No. 631,822. Patented Aug. 29, 1899.

E. L. RIGG.

STEAM GENERATING APPLIANCE.

(Application filed Oct. 18, 1898.)

(No Model.)

Fig. 1.

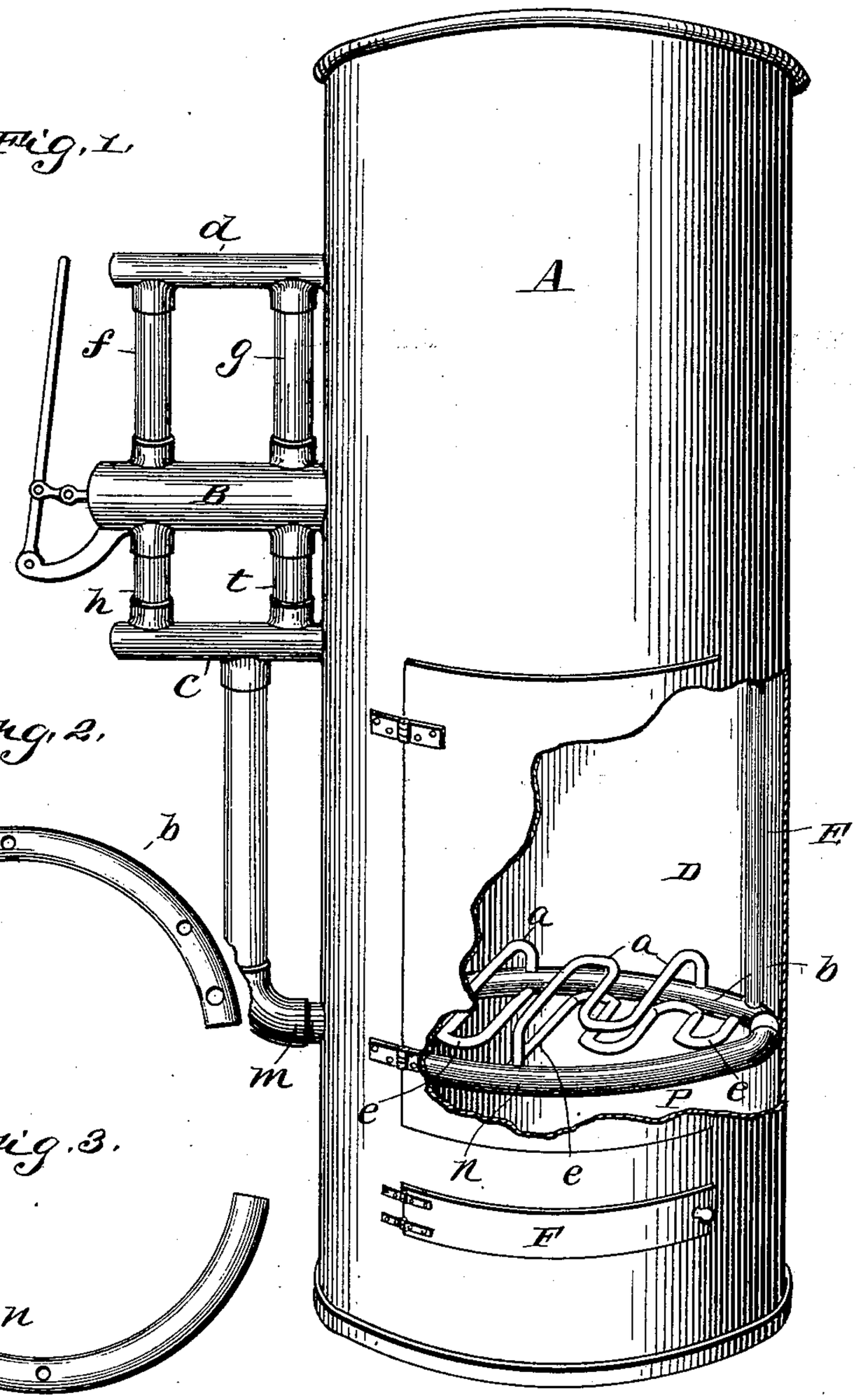

Fig. 2.

Fig. 3.

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STEAM-GENERATING APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 631,822, dated August 29, 1899.

Application filed October 18, 1898. Serial No. 693,881. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. RIGG, a citizen of the United States of America, residing at the town of Griswold, in the county of Cass and State of Iowa, have invented certain new and useful Improvements in Steam-Generating Appliances; 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 of reference marked thereon, which form a part of this specification.

My invention relates to those hollow-grate steam-generating appliances having hollow water-conductors in the fire-box connected to the grate and which are provided with a pump for drawing the water from the boiler and forcing it through the grate and water-conductors connected thereto back into the boiler, and which accelerates the generation of steam and at the same time produces a circulation of water through the grate, water-conductors, and boiler; and my object is to provide means which will more perfectly accomplish such purposes.

To this end my invention consists in the employment of hollow grate-bars of peculiar construction having hollow water-conductors in the fire-box connected thereto in combination with certain coöperating mechanism, all of which will be more fully described hereinafter and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a perspective view of an upright boiler and furnace having my improvements applied, a portion of the casing of the furnace being cut away to show the grate and water-conductors therein. Fig. 2 is a detailed top plan view of the rear end piece of the grate, and Fig. 3 is a similar view of the front end piece of the grate.

Similar letters refer to similar parts throughout the several views.

A is an upright boiler of ordinary construction.

The boiler A has arranged below it the furnace F, which may be constructed of a cylindrical form, as shown in the drawings, or of any other preferred form.

D is the fire-box of the furnace, and P is the grate, which is arranged therein, so that when the fire is built a draft-space will be left below. The grate P is composed of the hollow end pieces *n* and *b* and the hollow looped grate-bars *e*, the open front ends of which enter the front end piece *n*, and the rear open ends of the same enter the rear end piece *b*. One or more of these looped grate-bars can be employed; but if the fire-box is large several should be used.

a are hollow looped water-conductors located in the fire-box a few inches above the grate, the open front ends of which bend downward and enter the front end piece *n*, and the rear open ends of which bend downward and enter the rear end piece *b*. One or more of these hollow looped conductors can be employed; but if the fire-box is large several should be used. When the fire-box is cylindrical in form, the pieces *n* and *b* are constructed bent as shown in the drawings; but when the fire-box is constructed square the pieces *n* and *b* are constructed straight. The end pieces *n* and *b* are so constructed that the channels therein for the conveyance of water have a much larger diameter than those in the grate-bars and water-conductors *e*. I find from experience that it is necessary to so construct the end pieces *n* and *b* in order to cause the water to circulate freely through the grate-bars and water-conductors in the fire-box. Each end of the piece *b* is closed. One end of the piece *n* is closed and the other is open and threaded and screws into the pipe *m*. E is a pipe leading from the end piece *b* upward into the boiler through the bottom thereof.

B is a double-acting force-pump of ordinary construction.

d is a tube, the inner open end of which enters the boiler, the outer end of which is closed.

f and *g* are tubes leading from the tube *d* into the chamber of the force-pump B.

h and *t* are tubes leading from the chamber of the force-pump into the tube or chamber *c*, the tube or chamber *c* being closed at each end.

m is a tube leading from the tube or chamber *c* into the front hollow end piece *n* of the grate.

Any desired form of force-pump may be

employed, which is so constructed and arranged that it will draw the water from the boiler and force it through the grate and water-conductors connected thereto and back into the boiler. The pump may be operated by hand or with suitable machinery connected thereto by steam-power. When the pump is operated, it draws the water from the boiler and forces it through the grate and water-conductors connected thereto into the boiler, thereby causing, during the time the pump is operated, a continuous circulation of water through the grate, water-conductors, and boiler. When a fire is kept in the furnace, the grate and water-conductors in the fire-box become very hot, thereby imparting much heat to the water as it circulates through them. By reason of the fact that the water from the boiler is kept circulating through the hot grate P and the hot-water conductors *a* the heating of the water in the boiler is greatly facilitated and steam is quickly, readily, and economically generated.

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

1. In a steam-generating apparatus, the combination with a boiler, of a hollow grate, water-conductors connected to the grate and located in the fire-box between the grate and top of fire-box and adapted to be surrounded by the fuel in the fire-box, a tube leading from the grate into the boiler, and a force-pump adapted to draw the water from the boiler and force it through the grate and water-conductors back into the boiler, substantially as described.

2. A hollow grate for a steam-generating apparatus having water-conductors connected thereto and located within the fire-box between the grate and top of the fire-box and adapted to be surrounded by the fuel in the fire-box, substantially as described.

3. In a steam-generating apparatus, the combination with a boiler, of a hollow grate, water-conductors connected to the grate and located in the fire-box between the grate and top of the fire-box and adapted to be surrounded by the fuel in the fire-box, and means for causing the water to circulate through the boiler, grate, and water-conductors, substantially as described.

Signed by me at the city of Atlantic, in the county of Cass and State of Iowa, this 14th day of October, A. D. 1898.

EDWARD L. RIGG.

Witnesses:
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