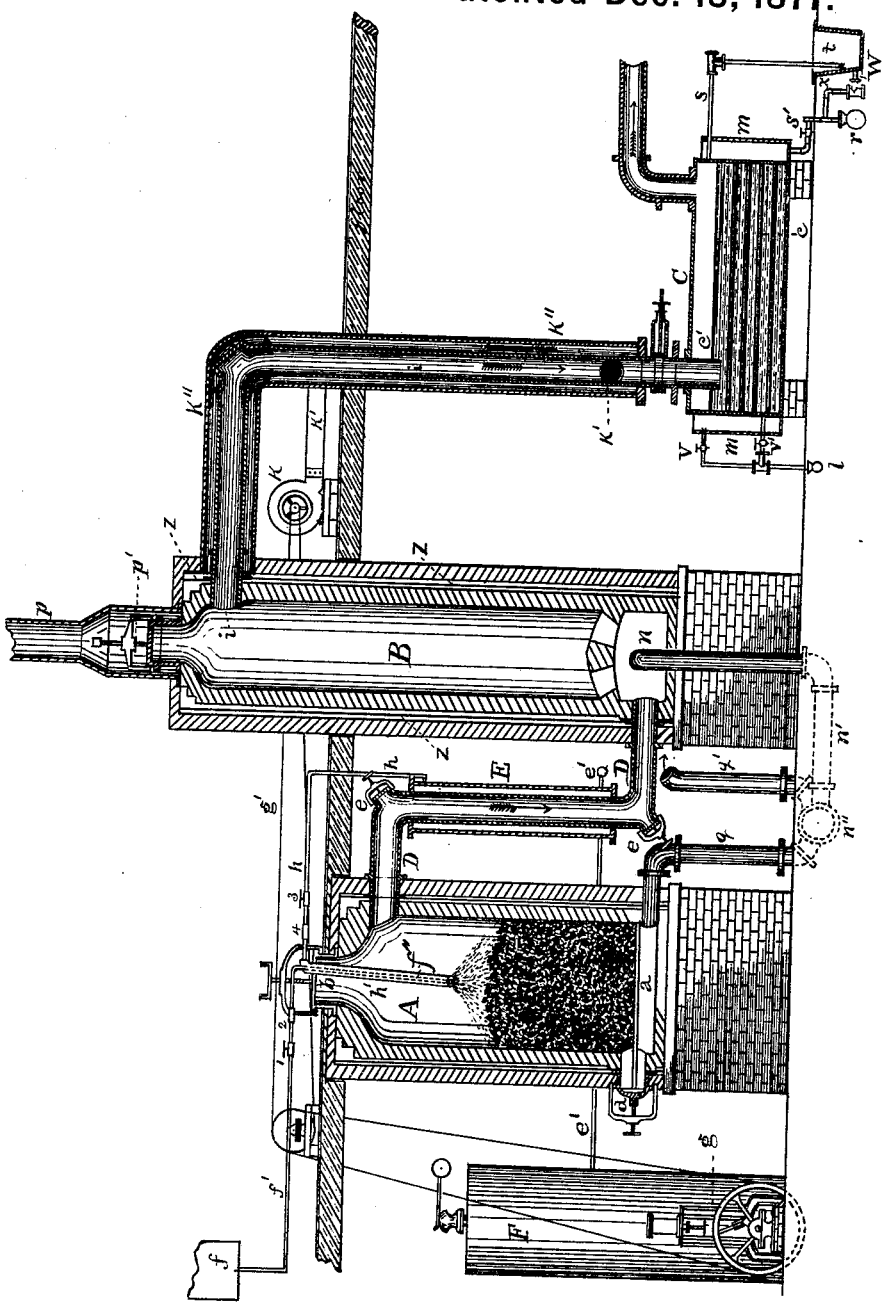
2 Sheets—Sheet 1.

T. R. WHITE.
Gas Apparatus.

No. 198,438. **Patented Dec. 18, 1877.**

FIG. 1.



WITNESSES.

Thos. R. Sheddon

Chas. E. Lewis

INVENTOR.

Thos. R. White

By his Attorney

Chas. B. Mann

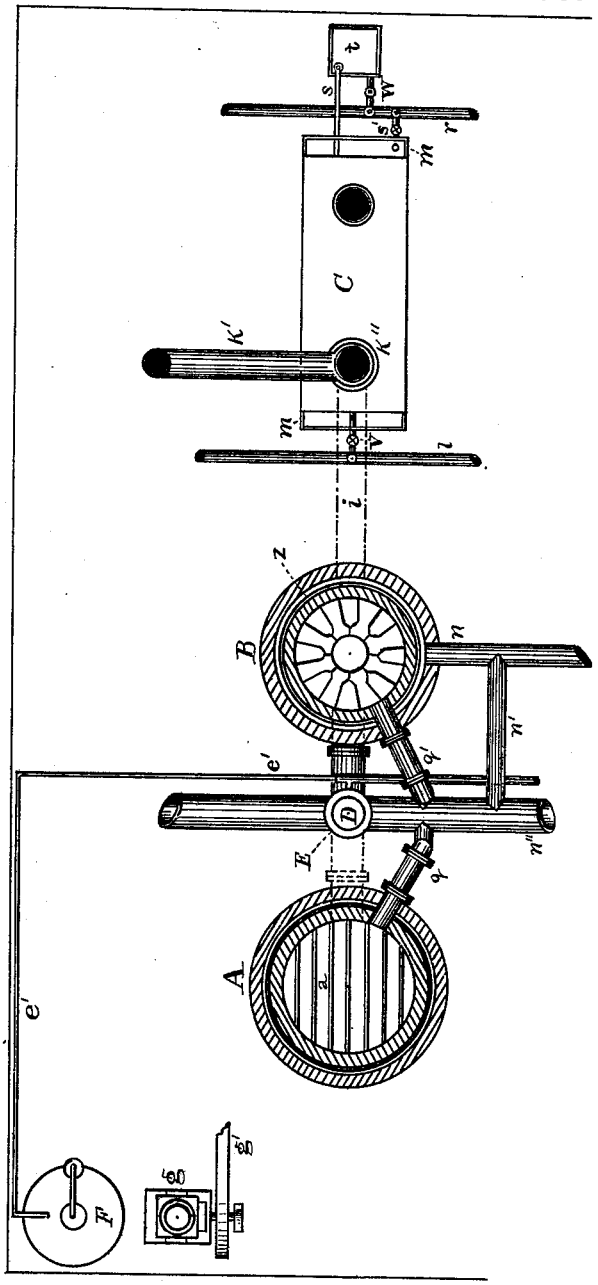
N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

2 Sheets—Sheet 2.

T. R. WHITE.
Gas Apparatus.

No. 198,438. **Patented Dec. 18, 1877.**

—FIG. II.—



—WITNESSES—

Chs. E. Lewis.

Jno. R. Sledden

—INVENTOR—

Thos. R. White

By his Attorney

Chas B. Mann

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS R. WHITE, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN GAS APPARATUS.

Specification forming part of Letters Patent No. **198,438**, dated December 18, 1877; application filed October 6, 1877.

To all whom it may concern:

Be it known that I, THOMAS R. WHITE, of Baltimore, in the county of Baltimore and State of Maryland, have invented a new and useful Improvement in Processes and Apparatus for the Manufacture of Illuminating-Gas, which is fully set forth in the following specification and accompanying drawings, in which—

Figure 1, Sheet 1, is an elevation, in section, of my apparatus. Fig. 2, Sheet 2, is a plan view of same.

My invention relates to an improved apparatus for superheating the steam previous to its admission to the gas-generator, and to an improved apparatus for admitting the oil and the aforesaid superheated steam to the gas-generator, and delivering the same onto the incandescent coals.

My invention further relates to an improved apparatus for utilizing the heated atmospheric air in the space surrounding the iron casing of gas-superheater; and, also, to utilizing the heat of the hot gas-pipe leading from the aforesaid superheater to the wash-box, by surrounding the aforesaid hot gas-pipe with a jacket, all of which heated air aforesaid is forced by the fan-blower, constituting a hot-blast, to revive the coals in the gas-generator to a state of incandescence, and to reheat the open brick-work in the superheater.

My invention further relates to an improved apparatus for maintaining a low temperature of the water in the wash-box, through which the hot gas passes.

Refering to the drawings, A represents the gas-generator, made of boiler-iron and lined with fire-brick. An outside jacket of fire-brick surrounds the generator. *a* is the grate; *b*, the charging-hole, the cinders and ashes being removed at *d*. B represents the superheater, constructed in a similar manner to the generator, the interior of which is filled, or nearly filled, with open brick-work, (not shown in the drawings, but arranged similarly to that in the "Lowe" apparatus,) and having an air-space, Z, surrounding the iron cylinder. *p* is the smoke-stack. *p'* is the damper, which is raised when the blast is on, and closed when the oil and steam are on. D is a pipe, which conveys the gas and products of combustion from generator to the lower side of perforated arch in the base of superheater. *e e* are hand-holes, for the purpose of cleaning the pipe. The heat of this pipe is utilized by surrounding it with the large pipe E, thus forming a steam jacket or superheater, as hereinafter set forth.

F represents the steam-boiler. *e'* is a pipe conveying steam from the boiler to steam-superheater E. The pipe *h* conveys the superheated steam from this jacket or heater, and is enlarged as it passes through the cover *b* of charging-hole, the enlarged part *h'* depending from the cover into the generator. The oil-tank *f* occupies an elevated position. *f'* is a pipe conveying oil from the tank to the interior of generator. Just above the cover *b* it enters the enlarged superheated steam-pipe *h'*, which incloses and surrounds the vertical depending portion *f''*. The discharge-orifices of both steam and oil pipes are thus at the same point. The figures 1 and 2 on the oil-pipe and 3 and 4 on the steam-pipe represent, respectively, stops and couplings, by which the oil and steam are shut off and the pipes disconnected to permit the removal of the cover *b*.

The pipe *i* conveys the hot gas from the superheater to the wash-box C. The lower end of this pipe passes through and terminates below the diaphragm *c'*, which is an iron plate, secured in the wash-box just below the level of the water-line. The wash-box is made of boiler-iron, and has pipes *c* passing horizontally through it, and opening into the cold bath or refrigerator *m*, which is an outer casing attached to the wash-box and supplied with cold water by the cock V, while the cock V' supplies the wash-box, both having connection with the water-pipe *l*. The pipe *s* is an overflow water-pipe to deliver the water in which particles of oil are intermingled from wash-box to the tank *t*.

s' is a cock by which the water contained in refrigerator is drawn off, and W is an overflow-pipe attached to tank *t*, near the bottom, and rising to the point *x;* thence connects with the waste-water pipes *r*, as shown.

By this arrangement the water from tank *t* flows off, while the particles of oil collect on the surface, and may be skimmed off or otherwise removed.

The letter K represents the blower, which

is operated by the belt g', connecting with engine g. The pipe K′ conveys the air from blower to the lower part of air-heater K″, which is a large pipe or casing inclosing the hot gas-pipe i. This casing makes connection at its upper end with the intervening air-space Z of gas-superheater.

The jacket or enlarged pipe or casing K″ may be dispensed with without departing from my invention, so far as it relates to utilizing the heated air in space Z. In such case the air-pipe from the blower may connect direct with the air-space Z, instead of passing the blast first through the casing K″.

The latter method, however, utilizes the heat of the hot gas-pipe for the blast, and has the further advantage of measurably cooling the aforesaid gas-pipe.

The outlet from the air-space Z is below, by the pipe n, from which the pipe n' connects with main air-pipe n'', the latter conveying the blast to any desired number of generators and superheaters, delivering to generators by pipe q, and to superheaters by pipe q', as shown.

I prefer to use anthrocite coal as fuel, which is brought to an incandescent condition by the blast from the blower, the open brick-work in the superheater, heretofore referred to, being heated, meantime, to a white heat, when the blast is shut off. Petroleum or other hydrocarbon oil is now admitted simultaneously with the superheated steam from the adjacent orifices of pipes f' and h', and delivered upon the incandescent coals in generator in the form of spray. The mixed gases then produced pass through pipe D to superheater, and thence through pipe i to the wash-box, which serves to eliminate from the hot gas particles of condensed oil, &c., and at same time cools the gas, the latter being a desideratum, which is greatly promoted and facilitated by my arrangement of water-bath or refrigerator.

When the heat of generator has been so much reduced as to be insufficient to decompose the steam the spray of oil and steam is stopped, and the hot atmospheric air-blast is again turned on.

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

1. The pipe or casing E surrounding the gas-pipe leading from gas-generator to superheater, in combination with the steam-induction pipe e' and eduction-pipe h, whereby the heat of the gas-pipe is utilized to superheat the steam previous to its admission to the gas-generator.

2. The combination of the superheated-steam pipe h', inclosing and surrounding the oil-induction pipe f'', and the couplings 4 and 2, connecting with their respective supply-pipes and the cover b, whereby steam and oil may be injected from adjacent orifices directly onto the incandescent coals, and these injecting-pipes may be removed while the blast is on.

3. The combination of the iron casing of the gas-superheater B and outer jacket of brick, forming the annular intervening air-space Z″, outlet air-pipe n, jacket or casing K″, surrounding the hot gas-pipe leading from gas-superheater to the wash-box, and pipe K′ from the blower, whereby the heat of the hot gas-pipe and iron casing of gas-superheater are utilized to heat the air-blast which is forced by the blower, as and for the purpose specified.

4. In combination with the wash-box C, horizontal pipes c, both ends of which open into the outer casing or cold-water bath m, water-supply cocks V and V′, overflow-pipe s, and draw-off cock s', as shown and described, and for the purpose specified.

THOMAS R. WHITE.

Witnesses:
CHAS. B. MANN,
CHS. E. LEWIS.