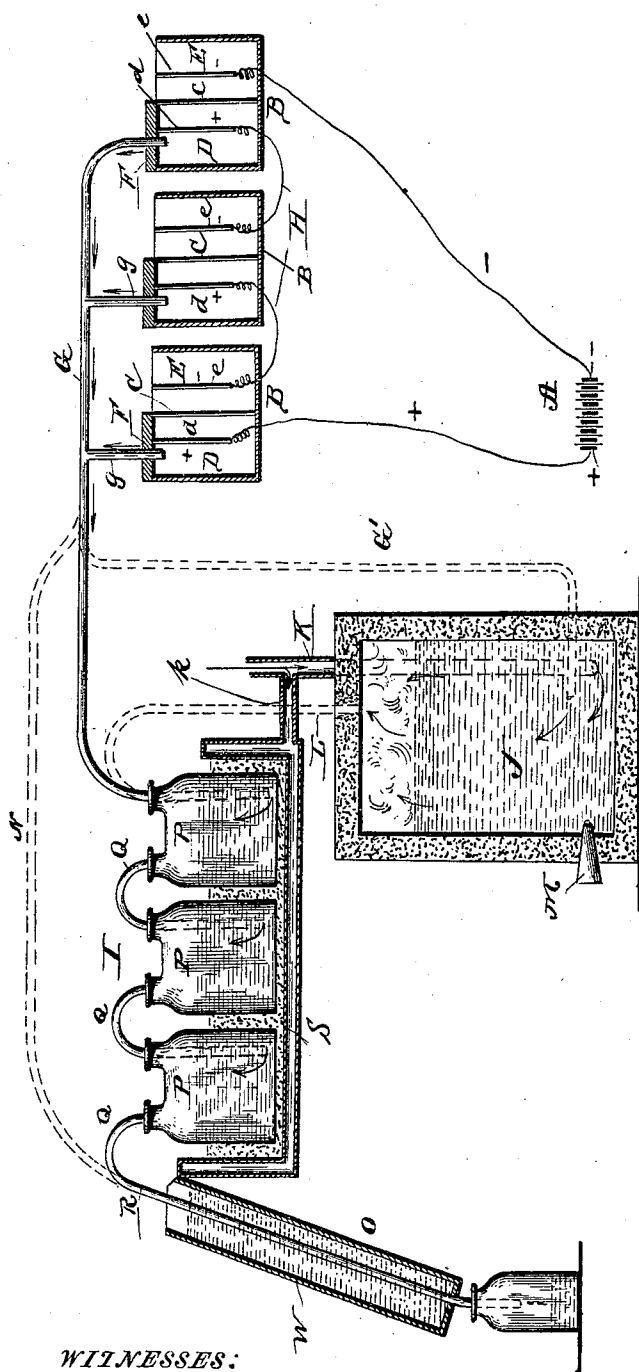


(No Model.)

J. C. KAUTZ.
PROCESS OF PURIFYING BROMINE.

No. 461,681.

Patented Oct. 20, 1891.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JACOB C. KAUTZ, OF MASON, WEST VIRGINIA, ASSIGNOR TO THE KAUTZ
CHEMICAL CO., OF SAME PLACE.

PROCESS OF PURIFYING BROMINE.

SPECIFICATION forming part of Letters Patent No. 461,681, dated October 20, 1891.

Application filed May 8, 1889. Serial No. 309,970. (No specimens.)

To all whom it may concern:

Be it known that I, JACOB C. KAUTZ, a citizen of the United States, and a resident of Mason, in the county of Mason and State of West Virginia, have invented certain new and useful Improvements in Processes for the Manufacture of Bromine; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation to the manufacture and purification of bromine from the native bromides which are held in solution in the bittern water left after the crystallization of common salt at the various salt-works or in concentrated sea-water; and it consists in the method hereinafter described of purifying bromine by passing the same while in a gaseous form and before condensing through a solution of the bromine.

In carrying out my method I employ an apparatus substantially like the one illustrated on the accompanying drawing, which represents a longitudinal sectional view on a vertical plane of the apparatus.

In carrying my invention into effect I pass the bromine, produced in any manner desired, through the purifying apparatus hereinafter described. I prefer, however, to obtain the bromine from the raw material by what is known as "electrolysis"—that is to say, I employ an electric current from a dynamo, galvanic battery, or any other known means capable of producing a current of sufficient power to decompose the bromides held in solution in the bittern. The source of electricity is indicated diagrammatically at A on the accompanying drawing.

The result sought after may be attained, first, by putting the bittern into any number of cells B, known to electricians as "decomposing-cells," and provided with a porous diaphragm or partition C, separating each cell into two compartments D and E, within one of which the positive pole or electrode (anode) *d* is placed, and in the other the negative electrode (cathode) *e*. The compartments D, containing the positive electrodes *d* and also the bittern, are closed with tightly-fitting covers F, and connected to one another by a

pipe G, having branch pipes *g*, after which the circuit is closed by the wires or electrical conductors H; or, second, instead of directly using the bittern in this manner, the closed compartments D may be filled with a solution of common salt (NaCl) or its chemical equivalent, and the chlorine which results from electrical decomposition after the circuit has been closed is conveyed into the branch pipes *g* and main pipe G. In the first case the bromine vapors are carried by the pipe G direct to the purifying apparatus I, to be hereinafter described; but in the second case the chlorine vapors are conveyed by pipe G', as shown in dotted lines, to the still or tank J, which in that case contains the bittern or its equivalent, steam being admitted into the tank near its bottom by a steam-pipe K from a boiler or other suitable steam-generator. This results in the decomposition of the bittern, and the resultant bromine escapes in gaseous form into the purifying apparatus through the pipe L, while the spent liquor may be drawn off through an aperture in the bottom of the still-tank, closed by a plug or stopper M in the usual manner. If, however, it is not desired to purify the bromine, the bromine vapors are conveyed through a pipe N (indicated in dotted lines) direct to the condensor O; but if, on the other hand, it is desired to purify the bromine vapors before condensing, pipe L is carried into the purifying apparatus I, as shown in dotted lines on the drawing. This apparatus consists of a series or battery of earthen vessels or Woulfe bottles P, nearly filled with a solution of bromide of sodium or any other easily-decomposable bromide. These jars or vessels are tightly sealed and are connected to one another by the connecting or coupling pipes Q, commencing in the top of the first jar or vessel, through the top into and ending near the bottom of the second vessel, and so on to the end of the series, as shown in the drawing, until the last jar is reached, the pipe Q of which connects with the condensing-pipe W of the condensing apparatus. In order to prevent the bromine vapors from condensing in their passage through the purifying apparatus, the jars or vessels constituting the same are immersed in a steam-heated sand or water

bath S, which is kept at the proper temperature during the process by steam through a branch *h* of the steam-pipe K.

In passing the bromine vapors through this purifier the small amount of chlorine gas which always accompanies the bromine will be arrested and absorbed by the bromide solution in the purifying-jars, decomposing the same in part and causing its bromine to pass off with the purified bromine to the condensing apparatus, which may be of any of the ordinary and well-known constructions in which the bromine vapors are condensed into liquid bromine. The chlorine which is liberated by this decomposition combines with the sodium, (or other base,) forming chloride of sodium, (or other chlorides, according to the

nature of said base,) which is retained in solution in the purifying-jars.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

The method of purifying bromine by passing the same while in a gaseous form and before condensing through a solution of the bromide, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JACOB C. KAUTZ.

Witnesses:

A. WM. MEES,
HENRY E. DIEHL.