

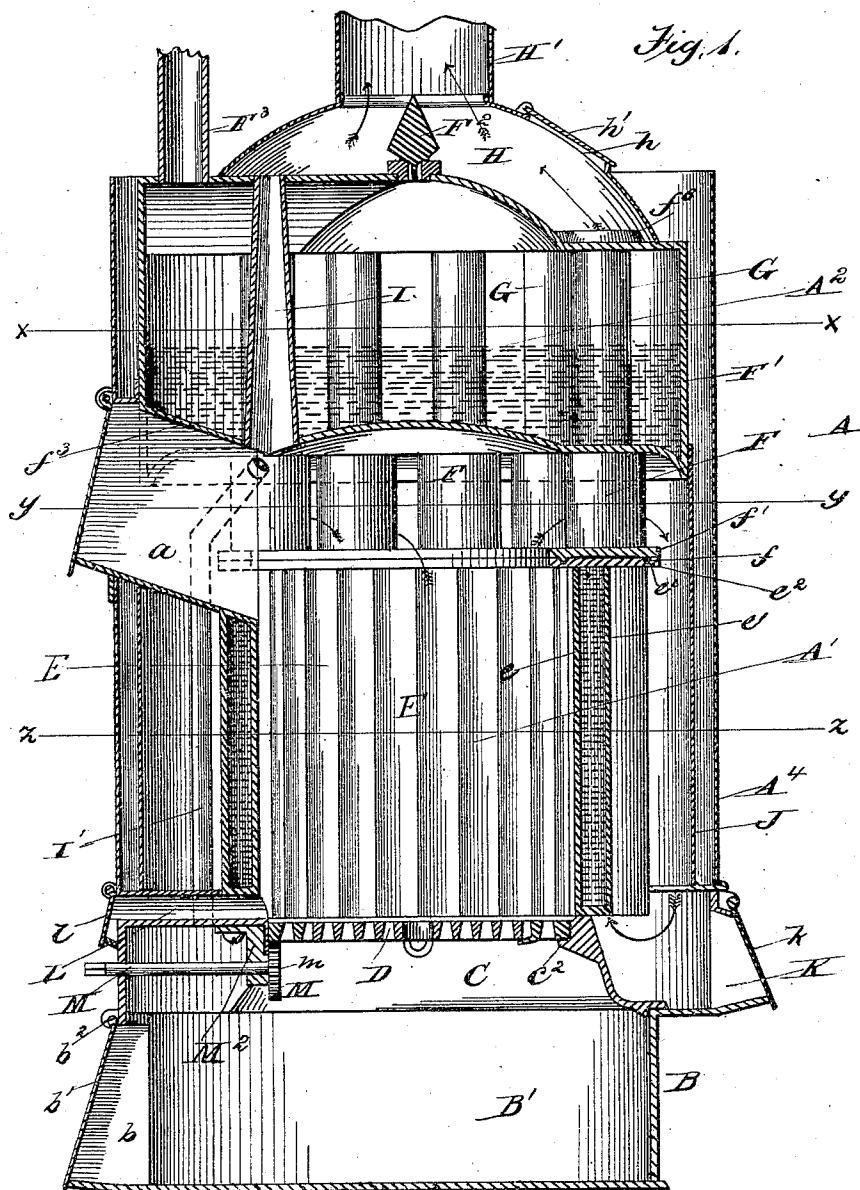
(No Model.)

3 Sheets—Sheet 1.

W. H. PAGE.
STEAM GENERATOR.

No. 312,652.

Patented Feb. 24, 1885.



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N. L. Bernhard.

Inventor:
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(No Model.)

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Fig. 2.

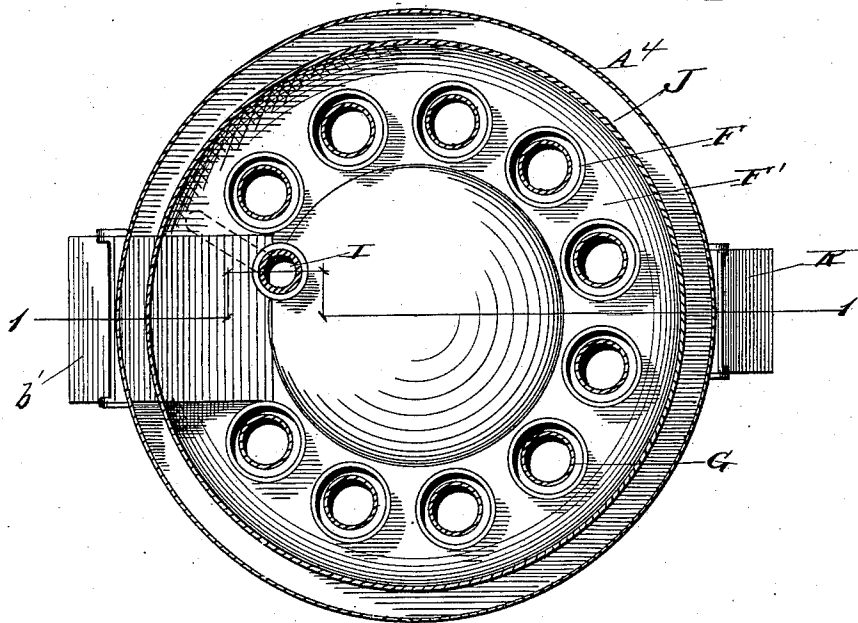
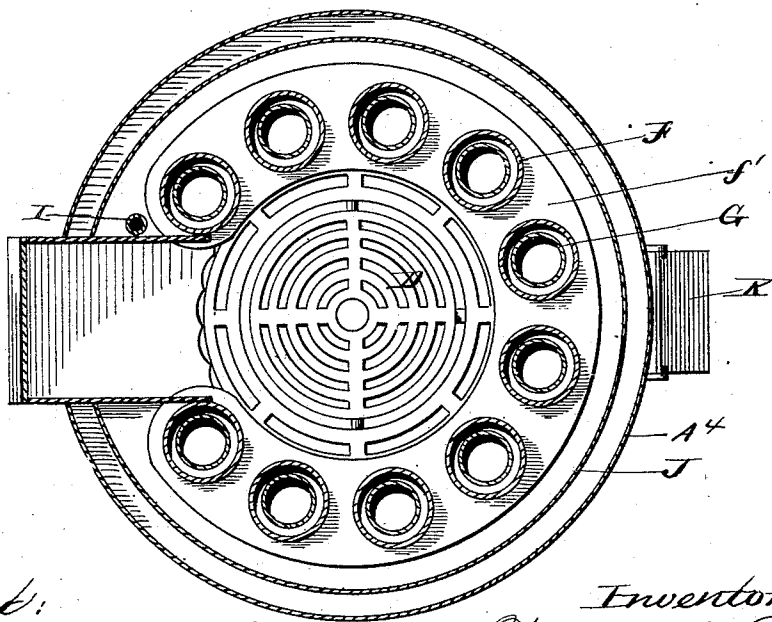


Fig. 3.



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Fig 4

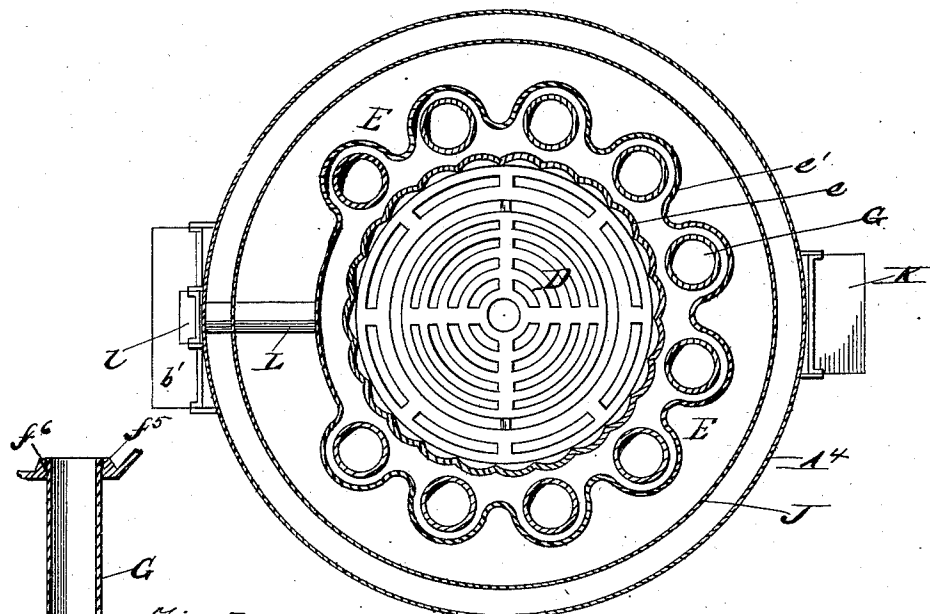


Fig. 5.

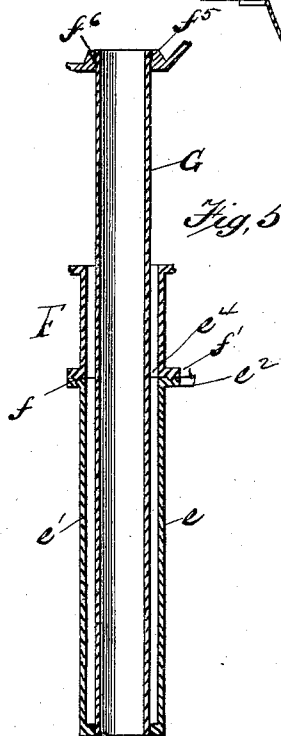
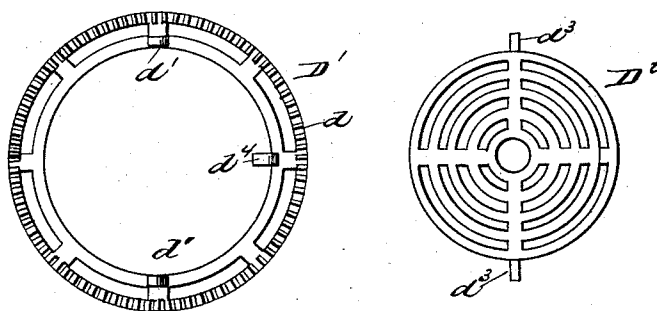


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM H. PAGE, OF NORWICH, CONNECTICUT.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 312,652, dated February 24, 1885.

Application filed May 9, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. PAGE, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Steam-Generators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to steam-generators designed for use in heating buildings; and it consists in certain new and useful improvements, substantially as hereinafter described, and pointed out in the claims.

In the drawings which form a part of this specification, and in which like letters of reference indicate like parts in the several drawings, Figure 1 is a vertical section through my improved generator on the line 1 1 of Fig. 2. Fig. 2 is a transverse section taken on the line *x x* of Fig. 1. Fig. 3 is a transverse section taken on the line *y y* of Fig. 1. Fig. 4 is a similar section on the line *z z* of Fig. 1. Fig. 5 is a detached detail view of the pipe. Fig. 6 is a bottom plan view of the grate detached.

Referring to the drawings, A designates the generator, consisting of the lower part, A', containing the fire-box, grate, and ash-pit, and the upper part, A², containing the boiler proper, said parts A' A² being joined together, as hereinafter described, and inclosed within a jacket, A⁴.

The parts named have the following-described construction, to wit:

B designates a casting which forms the base of the heater, and is provided with an opening, *b*, in the forward side thereof, for the removal of ashes, &c., from the ash-pit B', and is closed by a flap or door, *b'*, hinged at its upper edge to lugs *b²*, projecting from the top of the casting B.

C designates a casting, the lower surface of which bears or rests upon the top of the casting B, while its upper edge is provided with

an internal flange or ledge, upon which rests and rotates the double-acting grate D, as hereinafter described.

E designates a hollow tubular casting, the inner scalloped surface, *e*, of which forms the side walls of the fire-pot, the outer walls, *e'*, being corrugated, as shown.

e² designates a plate cast with E upon the top thereof, and is provided upon its upper surface, near its edges, with V-shaped grooves *e³*, for the reception of V-shaped flanges *f*, formed upon the lower surface of a plate, *f'*, cast upon the lower ends of a series of tubes, F, extending downward from the boiler F'. The tubes F are open at each end, and register at their lower ends with apertures *e⁴*, formed in the plate *e²*. (See Fig. 5.) The lower surface of the boiler F' is concavo convex in form, and serves as a crown-sheet, which is provided with an upward depression, *f³*, which forms part of the opening *a*, through which fuel is introduced into the fire-box. The top of the boiler F' is dome-shaped at its middle, and is provided at its center with a safety-valve, F², and at one side with a pipe, F³, whereby steam is conveyed from the generator to the heaters above. Said top is level between the dome and the outer edges of the boiler, at which point it is provided with a series of apertures, *f*, corresponding in number and being immediately above the pipes F. The apertures *f³* are surrounded upon the upper surface of the boiler-top with flanges *f⁶*.

G G designate tubes extending from the top of the boiler F' to and opening through the lower end of the casting E. As will be seen, the tubes G extend down through the tubes F through apertures *e⁴* in the plate *e²* of the casting E and between the side walls of said casting. Said tubes serve to hold the upper and lower sections of the generator together, as will be described farther on.

H designates a dome or cap placed upon the top of the boiler F', outside of the pipes G, into which the products of combustion are discharged, and thence conducted by a pipe, H', or otherwise, to the open air.

h designates an opening formed in the cap

H, and which is closed by a hinged flap, *h'*, said flap operating as a safety-valve in case of an explosion of gas in the generator.

I designates a pipe extending through the boiler from bottom to top thereof, and opening into the fire-box and cap H, respectively. This pipe is cone-shaped, as shown, and is for the purpose of conveying gas directly from the fire-box to the cap.

I' designates a pipe extending from the ash-pit to and opening into the lower end of the pipe I, whereby air may be mixed with the gas escaping from the fire-box, and thus cause it to burn while in the pipe.

J designates a jacket surrounding the casting E, said jacket extending from the boiler F' to the top of the base casting B within the exterior jacket, A⁴.

K designates a cleaning-aperture formed in the rear of the base-casting B, and is closed by a flap, *k*, when desired.

L designates an air-space extending from the outer surface of the jacket A⁴ to and opening into the fire-box at the upper surface of the grate, and is closed at its outer end by a flap, *l*. The tube L is to enable the grate to be cleaned of clinkers, &c.

It will be observed that the upper and lower portions of the generator are secured together by the pipes G without the use of bolts, said pipes being secured at the bottom and top ends to the casting E and boiler F', respectively, by rust-joints, thereby enabling the production of a generator that shall be simple in construction and more durable in practice than a similar article provided with securing-bolts.

I provide my generator with an improved double-acting grate, which I will now describe.

D designates the grate, composed of sections D' D², the outer one, D', being provided upon its lower surface with a series of gear-teeth, *d*, which rest upon a flange, *c*², formed upon the inner surface of the casting C. A portion of the flange *c* at the forward side of the generator is broken away, and through the space thus formed the teeth *m* of a gear-wheel, M, project to and engage with the teeth *d* upon the grate-section D'. The gear-wheel M is mounted upon the shaft M', journaled at its inner end in a hanger, M², and passing thence outward through the walls of the generator, its outer end being squared for the reception of a handle for rotating the wheel and the grate.

d' designate lugs projecting downward from the section D', for the reception of ears *d*³ upon the inner grate-section, D².

The ears *d*³ consist of short pieces applied to the grate after it is in position. The inner grate is kept in a normal level position by an ear, *d*⁴, projecting from the inner surface of the section D'.

The operation of my generator is as follows: Water being introduced through a suit-

able pipe into the boiler, fire is started in the fire-pot, the products of combustion passing over the top of the casting E, between the tubes F, and downward between the jacket J and the casting E, and thence upward through the pipes G to the pipe H'. It will be seen that by this described tortuous passage of the products I am enabled to utilize nearly the entire amount of heat produced by the fire.

I attach importance to the inclined flaps or doors at each and every aperture of the generator, such doors or flaps being kept closed by gravity solely, whereby in the event of an explosion of gas within the generator such doors will readily open and be again closed without danger from fire to surrounding objects or breakage to the generator.

Having thus described my preferred construction for carrying out my invention, I would have it understood that I am aware that changes therein can be made without departing from the principle or sacrificing the advantages thereof.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A steam-generator constructed substantially as described, consisting of the upper and lower sections or castings, held together by the smoke-conducting flues connected to said sections or castings by rust-joints, thereby dispensing with the use of bolts or rods, substantially as described, and for the purpose set forth.

2. In a steam-generator, a boiler constructed as described, having concavo-convex top and bottom, safety-valves, and a series of depending tubes, F, provided at their lower ends with a perforated plate, in combination with the hollow casting E, smoke-flues G, extending through the steam-dome, and grate D, substantially as described.

3. In a steam-generator, the combination of the hollow casting E, having scalloped inner side walls, corrugated outer side walls, and perforated top and bottom, said casting being surmounted by a boiler, F', having depending tubes F, with a series of tubes, G, that pass through said hollow casting and boiler and are held in position therein by rust-joints, substantially as described, and for the purpose set forth.

4. In a steam-generator, a boiler constructed substantially as described, having a concavo-convex top and bottom and a series of tubes depending therefrom, in combination with a tube passing through said boiler from bottom to top thereof, for the passage of gas, hollow scalloped and corrugated casting E, and grate D, substantially as described.

5. In a steam-boiler, the combination of the hollow casting E, having scalloped inner walls and corrugated outer walls surrounded by the boiler F', having concavo-convex top and bottom, pipe I, depending tubes F, and safety-valve, with an inclosing-jacket J and pipes G,

to conduct the products of combustion to the smoke-flue, substantially as described.

6. In a steam-generator, the combination of the hollow casting E, having scalloped inner
5 walls and corrugated outer walls, boiler F', having concavo-convex top and bottom, safety-valve, depending tubes F, pipe I, passing from top to bottom of said boiler and opening into the fire-box, and a smoke-cap, with an air-
10 pipe, I', extending from the ash-pit to and

opening into the pipe I, whereby air is mixed with escaping gas, causing it to ignite, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. PAGE.

Witnesses:

LUCIUS BROWN,
WM. W. HIGGINS.