(No Model.) 2 Sheets—Sheet 1.

C. C. MULFORD.

STEAM GENERATOR.

No. 396,105. Patented Jan. 15, 1889.

Fig. 1

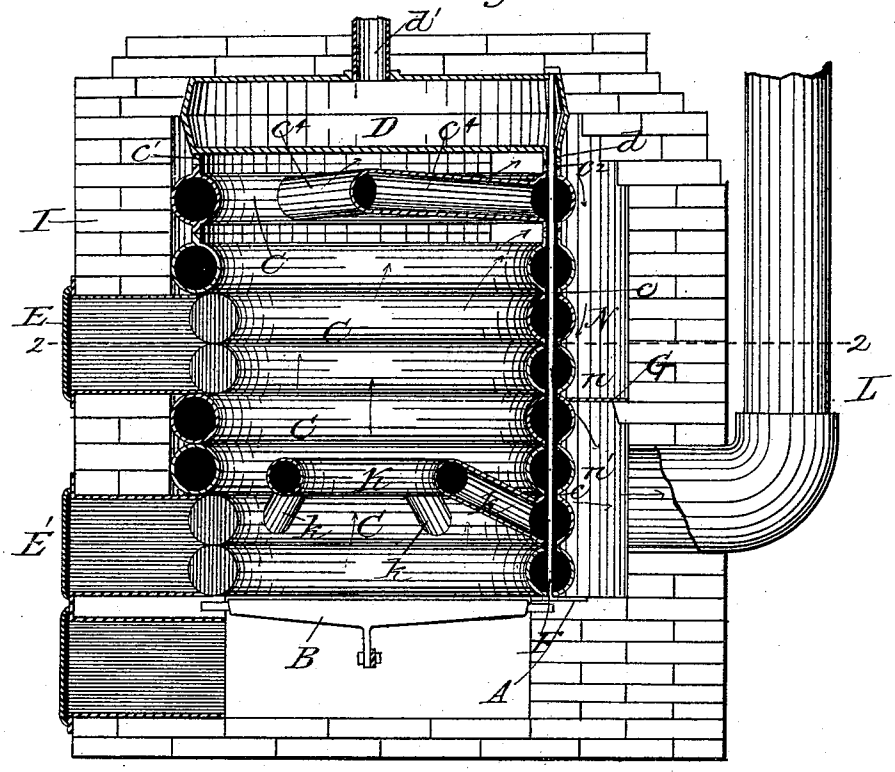


Fig. 5

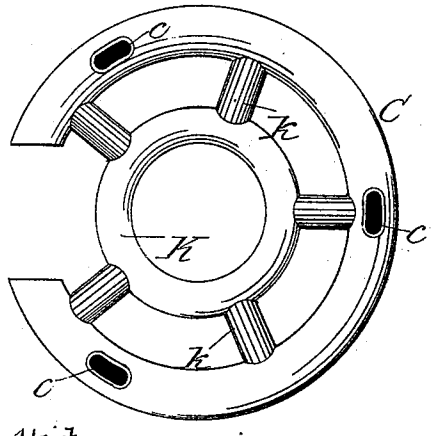
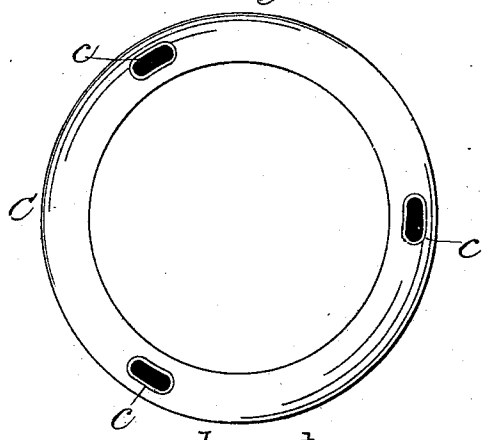


Fig. 6.



Witnesses:
E. L. Thurston
Wm. F. Dixon

Inventor:
Clarence C. Mulford
by Hill & Dixon
his attorneys.

(No Model.) 2 Sheets—Sheet 2.

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STEAM GENERATOR.

No. 396,105. Patented Jan. 15, 1889.

Fig. 2.

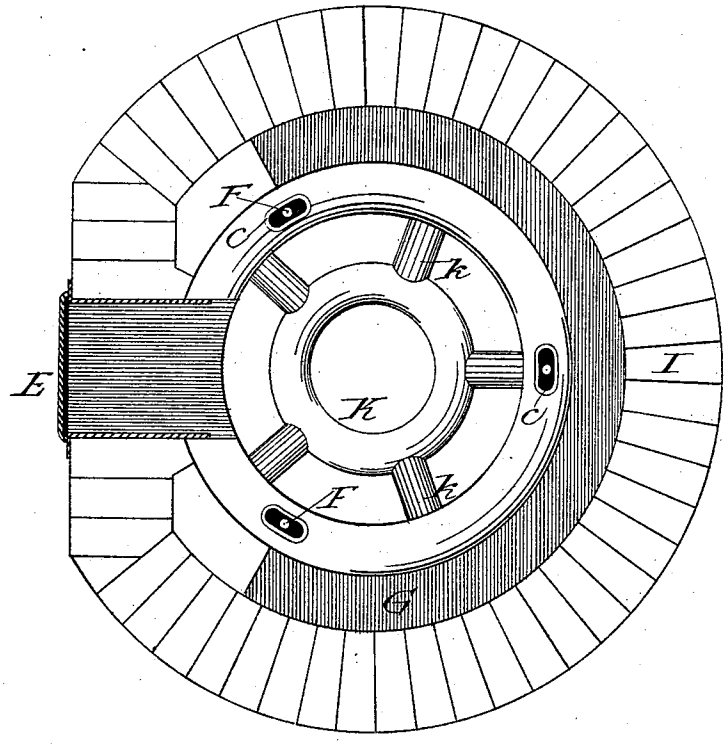


Fig. 4.

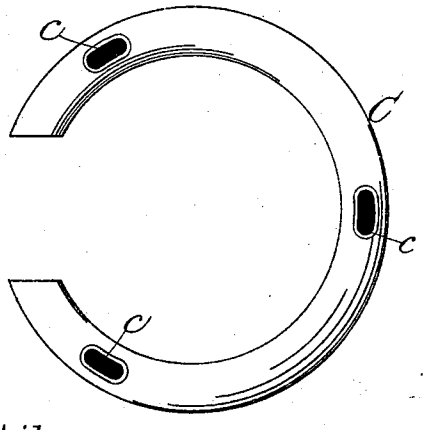
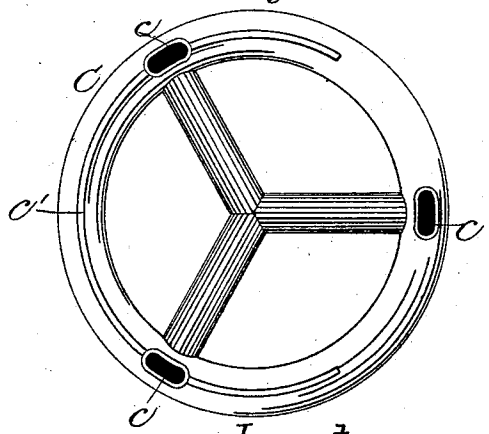


Fig. 3.



Witnesses:
E. L. Thurston
W. J. Peyton

Inventor
Clarence C. Mulford
by Hill & Dixon
his attorneys

UNITED STATES PATENT OFFICE.

CLARENCE C. MULFORD, OF STREATOR, ILLINOIS.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 396,105, dated January 15, 1889.

Application filed August 15, 1887. Serial No. 247,007. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE C. MULFORD, of Streator, in La Salle county and State of Illinois, have invented certain new and useful Improvements in Steam-Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical sectional view through the front and back of my invention. Fig. 2 is a horizontal sectional view on the line 2 2 in Fig. 1. Figs. 3, 4, 5, and 6 are views of boiler-sections in the different forms used in constructing my device in its preferable form.

My invention relates to steam-boilers of the class known as "tubular" or "sectional" boilers.

The object is to simplify and cheapen steam-generators in which this form of boiler is used, to increase their effectiveness, and to adapt them to be used advantageously with bituminous coal as fuel.

To these ends the invention consists in the construction and combination of parts herein described, and pointed out particularly in the claims.

In the drawings, A represents the base upon which the boiler rests and in which the grate B is hung.

C represents hollow ring-shaped boiler-sections, preferably made of cast-iron. They are arranged horizontally one above the other in such a manner that free circulation from one ring to another is permitted through the orifices *c*. Some of the sections are not complete rings, the front part being omitted, as shown in Fig. 4, to permit access to the inclosed space through the doors E E′. The sections are secured together by the vertical bolts F, which extend from the top to the bottom of the boiler through the orifices *c*. Two or three of the upper sections are provided at their proximate points with the vertical flanges *c*′, which extend about two-thirds of the distance around said sections, being absent at the rear side thereof, as shown in Figs. 1 and 3. By this means slots c^2 are formed between adjacent rings at the top rear side of the boiler.

D represents a dome, which is placed upon the upper section C, and thus the space J within the rings is completely inclosed except for the slots c^2. The dome is preferably hollow, and connects with the upper boiler-section through orifices *d*. The pipe *d*′, leading from the dome, is that through which the steam is conveyed from the boiler.

It will be noticed that with the construction above described the fire-pot is formed by the boiler sections or rings themselves, thus rendering a distinct and separate fire-pot unnecessary. It will be further noticed that the space, J, inclosed by the boiler-sections and the dome forms a combustion-chamber as well as the upward or direct draft flue, and that by this arrangement the heat from the fire is led upward in contact with the boiler-walls until it escapes through the slots c^2.

Outside of and surrounding the boiler is a jacket, I, preferably of brick-work, and built so as to inclose a space, N, between it and the boiler, as shown. This space acts as a diving-flue, and it is divided into an upper and lower flue, *n* and *n*′, respectively, by the horizontal partition G, which extends about two-thirds around the boiler and rests upon the brick-work, as shown. The communication between the upper and lower flues, *n* and *n*′, is at the front of the boiler, as shown most plainly in Fig. 2.

L represents the smoke-pipe, which leads from the flue *n*′ at the rear side of the boiler.

The section or ring C, which lies near the grate B, is provided with a supplemental ring, K, connected with it through the pipes *k*. This ring K is so placed that it lies substantially in contact with the fire, and is of great service in generating steam, inasmuch as it offers considerable heating-surface at a point where the heat is most intense. The upper section or ring C is also provided with arms c^4, which meet near the center of said ring, and additional heating-surface is afforded by these arms at a point where the heat, deflected by the dome D, will come in contact with said arms on all sides.

The operation of the device is as follows: The heat from the fire on the grate passes upward within the space J to the top thereof. It is deflected by the dome, and, after having come in contact with all the boiler-surface exposed on the inside of the rings C, passes out through the slots c^2 into the diving-flue *n*,

Here the heat is drawn downward and around the boiler on both sides thereof to the front, where it passes the partition G into the lower flue, *n'*. It then passes downward and around to the smoke-pipe. In its course the heat has thus come in contact with the entire exposed surface of the boiler both on the outside and inside of the ring-sections, and its full effect to produce steam has been utilized. It has not been obliged to pass through any small inclosed flues which could become choked by the products of combustion, and the device is therefore especially adapted to burn soft coal.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A steam-boiler composed of connected tubular water-rings, combined together substantially as described, whereby the space inclosed within said rings serves as a fire-box, combustion-chamber, and direct-draft flue, a portion of said rings being incomplete circles, forming an aperture or apertures opening directly into the fire-box, whereby direct access to the fire is afforded through a door, substantially as described.

2. The combination of a series of connected horizontally-arranged water-rings with a suitable dome, and flanges with openings between two or more of said rings, substantially as and for the purpose specified.

3. In a steam-generator, a boiler composed of horizontal water-rings, the upper two or three of which rings have vertical flanges at their meeting-points, which flanges are cut away at the rear of said boiler, substantially as and for the purpose specified.

4. The combination of a boiler composed of horizontal water-rings secured together substantially as specified, whereby a direct-draft flue is formed within said rings, and a dome placed upon said rings, with a jacket surrounding said boiler and inclosing a space which serves as a diving-flue, a horizontal partition dividing said diving-flue into an upper and lower flue, connections between said direct flue and diving-flue at the back of the boiler, connections between the upper and lower diving-flues at the front of the boiler, and the smoke-pipe at the back of the boiler, substantially as specified.

CLARENCE C. MULFORD.

Witnesses:
HARRY W. LUKINS,
R. G. COE.