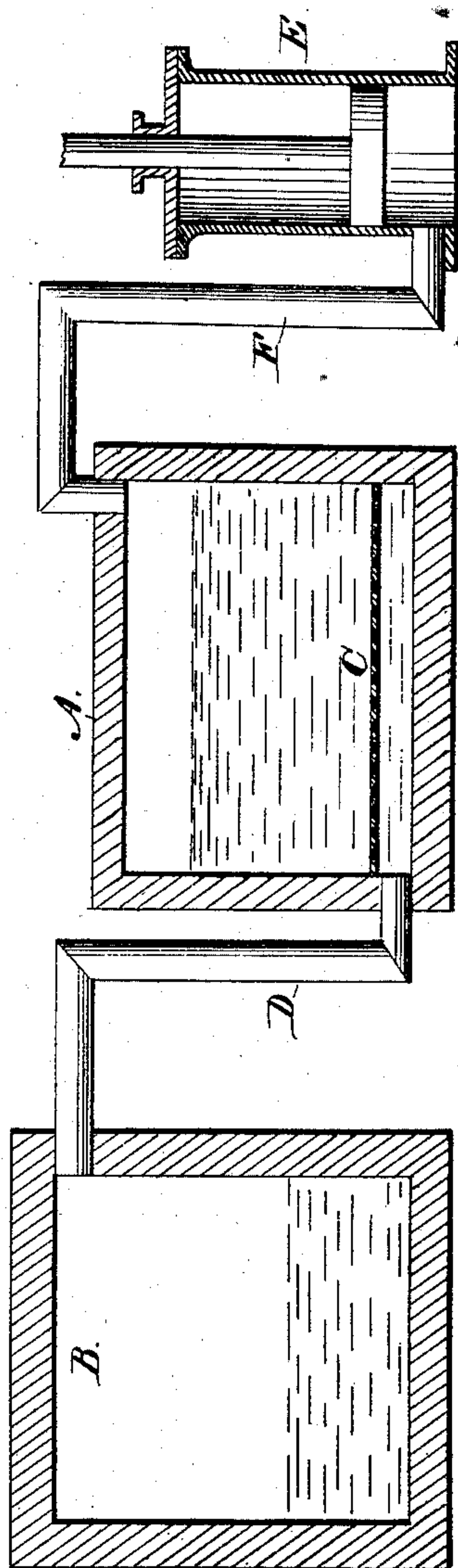


F. FORMHALS.  
Process of Obtaining Boracic Acid from Borate of  
Lime.  
No. 160,761.

Patented March 16, 1875.



*Witnesses*

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# UNITED STATES PATENT OFFICE.

FERDINAND FORMHALS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN PROCESSES OF OBTAINING BORACIC ACID FROM BORATE OF LIME.

Specification forming part of Letters Patent No. **160,761**, dated March 16, 1875; application filed October 16, 1874.

*To all whom it may concern:*

Be it known that I, FERDINAND FORMHALS, of San Francisco, in the county of San Francisco and State of California, have invented an Improved Process in the Manufacture of Boracic Acid from the Borate of Lime; and I do hereby declare that the best mode which I have discovered for performing said process is described in the following specification, with the best apparatus which I have found or discovered for performing the same, reference being had to the annexed drawings.

My invention consists mainly in obtaining boracic acid from borate of lime, or other alkaline borates, by means of sulphurous acid obtained directly from the combustion of sulphur or brimstone, which is made to pass through the borate of lime when held in suspension in water.

In order to accomplish this object I employ a tank, A, in which a sufficient quantity of water is placed to suspend the borate, and dissolve all of the boracic acid, which will readily take place, when the borate is decomposed, by heating to about 150° Fahrenheit. The tank is provided with a perforated diaphragm, C, and in close proximity to it is placed a furnace, B, having a pipe, D, leading into the bottom of the tank. At the opposite side of the tank is placed an air-pump, E, having a connection with the top of the tank by means of the pipe F, which creates a vacuum in the top of the tank when the pump is set in motion.

I commence operations by first charging the furnace with sulphur, which is ignited, and then set the air-pump in motion, which creates a vacuum in the top of the tank A, and

aids in promoting the combustion of the sulphur and formation of SO<sub>2</sub>, sulphurous acid, which passes or is drawn into the tank through the pipe D, and up through the perforated bottom into the solution, by which means the gases are divided and brought in intimate contact with the borates, which causes the SO<sub>2</sub>, sulphurous acid, to combine with the lime or alkaline base, and liberates the BO<sub>3</sub>, boracic acid, which is dissolved in the water, and the nitrogen is thrown off and allowed to escape.

When the decomposition is completed the sulphite of lime will be thrown down as an insoluble salt. The solution of boracic acid is then drawn off into shallow vats or tanks for crystallization, and the mother liquid containing the excess of SO<sub>2</sub>, sulphurous acid, and a small portion of BO<sub>3</sub>, boracic acid, is returned for the next operation.

It should here be observed that a series of tanks may be employed, so that the operation may be continued with little interruption.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The described process of obtaining boracic acid from borate of lime, consisting essentially in the treatment of borate of lime, while in suspension, with sulphurous acid, substantially as described.

In witness whereof I have hereunto set my hand and seal.

FERDINAND FORMHALS. [L. S.]

Witnesses:

C. W. M. SMITH,  
ROBERT SKINNER.