No. 676,033. Patented June 11, 1901.

S. ELLIOTT.

STEAM BOILER.

(Application filed Aug. 8, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

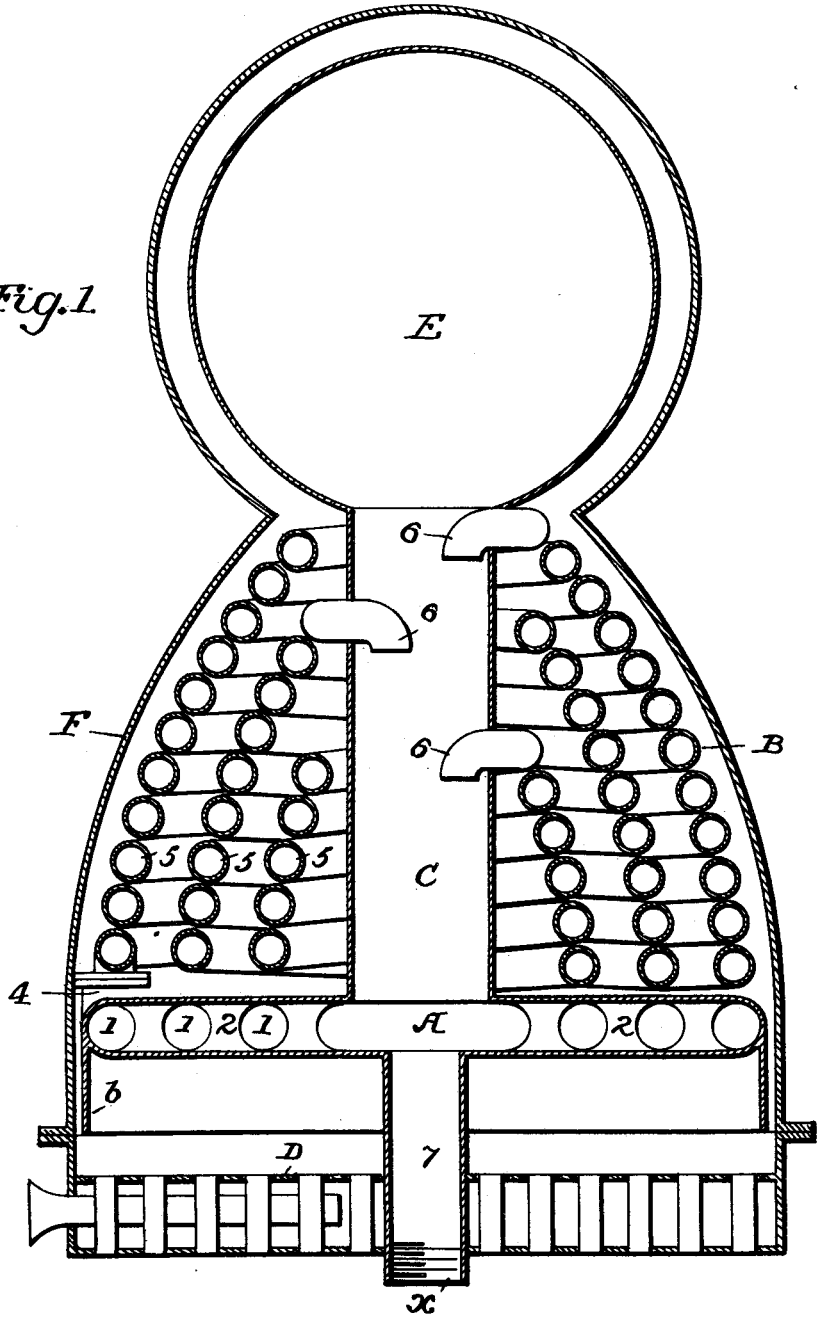

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Fig. 2.

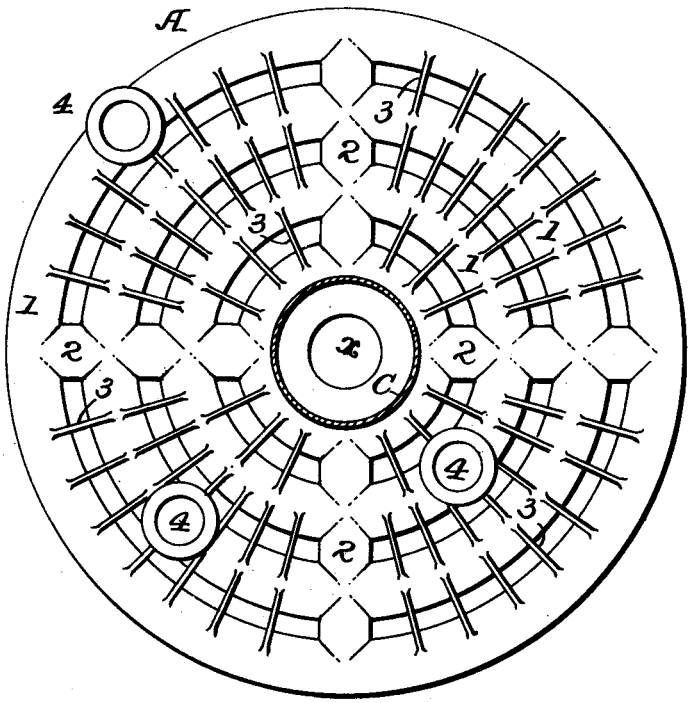


Fig. 3.

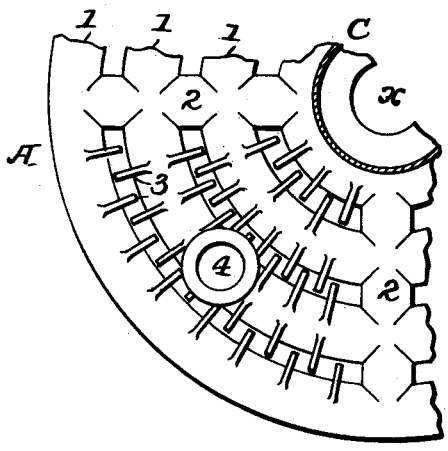
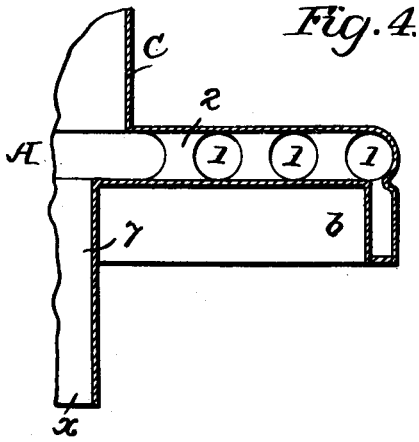


Fig. 4.



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UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF BOSTON, MASSACHUSETTS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 676,033, dated June 11, 1901.

Application filed August 8, 1900. Serial No. 26,291. (No model.)

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to certain improvements in steam-generators; and it consists in constructing and assembling the members thereof, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of a steam-generator embodying my improvement; Fig. 2, a plan view of the lower member thereof; Fig. 3, a partial plan illustrating a modification, and Fig. 4 a section showing another modification.

The boiler consists of different members A, B, and C. The member A is the lowest member, arranged above the burner D, of any suitable construction, and, as shown, the member A consists of a series of continuous tubes 1 1 1, of any desired number, preferably parallel and in the same plane, and shown as annular, these tubes being radially connected by branches 2 2 at any desired number of points, and the outer tube 1 is provided with a depending flange *b*, which serves to retain the heat from the burner, as well as to deflect the flames which impinge against it and direct them inward around the outer tube 1. This flange *b* may either be solid or hollow, forming a water-leg and facilitating the heating of the contents of the generator, as shown in Fig. 4.

In order to convey to a greater extent the heat from the burning gases which pass upward from the burner to the tubes 1, the latter are provided with radial wings 3, which may extend between and connect the tubes, as shown in Fig. 2, or may extend from opposite tubes without connecting the same, as shown in Fig. 3. The heated gases, which would otherwise pass up through the spaces between the tubes and merely radiate their heat, are thus brought into direct contact with portions of the tubes, which are thereby directly heated, and greatly increase the heating effect upon the contents.

The member A is preferably of cast metal—for instance, of bronze of sufficient tensile strength—and can thus be much more cheaply manufactured than when made of wrought metal, although this method of manufacture may be adopted. By the construction shown, whether of cast or wrought metal, the products of combustion are brought into very intimate contact with extended heating surfaces in tubes containing water in comparatively small volumes, so that a very rapid generation of steam is effected.

In order that the steam may escape immediately as formed in the different portions of the member A, the tubes 1 are provided with necks 4, arranged at any suitable number of points for connection with the member B. This member B consists of circulating-pipes, preferably in the form of coils, and, as shown, there is a coil 5 to each of the tubes 1, and the coils are arranged conically one within the other, so that the steam generated in each tube 1 can pass at once upward through the water in the coil connected therewith and escape to the central tubular member C, with which the different coils communicate at different points, as shown.

The water in the coils 5 is subjected to the direct action of the products of combustion and flows readily through the coils upward, together with the steam generated in the lower member as well as in the coils themselves, and passes into the central member C, from which the steam escapes upward and is preferably accumulated in a steam-dome E, connected with the upper end of the member C.

While the steam should pass upward to the dome, it is desirable in order to prevent foaming and to secure better circulation that the water-currents should pass downward to the bottom end of the member C, which communicates with the member A. Each coil 5, therefore, terminates in or communicates with a nozzle 6 within the member C, which nozzle is bent downward and projects the current of water downward in the member C, from the bottom of which it flows outward toward the necks 4. By this means a very rapid and effective circulation is insured. The water tends to flow back to the member

A rather than to foam in the dome, and the steam is discharged as rapidly as it is formed and flows upward into the dome.

The supply of water may be admitted at any desired point, but preferably is admitted through a port x in a branch 7, extending downward from or constituting the lower end of the member C, so that it will be carried into the member A by the circulation and moved outward and upward through the heated members.

All of the parts described are arranged within the fire-box F, which consists of a shell approximating the outline of the member B and the dome a short distance from the exterior thereof to provide an intervening space for the upward flow of the products of combustion to the outlet, while maintaining the latter in contact with the surfaces of the members and especially with the dome, thereby securing to a certain extent a superheating effect where the steam is above the surface of the water.

It will be evident that the arrangement of members C and B may be adopted in connection with the member A, differently constructed from what is herein shown, and that where the steam-dome is not required it may be dispensed with.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. A steam-generator having a bottom section consisting of a series of concentric annular tubes communicating at points radially in line with a central inlet and upper outlets, substantially as set forth.

2. A steam-generator having a bottom section consisting of a series of concentric annular tubes communicating at points radially in line with a central tube communicating radially with said annular tubes and extending above the same, and circulating-pipes extending from said annular tubes to the central tube, substantially as set forth.

3. A steam-generator having a bottom section consisting of a series of concentric annular tubes communicating at different points radially in line with a central tube communicating radially with said annular tubes and extending above the same, and circulating-pipes in the form of coils gradually tapering and extending from said annular tubes to the central tube at different points in the height thereof, substantially as set forth.

4. A steam-generator having a bottom section consisting of a series of annular tubes radially communicating at different points, with a central tube communicating radially with said annular tubes and extending above the same, and circulating-pipes extending from said annular tubes to the central tube and bent downward within the central tube, substantially as set forth.

5. The combination of the bottom section and central tube of a steam-generator, and tubular connections extending from the bottom section to the central tube with downwardly-projecting nozzles in said tube, substantially as set forth.

6. The combination in a steam-generator, of a bottom section, central tube, intermediate circulating-pipes communicating with the top of the bottom section and with the central tube, and dome above the central tube, substantially as set forth.

7. The combination in a steam-generator, of a bottom section consisting of a series of concentric tubes, central tube, intermediate circulating-pipes communicating with the bottom section and with said tube, and dome above the central tube, all arranged within the fire-box, substantially as set forth.

8. The combination in a steam-generator, of a bottom section, central tube connected therewith, coiled pipes connecting the top of the bottom section and central tube, and a burner under the bottom section, substantially as set forth.

9. The combination in a steam-generator, of a bottom section, central tube, and plurality of circulating-coils one within the other communicating with the top of the bottom section and central tube at different elevations, substantially as set forth.

10. The combination in the bottom section of a boiler, of series of tubular parts arranged substantially on the same level, and a flange, b, dependent from the outer of said parts, substantially as described.

11. The combination in the bottom section of a boiler, of series of tubular parts arranged substantially on the same level, and a hollow flange b dependent from the outer of said parts, substantially as described.

12. A steam-generator having one or more sections, consisting of a series of concentric annular tubes communicating at points radially in line with a central inlet subtantially as set forth.

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

STERLING ELLIOTT.

Witnesses:
WALTER E. LOMBARD,
HENRY S. DIX.