G. F. NORTH.

Gas Scrubbers and Purifiers.

No. 217,294. Patented July 8, 1879.

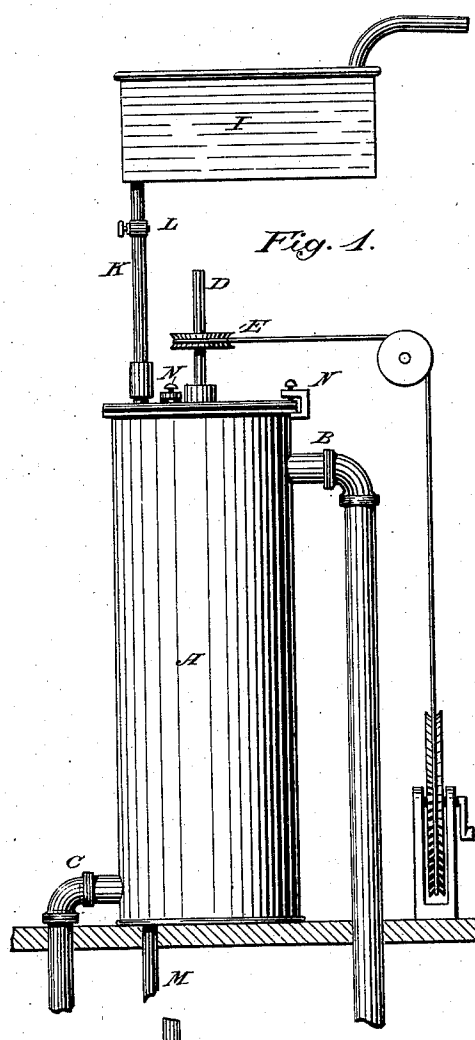

Fig. 1.

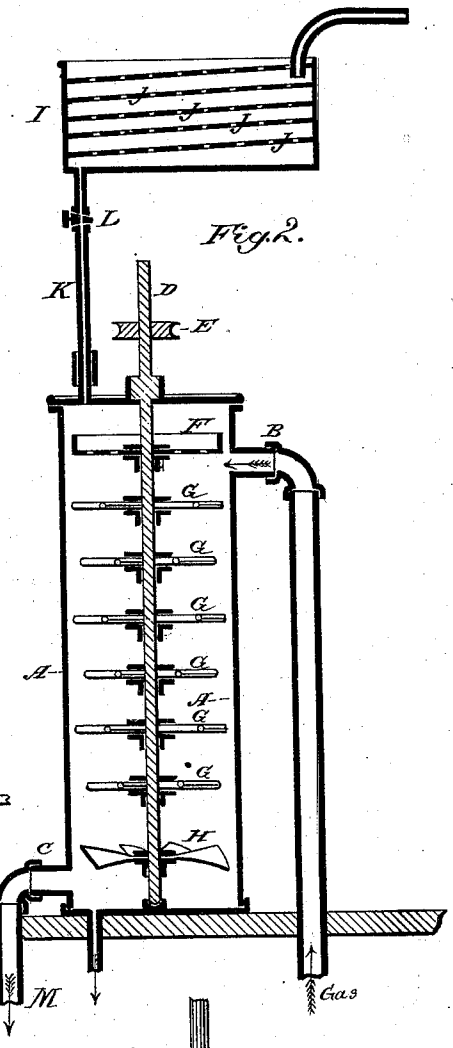

Fig. 2.

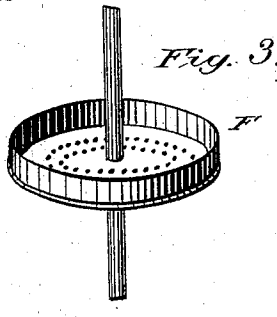

Fig. 3.

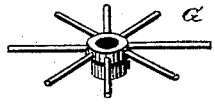

Fig. 4.

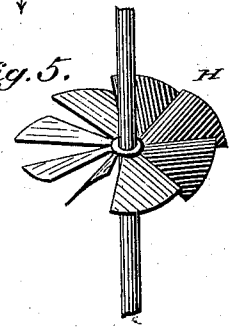

Fig. 5.

Attest:

L. M. Sulis

R. F. Dyer

Inventor:

George F. North

by Geo. W. Dyer & Co

Attys.

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

UNITED STATES PATENT OFFICE.

GEORGE F. NORTH, OF AUGUSTA, MAINE, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN T. SALTER AND JAMES M. LEIGHTON, OF NEW YORK CITY, AND GEORGE W. DYER, OF WASHINGTON, D. C.

IMPROVEMENT IN GAS-SCRUBBERS AND PURIFIERS.

Specification forming part of Letters Patent No. **217,294**, dated July 8, 1879; application filed September 3, 1877.

To all whom it may concern:

Be it known that I, GEORGE F. NORTH, of Augusta, in the county of Kennebec and State of Maine, have invented a new and useful Improvement in Gas Scrubbers and Purifiers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The purpose I have in view is the construction of a cheap, simple, and effective apparatus for the cleansing of illuminating-gas from the various impurities which injuriously affect it, which apparatus shall also be capable of performing the work done by the purifiers and scrubbers, and largely the work of the exhausters and condensers at present in use in gas-works.

The apparatus which I have made for the above purpose consists of a cylinder placed intermediate between the hydraulic main and the holder, through which the gas passes on its way from one to the other, said cylinder having within it a revolving shaft, which carries a sprinkler, a series of beaters, and an exhauster, through which cylinder there passes at the same time, and in the same direction with the gas, a certain quantity of a purifying material, preferably lime-water, in the form of spray or in a finely-divided condition.

The novelty in the invention which I profess to have made consists in the combination, within the same case or shell, of a sprinkler, a series of beaters, and an exhauster upon the same shaft, and in the process of admitting gas at the top of a vertical shell or case and drawing it out at the bottom, the gas at the same time being subjected to a falling spray of lime-water, and being beaten, scrubbed, and purified, as more fully hereinafter described and explained.

In order that those skilled in the art may know how to make and use my invention, I now proceed to describe the same with particularity, having reference to the drawings, in which—

Figure 1 is an elevation of the entire apparatus; Fig. 2, a central vertical section of the cylinder; and Figs. 3, 4, and 5, separate views of the sprinkler, the beaters, and the exhauster.

Like letters denote corresponding parts in each figure.

In the drawings, A represents the cylinder, of proper size and material, preferably placed in a vertical position at any convenient point between the hydraulic main and the holder.

An inlet-pipe, B, admits the gas near the top of the cylinder, and an outlet-pipe, C, affords a means of escape for the gas near the bottom of the cylinder.

A shaft, D, passes centrally down through the cylinder, turning in a proper step at the bottom thereof, upon which shaft is a pulley, E, by means of which the same is revolved by any proper connection, one form of which is shown in Fig. 1 of the drawings. Upon this shaft D, within the cylinder and near the top of it, is secured the sprinkler F, which is a suitable shallow vessel with perforations, preferably of the form shown in Fig. 3.

Directly below the sprinkler, beaters G are secured to the shaft D. These beaters are preferably metallic rods arranged radially, as shown in Fig. 4. Below the beaters is placed the exhauster H, preferably a wheel of the form shown in Fig. 5, having radial arms arranged and constructed like those in propeller-wheels for steam-vessels.

Above the cylinder there is placed in some convenient position a proper tank, I, having convenient means for filling it, and having within it a series of perforated or grated shelves, J. From this tank a pipe, K, having a proper regulating or stop cock, L, leads down through the top of the cylinder, and preferably is fitted with some sleeve-connections, by which the end which enters the top of the cylinder may be conveniently removed from the same.

An outlet-pipe, M, at the bottom of the cylinder permits the escape of water therefrom. For the convenience of examination and repairs the top of the cylinder is removable, and is adapted to be secured tightly upon the cylinder with any suitable packing by means of screw-clamps N or any other convenient method.

The operation of the device is as follows: A suitable purifying agent, soluble in water, (preferably lime, such as is used for building purposes,) is placed upon the shelves in the tank, and a supply of water is suffered to leach down through this lime and become converted into lime-water, which will contain more or less fine particles of lime in suspension. This lime-water flows by gravity in a current regulated by the cock L through the pipe K, into the cylinder, and falls into the sprinkler.

The shaft D being rapidly revolved by its connections, the sprinkler is revolved with like speed, and the water passing through its perforations is discharged into the interior of the cylinder in a finely-divided condition or in the form of spray, and falls by its own gravity to the bottom of the cylinder, from which it escapes by means of the pipe M. The gas at the same time enters the cylinder immediately below the sprinkler, and makes its way toward its proper outlet-pipe C, in combination with the spray of water before mentioned.

The commingled gas and spray of water in this passage is agitated violently by the beaters, which revolve also at a high speed, and by such agitation the water is kept in the form of spray, and the gas is thoroughly beaten, scrubbed, and purified at the same operation, so that all impurities are removed from it and unite with the spray of the water and pass out at the outlet M. The exhauster H, also revolving at high speed, removes back-pressure and draws the gas downward toward its proper outlet.

The shell or case being vertical in its position, and the gas entering at the top, is drawn by the exhauster slowly down to the discharge-outlet at the bottom, and this movement of the gas being opposed to its natural tendency to fly upward, being of less specific gravity than air, it results that the whole shell will be at all times filled with the gas. In this condition of the gas, the lime-water sprayed upon the gas at the top of the shell, and falling by its own gravity to the bottom, is beaten into and through every portion of the gas, which is thereby thoroughly beaten and scrubbed and purified.

If, as has been done, the gas entered at the bottom of the shell and escaped at its outlet at the top, its tendency would be to pass rapidly through the shell in a current or stream more or less large, according to the respective cross-areas of the inlet and exit pipes.

It will be understood that many modifications of my apparatus and of its various component parts may be used, and also that other suitable agents besides lime may be employed in a liquid form, or even pure water without the addition of chemical agents, without departing from the spirit of my invention.

Among the advantages of my improvement may be mentioned its great cheapness of first cost as compared with the expensive and complicated apparatus now required for the same purposes, its simplicity of construction, from which results cheapness of operation and of repairs, and its efficiency in use

Having thus described my improvement, its mode of operation, and some of its advantages, what I claim as new therein and my own invention is—

1. In an apparatus for cleansing gas, the combination of a sprinkler at the top, a series of beaters below the sprinkler, and an exhauster below the beaters, all upon the same rotating shaft and in the same case or shell, constructed and arranged substantially as described.

2. In cleansing gas, the process of purification wherein every portion of the gas in a scrubber is acted upon at the same time, which consists in passing the gas downward through a shell or case, subjecting it to the action of a liquid purifying agent in the form of spray falling by gravity through such shell or case, and at the same time beating the commingled spray and gas, substantially as explained.

This specification signed and witnessed this 5th day of July, 1877.

GEORGE F. NORTH.

Witnesses:
W. P. WHITEHOUSE,
S. S. HASKELL.