2 Sheets—Sheet 1.

W. D. JONES.

APPARATUS FOR MANUFACTURING HYDRO-SULPHUROUS ACID.

No. 185,640. Patented Dec. 26, 1876.

Fig. 1.

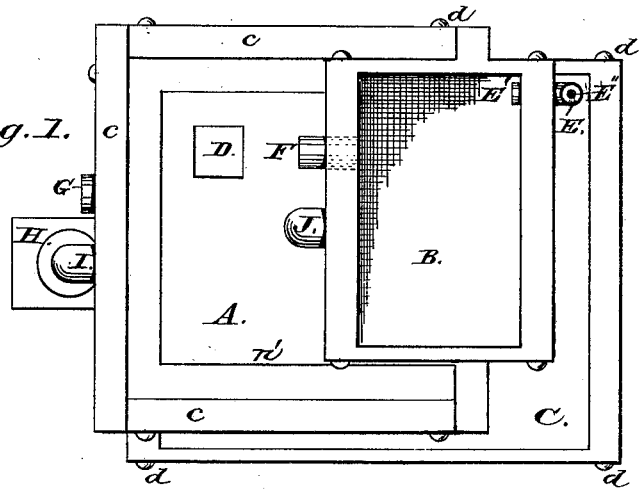
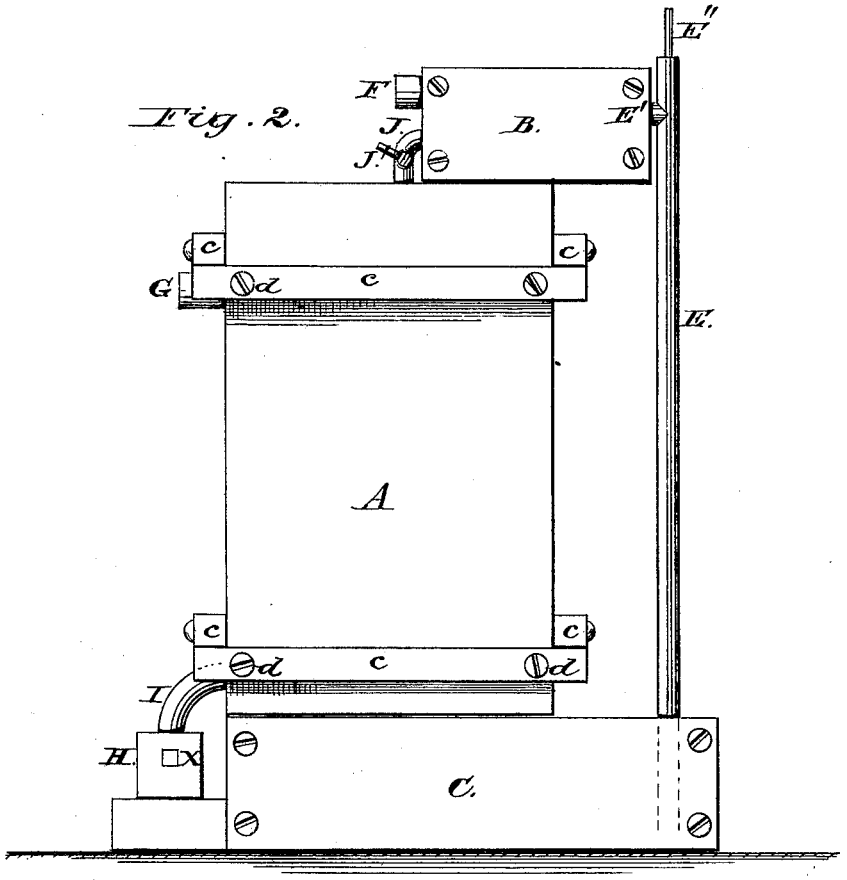


Fig. 2.



Attest:
Wm. McPawling.
H. H. Pawling.

Inventor:
W. Davidson Jones.

2 Sheets—Sheet 2.

W. D. JONES.

APPARATUS FOR MANUFACTURING HYDRO-SULPHUROUS ACID.

No. 185,640. Patented Dec. 26, 1876.

Fig. 6.

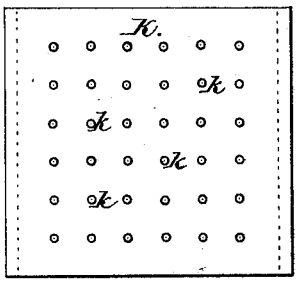
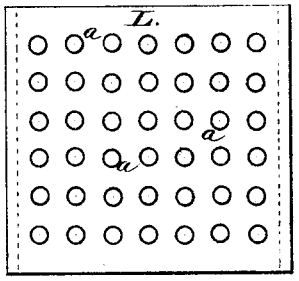


Fig. 7.



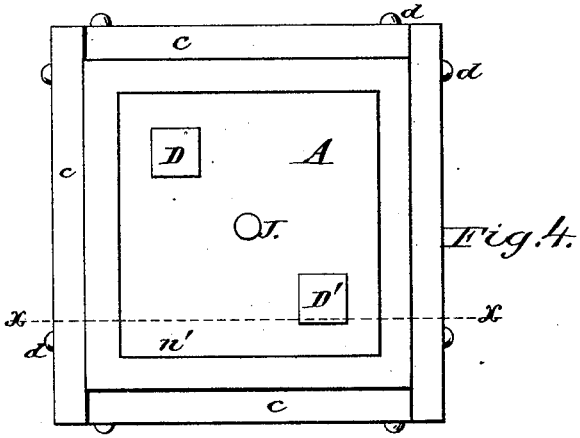
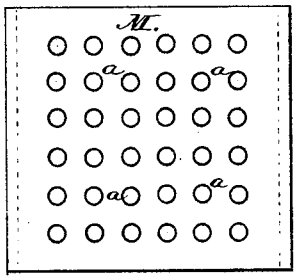


Fig. 4.

Fig. 8.



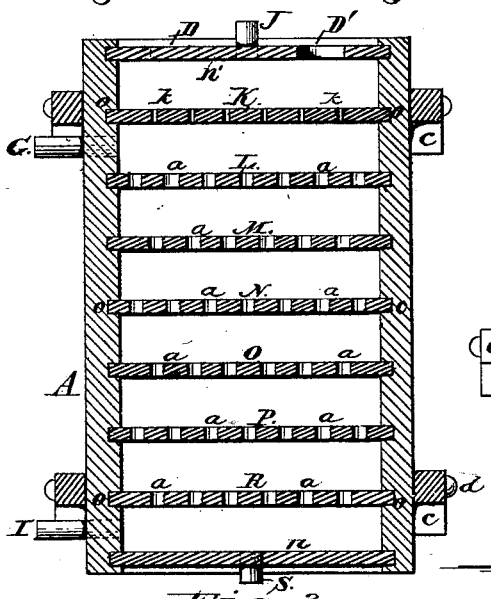
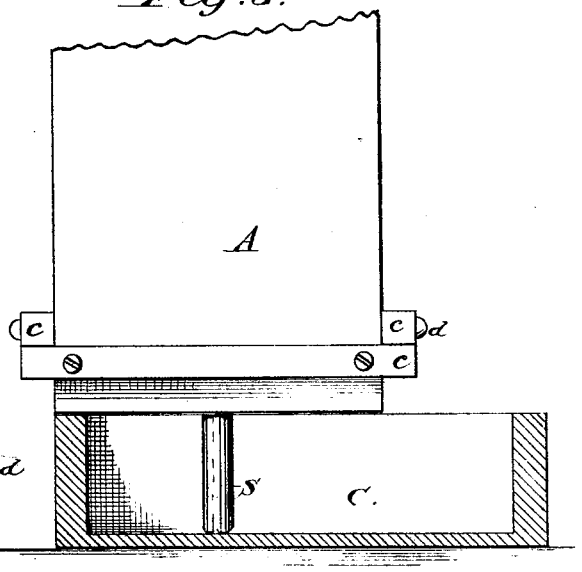


Fig. 3.

Fig. 5.



Attest:
Wm. M. Pawling
H. R. Pawling

Inventor
W. Davidson Jones

UNITED STATES PATENT OFFICE.

W. DAVIDSON JONES, OF HAGAMAN'S MILLS, NEW YORK, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO HENRY HASKELL PAWLING, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR MANUFACTURING HYDROSULPHUROUS ACID.

Specification forming part of Letters Patent No. **185,640**, dated December 26, 1876; application filed December 14, 1876.

To all whom it may concern:

Be it known that I, W. DAVIDSON JONES, of Hagaman's Mills, in the county of Montgomery and State of New York, have invented a new and useful Improvement in Apparatus for Manufacturing Hydrated Sulphurous Acid, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan, showing the condenser A, the tanks B and C, hand-hole D, pump E, pump-spout E′, and pump-stem E″, fresh-water-supply pipe F, exhaust-pipe G, retort H, vapor-pipe I, and supply-pipe J, provided with stop-cock J′. Fig. 2 is a front elevation, showing retort H, vapor-pipe I, condenser A, tanks C and B, pump E, and pipes G, J, and F. Fig. 3 is a sectional elevation of the condenser A on the line *x x*, in Fig. 4, showing the distributive diaphragm K, with its minute perforations *k*, the series of diaphragms L, M, N, O, P, and R, containing the holes *a a*, and the pipes and connections J, G, I, and S. Fig. 4 is a plan of the condenser A, showing the supply-pipe J and hand-holes D D′. Fig. 5 is a sectional elevation of tank C with the front part removed, (on the line *x x*, see Fig. 4) and condenser A, showing their relative position as relates to the discharge-pipe S, so as to conduct the liquid to the bottom of the tank C. Fig. 6 is a plan of the distributing-diaphragm K. Fig. 7 is a plan of the diaphragm L, and Fig. 8 is a plan of diaphragm M.

Like letters of reference indicate like parts in each drawing or section thereof.

My invention relates to improvements in the manufacture of hydrated sulphurous acid, and of restoring to its proper strength the partially-spent hydrated sulphurous acid which becomes reduced in strength by the sulphurous gases being set free, and absorbed by use in bleaching textile fabrics or through other causes.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

H (see Figs. 1 and 2) is a retort of proper construction, which may be made after any of the well-known forms for such purposes, in which the sulphur is burned or sublimed by heating the said retort with a gas or coal-oil stove or any other proper heating apparatus. The door *x* in the retort is to feed in the sulphur, and to supply air to support the burning of the sulphur.

C (see Figs. 1, 2, and 5) is a tank, substantially as shown, in which the hydrated sulphurous acid is received from the condenser A through the pipe S. This tank may be made of wood, and of any convenient size and shape, and is bolted together, care being taken not to present any iron to the action of the liquid.

A (see Figs. 1, 2, 3, 4, and 5) is the condenser, made of wood, substantially as shown, and bound together by the bars *c* and bolts *d*, as indicated, care being taken that no iron enters the inside of the condenser, so as to come in contact with the liquid.

The vertical sides of the condenser are grooved horizontally, as indicated at *o* (see Fig. 3) at intervals of about six inches. In the upper one is placed the top *n′*, said top being provided with hand-holes D D′, and central hole to receive the supply-pipe J. The hand-holes are provided with suitable covers. In the lower groove is placed the bottom *n*. In the second one from the top is placed the distributive minutely-perforated diaphragm K, having perforations about one eighth of an inch in diameter. In the one next below is placed the diaphragm L, and then in succession in the diaphragms M, N, O, P, and R, all of them having many holes about one inch in diameter.

The perforations in K (see Figs. 3 and 6) and holes in M, O, and R (see Figs. 3 and 8) are upon the same plan or spaced alike. The holes in L, N, and P (see Figs. 3 and 7) are upon the same plan or spaced alike. B (see Figs. 1 and 2) is a supply-tank, substantially as shown, made of wood, and securely bolted together. This tank may be securely covered and of any convenient size or shape. Within the tank C is placed a pump, E. (See Figs. 1 and 2.) The discharge-spout E′ of said pump discharges into tank B. F is a pipe (see Figs. 1 and 2) provided with a stop-cock to supply fresh water as may be desired. J (see Figs. 1, 2, 3, and 4) is a pipe, provided with a stop-cock, J′, to convey and regulate the supply of liquid from the supply-tank B to the condenser A. G (see Figs. 1, 2, and 3) is an exhaust-pipe connected with the condenser, sub-

stantially as shown in Fig. 3, and communicating with the atmosphere. I is a pipe (see Figs. 1, 2, and 3) making the proper connections between the retort H and the lower part of the condenser A, substantially as shown. The pipe S (see Fig. 5) is placed in the back portion of the condenser A and tank C. It is necessary that the condenser should set so that the diaphragms will be level.

The operation of my invention is as follows: The tank B is supplied with water from the pipe F. The retort H is heated to the proper temperature. Sulphur is fed into the retort H through the door *x*, where it melts, burns, and vaporizes, the burning and subliming being supported by a supply of air through the door *x*, the vapors or products of combustion passing through pipe I into the condenser below diaphragm R.

The cock J′ is turned so as to allow a suitable supply of water from the tank B to enter by the pipe J into the upper part of the condenser, where it falls upon the center of the distributive diaphragm K.

The stream is broken, and spreads over the level surface of the diaphragm K, and passes equally through the small perforations in small streams upon the interspaces between the holes in diaphragm L. As the falling water strikes the spaces between the holes in L, the water is spattered and dashed into many small particles or globules, and falls upon diaphragm L, and running over the edges of the holes *a* strikes upon the interspaces between the holes in diaphragm M, thereby repeating the same spattering and dashing into many small particles, globules, or spray, as before stated.

This repetition of the action of the water or liquid just recited is repeated from diaphragm to diaphragm until it passes the lower one, and is discharged through pipe S.

The products from the combustion of the sulphur as it passes from pipe I into the condenser, between the bottom *n* and diaphragm R, cannot escape through the pipe S, as the lower end of pipe S is sealed with liquid. It diffuses throughout the whole space, and is partially absorbed by the falling liquid, while the balance passes up through the holes *a* in diaphragm R, where it comes in contact with the spattering spray of the falling water, thereby having a portion condensed and absorbed by the water. The uncondensed portion, being diffused throughout the space between diaphragms R and P, contacts with the water falling from the holes in diaphragm P, and as it passes up through said holes it is again submitted to a like action, as above recited, and repeated from diaphragm to diaphragm until the uncondensable portions of the products of combustion reaches the distributive diaphragm K, which diaphragm it cannot pass on account of the minute perforations being filled, or nearly filled, with passing water. It passes out through the pipe G into the atmosphere.

The liquid as it passes from diaphragm to diaphragm is spattered into small globules or spray, condenses, unites, and absorbs the condensable portions of the products of the burning sulphur in its attempted passage upward through the condenser A, thereby forming hydrated sulphurous acid, which is conveyed by the pipe S to the tank C, where it is stored for use.

If the hydrated sulphurous acid is not of sufficient strength, or by use or by mechanical or chemical causes it is partially spent, the liquid is recharged by operating the pump E, through reciprocating motion given to pump-stem E″, thereby pumping from tank C and discharging into tank B.

The pump E may be worked at intervals or it may be worked continuous, and the supply F shut off quite closely, only allowing sufficient fresh water to escape into the tank B to supply the waste caused by the immersion and removal of the fabrics operated upon, the balance of the supply of liquid to effect the condensation of the vaporized sulphur being supplied by the pump E.

The condenser A may be made of any desired size, and the diaphragms below the distributive diaphragm may be increased or diminished in number, as circumstances require, without changing the nature of my invention.

The hand-holes D D′ are for the purpose of access to the distributive diaphragm K, so as to inspect and determine the quantity of liquid admitted, and remove any obstructions that may accidentally pass therein, and to adjust to a level the condenser A, as indicated by the fluid upon said diaphragm.

With this apparatus hydrated sulphurous acid can be cheaply and easily made, requires but little mechanical skill to operate the same, and obviates the wasting of a large amount of hydrated sulphurous acid, which has become partially spent, requiring the waste to be supplied with new, which necessitates the consumption of a large amount of material and time.

I am aware that devices for hydrating sulphurous acid, washing illuminating gas, and making vinegar, have been constructed and employed, wherein the ascending currents of gases and atmospheric air have been brought in contact with the descending fluids. All such I disclaim, as being old.

What I claim as my invention, and desire to secure by Letters Patent, is—

A condenser provided with the distributing-diaphragm K and the series of perforated diaphragms L, M, N, &c., the alternating ones having their perforations situated in vertical lines with the imperforated parts of the intermediate ones, and the diaphragms extending entirely across the condensing-chamber, as and for the purposes specified.

Witnesses: W. DAVIDSON JONES.
WM. M. PAWLING,
H. H. PAWLING.