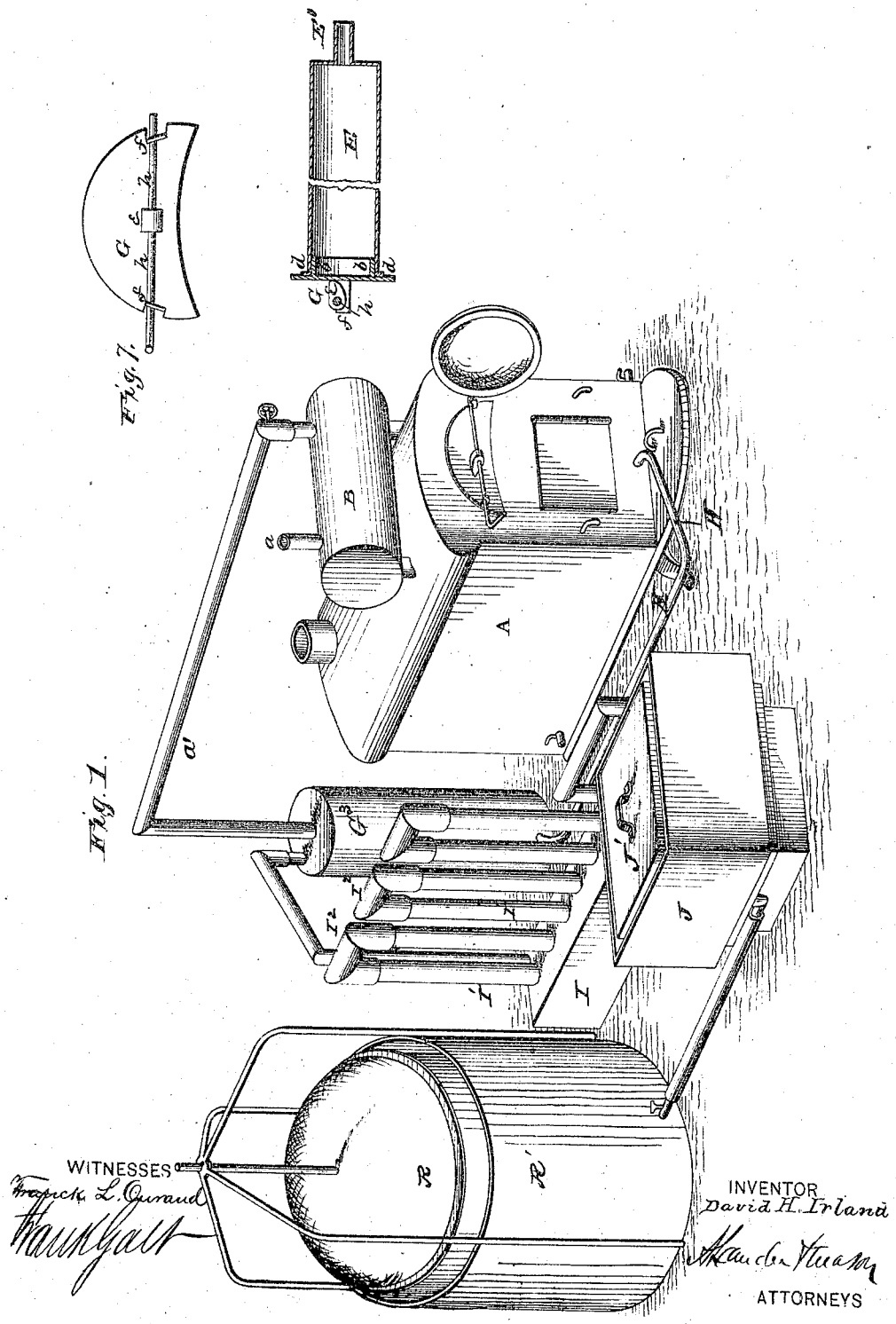
3 Sheets—Sheet 1.

D. H. IRLAND.

PORTABLE GAS APPARATUS.

No. 191,531. Patented June 5, 1877.



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PORTABLE GAS APPARATUS.

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Fig. 2.

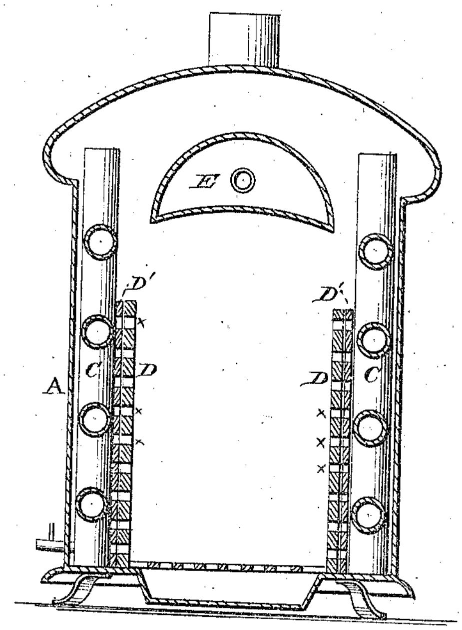
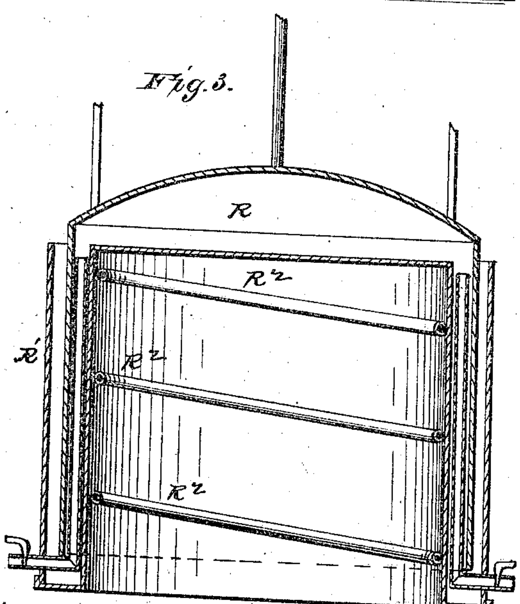


Fig. 3.



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3 Sheets—Sheet 3.

D. H. IRLAND.

PORTABLE GAS APPARATUS.

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Fig. 4

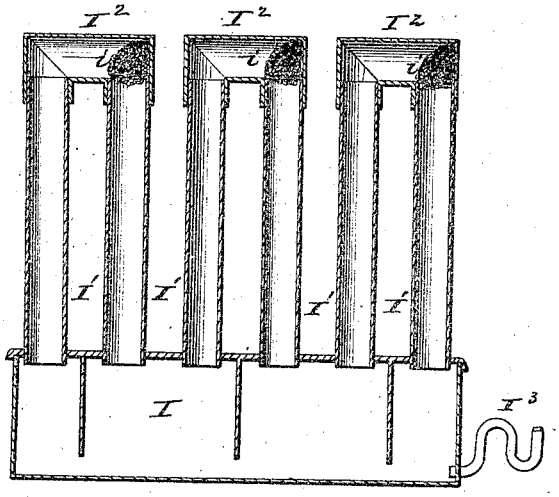


Fig. 6.

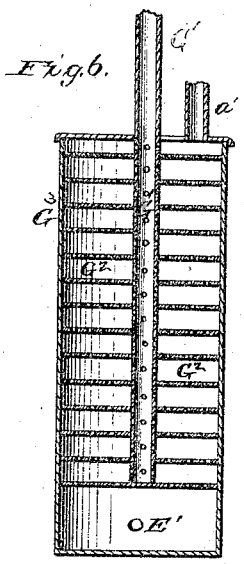
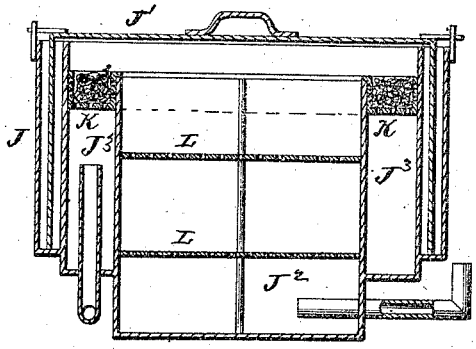


Fig. 5.



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UNITED STATES PATENT OFFICE.

DAVID H. IRLAND, OF NEW YORK, N. Y.

IMPROVEMENT IN PORTABLE GAS APPARATUS.

Specification forming part of Letters Patent No. 191,531, dated June 5, 1877; application filed May 3, 1877.

To all whom it may concern:

Be it known that I, DAVID H. IRLAND, of New York city, in the State of New York, have invented certain new and useful Improvements in Portable Domestic Gas Apparatus; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the construction and arrangement of a portable domestic coal-gas generator and steam-heater combined, as hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a perpective view of the entire machine. Fig. 2 is a cross-section of the furnace; Fig. 3, a vertical section of the gas-holder; Fig. 4, a section of the condenser; Fig. 5, a section of the purifier; Fig. 6, a section of the hydraulic main and scrubber; and Fig. 7, a detailed view of the retort.

A represents the shell of the furnace, provided on top with a horizontal steam-boiler, B, which is connected near each end with a system of horizontal and vertical pipes, C C, arranged along the sides on the inside of the furnace, said pipes forming or constituting part of the boiler, the so-called boiler B on top forming also the steam-dome, from an outlet, *a*, on the top of which steam may be conducted through suitable pipes to radiators of any ordinary construction for heating the building by steam.

On each side of the furnace is a lining, D, of tiling, extending from the bottom upward for a suitable distance; and between this tile-lining and the pipes C, on each side, is a sliding sheet-metal damper, D′. The lining D and damper D′ are both provided with a number of perforations, *x*, corresponding with each other. The dampers D′ may be moved forward and backward by means of suitable handles at the front of the furnace, so as to entirely uncover the perforations in the tiling, or partially or entirely close the same, and thereby regulate the heat to the boiler.

In summer time, or at any time when no steam is to be used, the tile-lining is to extend all the way up to the top.

In the top of the furnace is a retort, E, of ordinary construction, provided at its front end with a lid, G, having the usual flange *b* fitting within the end of the retort. To seal the retort I use a packing, *d*, of isinglass cut out to fit around the flange *b*, as shown. This isinglass packing takes the place of the common "luting," and is far superior thereto, as it is always in place and can be used over and over again, saving both time and labor.

From the sides of the retort project two hook-shaped arms, *f f*, in which is placed a shaft, *h*, provided with an eccentric, *e*, which by turning the shaft *h* is brought against the lid G to press the same into its place on the end of the retort and hold it there.

From the retort E the gas passes through a pipe, E′, into the hydraulic main G^3, which also forms a scrubber. Through the top of the combined scrubber and hydraulic main G passes a pipe, G^1, which is closed at its lower end and perforated, its entire length within the main, as shown. To this pipe is secured a series of horizontal perforated diaphragms, G^2, fitting within the main G^3.

The gas-pipe E′ enters the main below the bottom diaphragm; and the top of the pipe G^1 is by a pipe, *a′*, connected with the steam-boiler or dome B, so that steam will be conducted into said pipe G^1 from the boiler, and escape through the perforations in the pipe into the main and scrubber. The steam thus admitted under low pressure permeates and acts upon the ascending gas to take out the ammonia. This process of scrubbing by means of steam under low pressure is thorough and efficient, and all the condensation settles down to the bottom of the main G^3, from whence it is taken off automatically by a siphon, H, and conducted to the fire-box of the furnace and consumed.

It will thus be seen that there is no necessity of cleaning out the scrubber. It cleans

itself by the tar being drawn off automatically from the bottom of the hydraulic main to the furnace, where it is consumed.

From the top of the combined hydraulic main and scrubber the scrubbed gas passes to the condenser, consisting of a box, I, divided by partitions, and provided with upright pipes I^1, connected at the top in pairs by elbow-pipes I^2.

This construction of the condenser is substantially the same as heretofore sometimes used; but I provide the elbow at the top of each pipe, through which the gas passes upward, with an interior packing, *i*, of sponge or similar absorbent material, which retards the flow of the gas, so that the condensation will be the more thorough. This sponge-packing also absorbs the moisture contained in the gas, which moisture then settles down in the bottom of the condenser, and is carried off by a siphon, I^3.

From the condenser the gas passes to the purifier J, which has a water-sealed cap, J^1, as is usual. The gas enters a central chamber, J^2, of the purifier at the bottom, passes upward through the same, over the top thereof, and down through a surrounding chamber, J^3, and from the bottom thereof to the gas-holder.

In the central chamber J^2 of the purifier are two perforated diaphragms, L L, between and on top of which is placed a purifying mixture composed of equal parts of oxide of iron, tan-bark, shell-lime, and copperas thoroughly mixed together. By repeated and long-continued experiments I have found that this mixture takes the sulphur fully out of the gas more thoroughly than is done by the purifying materials or mixtures heretofore generally employed, and this mixture need not be renewed near as often as those now used.

If a poor quality of coal is used to make the gas, the chamber J^3 is provided at the top with a pan-shaped perforated diaphragm, K, which pan is to be filled with wool for the gas to pass through, whereby the gas is enriched and its illuminating power greatly increased.

From the purifier the gas passes, as described, to the gas-holder R, which moves up and down in the usual manner in a water-seal, R^1. The inner shell or cylinder of this water-seal is closed at the top, and within the same is laid a coil of pipe, R^2, close against the inside thereof, and extending the entire distance from top to bottom of the water-seal. This coil is to be connected with the steam-boiler, so that steam can be passed through it in the winter time to prevent the water in the seal from freezing. This is applicable to both portable and stationary gas-works.

I am aware that steam has been used for this purpose before; but in such cases it has only been applied at the top of the water-seal when the same is built in the ground. By my invention of applying the steam through a coil from top to bottom of the water-seal the entire height of the seal is acted upon by the steam, and thus the construction of stationary gas-works may be made less expensive and costly.

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

1. In a furnace for portable domestic gas apparatus, the combination, with the boiler-tubes C, of the perforated tile-lining D and the sliding perforated dampers D′, for the purposes herein set forth.

2. In a gas-retort, a packing or seal, *d*, of isinglass interposed between the lid and the end of the retort, as set forth.

3. In a portable domestic gas apparatus, the hydraulic main and scrubber G^3, having the perforated steam-pipe G^1 and the series of perforated diaphragms G^2, substantially as and for the purposes herein set forth.

4. In a portable domestic gas-machine, the gas-condenser composed of the partitioned box I, upright pipes I^1, and elbow-connections I^2, the packing *i*, of sponge or similar absorbent material, placed in the elbows, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of May, 1877.

DAVID H. IRLAND.

Witnesses:
J. M. MASON,
FRANK GALT.