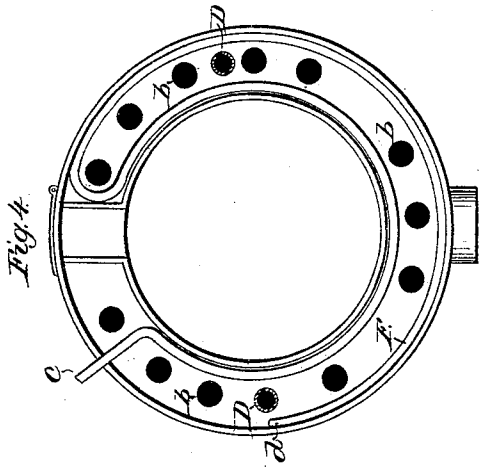
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N. COOMBS.

Steam Heating Apparatus.

No. 234,705. **Patented Nov. 23, 1880.**

Fig. 4.



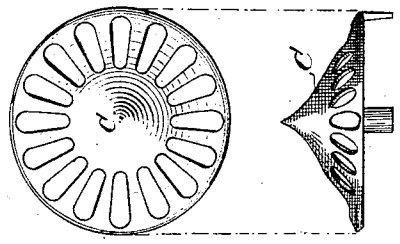
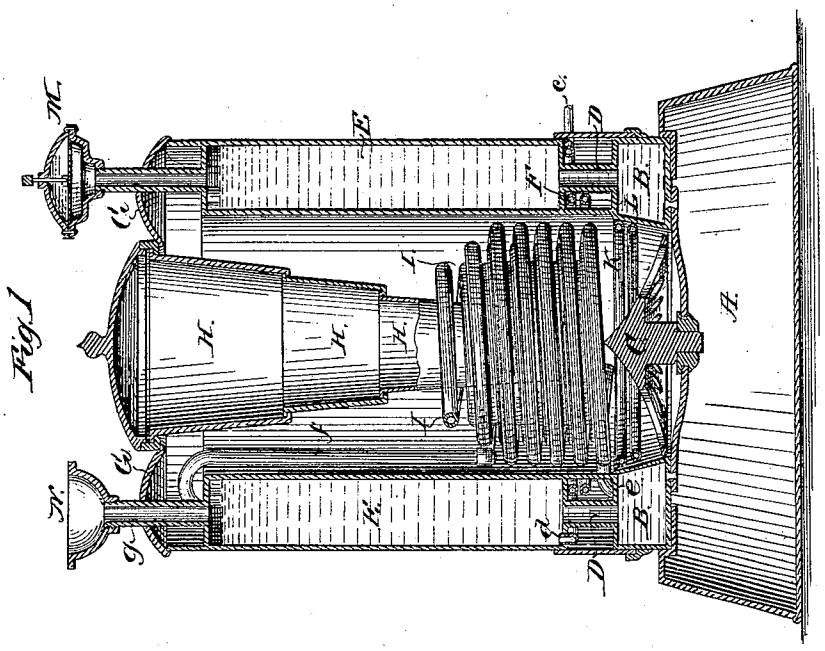


Fig. 5.

Fig. 1



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Steam Heating Apparatus.

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Fig. 3.

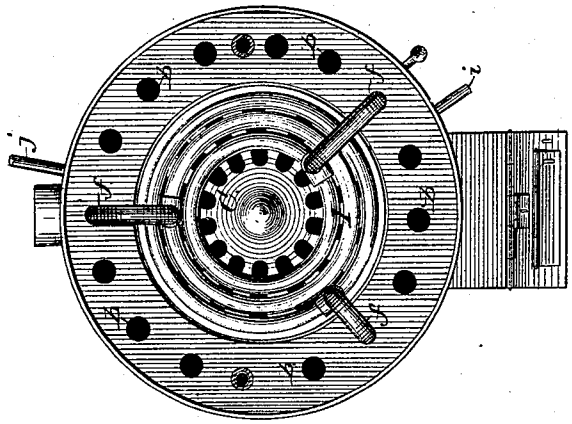
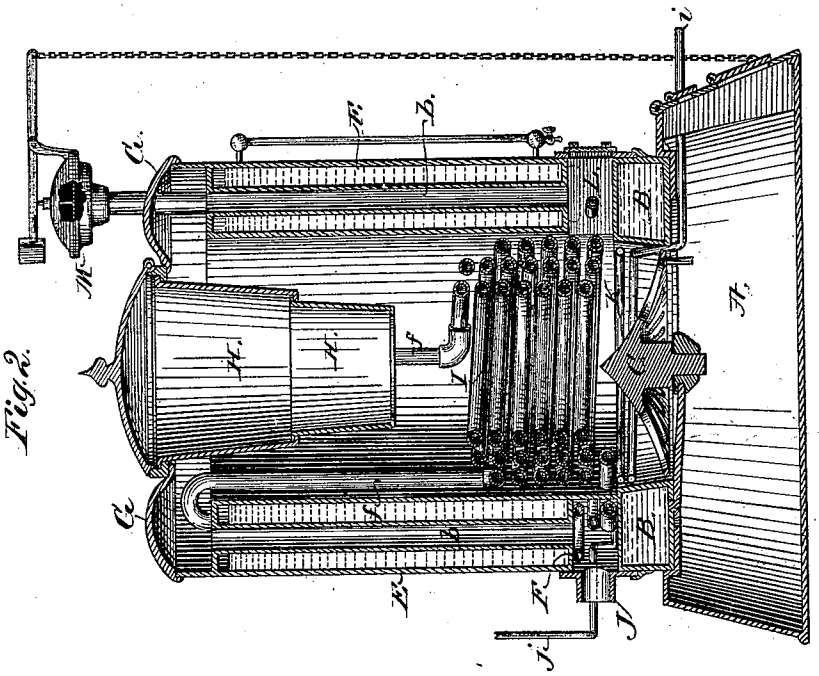


Fig. 2.



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UNITED STATES PATENT OFFICE.

NELSON COOMBS, OF TITUSVILLE, PENNSYLVANIA.

STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 234,705, dated November 23, 1880.

Application filed March 23, 1880. (No model.)

To all whom it may concern:

Be it known that I, NELSON COOMBS, of Titusville, in the county of Crawford and State of Pennsylvania, have invented a new and Improved Steam-Heating Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section. Fig. 2 is another vertical section taken at right angles to the first. Fig. 3 is a plan view with the top removed. Fig. 4 is an underneath view of the annular boiler. Fig. 5 shows in detail a plan and side view of the conical grate.

My invention relates to certain improvements in steam-generators, designed more particularly for generating steam for heating buildings, but applicable generally to the generation of steam for power purposes or other uses.

In structure this improved generator follows to some extent the plan shown in my prior patent, No. 219,072, in which a water-chamber surrounds the fire-pot and communicates with a separate reservoir and a coil of pipes wound about a magazine-cylinder just above the fire-pot communicates with the water-reservoir at a point near the bottom of the same, and also at a point higher up.

My present invention contemplates dispensing with this separate reservoir and substituting therefor an annular boiler arranged concentrically with and encompassing the coils; and it consists in such a peculiar construction and arrangement of parts as will secure a better utilization of the heat and the more economical use of fuel, as hereinafter fully described, and pointed out in the claims.

In the drawings, A represents a base supporting an annular water-chamber, B, the central opening of which constitutes the fire-pot, and which is prevented from burning out by the circulation of water around the same. In the bottom of this fire-pot, and supported upon a bridge by a central pivot, is a horizontally-oscillating and tilting grate, C, (see Fig. 5,) which latter is made cone-shaped, with the point or apex projecting upwardly into the center of the fire-pot, the said grate being imperforate in its center and open near its edge or periphery, for the purpose hereinafter described.

Arranged upon the annular chamber B, and connected to it by nipples D D, (see Fig. 1,) is an upright annular boiler, E, having vertical return-flues *b* extending from the upper end of it down to the space between the boiler and the water-chamber B. In this space is arranged a water-tube coil-heater, F, (see Figs. 1 and 4,) through which all the water-supply passes before it is discharged into the boiler, the water entering this tube at *c* and being discharged into the boiler at *d*.

G is an annular cover, under which the heat that rises through the central opening in the boiler is returned downward through the flues *b*. In the center of this cover is suspended a sectional magazine, H, each of the sections of which is formed at its upper edge with a lip that hangs upon the inturned flange of the next higher section, and projecting down more or less closely to the fire-pot, according to the number of sections used. As shown in Fig. 2 only two sections are employed; but when less heat is required and a smaller amount of fuel is to be economically burned I employ another section, as shown in Fig. 1, which prolongs the magazine down into close proximity to the grate.

Extending from the top of the chamber B, and coiled about the space between the inside of the boiler and the outside of the fuel-magazine, are arranged a series of coils of water-tubes, I, which, at their lower ends, communicate at *e* with the water-chamber B, and at their upper ends, *f*, are bent and provided with flanges and communicate with the upper end of the annular boiler.

In the operation of the devices as so far described all the heat from the fire on the grate, in its upward course, acts directly on the coils and inside shell of the boiler, and, turning at the top, acts on the upper end of the boiler and on the flues *b* down to and on the lower end of the boiler and top of the water-chamber, and, also acting on the feed-water-heating coil, passes out at the smoke-flue J, (see Fig. 2,) giving the largest amount of heating-surface possible in a self-feeding steam-generator, and thereby giving the best results in gener-

ating steam fast and with a small quantity of fuel. As the steam is generated it passes from the upper portion of the annular boiler out through the pipe *g* to the dome N, (partially shown,) and thence is conducted to the several radiators throughout the building to be heated, the steam and condensed water being returned to the heating-coil F at the point *e*, to be reheated in the hot-air space below the boiler.

In some cases it may be desirable to heat the building or a part of the same by hot water, and for this purpose I arrange a water-coil, K, in the fire-pot, so as to form a lining for the fire-pot, and through which coil a circulation of water is kept up by connection or otherwise, the water entering at *i* and leaving at *j*. (See Fig. 2.) This circulation is entirely separate and distinct from the steam-generating coils, and may or may not be used, as desired. I may also employ another separate and distinct water-heating coil, L, for culinary purposes.

In order to render the action of the steam-generator uniform, I locate upon the top of the steam-boiler a pressure-regulator, M, consisting of a case containing a flexible diaphragm, upon which the steam acts, which diaphragm is connected by a stem with a lever weighted at one end and connected with a chain at the other, which chain extends down to and connects with the draft-door of the furnace. Now, when the steam-pressure gets low and the weight on the lever falls, the outer end of the lever rises and opens the draft, causing the fire to burn with more energy. On the contrary, when the steam-pressure gets too high the pressure on the diaphragm raises the weighted end of the lever, and, causing the other end to fall, allows the draft-door (which is hung at the top) to close and cut off the supply of air to reduce the energy of the fire.

With respect to the advantages of my invention I would state, first, that I secure a great amount of heating-surface in a simple, compact, and practical form with great economy of fuel; secondly, by the conical grate, imperforate in the center and open about its edges, the fuel is distributed to the outer edges of the grate and combustion allowed to proceed only at the edges or immediately beneath the coils, at which point only the air has access to the coal. This prevents burning out the magazine, economizes fuel, and places the heat just where it will do the most good.

I do not claim, broadly, the conical grate, as this is not broadly new; but the combination of this grate, perforated as described and combined with the concentric magazine-cylinder, and the coils of the steam-pipe forms a novel and effective organization for my purpose.

In defining my invention more clearly I would state, further, that I am aware that a magazine-cylinder has been arranged heretofore concentrically in the annular water-chamber of a steam-heating apparatus, which water-chamber has smoke-flues dipping down through the same, and I therefore do not claim such arrangement broadly.

Having thus described my invention, what I claim as new is—

1. A steam-generator consisting of a subjacent fire-pot having an upwardly-pointing conical grate with open edges, an annular boiler located concentrically above the same and having flues through the same, which communicate with the central opening in the boiler above and an annular exit below, a set of steam-coils located concentrically within the steam-boiler directly above the openings in the grate and connected with the boiler, as described, and a magazine-cylinder opening at the top and located concentrically with respect to the steam-coils, all combined substantially as and for the purpose described.

2. In a steam-generator, the combination, with a conical grate having its center imperforate and pointing upwardly and made open around its edges, as described, of a magazine-cylinder arranged to discharge centrally upon the conical grate and a set of steam-coils located above the openings in the grate and having a central opening through the said coils for the passage of the fuel from the magazine to the fire-pot, as shown and described.

3. The combination, with a grate, of an annular water-chamber, forming the walls of the fire-pot, an annular boiler with return smoke-flues located above the water-chamber, leaving an annular exit-flue between, and connected by nipples D D, substantially as and for the purpose described.

4. The combination of the annular water-chamber, forming the fire-pot, and the annular boiler above, connected thereto by nipples and having a smoke-exit flue between, and the water-heating coil F, located in the annular exit-flue and communicating with the boiler, substantially as and for the purpose described.

NELSON COOMBS.

Witnesses:
T. J. SMILEY,
J. J. HOLDEN.