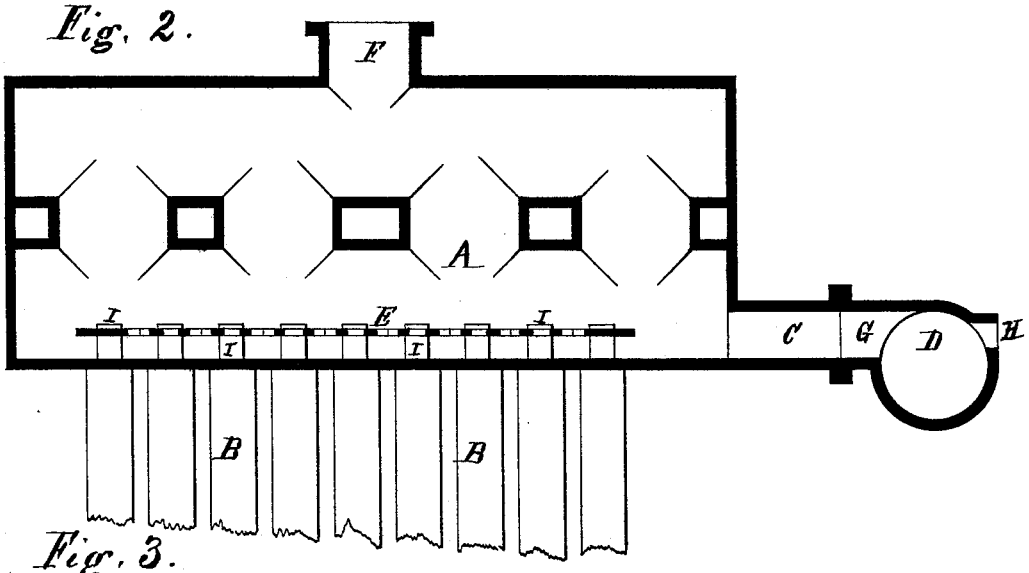
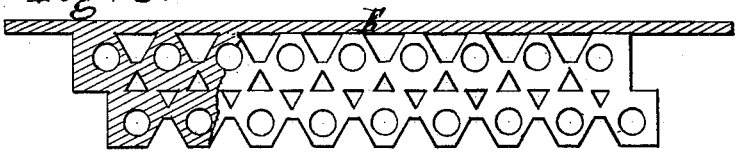


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD H. GRAHAM, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SECTIONAL STEAM-BOILERS.

Specification forming part of Letters Patent No. **190,966**, dated May 22, 1877; application filed April 6, 1877.

To all whom it may concern:

Be it known that I, EDWARD H. GRAHAM, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Boilers; and I do hereby declare the following to be a full, clear, and exact description thereof, such as will enable any one skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of my improvement. Fig. 2 is a longitudinal sectional elevation on line X X; and Fig. 3 is a plan, partly in section, of my improved form of baffle-plate, detached and shown separate.

My invention relates to that form of sectional steam-boilers which are constructed of separate tanks, placed side by side across the top of, and resting upon, the walls of a furnace, depending into which are a number of tubes, screwed by their upper ends into the bottom of the tank, and their lower ends closed by a cap, which also supports an inner tube, for purposes of circulation, which extends from a short distance above the bottom of the cap, up through a baffle-plate placed a short distance above and parallel to the bottom of the tank, and cast thereto. These tanks or sections are attached to a common feed-pipe and a common steam drum; and my invention consists in certain construction of the tank or section, whereby the separation of the steam from the water is facilitated, the deposit of sediment outside the tank secured, ready means for its easy removal provided, and the equalization of water-level in the several tanks maintained, at the same time reducing the number of parts, and lessening the cost of construction and repairs, as hereinafter more fully set forth.

Referring to the accompanying drawings, A is the tank or section. B B are the outer tubes. C is the extension of the tank, forming a nozzle connecting with the feed-pipe D. E is the baffle-plate; F, the outlet connecting with the steam-drum. G is the mouth placed upon the upper part of the feed-pipe. H is the opening in feed-pipe opposite the mouth G, for the admission of cleaning-tools; and I I are the inner or circulating tubes.

I shall now proceed to describe the operation of my invention: The parts of the boiler being in place and filled with water and heat applied, circulation ensues by the rising of the contents of the annular space between the outer and inner tubes, which ascend to and pass through the apertures in the baffle-plate not occupied by the inner tubes, and thus reach the top of the water-level, where the steam separates and goes off to the steam-drum, and water descends through the inner tube to the cap on the bottom of the outer tubes, thus establishing a complete circulation. The constant agitation of the contents of the tank or section has the effect of precipitating any sediment or foreign substance to the front of the tank, where there is no agitating influences, and by means of the large nozzle the sediment finds its way to the feed-pipe, where it subsides to the bottom. The action of the currents through these nozzles, caused by the equalization of the water-level in the tanks and the formation of the mouth on the feed-pipe, is such as to retain it and enable only the freshest and cleanest water to pass into the tanks from the feed-pipe. These equalizing-currents are very gentle, by reason of the large area of the nozzle which I attain by casting the baffle-plate within and to the tank, forming one piece. The introduction of this baffle-plate, when cast separate and apart from the tank, has hitherto been a barrier to the attachment of large feed-nozzles, and recourse has been had to return bends, whose tortuous channels afford little chance for the escape of sediment to the feed-pipe, and have been quick to choke up and most difficult to clean out, the equalization of the water-level having been provided for by separate and additional pipes and attachments; and where the baffle-plate has been made in one piece with the tank it has hitherto been made a solid plate, excepting where perforated for the admission of the inner tubes, which compelled the current rising from the tubes to traverse the length of the plate to either end before it could ascend to the upper part of the tank, the presence of the numerous in-

ner tubes in this space under the plate operating to greatly retard the traversing currents, all of which I avoid by the peculiar shape given the openings in the baffle-plates, which enables it to be cast as readily as a solid plate in one piece with the tank, thereby strengthening the tank and more securely holding the inner tubes in their places. The placing of the mouth G on the feed-pipe D so that the lower line of the mouths is elevated some distance above the lower line of the feed-pipe provides a settling chamber or recess in which the sediment can be deposited, whence, if not blown off through the blow-off cock, it can be removed by displacing the head on the end of the feed-pipe, and if it is desirable to introduce tools for scraping the interior surface of the mouth G or nozzle C, the opening H affords a convenient means of so doing.

I am aware that sectional boilers formed of tanks and tubes are not new, and that they have been made with perforated plates, not cast in one piece with the tank, but separate therefrom, and also that there have been small pipes screwed into one corner of one end of the tank, through which to admit the feed-water, all of which I distinctly disclaim; but

What I do claim as my invention, and desire to secure as such by Letters Patent, is—

The improved sectional boiler-tank, having the baffle-plate cast thereto and in one piece, said plate being provided with openings E, in combination with tube B and the bottom plate, and the extension or nozzle C and pipe D, constructed and arranged substantially in the manner and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 29th day of March, A. D. 1877.

E. H. GRAHAM. [L. S.]

Witnesses:

FRANK F. THOMPSON,

J. DANIEL EBY.