

(No Model.)

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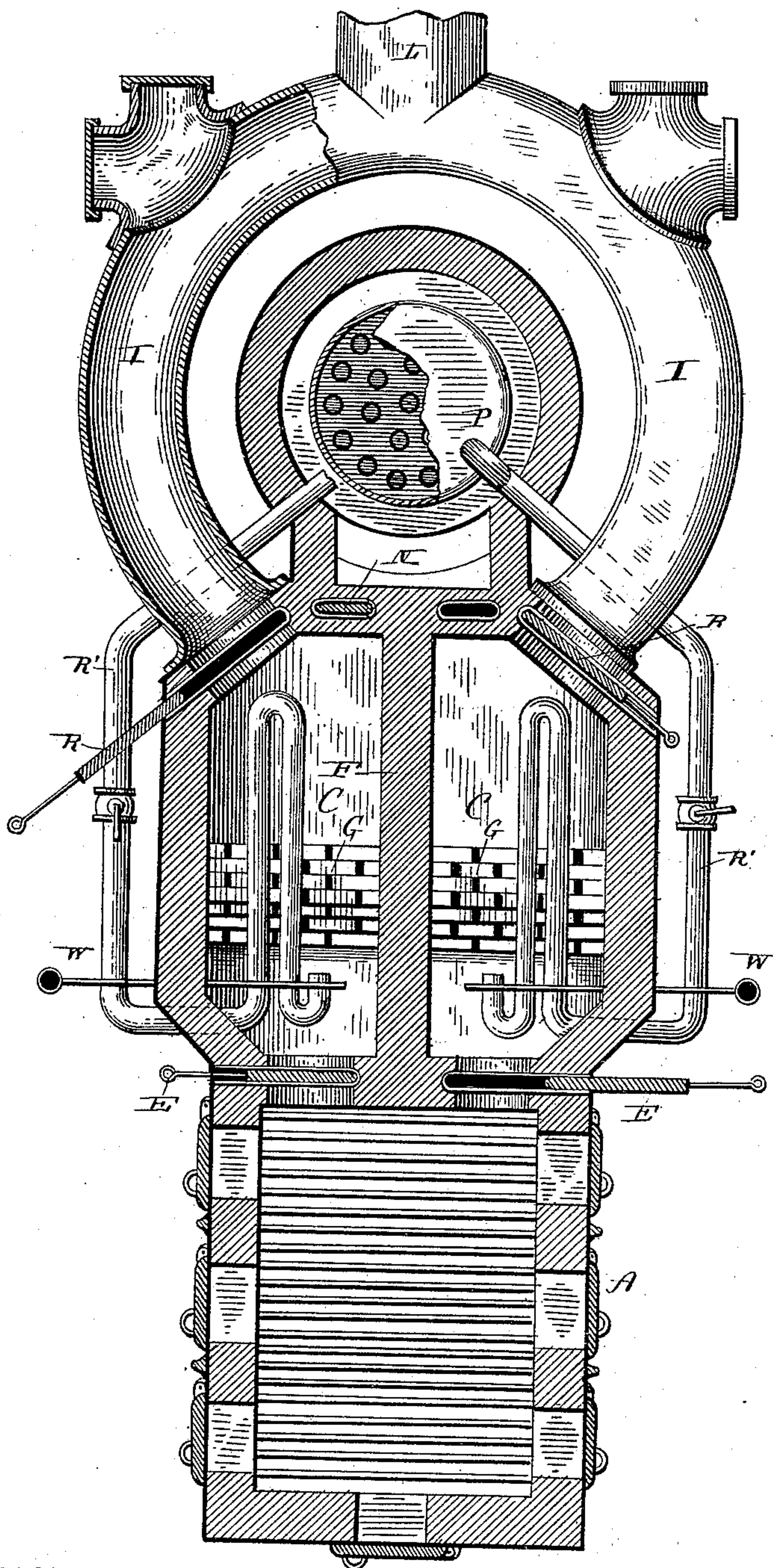
R. H. SMITH.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 397,397.

Patented Feb. 5, 1889.

Fig. 1



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(No Model.)

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Fig. 2.

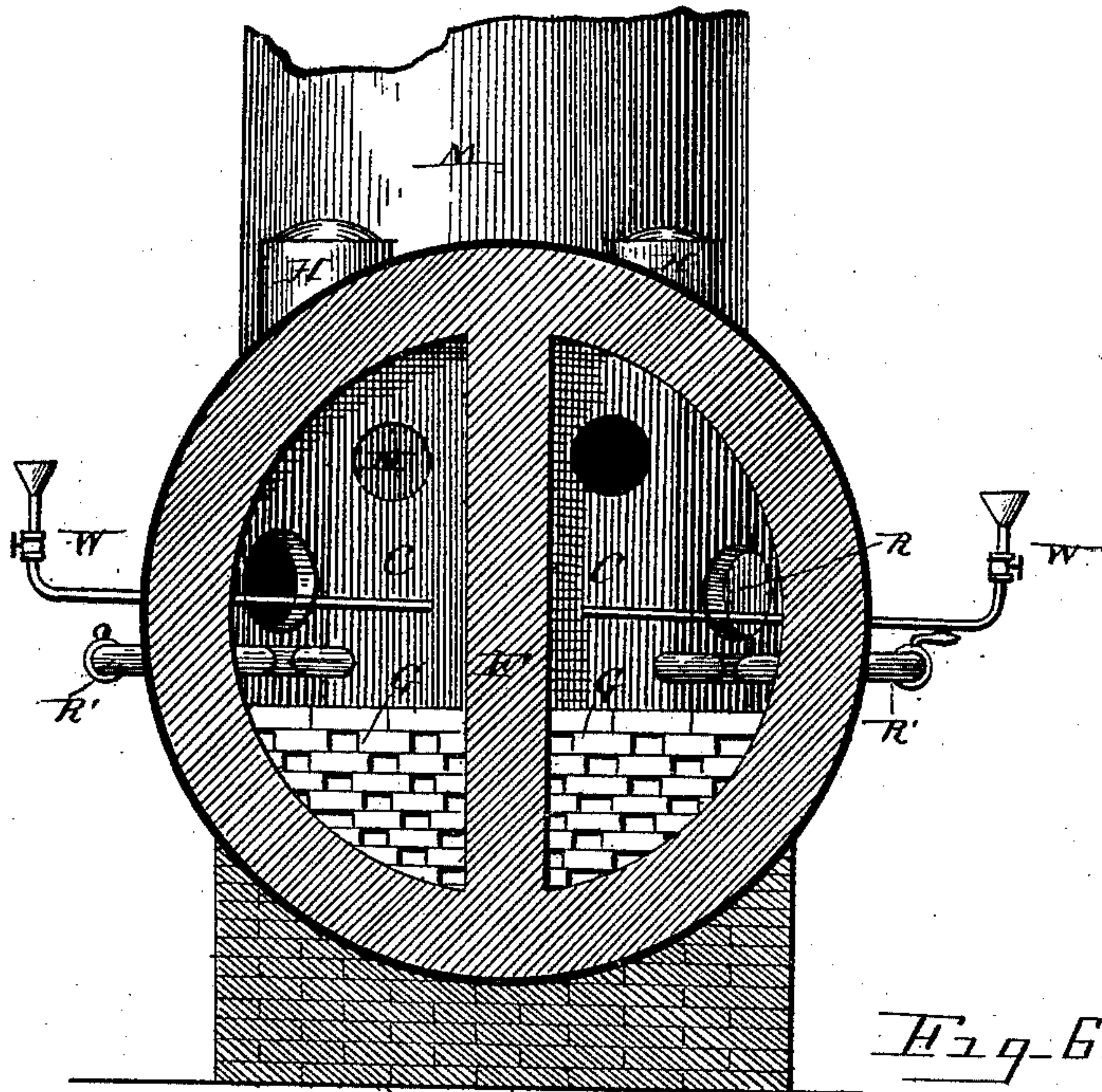
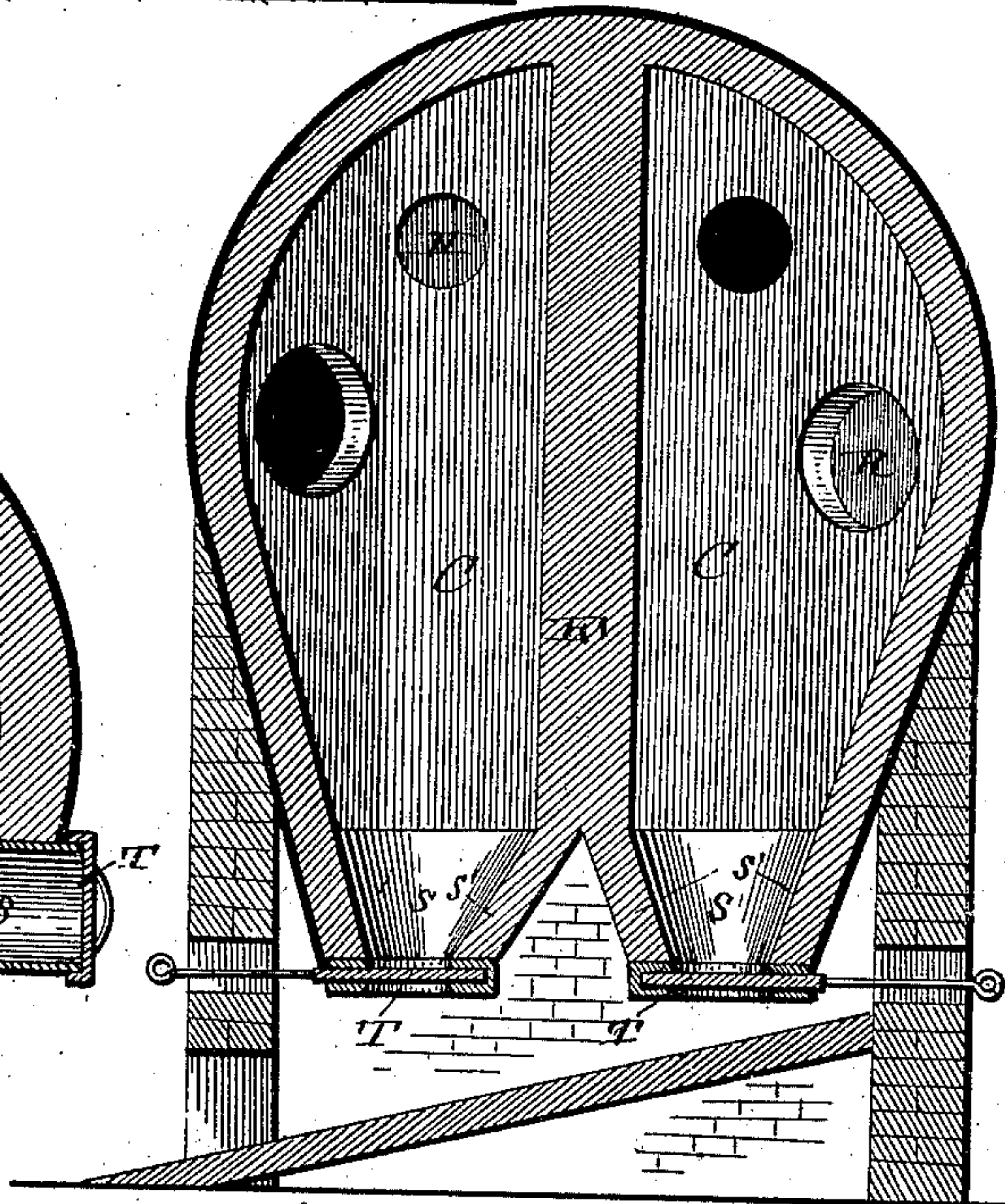
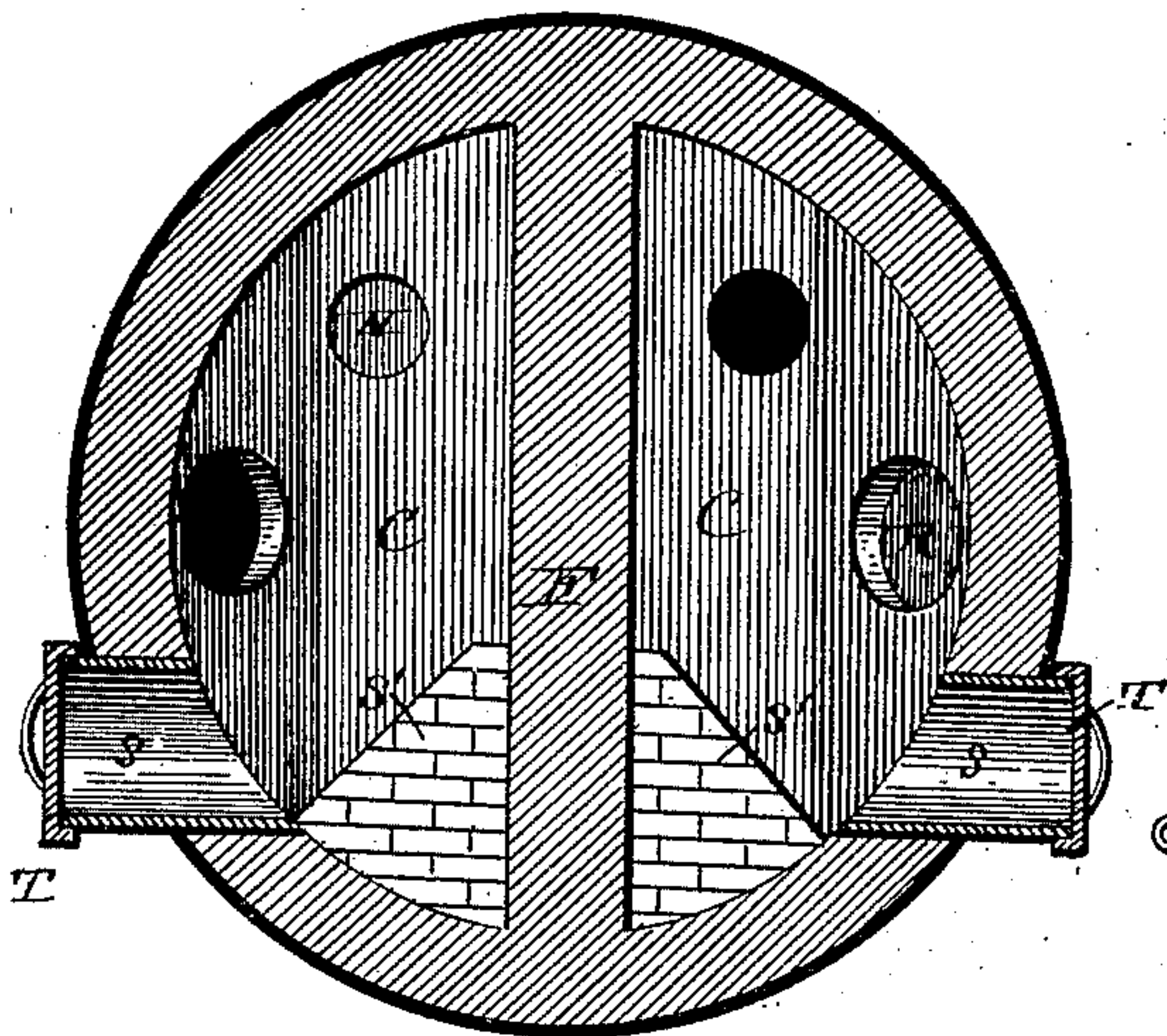


Fig. 6.

Fig. 5.



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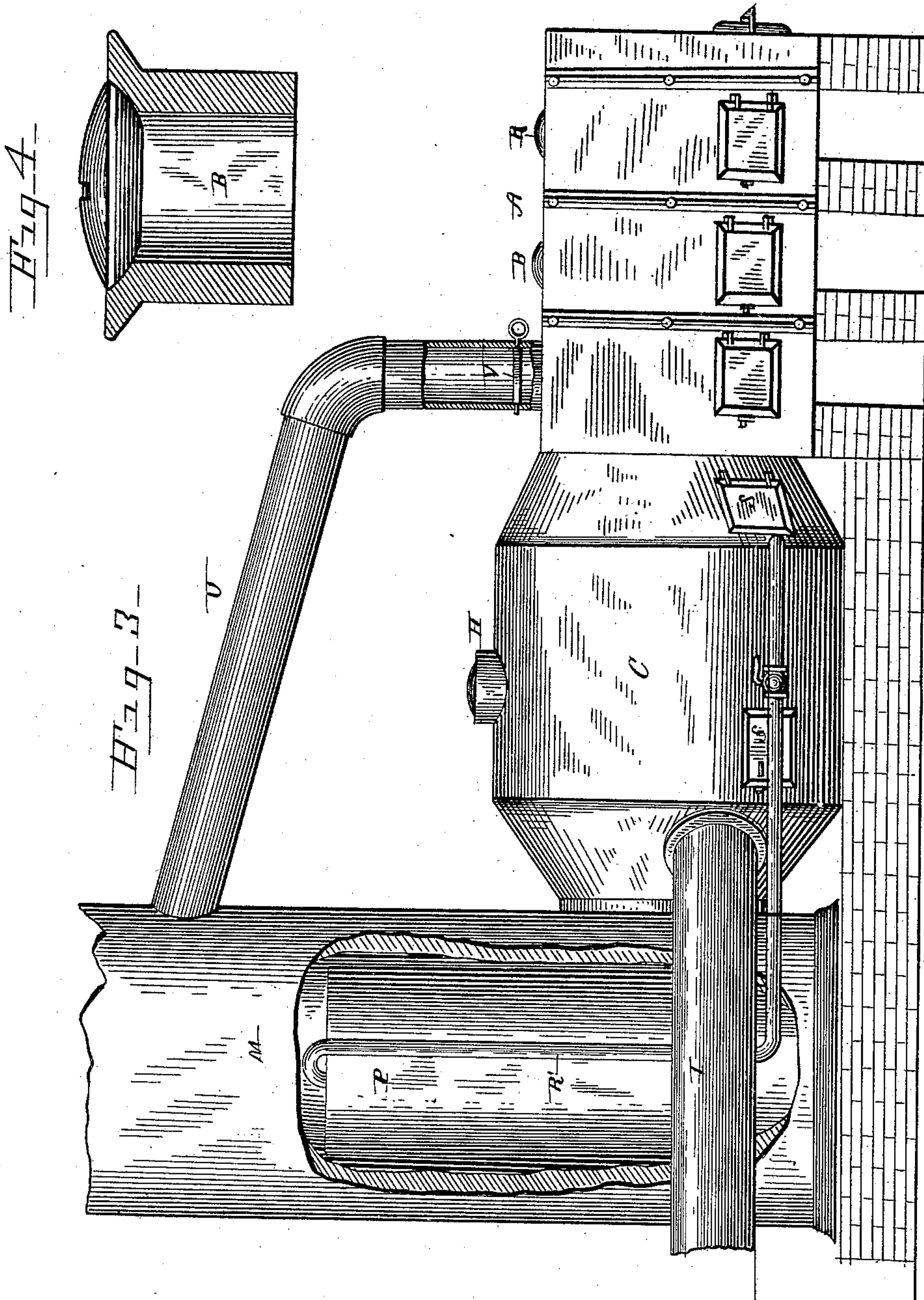
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 397,397, dated February 5, 1889.

Application filed December 15, 1887. Serial No. 258,009. (No model.)

To all whom it may concern:

Be it known that I, ROLAND H. SMITH, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for the Manufacture of Gas, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain improvements in apparatus for the manufacture of gas for heating and illuminating purposes.

In many localities coal suitable for the manufacture of gas cannot be obtained except at great cost, and it has long been a desideratum to obtain some substitute for the coal and means for economically working such substitute or substitutes for the production of gas.

20 In various localities large quantities of refuse of various descriptions are to be had for the cost of handling, which if properly treated could be converted into gas suitable for various purposes. Among such substances may be mentioned spent tan-bark, coal-dust, sawdust, and the like; and it is the object of my invention to utilize such substances in the manufacture of gas, as more fully hereinafter specified.

30 It is a well-known fact that in order to convert any suitable gas-producing substance into gas a certain degree of heat is required. This heat can be obtained in various ways—most generally by the combustion of coal, coke, or natural gas. Where one generating-chamber is used it is necessary to first get the first generating-chamber to the proper temperature, after which the air-supply is shut off and the material to be converted into gas is introduced and subjected to the action of the heat so long as the temperature is sufficient for the production of the gas, the gas being run off to the holders being purified on its way in the usual manner. When the generator becomes so much reduced in temperature as to no longer supply the heat necessary for the generation of the gas, it becomes necessary to reheat it, and during the time of reheating the production of gas is interrupted, and such interruption has been obviated by employing two or more generators, using the

same alternately, so as to produce gas in one while the other is being heated, and vice versa.

My invention relates to the peculiar construction and arrangement of such a system of generators as more fully hereinafter set forth.

Referring to the accompanying drawings, Figure 1 represents a sectional plan view of an improved plant for carrying out my invention. Fig. 2 represents a transverse vertical sectional view of the apparatus taken through the generators. Fig. 3 represents a view, partly in side elevation and partly in section, of the plant. Fig. 4 represents a detached sectional view of one of the sections through which fuel or solid gas-producing material is inserted. Fig. 5 represents a sectional view of a modification of the generator, showing means for removing the waste. Fig. 6 represents another modification of the generators for the same purpose.

The letter A indicates the heating-furnace, which is constructed of brick-work or other suitable material and provided with a refractory lining. The said chamber is provided with a series of grates and ash-pits and at the top with a series of tubular sections, B, having suitable covers through which the fuel is introduced. The furnace is also provided with suitable doors through which cinders and ashes may be removed.

Back of the furnace are located the gas-generating chambers C, which communicate with the furnace by means of openings, which may be closed by the sliding dampers E. The said chambers are preferably formed in a cylindrical structure having a refractory lining and divided into two compartments by means of a refractory partition, F, each chamber being partly filled with a bed of brick-work, G, the bricks of which are laid with alternating open spaces between them, forming a mass of heat-absorbent material, through which the products of combustion from the furnace may pass, and which serves to store up the heat for the generation of gas, as more fully hereinafter specified. The generators are provided at the top with tubular sections and covers H, similar to the sections B, through which solid gas-producing material may be inserted.

The letter I indicates a circular pipe connecting at its ends with the respective generators, and R two slide-valves, by means of which communication with either generator
5 and the pipe may be cut off when desired.

L indicates a pipe leading from the pipe I to the purifiers and holders, wherein the gas is stored.

The letter M indicates the smoke-stack of
10 the furnace, which communicates with the generators by means of suitable passages, which are controlled by valves N, so that either generator can be thrown into communication with the stack, or vice versa. Within the
15 smoke-stack is located a vertical tubular boiler, P, from which extend the steam-pipes R' to the respective generators. The pipes pass in at the forward portions of the generator, and are carried back and forth in the same,
20 so as to superheat the steam before escaping at their extremities.

In the modifications shown in Figs. 5 and 6 of the drawings the generators are provided with passages S, preferably constructed with
25 slanting floors S' and doors T, through which the refuse, after the generation of the gas, may be discharged.

The letter U indicates a direct-draft flue leading from the fuel chamber or furnace to
30 the smoke-stack. The said flue is provided with a damper, V, by means of which communication between the fuel-chamber and stack may be opened and closed at will.

The operation of my invention is as follows:

35 The valves E N of the generating-chamber C to the right being opened, fuel—such as coke or coal—is placed in the furnace and ignited and allowed to burn until the said chamber C is highly heated. When the said chamber C
40 is properly heated, the valves E and N thereof are closed and the corresponding valves E and N of the generating-chamber C at the left are opened. Hydrocarbon fuel is then fed into the chamber C at the right, and the
45 valve R thereof opened, the gas generated therefrom passing through the right branch of the pipe I and the pipe L to the holder. When the chamber C at the right is so reduced in temperature as to no longer produce
50 gas, the valves E and N thereof are again opened and the heating again commenced, the corresponding valves E and N of the generating-chamber C at the left being again closed and the valve R thereof opened. The
55 last-mentioned chamber having become heated, hydrocarbon-gas-producing material is then introduced into the same and the generation of gas continued therein. The generating-chambers are thus alternately used,
60 producing a continuous current of gas in large volume which passes to the holder. During the process of generation superheated steam may be admitted to the generator through the pipes R', and, if desired, liquid
65 hydrocarbon may be admitted through the pipes W. After the bed of coal in the furnace

A becomes incandescent, garbage or other refuse is introduced into said furnace, the valve N of the generating-chamber C for the time
70 connecting with the furnace A is closed and the valve R thereof opened. The volatile constituents of the garbage or refuse will then pass into the generating-chamber last mentioned, where they will be decomposed into a
75 fixed gas and any carbonic-acid gas deoxidized, the resulting gases passing on through one of the branches of the pipe I to the holder. After the vapors and gases have thus been eliminated the valve N is opened and the
80 valve R closed, the incandescent carbonized portions of the garbage or waste serving as fuel for heating the chamber.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—
85

1. The combination, in a gas-generating furnace, of the furnace, the horizontal generating-chambers, and the exhaust-pipe leading to the holder, the said generating-chambers
90 being provided with valve-passages leading from the fuel-chamber and to the smoke-stack, and the exhaust-pipe being provided with suitable valves, whereby the generating-chambers may be alternately heated and alternately
95 employed for the generation of the gas in an uninterrupted volume, substantially as specified.

2. In a gas apparatus, the combination of a furnace, the horizontal generating-chambers communicating by valved passages with the
100 fuel-chamber of the said furnace and the smoke-stack, the exhaust-pipe communicating with the generating-chambers by means of valved passages, and the tubular sections B and H and their covers, these tubular sections
105 leading into the furnace and generating-chambers, substantially as and for the purpose set forth.

3. In a gas-generating apparatus, the combination of a furnace, the generating-chambers communicating with the said furnace by
110 means of valved passages, the exhaust-pipe communicating with the respective generating-chambers by means of valved passages, the smoke-stack communicating with the generating-chambers by means of valved passages,
115 the steam-boiler in the smoke-stack, and the steam-pipe R, leading from the boiler to the respective generating-chambers, substantially as described.
120

4. The combination of a furnace, gas-generating chambers communicating with the
125 furnace by means of valved passages, the exhaust-pipe communicating with the generating-chambers by means of valved passages, the smoke-stack communicating with the generating-chambers by means of valved passages, a steam-generator, and steam-pipes leading from the generator into the respective generating-chambers, the portions of the pipes
130 within the generating-chambers being coiled back and forth, substantially as described.

5. The combination of a furnace, independent gas-generating chambers communicating with the furnace by means of valved passages, an exhaust-pipe communicating with the generating-chambers by means of valved passages, a smoke-stack also communicating with the generating-chambers by means of valved passages, the said generating-chambers each being provided with outlet-passages for the

refuse, and slanting hearths leading to the passages, substantially as described.

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

ROLAND H. SMITH.

Witnesses:

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