

(No Model.)

T. J. CLOSE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 416,825.

Patented Dec. 10, 1889.

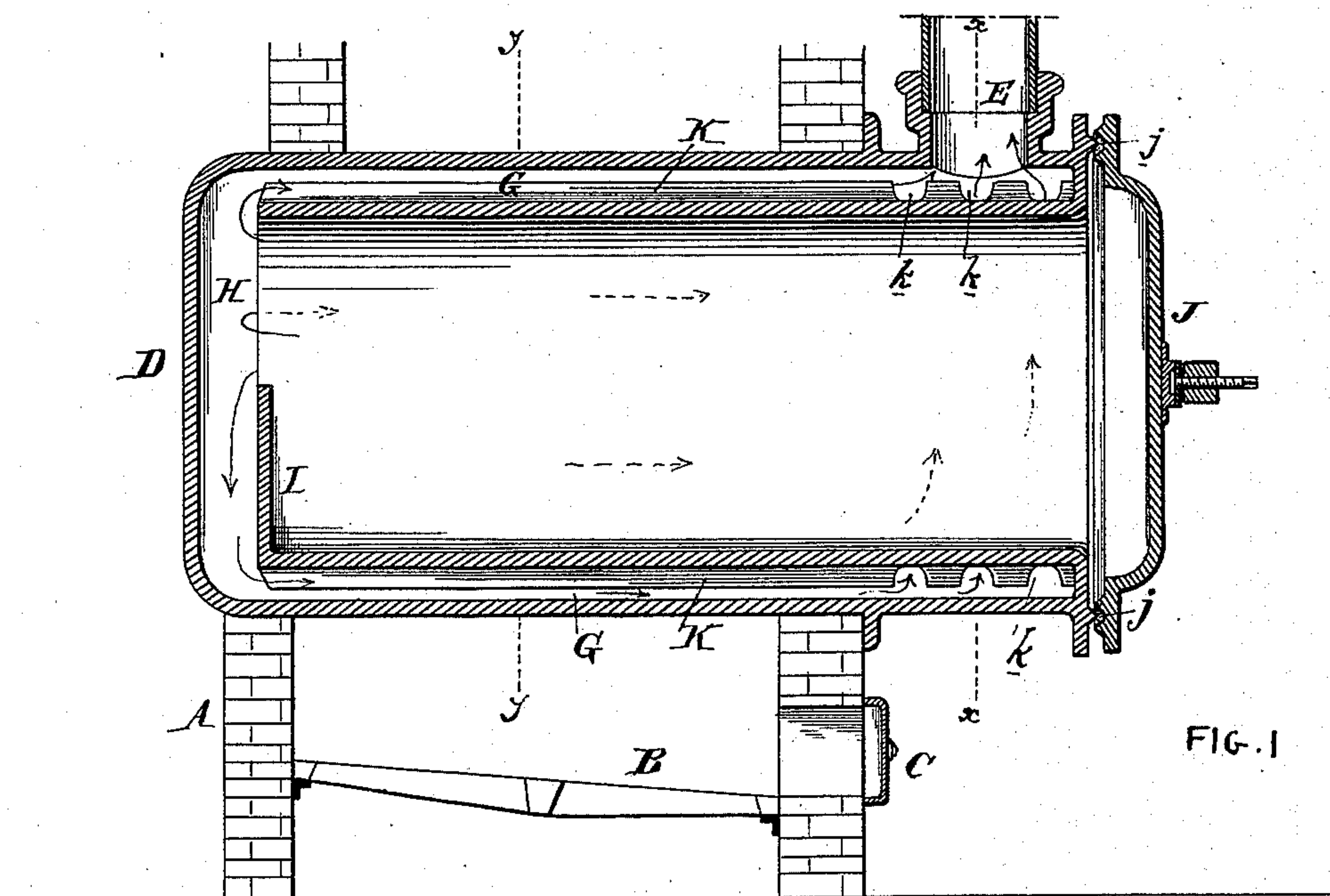


FIG. 1

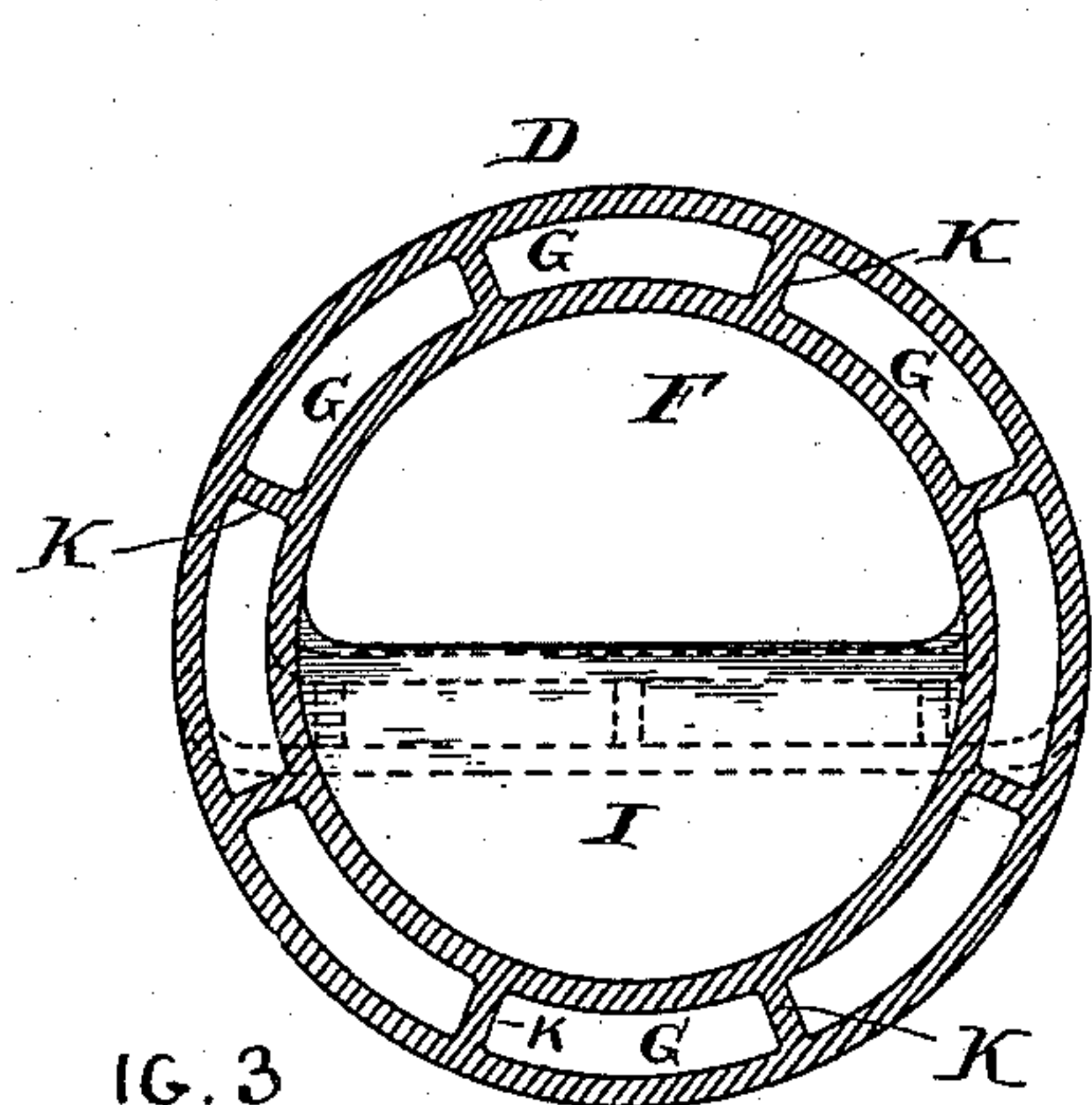


FIG. 3

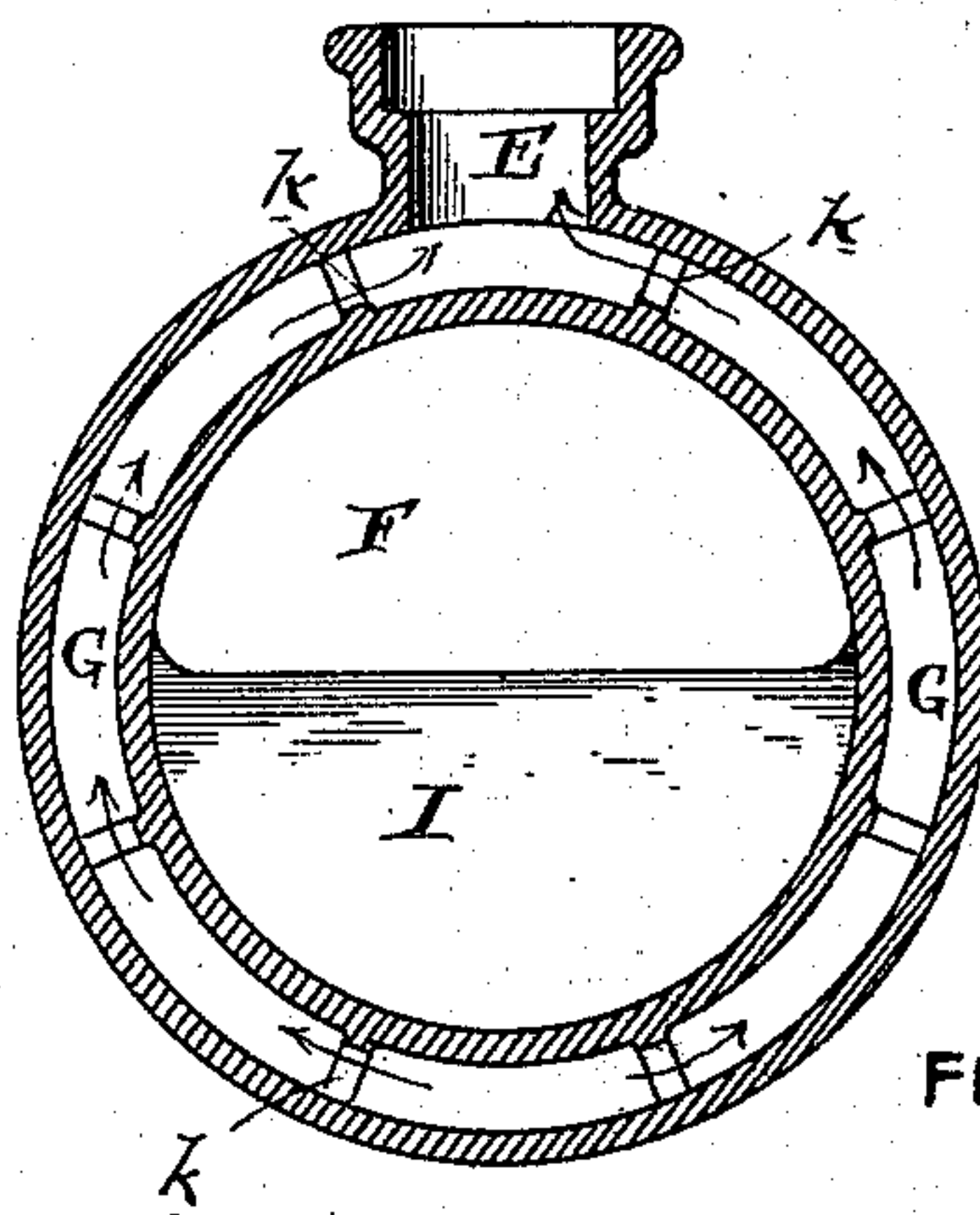


FIG. 2

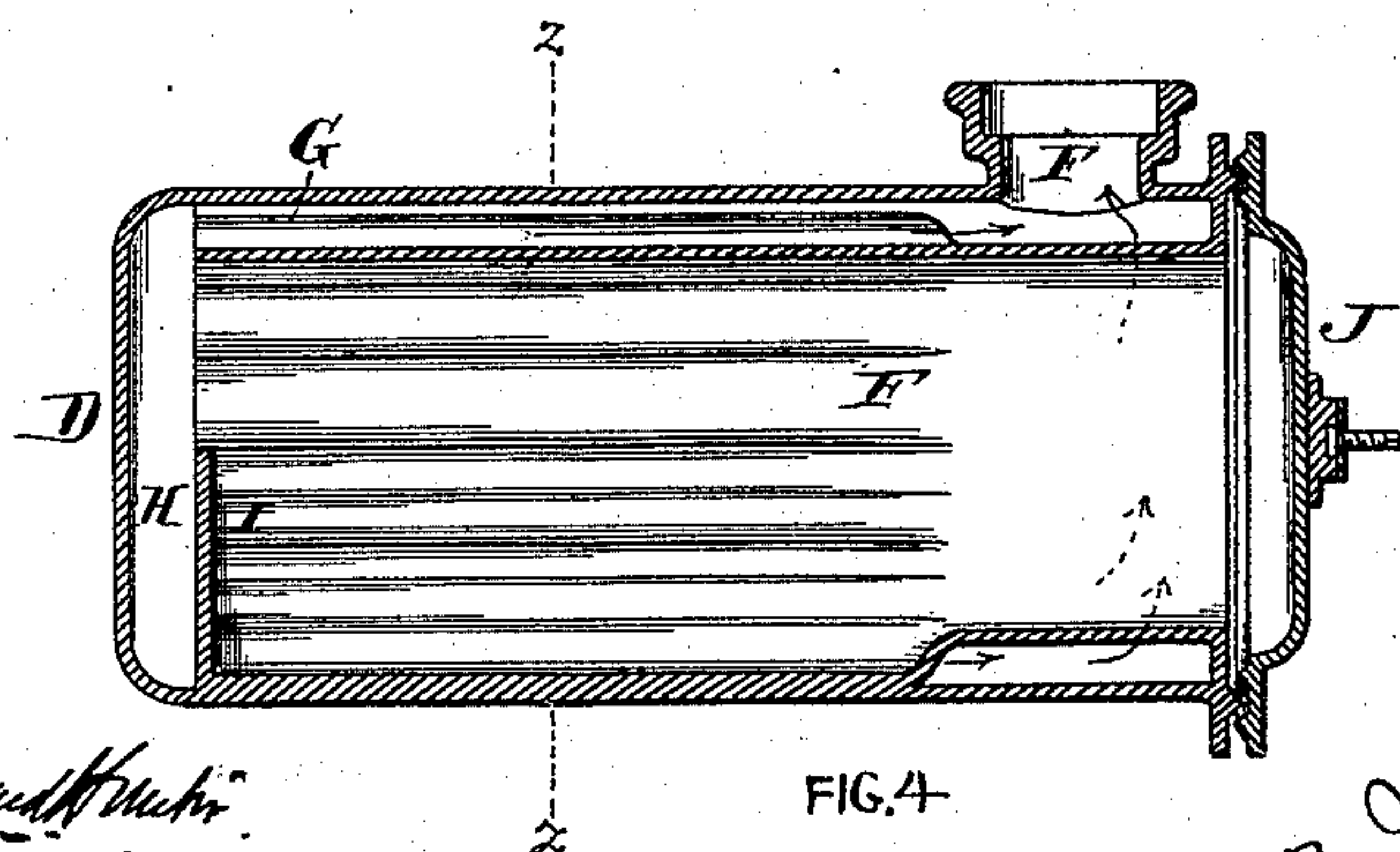


FIG. 4

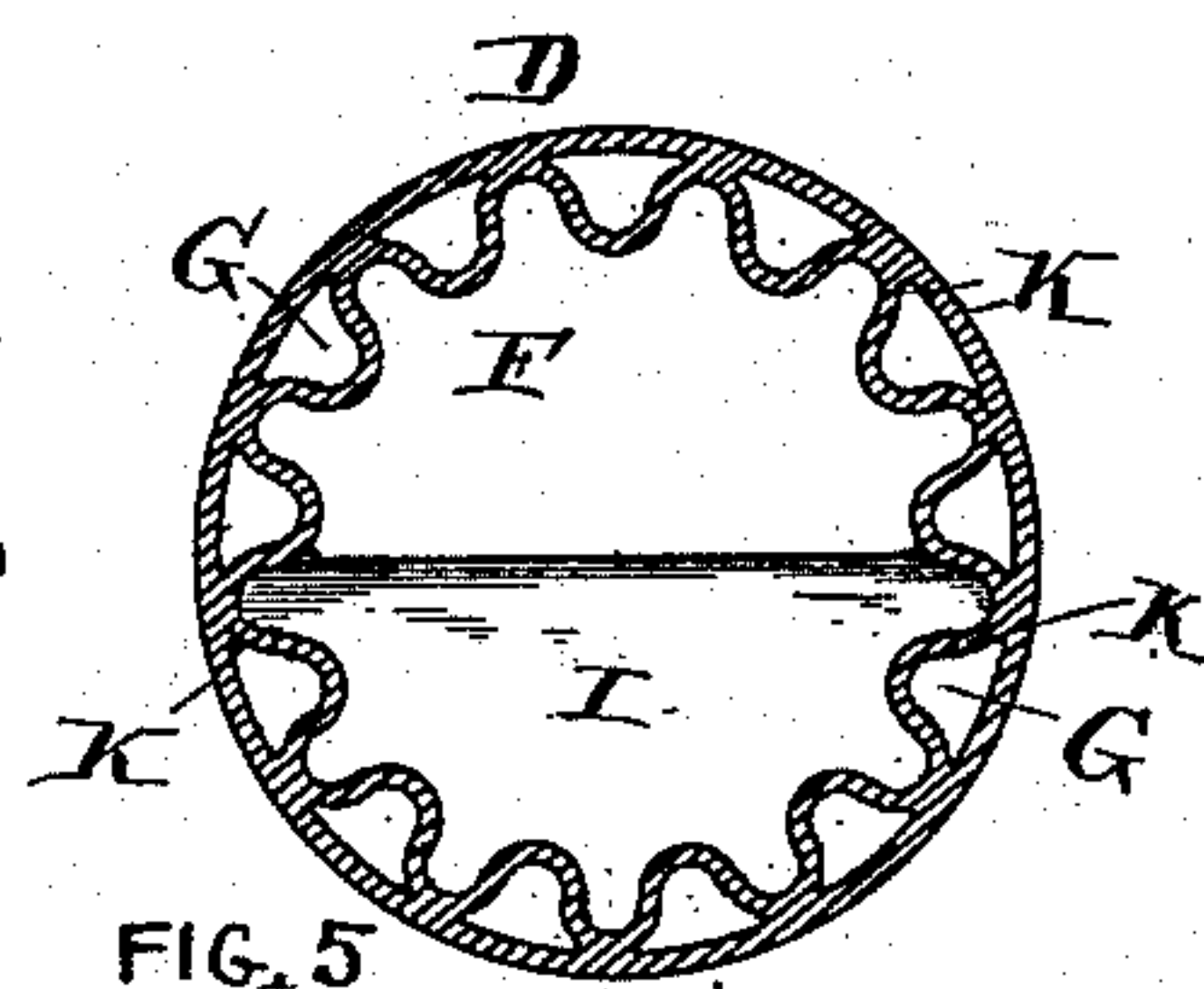


FIG. 5

Attest  
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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. 416,825, dated December 10, 1889.

Application filed July 15, 1889. Serial No. 317,582. (No model.)

### *To all whom it may concern:*

Be it known that I, THOMAS J. CLOSE, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Gas Apparatus, of which the following is a specification.

My invention relates to apparatus for the manufacture of gas; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

More particularly my invention relates to externally-heated generating and superheating gas-retorts for the purpose of generating and immediately superheating and thoroughly fixing the gas before it passes to the holders, whereby the purity, quantity, and illuminating power of the gas is increased.

In carrying out my invention I employ a retort having an inner compartment to contain the gas-producing materials, open at both ends, and a superheating space or spaces between the surface of the outer shell of the retort and the inner compartment, a charging-door to the inner compartment, and an outlet from the superheating space or spaces to convey the gas to the holder, as more clearly described hereinafter. The products of combustion from this inner compartment pass through the open end thereof into the superheating space or spaces between the outer shell of the retort and the inner compartment or chamber, and are thereby subjected to a large degree of heat, and are superheated and freed of their smoky constituents and made into a thoroughly-fixed pure gas which escapes to the holder. This inner superheating-space between the inner combustion-chamber and the outer shell of the retort preferably extends entirely about the inner chamber, so as to form a space on all sides thereof, in order that the products of combustion passing from the inner chamber into this superheating-space may be brought in contact with a large area of heating-surface. In order to more thoroughly diffuse or scatter the products of combustion throughout this superheating-space, I prefer to provide the superheating-space with a series of dividing walls or ribs

extending longitudinally, as is hereinafter more fully explained.

The particular form or shape of the apparatus and the minor details of construction may be varied, as the essence of my invention lies in the formation of a superheating-retort with an inner combustion-chamber, and a superheating space or spaces between the outer shell of the retort and the inner combustion-chamber, through which the products of combustion are caused to pass from the inner combustion-chamber to the gas-outlet, for the purpose of subjecting them to a large degree of heat to purify and thoroughly fix the gas, and also to protect the inner compartment from an excessive temperature, and thus induce perfect destructive distillation of the products without excessive disintegration and too rapid carbonization of the gas-producing materials.

In the drawings, Figure 1 is a sectional side elevation of my improved retort. Fig. 2 is a cross-sectional view of the same upon the line  $x x$  of Fig. 1. Fig. 3 is a similar view upon the line  $y y$  of Fig. 1. Fig. 4 is a sectional side elevation illustrating a modification of my invention, and Fig. 5 is a cross-sectional view of the same on the line  $z z$  of Fig. 4.

A is the furnace-setting, provided with a grate B, above which the generating and superheating retort is supported.

C is a grate-door.

D is the outer shell of the superheating-retort, supported within the setting A above the grate B.

E is the gas-outlet, opening from the outer shell D.

F is the inner combustion-chamber, formed within the outer shell D and having a space G between the inner surface of the outer shell D and the outer surface of the inner chamber F. This inner chamber F is preferably shorter than the outer shell, and is open at its rear end to the superheating-space G by a space or passage H between its end and the wall of the outer shell D, through which products of combustion from the interior of the chamber may escape into the superheating-space G. This inner chamber F is preferably formed with a wall or flange I on its rear end



to prevent the ashes falling out into the shell D and clogging up the lower part of the superheating-space G. It will thus be seen that the retorts are made long, as compared with  
5 their diameter, so as to have a small cubical capacity with relation to the heating-surface as is consistent with a proper adaptation to hold the material to be treated.

J is the door of the retort, opening into the  
10 inner chamber F only, and preferably having an asbestos or other suitable packing *j* and clamped in place in any manner desired. For the purpose of more perfectly distributing and diffusing the products of combustion  
15 throughout the entire superheating-space G for the purpose of bringing them into contact with a larger heating area, I prefer to divide the space G into channels by a series of longitudinally-extending ribs or walls K K.  
20 These ribs or walls are provided with notches, openings, or holes *k* at the front end to allow the gas to escape to the outlet E.

By the arrangement of the ribs the longitudinal passageways are so formed that they  
25 communicate with each other at both ends of the retort, receiving the gaseous products at one end and allowing their escape at the other end. The use of these walls or ribs and the particular formation or construction of them  
30 are not absolutely necessary to my invention, although I consider them an advantage.

In Figs. 4 and 5 is shown a modification of my invention, in which the inner or distillation chamber is formed with a fluted or corrugated surface, with the superheating-space  
35 G, formed of the passages made by these longitudinal corrugations. The spaces made by the corrugations open into an annular chamber *g*, communicating with the outlet E. In  
40 place of making the retort cylindrical, it may be made D shape, as shown in dotted lines in Fig. 3, or, in fact, of any form which may be deemed advantageous. The D-shaped construction referred to would be found advantageous, as presenting a larger surface of the  
45 retort directly to the flame of the fuel on the grate B.

The operation of my invention is as follows:  
The door J is opened and a suitable quantity  
50 of fuel—such as wood or coal—is placed in the inner combustion-chamber F. The door J is now closed and the heat from the furnace dissociates the fuel in the chamber F into its gaseous constituents, which escape out of the rear  
55 end of the chamber through the passage H into the space G. Here they are thoroughly subjected to contact with a large area of heating-surface and their smoky constituents are fully gasified, and a thoroughly-fixed gas of  
60 excellent quality is produced, which upon reaching the forward end of the superheating-space passes through the outlet E to the holder without again entering the entrance or throat of the retort. It is evident that in  
65 this form of retort the heat of the outer shell is far in excess of that of the inner shell; hence anything which passes in contact with

the said outer wall (through the spaces G) is going to be heated to a much higher temperature than that of the chamber F. This is utilized to superheat the gaseous products emanating from the inner chamber and convert  
70 into gases of the proper composition such carbonaceous vapors and gases not already fully dissociated into the required gaseous products,  
75 and such gases are then fixed in passing through the chamber G'. By performing the superheating and fixing operation in the same structure, and immediately upon the taking  
80 place of the destructive distillation of the gas-producing materials, (wood or coal,) I am enabled to obtain a pure gas of high candle-power and great non-condensability. The outer  
85 chamber G also guards the inner wall of the compartment F from becoming too hot, and thus interfering with the proper and perfect carrying on of the destructive distillation process.

It is evident that the retort may be made of metal or fire-clay, as desired.

In my improvement the inner chamber F  
90 is permanently in the retort, and is charged with the material to be gasified through the door or cover J. The outlet E is not exposed by the opening of the retort, as the shell of  
95 the inner chamber seals it at the charging end of the retort.

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

1. In a gas-generating apparatus, the combination of an inner and outer retort, the passage-way between the two retorts being sealed at its forward end and having a communicating passage-way between the retorts  
100 at its rear end, and a gas-tight door to the inner chamber at the front end to close it directly against the exterior atmosphere, and a gas-tight passage-way opening from the sealed end of the passage-way between the two retorts, whereby the inner retort may be  
105 charged without opening the forward end of the passage-way between the two retorts.

2. In a gas-generating apparatus, the combination of an inner and outer retort having  
115 a passage-way between the two retorts, which is sealed at its forward end and communicates with the rear end of both retorts, a gas-outlet pipe from the sealed end of the passage-way between the two retorts, and a gas-tight door to seal the forward end of the inner retort against the exterior atmosphere,  
120 and which may be opened for charging said inner retort without its removal from the outer retort.

3. In a gas-generating apparatus, the combination of long inner and outer retorts arranged one within the other and forming between them longitudinal passage-ways communicating with each other at both ends and  
130 at the rear end opening into the inner retort, but sealed at the forward end, a gas-outlet from the forward or sealed end of the longitudinal passage-ways, and a gas-tight door



arranged between the inner retort and the exterior atmosphere to permit ready and direct charging and discharging of the inner retort without its removal from the outer retort.

5 4. A gas generating and superheating retort, consisting of the inner compartment F, having a door or cover J at one end, closing it to the exterior atmosphere, and formed  
10 with the wall I, extending upward from its lower part and partly closing its other end, an inclosing superheating-chamber G, sealed at its forward end, substantially as set out, around said inner compartment, a passage-  
15 way H between the inner compartment above the wall and one end of the chamber G, and a gas-outlet E from the other end of the said chamber G.

5. The combination of long inner and outer chambers formed of one integral casting and 20 formed with a communicating-passage for gas between them at their rear end, and a gas-tight front end to the outer chamber made by a flange forming a union between the chambers, a gas-outlet from the front end of 25 the outer chamber, and a removable gas-tight door to close the inner chamber against the atmosphere and permit direct charging and discharging.

In testimony of which invention I have 30 hereunto set my hand.

THOMAS J. CLOSE.

Witnesses:

ERNEST HOWARD HUNTER,  
ALPHONSUS J. DUNN.