3 Sheets—Sheet 1.

I. N. STANLEY.

GAS GENERATING APPARATUS.

No. 180,955. Patented Aug. 8, 1876.

Fig: 1.

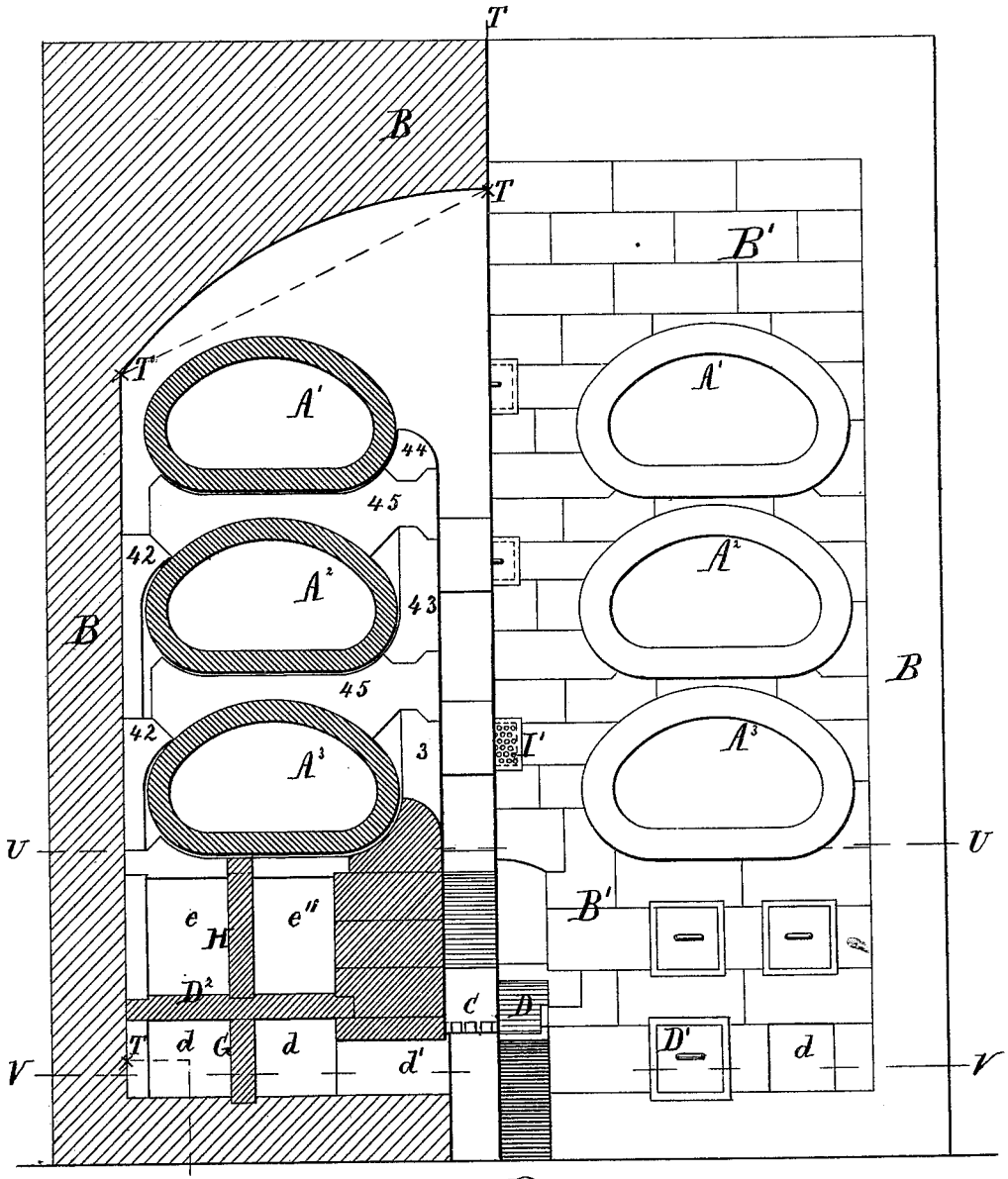
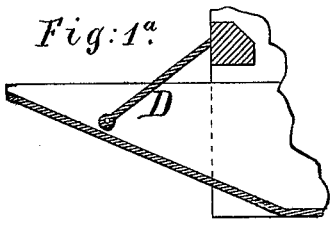


Fig: 1ª.



Witnesses:

C. Henry Gentner

C. C. Stetson

Inventor:

Ira N. Stanley

by his attorney

F. S. Stetson

3 Sheets—Sheet 2.

I. N. STANLEY.

GAS GENERATING APPARATUS.

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Fig: 2.

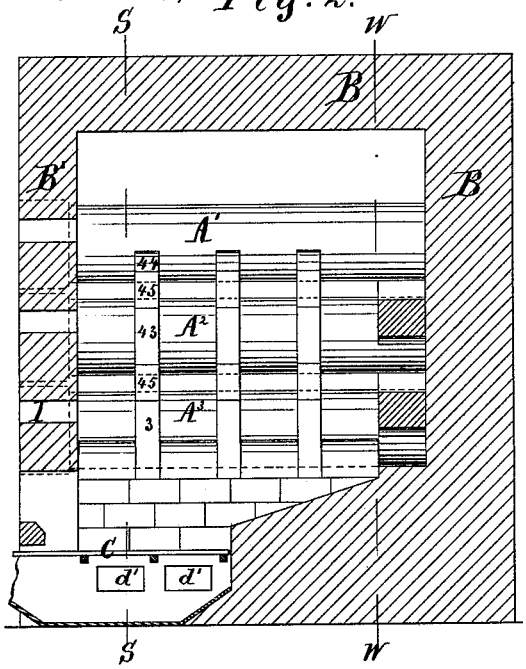


Fig: 3.

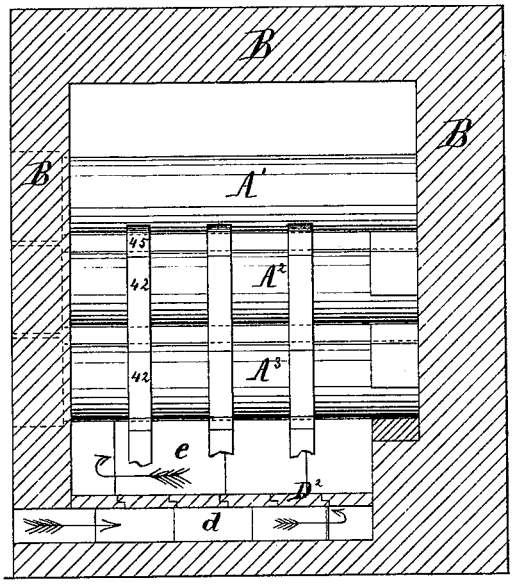


Fig: 4.

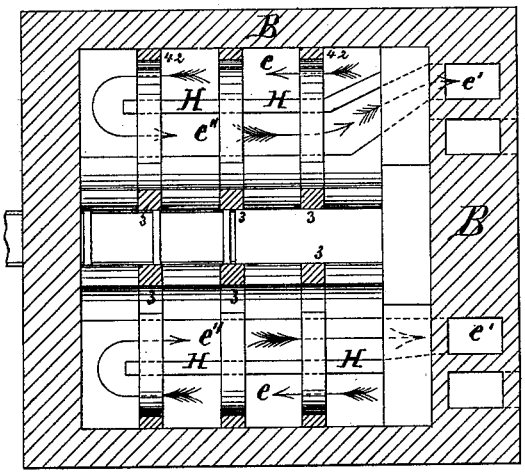
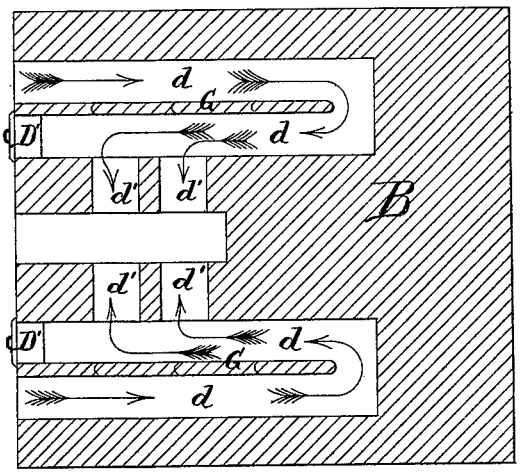


Fig: 5.



Witnesses:

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3 Sheets—Sheet 3.

I. N. STANLEY.

GAS GENERATING APPARATUS.

No. 180,955. Patented Aug. 8, 1876.

Fig: 6.

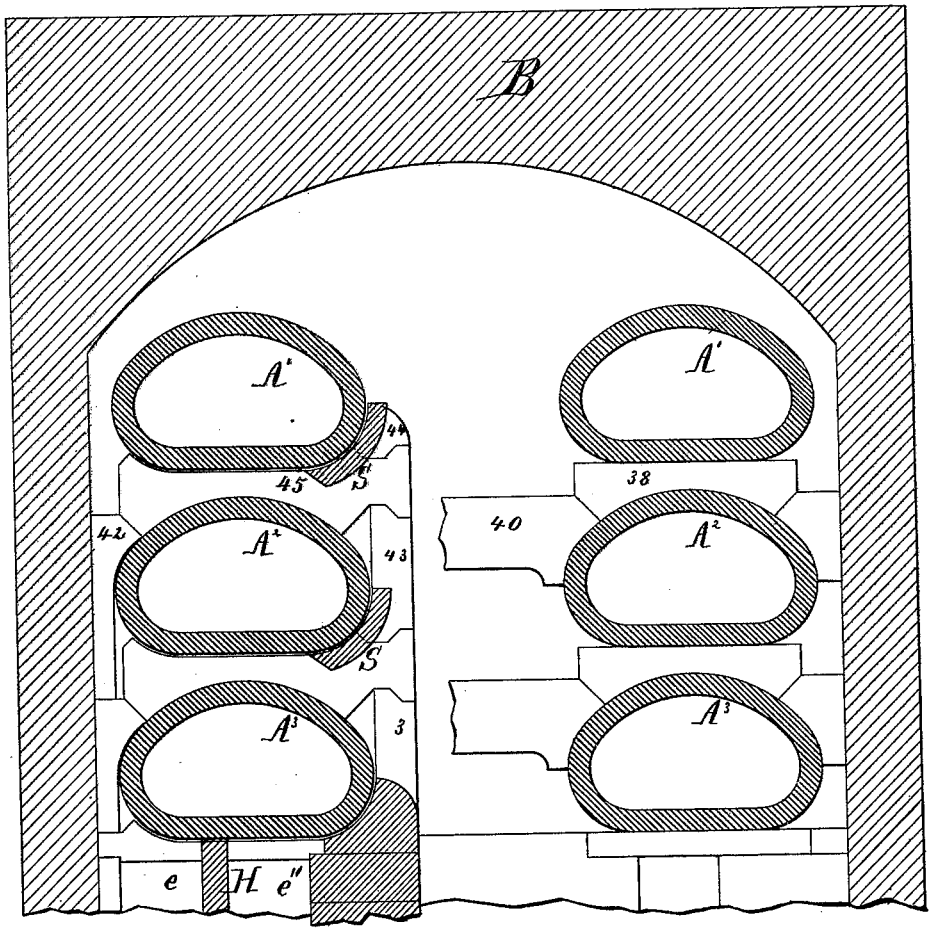
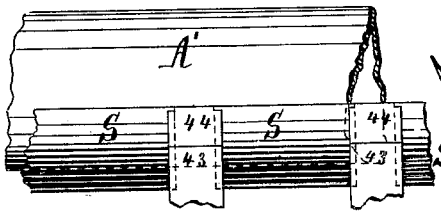


Fig: 6ª



Witnesses:

A. Henry Gentner

C. C. Stetson.

Inventor:

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J. D. Stetson.

UNITED STATES PATENT OFFICE.

IRA N. STANLEY, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND EDWARD D. WHITE, OF SAME PLACE.

IMPROVEMENT IN GAS-GENERATING APPARATUS.

Specification forming part of Letters Patent No. **180,955**, dated August 8, 1876; application filed May 8, 1876.

To all whom it may concern:

Be it known that I, IRA N. STANLEY, of Brooklyn, Kings county, and State of New York, have invented certain Improvements relating to Gas-Generating Apparatus, of which the following is a specification:

I have devised a series of improvements in the construction of benches of retorts. The retorts may be of the usual form and material, and the benches may present very nearly the usual appearance externally.

I will describe the invention as applied to a six-retort bench, though it will be understood that a bench of four retorts, or of any other number, may be used in connection with the whole or the main portion of the invention, if desired.

I utilize heat heretofore lost by causing it to heat the air which supports combustion. I carry the hot gaseous products of combustion forward and back under the lower retorts. I provide a series of cross or saddle tiles, properly supported, slightly below each retort, for the purpose of allowing for the expansion and contraction of the retorts, and supporting the same when sagged or bent by high temperature.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a front view, partly in section. The right-hand side is a front view, and the left-hand side is a section on the line S S in Fig. 2. Fig. 2 is a central longitudinal section. Fig. 3 is a section on the crooked line T T T in Fig. 1. Fig. 4 is a horizontal section on the line U U in Fig. 1. Fig. 5 is a horizontal section on the line V V in Fig. 1. Fig. 6 is a cross-section in two planes. The right side is a section near the back, on the line W W in Fig. 2. The left side is a section near the front, on the line S S in Fig. 2. The construction shown in the left side of this figure differs from that shown in Fig. 1, by showing shield-tiles employed to shield the inner sides of the middle retorts and upper retorts from being overheated. Fig. 1ª is a central longitudinal section through a portion at, and immediately adjacent to, the front of the ash-pit. Fig. 6ª is a side view of a portion of one of the upper retorts, as seen from the center line of the bench.

Similar letters of reference indicate like parts in all the figures.

A^1 A^2, &c., are the retorts, supposed to be of fire-brick, and equipped with usual connections for working, in the ordinary manner, except as hereinafter set forth. B is the masonry constituting the piers, arch, and back, as usual. C is the ordinary grate, on which the fuel is burned to generate heat for the operation. D is a door turning on a horizontal axis, near the front of the incline, which communicates with the ash-pit. When it is turned in one position it forbids the access of air to the ash-pit from the front, and compels it to enter through a long and peculiar passage, in which it absorbs much heat which would otherwise be wasted by being conducted downward into the earth. These passages are marked *d d*. A door may be removed at the end of each to allow of cleaning at intervals. These doors are marked D^1 D^1. The opening on each side farthest from the center should be left open to allow the induction of air, which, after traversing back and forth in these passages and becoming heated by the waste heat conducted downward through the covering-tiles D^2, flows into the ash-pit through lateral apertures *d'*. Above the covering-tiles D^2 are flues *e e''*, in which the hot products of combustion are traversed forward and backward under the lower retorts, immediately before their discharge into the back escape-passage *e'*, from whence they enter the stack. (Not represented.) While traversing the flues *e e''* the hot products of combustion are brought into direct contact with the lower sides of the lower retorts A^3 A^3. The retorts are arranged in two tiers, with uniform spaces between them. Saddle-tiles 45 extend across and rest upon supports 3, 42, and 43, independent of the retort and of the walls, and which are likely to expand and contract to about the same extent as the retorts, with changes of temperature or with long use.

Each retort is, by preference, held up in its ordinary support at the front and back, at

such height as to be a little clear of cross-supports afforded by the saddle-tiles while the work is new; but as the retorts are repeatedly heated and maintained at the high temperatures required in this business while loaded with coal, the retorts sag a little, and in time come to the bearings on the saddle tiles.

G indicates a division-tile placed on edge. It divides the flues *d d*, and also aids to support the work above. H indicates division-tiles, which similarly divide the flues *e e''*, and aid to support the retorts. They are recessed into the covering-tiles D^2. Brick may be used for both these divisions H and G, if preferred.

Referring to Figs. 6 and 6ª, S are shield-tiles, made of a curved section, to match to the exterior of the several retorts on the inner and lower edges or corners. They are held in place by being let into the upright tiles 43 and 44, and also into the saddle-tiles 45. The extent to which I deem it expedient to thus interlock these parts is indicated by the dotted lines in Fig. 6ª; but a greater or less extent may be practicable. Ordinarily, the heated gases from the fuel on the grate C will rise without obstruction to the crown, and be there diffused to each side, enveloping the upper retorts A^1 A^1 in the freshest and hottest bath of flame, from whence it (the current of flame) descends to the middle retorts A^2, and to the lower retorts A^3, successively heating all; and by reason of my flues *e e'* under the lower retorts, the whole bench is heated with uniformity.

I provide the lower peep-hole I with a removable cover, I', of perforated tile, which allows a slight induction of air divided in fine streams. This hole may be opened, like the others, by the removal of the stop-tile, to allow of inspection of the degree of heating of the interior work of the bench. The slight streams of air which enter when this hole is closed aid to complete the combustion. The front of the bench, (indicated in some of the figures by the letter B') is composed of a series of tiles molded and burned in shapes, each especially adapted for its purpose and position.

The ordinary construction of benches either leaves the retorts without sufficient support, or else encumbers the center space with what are known as "bridge-tiles," which extend across between the saddle-tiles on one side and the corresponding saddle-tiles on the other side. The unsupported tiers of retorts are liable to become displaced, and also to sag out of place. Those with the bridge-tiles are open to an objection still more serious, in the crushing in of the inner sides of the retorts at the point of bearing. The bridge-tiles seem, by the weight of the load above, to abut with such force against the hollow structure that the feeble coherence, when in the highly-heated condition, is not able to withstand it.

My construction is being tested in the large way, and gives promise of avoiding the objections to both the previous plans. My method of constructing the front of tiles accurately formed of the proper shapes not only decreases the labor and expense of putting up the benches of retorts, but also makes more stable work, by reason of the front being in fewer pieces, with consequently fewer joints, perfectly matched together.

It is well understood, in the gas-manufacturing business, that the rear or back ends of the retorts are ordinarily the hottest parts. It is important to distribute or equalize the heat, which I accomplish by causing the sheet of flame from the furnace to wrap with approximate uniformity around the top and middle of the retorts, and enter the outermost of the bottom flues *e e*, not at the back end or at the front end, but along the entire outer side of each lower retort. After entering the outer flue *e* thus along its entire length, the hot products of combustion move forward, and, doubling around the front end of the partition between the flues *e e*, it moves backward in the innermost flue and escapes at the chimney, having distributed the heat nearly uniformly along the entire length of the retort. The construction, therefore, besides increasing the heat in the lower retorts, materially aids to render the heat in each of the retorts uniform throughout its length.

I claim as my invention—

1. The tortuous air-heating flues *d d* and lateral passages *d' d'*, leading into the space below the grate C, as specified.

2. The flues *e e''*, combined with the fire-chamber, and adapted to conduct the heated products of combustion above and around the retorts, and above the air-inlet flues *d d*, substantially as specified.

3. The flues *e e''*, leading from the furnace to the escape-flues, in combination with the tortuous air-inlet flues *d d* leading from the external air to the space below the grate, for the purpose of heating the air previous to its admission to the furnace, as specified.

4. In combination with the retorts, supported front and rear, as described, the saddle-tiles located slightly below the retorts, for the purpose of allowing for the expansion and contraction of the material, and supporting the retorts when sagged or bent from high heating, as herein set forth.

In testimony whereof I have hereunto set my hand this 4th day of May, 1876, in the presence of two subscribing witnesses.

IRA N. STANLEY.

Witnesses:
THOMAS D. STETSON,
C. C. STETSON.