2 Sheets—Sheet 1.

W. D. JONES.

APPARATUS FOR MANUFACTURING HYDRATED SULPHUROUS ACID.

No. 188,801. Patented March 27, 1877.

Fig. 1.

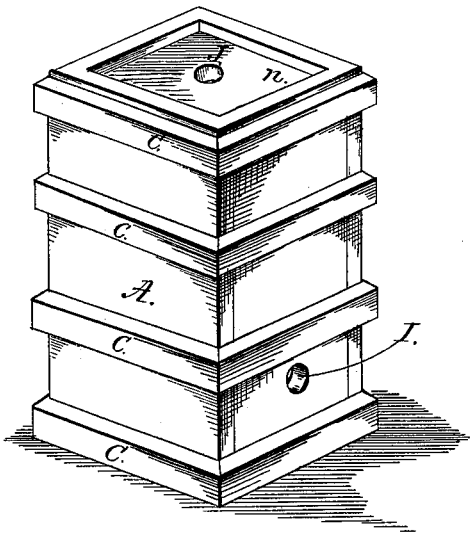


Fig. 2.

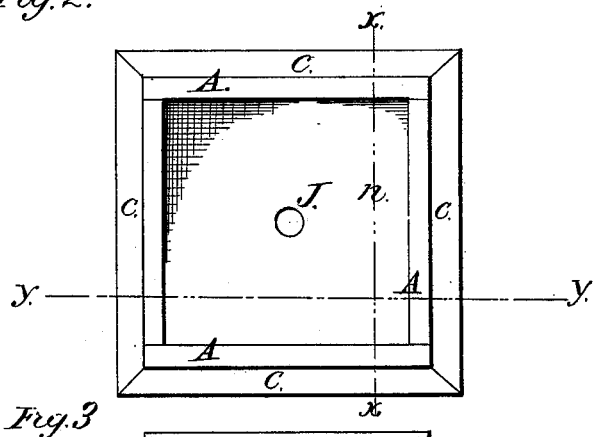
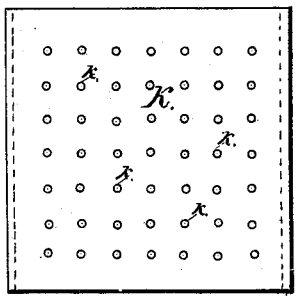


Fig. 3



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2 Sheets—Sheet 2.

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Fig. 4

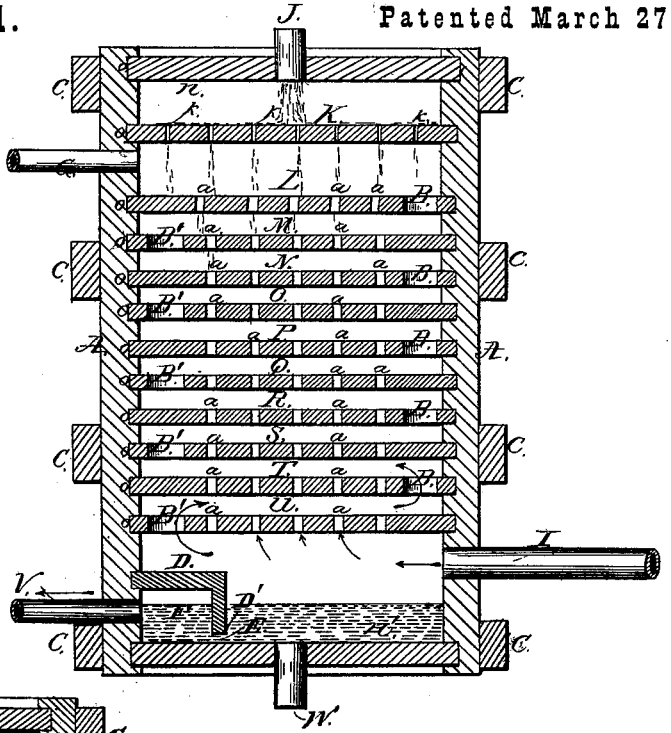


Fig. 8.

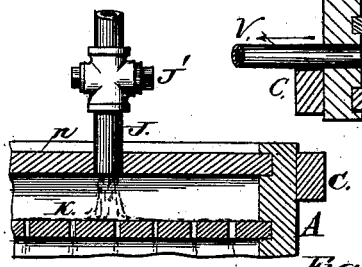
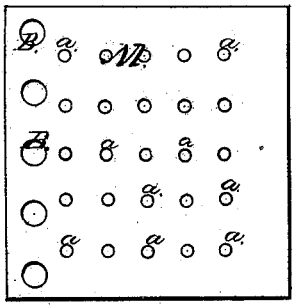


Fig. 5

Fig. 6



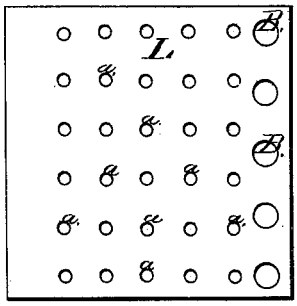
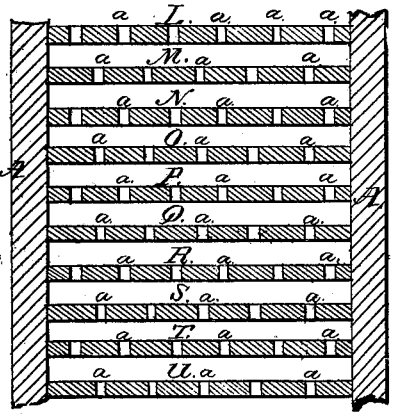


Fig. 7.



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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN APPARATUS FOR MANUFACTURING HYDRATED SULPHUROUS ACID.

Specification forming part of Letters Patent No. **188,801**, dated March 27, 1877; application filed March 12, 1877.

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 perspective view, showing the apparatus embodying the case A, bands C, top *n*, water-inlet J on the top, and gas-inlet I.

Fig. 2 is a plan of the condenser, showing the case A, head *n*, with the hole J, and the bands C.

Fig. 3 is a plan of the distributing-diaphragm K, provided with the fine perforations *k k*.

Fig. 4 is a sectional elevation of the condenser, on the line *y y* in Fig. 2, showing the distributive diaphragm K, with its minute perforations *k*, the series of diaphragms L, M, N, O, P, Q, R, S, T, and U, containing the small holes *a* and the large holes B and B′, the angular partition-pieces D D′, forming the chamber F and passage E, and the pipes and connections I, J, G, V, and W.

Fig. 5 is a plan of diaphragm M, showing the small holes *a* and large holes B.

Fig. 6 is a plan of diaphragm L, whose relative position of the holes *a* is such that they describe a line on the imperforated part of diaphragm M.

Fig. 7 is a sectional elevation of the condenser on the line *x x* in Fig. 2, showing the relative position of the perforations *a a* in the series of diaphragms L M N O P Q, &c.

Fig. 8 is a sectional elevation of the upper part of the condenser A A, showing a cock, J′, attached to the pipe J, by which the supply of water is regulated.

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

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

A (see Figs. 1, 2, 4, 7, and 8) is the condenser, made of wood or other material, substantially as shown, bound together by bolting through the bars C, 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. 4,) at intervals, substantially as shown. In the upper one is placed the top *n*, said top being provided with the central hole, to receive the supply-pipe J, and may also be provided with hand-holes to allow access to the diaphragm K, for the purpose of examining the same, if necessary. In the lower groove is placed the bottom *n′*, which is provided with a hole, W. This hole W may occupy any part of the bottom that is most convenient.

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 next one below is placed the diaphragm L, and then in succession the diaphragms M, N, O, P, Q, R, S, T, and U, all of them being perforated, substantially as indicated in Figs. 5 and 6.

The perforations in L, N, P, R, and T (see Figs. 4, 6, and 7) are upon the same plan, or spaced alike.

The perforations in M, O, Q, S, and U (see Figs. 4, 5, and 7) are also upon the same plan, or spaced alike.

J (see Figs. 1, 2, 4, and 8) is a pipe, provided with a stop-cock, J′, to convey and regulate the supply of water to the condenser A.

G (see Figs. 1 and 4) is an exit-pipe, connected with the condenser, substantially as shown in Fig. 4, and communicating with the atmosphere.

I is a pipe, (see Figs. 1 and 4,) which makes the proper connections between a proper and suitable retort, (which is not shown,) for burning the sulphur, and the lower part of the condenser A, substantially as shown, said pipe I entering the condenser a short distance below the last diaphragm U, and at a higher level than the liquor-discharging pipe V.

The pipe V (see Fig. 4) enters the case A several inches above the bottom *n′*, but at a lower level than the pipe I, two or three inches being sufficient between the upper part of the pipe V and the lower part of the

pipe I to prevent any liquid from flowing out of said pipe I.

The pipe W enters the center or any proper place in the bottom n', and is provided with a plug or cork, which may be removed at pleasure.

The angular pieces D D′ are grooved in the sides of the case A, substantially as shown, so as to form the chamber F and leave a narrow passage, E, extending the width of the condenser A, close to the bottom n'. It is necessary that the condenser should set, when placed for use, so that the diaphragms will be level.

The operation of my invention is as follows: The pipe W is plugged or corked tight, so that no liquor can escape from said pipe.

The cock J′ is turned so as to allow a suitable supply of water 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 diaphragm L. As the water falls upon diaphragm L it is spattered or broken into many small particles or globules, and, running over the edges of the holes *a*, strikes upon the interspaces between the holes in diaphragm M, thereby repeating the same breaking up of the water into many small particles, globules, or spray, as above 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 as it cannot escape through the pipe W, it accumulates in the bottom of the case A until it rises to the height indicated, and is discharged through pipe V into any suitable reservoir. By the accumulation of the liquor in the bottom of the reservoir, as indicated, (see Fig. 4,) all sediment that may be carried in by the water, and the flowers of sulphur which may be carried over in the pipe I, will be precipitated to the bottom, and be held there until washed out, the clear liquor only passing out at pipe V.

As the products from the combustion of sulphur in any suitable and proper retort (which retort is not shown) passes through pipe I into the condenser between the surface of the water in the bottom of the condenser and diaphragm U, the vapors cannot escape by the pipe V. As the angular pieces D D′ form a perfect liquid-sealed chamber, F, it diffuses throughout the whole space, and is partially absorbed by the falling liquid. A small portion of the unabsorbed gases passes up through the small holes *a*, and the large majority passes up through the series of large holes B′ in diaphragm U; and as it passes up through the several holes, as above stated, it comes again in contact with the spray of the falling water, thereby having another portion condensed and absorbed.

The majority of the uncondensed sulphur fumes which have passed up through the holes B′ in diaphragm U diffuses throughout that portion of the space between diaphragms U and T, and passes laterally toward the series of holes B in diaphragm T, excepting so much thereof as may pass up through the small holes *a* in said diaphragm. In making the passage laterally and up through the small holes *a* and the large holes B, the many streams of water passing downward meet the rising and passing products from the burning sulphur, and absorbs and unites with them.

The remaining uncondensed gases that pass up through the series of holes B and perforations *a* in diaphragm T comes in contact with the water falling from the perforations *a* in diaphragm S, and as it passes laterally in the direction of the holes B′ in S, 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 reach 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, 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 V into any suitable tank for use.

When the operator is through with his work at the close of the day, or when desirable to wash out the machine, the fire in the retort is extinguished, the cork or plug in the pipe W is withdrawn, and a free supply of water let in at the pipe J, which effectually washes out all sediment, and cleanses the machine. The water may be allowed to run all night, if desired.

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

With this apparatus hydrated sulphurous acid can be cheaply and easily made. It occupies but little room, (which, in many mills, is of great importance,) condenses and absorbs all of the condensable fumes of vaporized and burning sulphur, and deposits all sediment on the bottom of the condenser that may pass within, and allowing the pure liquor only to escape by the pipe V for use.

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 old.

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

1. In an apparatus for hydrating gases, the finely-perforated distributing-diaphragm K and the series of perforated diaphragms L M N O, &c., each diaphragm being provided with a series of large holes, B, or B′, at alternate ends, and the alternating diaphragms having their perforations *a* 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.

2. The combination and arrangement, with the lower part of an apparatus for hydrating gases, of the chamber F, having passage E, eduction-pipe V, vapor-pipe I, and discharge-pipe W, said pipe W being provided with a removable cork or plug, whereby, when the cork is inserted, the lower part of the apparatus will be flooded, as shown and described, and when the cork is withdrawn the liquid will escape freely, all substantially as and for the purposes shown and set forth.

3. The combination and arrangement, with the lower part of an apparatus for hydrating gases, of the eduction-pipe V above the bottom of the condenser, vapor-pipe I, opening above the level of the liquid, and discharge-pipe W, said discharge-pipe W being provided with a removable plug, whereby, when the plug is inserted, the lower part of the apparatus will be flooded, as shown and described, and when the plug is removed the liquid will have free escape, all arranged substantially as and for the purposes shown and set forth.

W. DAVIDSON JONES.

In presence of—
JOHN T. ARMS,
D. W. KETCHAM.