(No Model.) 2 Sheets—Sheet 1.

C. GORTON.

STEAM BOILER.

No. 413,658. Patented Oct. 29, 1889.

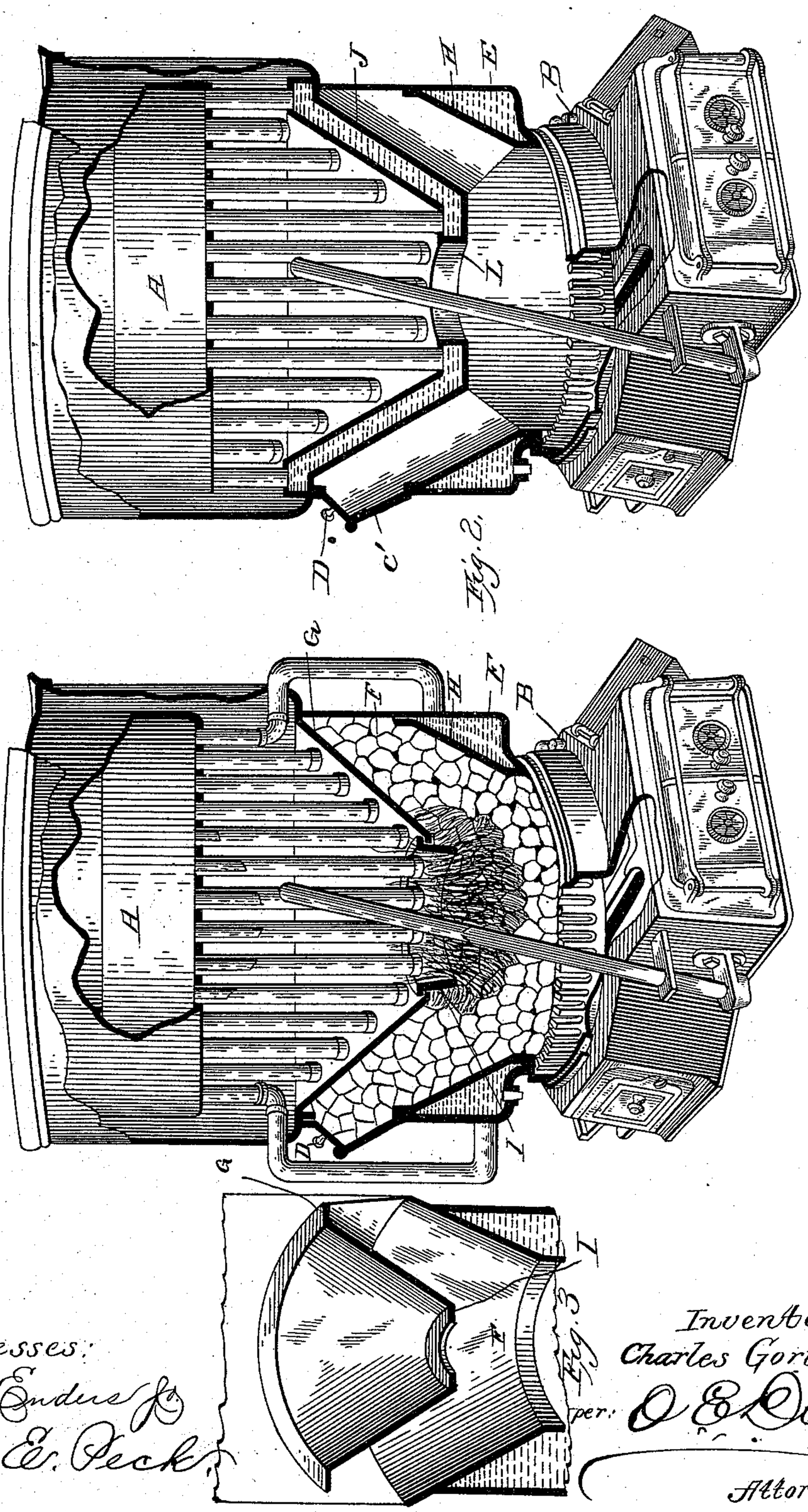

Fig. 2.

Fig. 1.

Fig. 3.

Witnesses:
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Hen. E. Peck.

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Charles Gorton,
per: O & Duff
Attorney:

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

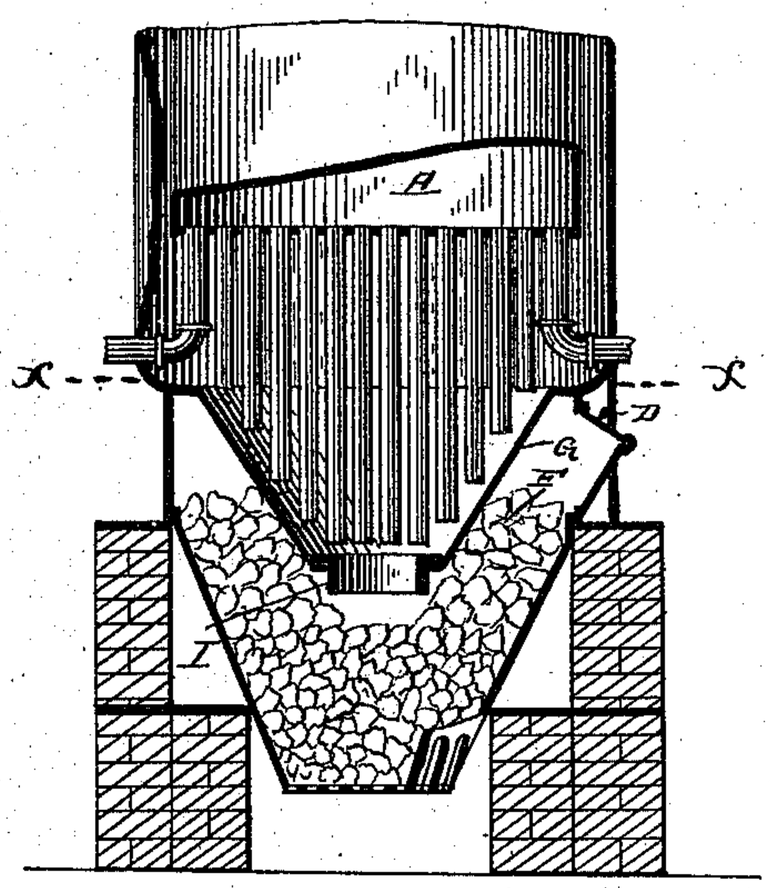


Fig. 5.

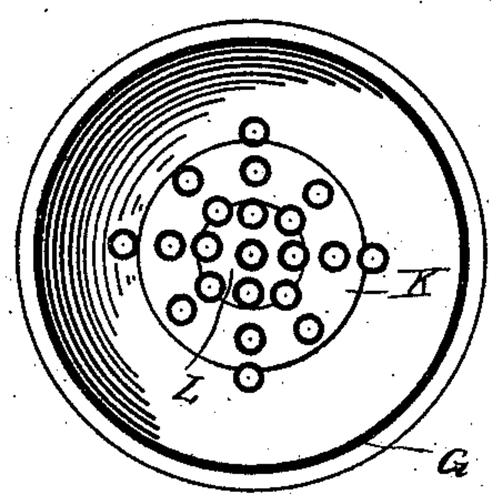


Fig. 8.

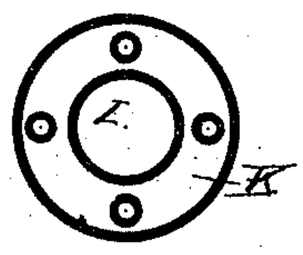


Fig. 6.

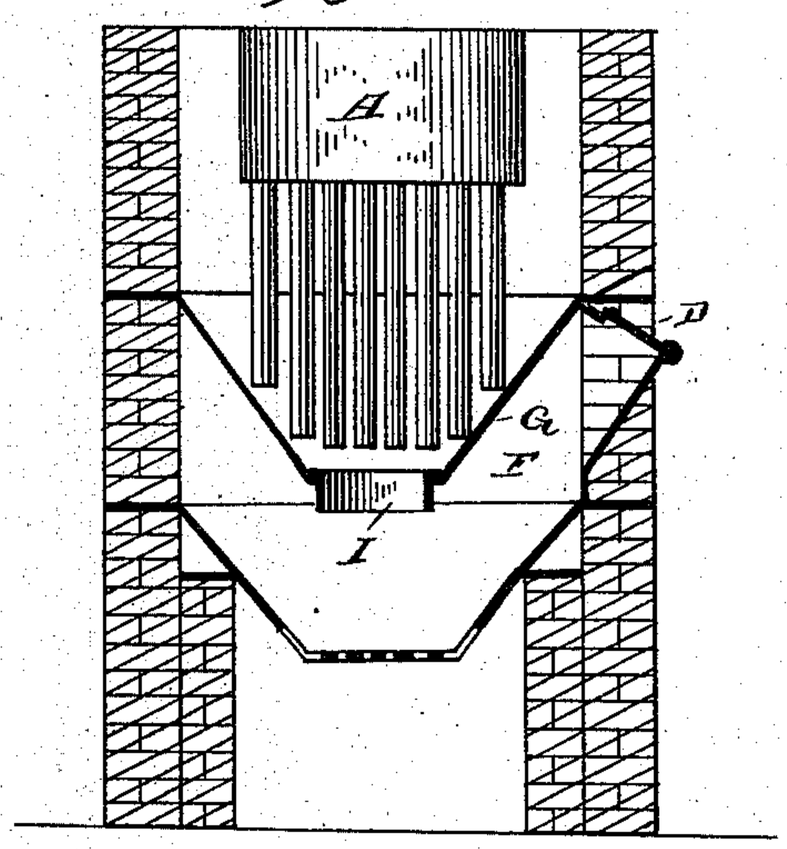
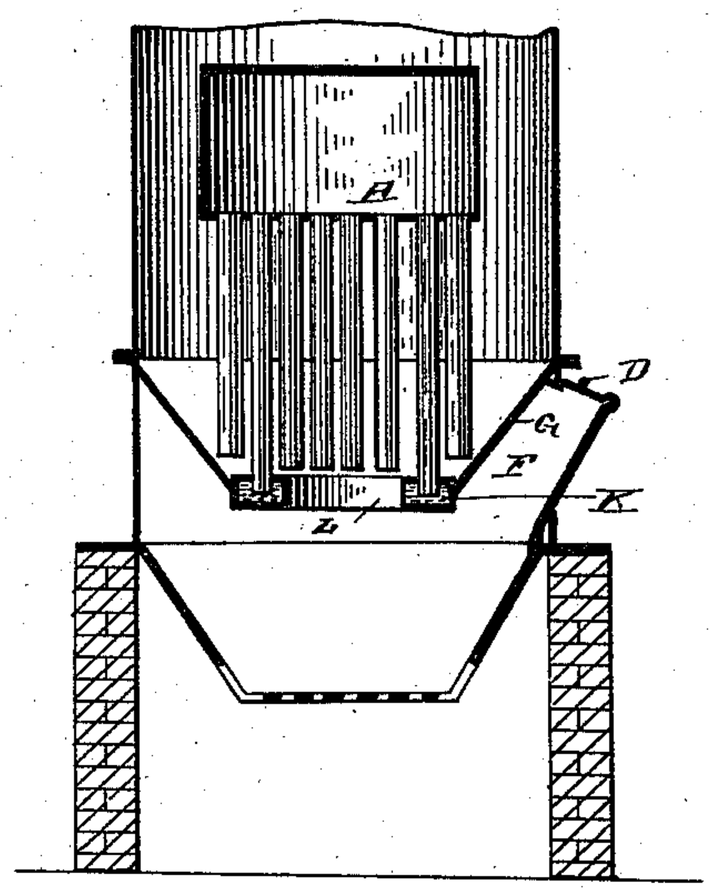


Fig. 7.



Witnesses:
E. E. Duffy
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per O. E. Duffy
Atty

UNITED STATES PATENT OFFICE.

CHARLES GORTON, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 413,658, dated October 29, 1889.

Application filed February 23, 1889. Serial No. 300,858. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GORTON, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 part of this specification.

The main object of my invention is to economize in fuel, to cheapen and simplify the construction, to obviate the waste of gaseous matter, to lessen the development of smoke within the furnace and among the tubes, to prevent the escape or discharge of solid particles of fuel, to insure the consumption of all ignitible matter, whether solid or gaseous, and that with a high degree of combustion no smoke escapes from the furnace, particularly from soft coal, and thus prevent the deposit of soot, lamp-black, and the like on the outer generating surfaces of the tubes, which, when kept clean, transmits the heat with a greater degree than when the tubes have a thick outside scale.

To more particularly describe and illustrate my invention, reference is made to the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation of a boiler having two single plates in the shape of an inverted frustum of a cone, forming between them an annular fuel-reservoir and partially forming the furnace. Fig. 2 is a like sectional elevation, only the upper annular section of the reservoir is double, forming a water-space communicating with the water-space of the boiler. Fig. 3 shows a detached detail section of the annular fuel-reservoir, showing segments thereof, the said figures having water-legs; Fig. 4, a like boiler with a lower brick base and upper iron casing; Fig. 5, a cross-section of Fig. 4 at line *x x*; Fig. 6, a similar boiler having the annular combustion and fuel chamber, and entirely incased in brick. Fig. 7 is another modification, showing a brick base, an upper iron jacket, and an intermediate casing having the annular magazine and combustion-chamber, with an annular ring connected by circulating-tubes; and Fig. 8 is a top plan view of said water-ring.

It will be observed that the usual doors to the ash-pit, safety-valves, indicators, and like appliances are not shown in Figs. 4, 6, and 7, these being no part of my invention.

The same letters will indicate like parts throughout the several figures.

A is the boiler, B the base, and F the annular fuel magazine or reservoir. I prefer to provide the reservoir with four fuel-feed chutes, at equal distances apart around the boiler; but there may be more or less, and each chute is provided with a feed-door D.

When a water-leg E is used, circulating-tubes connecting the water-leg and the boiler are supplied at different horizontal planes to establish circulation, the principle of which is well known. The same may be said with other detached water-holding portions of the boiler.

The annular reservoir F, constructed, as described, of upper and lower sections G H, is preferably tapering in cross-section, the space between them enlarging toward the grate, by which the expansion of the fuel by the heat is provided for. These sections are set at such an inclination as not to prevent the fuel from automatically feeding down into the furnace as fast as the fuel on the grate is consumed.

It will be distinctly understood that the reservoir F forms its own chute after the coal is within the shell of the boiler, and, further, that this annular fuel-reservoir formed between two cone-shaped sections is the gist of my invention.

It will be seen that the most intense heat is at the opening of the upper section, just over the grate, and that when this portion is not protected it is liable to become impaired, particularly when a single thickness of material is used, and when impaired the whole section would have to be removed. However, to prevent such removal, I provide a ring I, of any suitable material—cast-iron, clay, and asbestus, or other refractory or incombustible material—and made of two or more sections, for ready removal and substitution. The segments or sections may be provided with a flange, by which they may be suspended; but

when water-sections J or rings K are used, of course they are designed to last as long as the boiler itself. The most approved method of burning coal, particularly soft coal, is to keep an over fire. When the fuel is in irregular courses over the grate, there is never a proper mixture of the air and gases, and hence imperfect combustion; but with my improved annular combustion chamber and reservoir the fuel is evenly fed all over, causing an even flow of air all through the insterstices of the burning coal.

The operation is as follows: The reservoir being filled with fuel and the fire ignited, the smoke and gases pass up through the opening L until incandescence takes place at the surface of the fuel. The fire then being well under way, it spreads to the mass of fuel over and around each side of the grate, combustion being thus established, and the opening L being contracted and having the drop-ring I suspended well into the bright burning fuel, all the smoke and gases are compelled to pass through, down, and around the lower edge of the opening, where the most intense heat is, and thus be consumed, exposing the generating-surface of the boiler to nothing but clear, solid heat.

The reservoir above the opening L forms a coking or roasting chamber for the fuel, and the gas therefrom is also compelled to pass through the highly-heated incandescent fuel, and is thus consumed, so that complete combustion of all ignitible particles, gaseous or solid, must ensue. The opening L being of much more constricted area than the furnace-chamber, the gases pass through it with more rapidity. On the principle of the nozzle the atoms contact is greater, and therefore a greater mingling and diffusion of the gases takes place while passing through said opening than would were the opening larger, and when released among the tubes above the conical section they spread and expand, giving off an extremely clear and intense heat.

It is evident that many modifications may be employed and details changed without departing from the spirit of my invention, and hence do not desire to limit myself to the precise form shown.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a boiler-furnace, an annular combustion fuel-reservoir and combustion-chamber formed between a depressed upper and lower section, substantially as described.

2. In a boiler-furnace, a combustion-chamber formed between two annular sections, each of said sections being of inverted conical shape and having openings in their center, as described.

3. In a boiler-furnace, the combination of an annular combustion-chamber formed of two sections of inverted cone shape, one diverging from a horizontal plane more than the other, whereby the reservoir is given a tapering form, substantially as described.

4. The combination, in a furnace, of a reservoir and combustion-chamber consisting of an upper and lower section, each being centrally depressed and having central openings varying in diameter, substantially as set forth.

5. The combination, in a furnace, of a fuel-reservoir and combustion-chamber, of an upper and lower section centrally depressed, having central openings of varying diameter, and the feeding-chutes and smoke and gas deflecting ring, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES GORTON.

Witnesses:
O. E. DUFFY,
C. M. WERLE.