

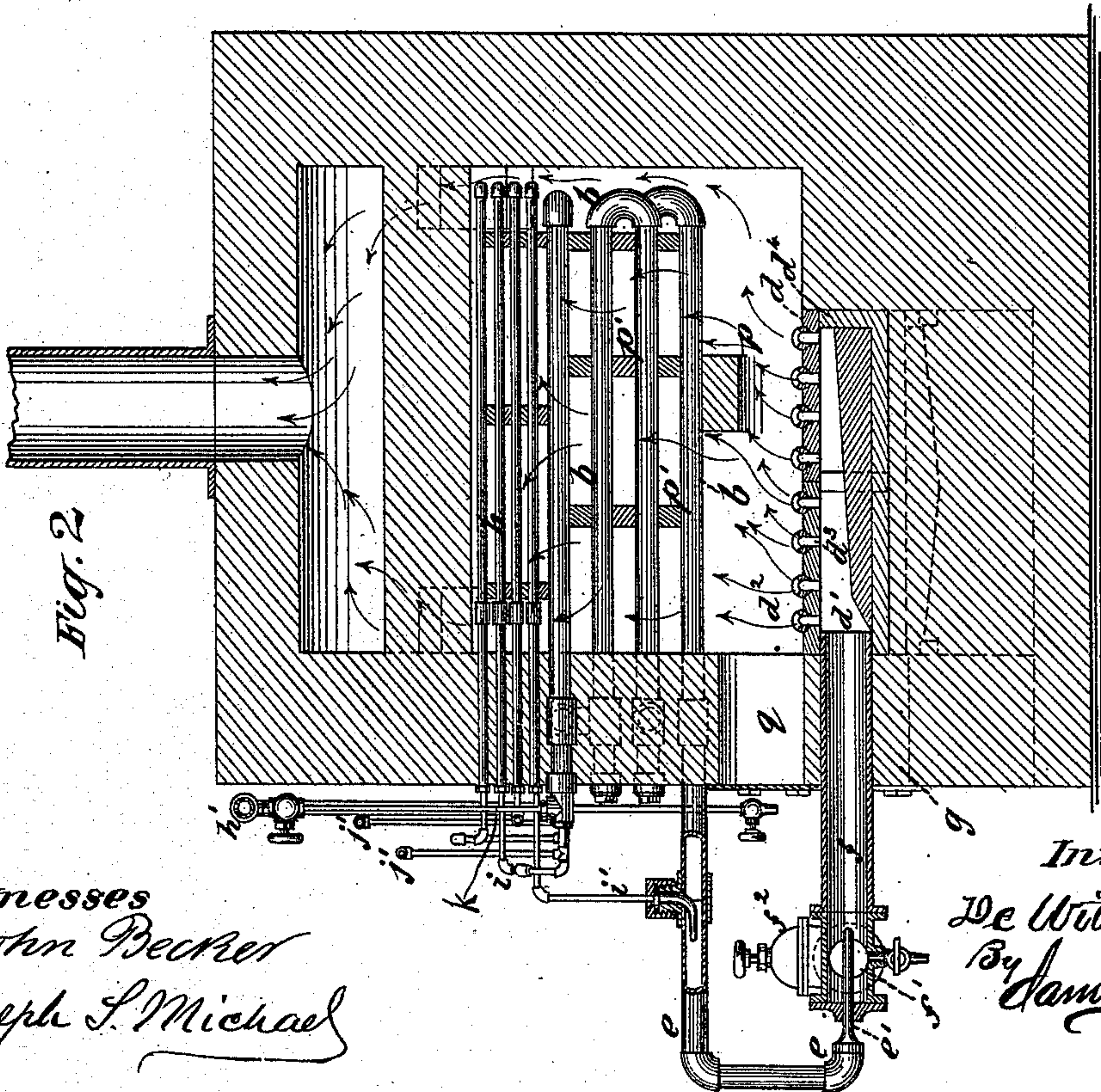
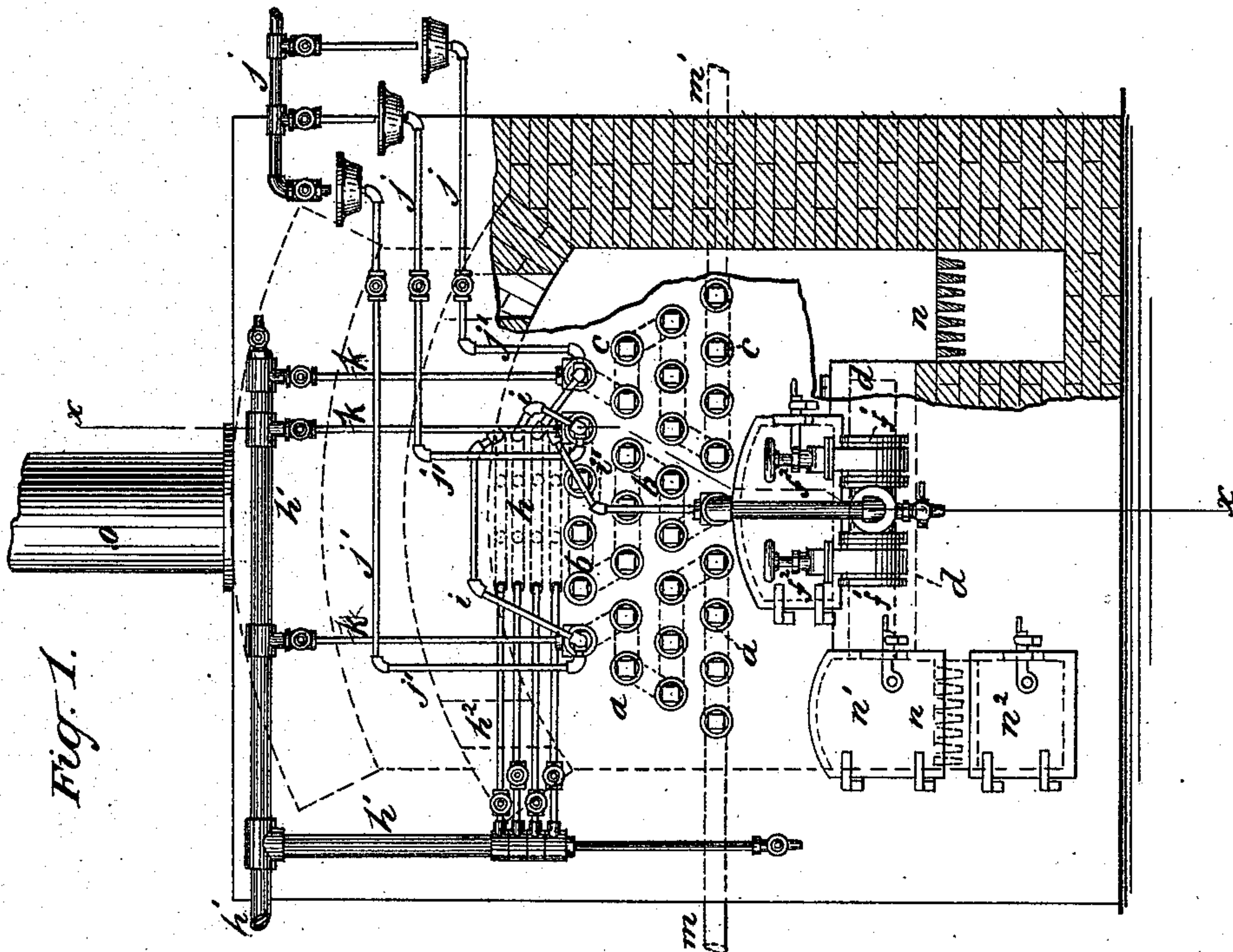
(No Model.)

2 Sheets—Sheet 1.

DE WITTE STEARNS.
GAS GENERATOR.

No. 413,767.

Patented Oct. 29, 1889.



Witnesses
John Becker
Joseph S. Michael

Inventor
De Witte Steam
By James A. Hudson
att'y.

(No Model.)

2 Sheets—Sheet 2.

DE WITTE STEARNS.
GAS GENERATOR.

No. 413,767.

Patented Oct. 29, 1889.

Fig. 3.

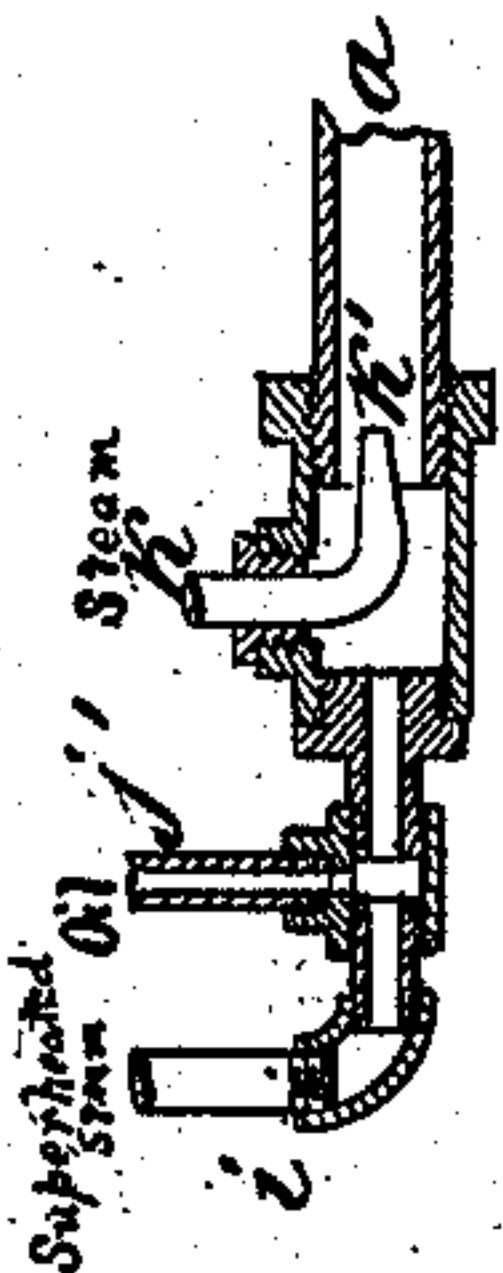


Fig. 5.

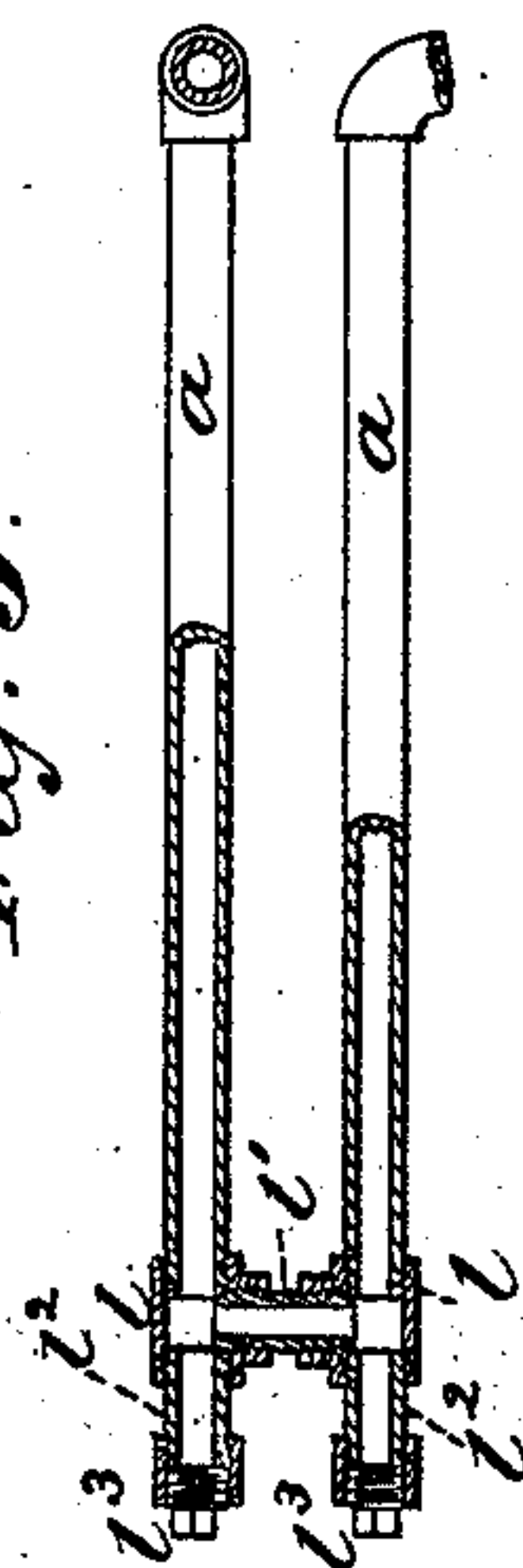
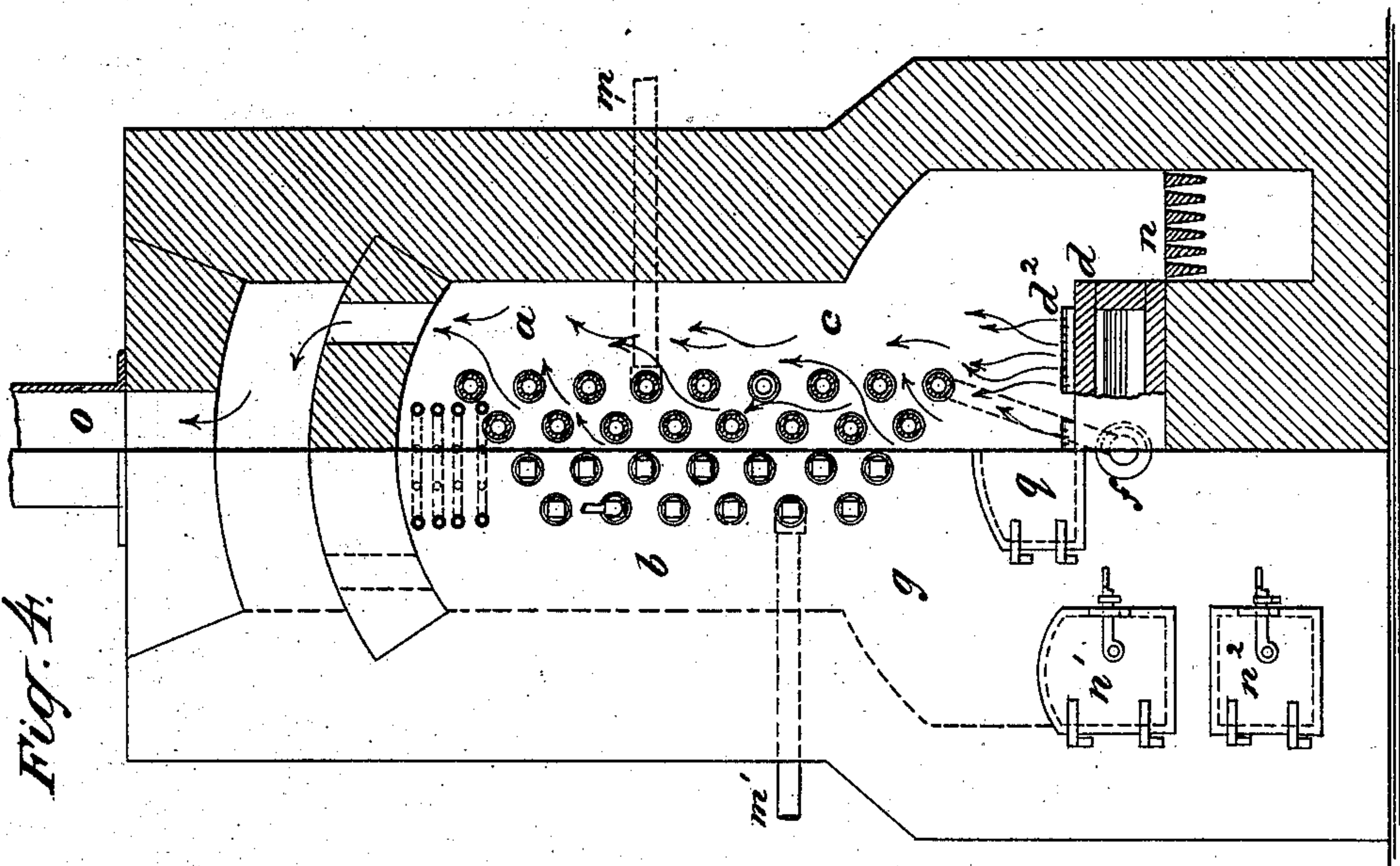


Fig. 4.



Witnesses

John Decker
Joseph S. Michael

Inventor

De Witte Stearns
By James A. Hudson
att'y.

UNITED STATES PATENT OFFICE.

DE WITTE STEARNS, OF DES MOINES, IOWA.

GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 413,767, dated October 29, 1889.

Original application filed June 12, 1888, Serial No. 276,836. Divided and this application filed November 2, 1888. Serial No. 289,809. (No model.)

To all whom it may concern:

Be it known that I, DE WITTE STEARNS, a citizen of the United States, and a resident of Des Moines, Polk county, Iowa, have invented certain new and useful Improvements in Gas-Generators, of which the following is a specification.

This invention relates to improvements in gas-generators for converting liquid hydrocarbons into gases; and it consists of a series of retorts, each composed of rows of pipe alternately connected at their ends and triangularly arranged, said retorts being nested together by the inversion of the alternate ones, and also of simple means whereby they may be readily cleaned. It is a division of an application for Letters Patent of the United States filed by me on the 12th day of June, 1888, and known as Serial No. 276,836, and said generator is shown in the drawings in conjunction with other apparatus not here claimed.

In the drawings, Figure 1 is a front elevation, partly in section, of my improved apparatus for the production of gas from liquid hydrocarbon. Fig. 2 is a longitudinal vertical section of the same on the line *x x*. Fig. 3 is a sectional view of the inlet of one of the retorts. Fig. 4 is an elevation, partly in section, of a modification in the arrangement of the retorts. Fig. 5 is a view showing the manner of connecting the front ends of the adjacent pipes of the retorts.

The retorts *a b c*, in which the gas is produced, consist of sets of pipes arranged in rows embraced in a triangular area, each alternate retort thereby formed being inverted, as shown in Figs. 1 and 2, or reversed, as shown in the modification, Fig. 4. The purpose of this arrangement is to economize space and to better utilize the heat from the furnace above the burner-tile *d d*. The outlet of the central retort *b*, or, in the form shown in Fig. 4, of the lower retort *c*, is connected to the burner *d* by the pipe *e*, the end of which is provided with the nozzle *e'*, which projects into the closed end of the mixing-chamber *f* to or past the air-inlets *f'*, the areas of the orifices of which are controlled by the valves *f²*, and this mixing-chamber passes through the front wall *g* and enters the forward end of

the burner-chamber *d'*. To insure the flow of gas from the retort *b*, the pipe *i* from one of the steam-superheaters is arranged to enter the pipe *e* and terminate therein with a nozzle, as shown in Fig. 2.

The steam-superheaters *h*, placed above the retorts *a b c*, are supplied with steam from the pipe *h'* through the horizontal pipes *h²*. The superheated steam passes from the superheaters into the entrance ends of the retorts *a b c* through the connecting-pipes *i*, at which points it comes in contact and mixes with the liquid hydrocarbon and carries the same into the retorts. The liquid hydrocarbon supplied by the pipes *j* enters the entrance ends of the retorts through the pipes *j'*. To facilitate the entrance of the hydrocarbon into the retorts, pipes *k* extend from the steam-supply pipe *h'* to the retorts, each being provided with an injector-nozzle *k'*, arranged within the entrance ends of the retorts, as shown at Fig. 3.

The pipes composing the retorts *a b c* are connected together in pairs at their front ends by T's and with nipples joining the side branches of the T's, and to facilitate the cleaning of these pipes they are extended from the T's in a straight line through the front wall *g* by short pieces of pipe, the ends of which are closed by means of plugs. One of these connections is shown at Fig. 5, wherein *l l* represent the T-pieces, *l'* the connecting-nipple, *l²* the front extension-pipes, and *l³* the plug. The removal of these plugs *l³* permits of any suitable scraper or cleaning implement being passed into the retort-pipes for the extraction of any deposit that may occur therein without disturbing any of the connecting-joints.

The gas generated in the two outside retorts *a* and *c*, Fig. 1, is carried off for illuminating or heating purposes or for storage through the pipes *m* and *m'*, connected to the exit ends of such retorts.

At each side of the gas-burner, and arranged near the bottom of the furnace, is a small grate *n*, upon which a wood or other fire may be kindled to initially heat the retorts, the necessary fuel being applied through the doors *n'*, and the ashes removed through the doors *n² n²* in the front wall *g*. By this arrange-

ment of grates at the sides of the gas-burner dirt and ashes from the starting fires are prevented from being deposited on the burner and obstructing its gas-orifices.

5 Gas previously produced by the apparatus or otherwise, if conveniently stored, may be supplied to the burner to initially heat the retorts and start the generation of the gas in lieu of using fires in the side grates. When
10 the retort *b* becomes sufficiently heated to convert the steam and liquid hydrocarbon into gases, the gases therein formed pass through the pipe *e* and the mixing-chamber *f* into the chamber *d'* of the burner, taking
15 with them through the openings *f'* of the mixing-chamber the quantity of air necessary to insure perfect combustion. The amount of this air-supply is controlled by the adjustment of the air-valves *f*². The mixture of the gases
20 and air so produced fills the chamber *d'* with a uniform pressure throughout and issues therefrom through the orifices in the tiles *d*, and a steady and uniform fire over the whole extent of the burner-tiles is thereby secured
25 upon the ignition of the gas, and economical distribution and utilization of the heat therefrom among and by the pipes composing the retorts *a b c* results in part therefrom and in part from the relative arrangement of such
30 pipes, and the products of combustion not utilized finally escape through the flue *o*. The lower layer of pipes of the retorts are supported on the narrow arch *p*, and the successive layers of these pipes are held out of
35 contact with each other by the spacing-bars *p'*.

The number of the retorts may be varied at pleasure, according to the exigencies of the case. The novel method of inverting or reversing the position of the alternate retorts, be-
40 sides more fully utilizing the heat, admits of

the arrangement of a group of such retorts vertically, as shown in the modification, Fig. 4, thereby economizing floor-space when desired.

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

1. In an apparatus for the production of gas from liquid hydrocarbon, the combination of a series of retorts each composed of connected pipes arranged in rows embraced
50 in a triangular area and alternately reversed or inverted, substantially as and for the purpose set forth.

2. In an apparatus for the production of gas from liquid hydrocarbons, the combination of a series of retorts each composed of
55 connected pipes arranged in rows embraced in a triangular area, with steam-superheaters placed above the retorts and connected therewith, substantially as and for the purpose set
60 forth.

3. In an apparatus for the production of gas from liquid hydrocarbons, in combination, a series of retorts each composed of connected pipes arranged in rows embraced in a
65 triangular area and alternately reversed or inverted, steam-superheaters connected to the retorts, a burner arranged to heat all the retorts and the steam-superheaters, and a connecting-pipe joining one of the retorts to
70 the burner, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 1st day of November, 1888.

DE WITTE STEARNS.

Witnesses:

CHAS. STILLWELL,
JOSEPH S. MICHAEL.