

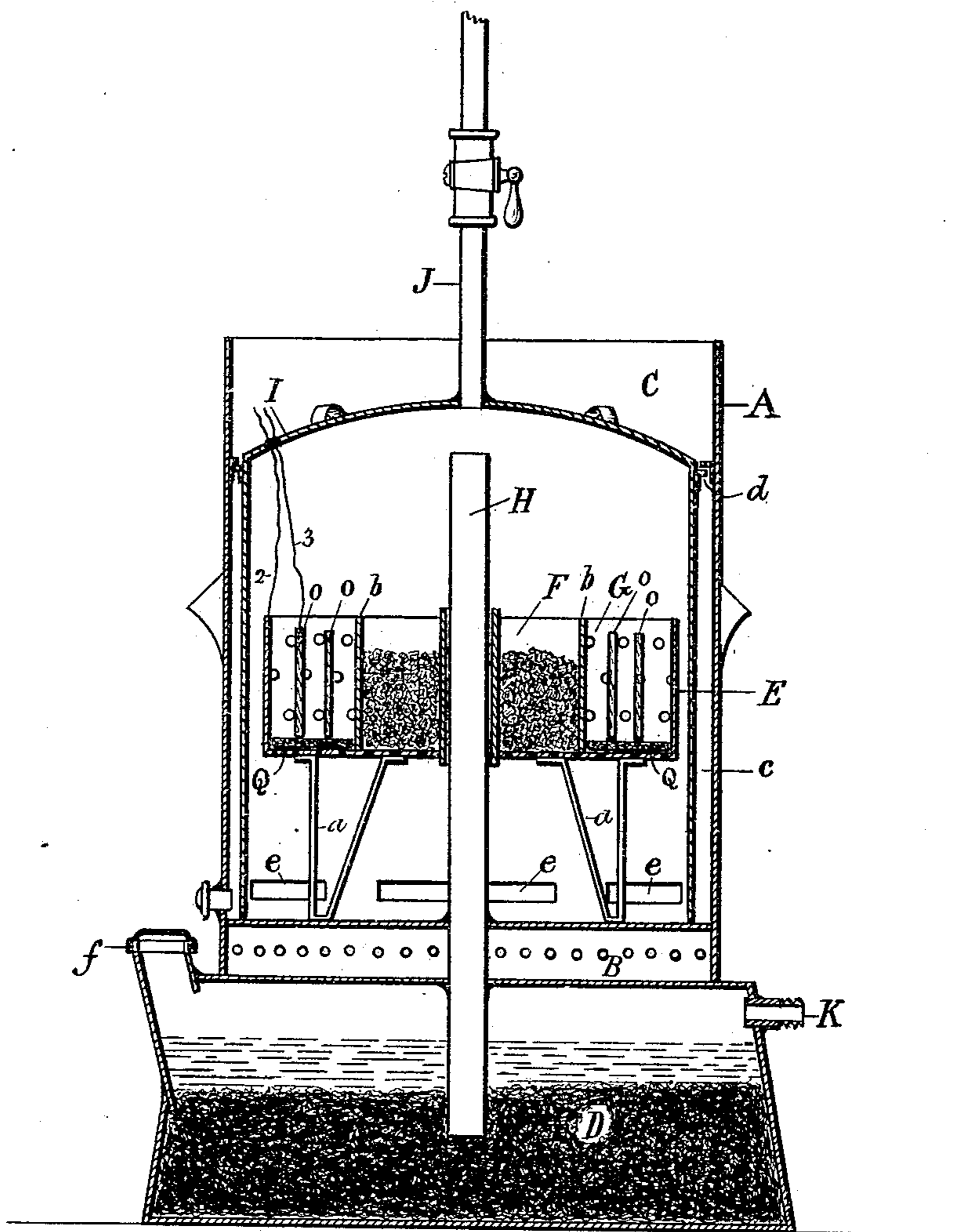
(No Model.)

F. B. FORSTER.

APPARATUS FOR MANUFACTURING ILLUMINATING AND HEATING GAS.

No. 354,185.

Patented Dec. 14, 1886.



WITNESSES:

*Gas S. Eubank.*  
*E. P. Flint.*

INVENTOR

FRANCIS B. FORSTER.

BY

*Francis C. Bowen*

ATTORNEY

# UNITED STATES PATENT OFFICE.

FRANCIS B. FORSTER, OF NEW YORK, N. Y.

APPARATUS FOR MANUFACTURING ILLUMINATING AND HEATING GAS.

SPECIFICATION forming part of Letters Patent No. 354,125, dated December 14, 1886.

Application filed April 14, 1886. Serial No. 198,838. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS B. FORSTER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Manufacturing Illuminating and Heating Gas, of which the following is a specification.

My invention relates to the manufacture of illuminating and heating gas for heating and lighting purposes; and it consists in the novel apparatus herein described, whereby a gas of superior quality may be produced at a very low cost.

The apparatus used in carrying out my invention is illustrated in the accompanying drawing, which represents a vertical central section thereof.

The letter A designates a vessel, which is divided by means of a horizontal partition, B, into two compartments, C D, the upper of which is preferably made of larger area than the lower, and in which is supported, as upon feet *a*, a pan, E. This pan is of annular or other suitable shape, and is divided by an annular partition, *b*, into two compartments, F G, while it is perforated on the side and bottom, either or both, to permit entrance of liquid thereto. Said annular pan E surrounds a pipe, H, which is supported in the partition *b*, and extends from the lower compartment, D, to a point near the top of the upper compartment, thus producing a communication between the two compartments, said pipe being open at both ends. In the upper compartment, C, is a bell, I, which is of less diameter than said compartment, leaving a space, *c*, between it and the sides of the compartment, and which is inverted over the annular pan E, as well as over the pipe H. Said bell I is held in position in the upper compartment, C, by suitable lugs and keys, *d*, and it is open at the bottom, and it is provided with holes or openings *e* in the side for the passage of liquid thereto from its inclosing-compartment. From the top of the bell I extends a pipe, J, which is provided with a suitable stop-cock, and may be filled for a portion of its length with copper wire-gauze acting as a sieve or filter. The lower compartment, D, is provided with a filling-orifice, *f*, having a suitable cap, and also with an outlet-pipe, K, both said filling-

orifice and pipe being at or near the top of said compartment.

The apparatus is preferably made of copper throughout, except as to the outlet J of the bell, and the operation is as follows: The lower compartment, D, is supplied with naphtha or other hydrocarbon liquid, and also supplied with a suitable quantity of excelsior or other fibrous material. The inner compartment, F, of the annular pan E is supplied with salt (either fine or rock salt) in a dry or undissolved state, and into the outer compartment, G, of said pan are placed sheets of zinc *o*, which may be in the form of rings, and to which is attached the pole of an insulated wire, another wire being attached to a suitable part of the copper composing the body of the pan. Said wires may be carried either through air-tight insulated openings P in the top of the bell I, or they may pass under the lower edge of the same through the annular chamber. Sulphuric acid is now mixed with water in fixed proportions—say in the proportion of one part of sulphuric acid to nine parts of water—and the diluted acid poured into the upper compartment, C, whence it passes through the openings *e* of the bell into the latter, and thence through the perforations of the pan into the latter, where it comes in contact with the zinc plates *o*, as well as the salt contained in the pan. By the contact of the diluted sulphuric acid with the zinc plates *o* hydrogen is produced, and by opening the valve of the outlet-pipe J a sufficient length of time to permit the air contained in the bell I to escape after the valve of the outlet-pipe J is closed, the bell becomes filled with the hydrogen gas, whence it forces itself through the pipe H into the lower compartment, D, so that by contact with the light carbon vapors of the liquid contained in the lower compartment it becomes carbureted, and in that state may be conducted to any desired point through the outlet-pipe K. The action of the diluted sulphuric acid on the salt contained in the pan E is to produce, in the first instance, hydrochloric acid, which is decomposed by the action of the battery into hydrogen, and chlorine, the latter decomposing the zinc plates, forming chloride of zinc, and the hydrogen being set free, to be afterward carbureted, if desirable, by passing it through the naphtha. The

effect of the hydrochloric acid is to increase the acidity of the diluted acid introduced into the gas generating chamber and replace or replenish any acid that may be consumed in the production of hydrogen, while the effect of the chlorine, a portion of which mixes with the hydrogen, is to render the latter heavier and better fitted to be carbureted.

When it is desired to use the hydrogen gas without carbureting the same, as for heating purposes, the illuminating-pipe K is shut off and the gas is permitted to escape directly from the bell I through its outlet-pipe J, the latter being provided with flexible pipes for conducting the gas to the desired point, as to a heating or cooking stove.

The electricity generated by the action of the diluted acid on the zinc plates *o* and the copper may be used for various purposes—as for ringing electric bells, annunciators, fire or burglar alarms, or for lighting gas—and it is evident that by means thereof the utility of my apparatus is materially increased.

As the apparatus is working automatically through the hydrogen in the bell I, it follows that when no gas is used either through the hydrogen pipe J or the illuminating-gas pipe K, the acidulated water will be driven back through the openings *e* into the outer compartment, C, leaving the zinc plates *o* free from connection with such diluted acid, which will have the effect of stopping the production of electricity. In order to have no interruption in the production of electricity, I place in the bottom or on the sides of the outer compartment, G, of the pan a porous material, such as asbestos or felt, *e*, or mineral wool or other suitable material, about one inch thick, which will hold the diluted acid until the time that either the illuminating or heating gas is used again.

When the electric wires 2 and 3 are conducted through the top of the bell I, the portions of the wire within the bell may be coiled in the form of springs, to permit a motion of the bell without affecting the wires.

I am aware that the use of zinc and an alkaline salt in the manufacture of hydrogen gas is old, and I do not claim such, broadly, as my invention, the novel features of which, as to

the process employed, are the introduction of dry salt, together with the zinc, into the proper chamber to be simultaneously acted on by the diluted acid subsequently supplied to said chamber, the effect being to produce superior operation and prevent waste of material.

I am also aware that an apparatus has heretofore been used in which metallic scraps or turnings and carbonate of lime are subjected to the action of diluted acid, and the resulting gas carbureted with hydrocarbon vapor, and neither do I claim such as my invention. It will be seen that in my apparatus provision is made for producing an electrical current within the gas-generating chamber by the connection of suitable wires to the copper pan and zinc plates, which being constituent parts of the apparatus do not entail any expense in effecting the desired result.

Another important feature of my apparatus is the employment of the pipe J, whereby provision is made for carrying off the hydrogen gas without its being carbureted, to be used for heating or other like purposes, and without interfering with the carbureting medium, the apparatus being, in fact, adapted to supply both carbureted and uncarbureted gas, one independently of the other.

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

In an apparatus for generating gas, the combination of a copper pan, arranged substantially as herein described, to be supplied with diluted acid, zinc plates arranged in said pan, electric wires connected to said plates and the body of the pan, respectively, the bell I, inverted over said pan and constructed to permit the passage of said wires, the pipe J, extending from the top of said bell, for the outlet of hydrogen gas, the carbureting-compartment D, and the inlet-pipe H of said compartment, substantially as and for the purpose set forth.

Signed at New York, in the county of New York and State of New York.

FRANCIS B. FORSTER.

Witnesses:

FRANCIS C. BOWEN,  
JAS. S. EWBANK.