3 Sheets—Sheet 1.

W. SMITH.

Apparatus for the Manufacture of Gas.

No. 197,420. Patented Nov. 20, 1877.

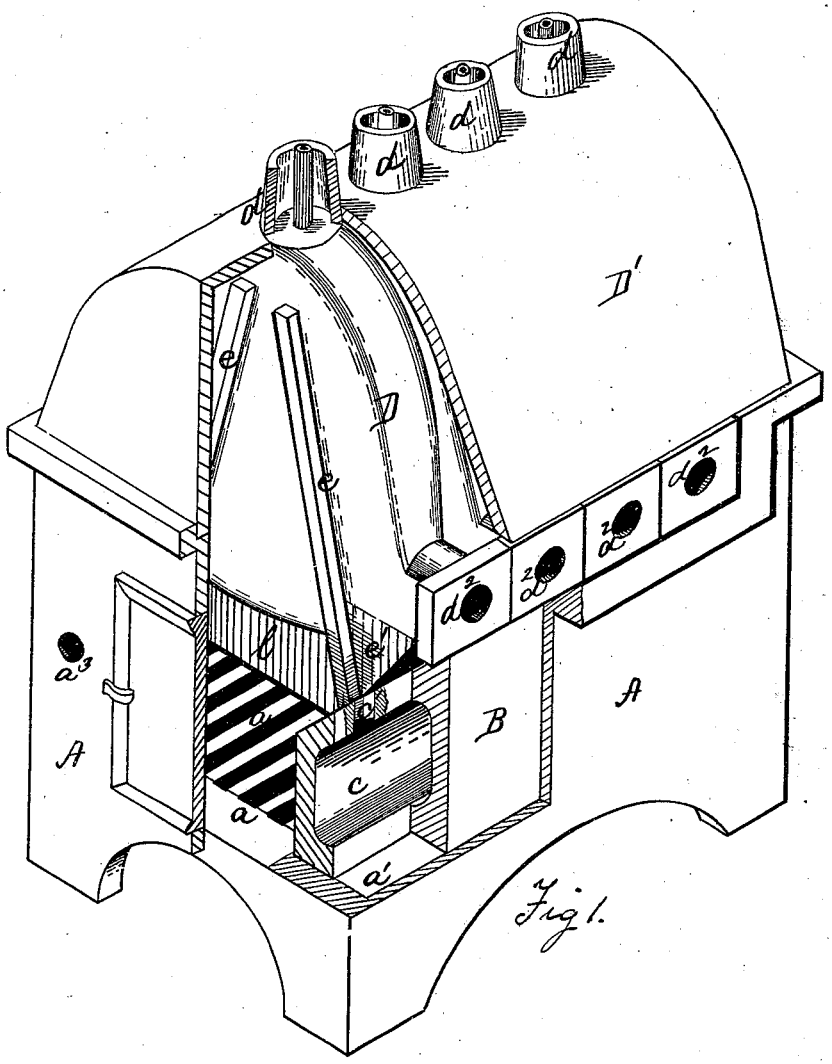

Fig 1.

Witnesses.
John K Smith
John. D. Best

Inventor.
William Smith
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Attys

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W. SMITH.

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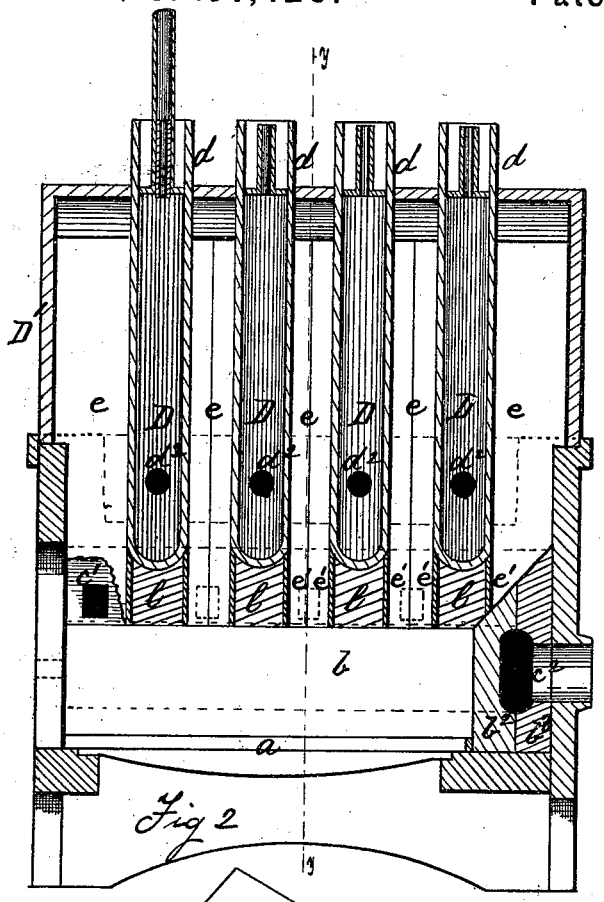

Fig 2

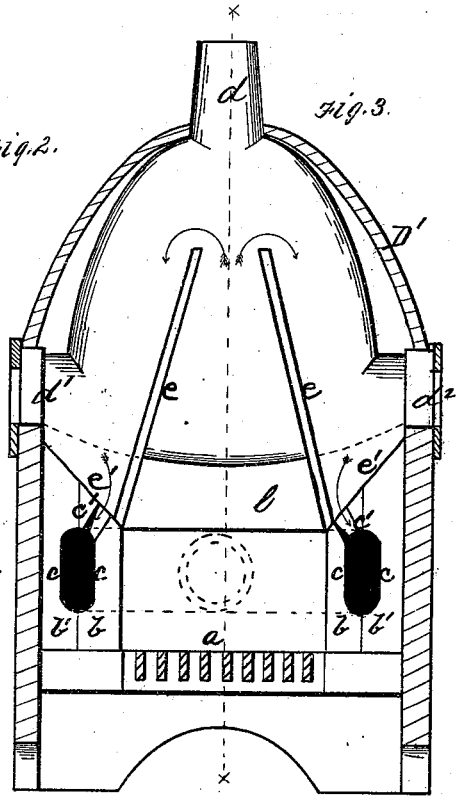

Fig. 3.

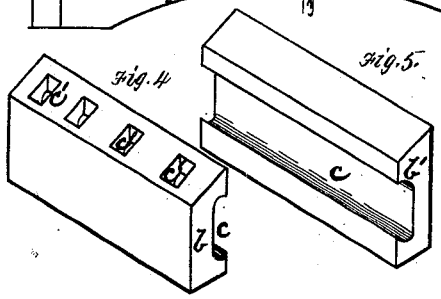

Fig. 4

Fig. 5.

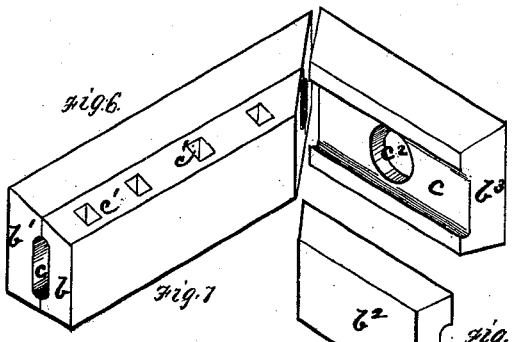

Fig. 6.

Fig. 7

Fig. 8.

Fig. 9.

WITNESSES.

John K. Smith

John F. Best

INVENTOR.

William Smith

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3 Sheets—Sheet 3.

W. SMITH.

Apparatus for the Manufacture of Gas.

No. 197,420. Patented Nov. 20, 1877.

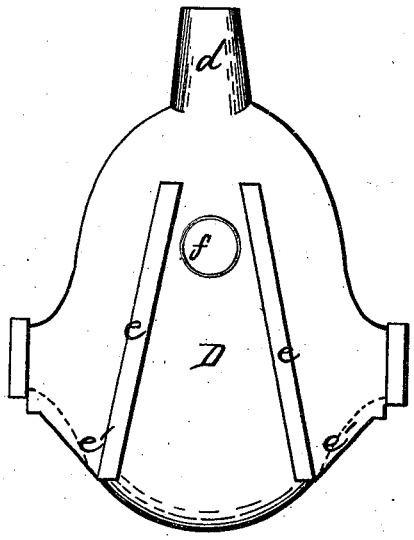

Fig 10

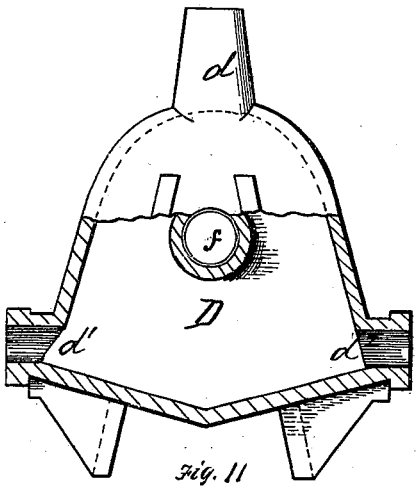

Fig. 11

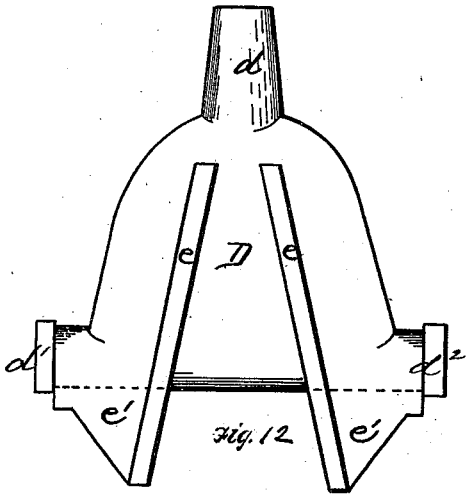

Fig. 12

WITNESSES.

John A Smith

John F Best

INVENTOR.

William Smith

by Bakewell & Klein

Attys

UNITED STATES PATENT OFFICE.

WILLIAM SMITH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **197,420**, dated November 20, 1877; application filed September 27, 1877.

To all whom it may concern:

Be it known that I, WILLIAM SMITH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for the Manufacture of Gas; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a perspective view, partly in section, of a furnace and retorts embodying my invention. Fig. 2 is a longitudinal vertical section, and Fig. 3 a transverse section, of the same. Figs. 4, 5, 6, 7, 8, and 9 are detailed views of the furnace-tile. Figs. 10, 11, and 12 are modified forms of retorts.

Like letters refer to like parts wherever they occur.

My invention relates to the construction of furnaces and retorts for the manufacture of gas from oil; and consists, first, in the arrangement of a series of vertical retorts, so set in a suitable furnace and provided with deflectors that the flame of the furnace is caused to reverberate upon and envelop the retorts, whereby the retorts are evenly and effectually heated; secondly, in the formation of grooved or channeled and perforated tile, which, when arranged in position, form a series of flues surrounding the fire-chamber, and communicating with the stack; thirdly, in so constructing and shaping the retorts that only curved lines are presented to the flame, whereby the effect of the expansion and contraction of the metal is neutralized, and a strong and durable apparatus is obtained; and, finally, in details of construction hereinafter specified.

I will now proceed to describe my invention so that others skilled in the art to which it appertains may apply the same.

A indicates the outer wall of the furnace or fire-chamber, which may be built of brick, if desired; but, if preferred, either cast of metal or formed in separate plates and bolted together. Within the same is arranged centrally a grate surrounded by a ledge or flange, a^1, for the support of the lining B. The lining B is composed of a series of tiles, b b^1 b^2 b^3, grooved longitudinally, as shown at c, so that when two tiles are placed face to face a continuous flue is formed within the fire-chamber walls. Of these tiles those marked b b^1 are usually beveled or sloped upon one side, to accommodate the retort when dependent retorts are used. Said tiles are pierced, as at c^1, at equal distances, so that the flue formed by c communicates directly with the fire-chamber. The end tiles b^2 b^3 may or may not be beveled, as preferred, there being no special object other than uniformity in sloping them; but the tile b^3, next the outer wall, should be perforated, as at c^2, to permit the products of combustion from c to enter the smoke-stack. l represents a series of liners, formed of fire-brick or other material, shaped on one face to correspond with the under surface of the retort, which is to rest thereon. These liners span the fire-chamber between the flue openings or ports c^1, and support the several retorts, thus preventing any tendency of the retorts to sag, and preserving them from the direct action of the heat on the bottom.

D represents a series of vertical retorts arranged within the furnace, as shown in Fig. 1, supported by the wall A, or, if desired, by the tiles B, and with spaces between the several retorts to permit the flame to play around them. These retorts are flat or flask-shaped, terminating above in a neck, d, having a cup or lead seal for the reception of the pipe which conducts off the gas, and either straight, rounded, or sloping below, as shown in Figs. 3, 10, 11, and 12, but preferably rounded or slightly bellied, as shown in Fig. 3, such shape being found to be equally efficient and very durable. d^1 d^2 indicate tubes or openings on opposite sides of the retort, one being provided with a suitable pipe for admission of oil to be transferred into gas, the opposite opening being employed for cleaning the retort, and when not so used is luted or otherwise closed.

In order to cause the flame and products of combustion to envelop and equally heat the retort a series of deflecting-partitions, e, are formed upon the sides of the retorts, which, when the retorts are set, form central flues, which receive the products from the grate, and side flues, which conduct the products to the flues which surround the fire-chamber.

Where necessary, from the form given to the bottom of the retort, the partitions *e* are extended down to form wings or flanges *e'*, whose lower edges rest upon the tiles B between the perforations c^1. In some instances it will be found advantageous to form passages or flues *f* (shown in Figs. 10 and 11) through the retorts to effectually heat the upper part thereof.

D' is a hood or cap, which may be of any suitable material, but is preferably of cast metal, or plate riveted to end pieces, provided with openings above for the passage of the necks of the retorts, and so connected to the case A as to be detachable therefrom. In the end of the outer wall or case A, opposite each set of tiles *b* b^1, is an opening, a^3 by means of which the tile-flues can be cleaned at will.

The devices are employed in the usual manner of making oil-gas—that is to say, the retorts having been brought to or nearly to a cherry red, the oil is admitted to the retort in graduated quantities by means of opening d^1, is converted into gas, and escapes by the eduction-pipe connected to neck *d*.

When the retorts are to be cleaned the tube d^2 is unclosed, and the gas allowed to flow through, or burn within the retort, and a rod or other instrument inserted to scrape the retort, if necessary. The openings a^3, which are ordinarily closed by fire-clay or plugs, may be opened to clear the flues *c*.

The advantages of my invention are that the essential parts are readily detached and packed for transportation; are easily removed and replaced, or repaired; new parts can be substitute for old sections without materially interrupting the working of the apparatus; the apparatus is very compact, and has great capacity in proportion to its size; and, owing to the arrangement of the flues and form of the retorts, is very durable, and consumes little fuel.

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

1. In a gas apparatus of the class described, the combination of a series of vertical retorts having deflecting ribs, forming the central flue and side flues, with a series of channeled and perforated side walls, and central fire-chamber, substantially as and for the purpose specified.

2. The longitudinally grooved and perforated tile lining for gas-retort furnaces, in combination with the ribbed retorts, substantially as specified.

3. The oval flask-shaped gas-retort provided with the deflecting-ribs, the neck, and oil-inlet, substantially as and for the purpose specified.

In testimony whereof I, the said WILLIAM SMITH, have hereunto set my hand.

WILLIAM SMITH.

Witnesses:

JAMES I. KAY,

F. W. RITTER, Jr.