

UNITED STATES PATENT OFFICE.

JAMES DOUGLAS, OF NEW YORK, N. Y.

PROCESS OF EXTRACTING COPPER.

SPECIFICATION forming part of Letters Patent No. 664,537, dated December 25, 1900.

Application filed September 22, 1900. Serial No. 30,785. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES DOUGLAS, a subject of the Queen of Great Britain, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Processes of Extracting Copper from Copper Ore and Matte; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has for its object the utilization of the chlorin or its compounds evolved in the separation of copper from solid cuprous chlorid by electrolysis for the extraction of copper from copper ores and copper matte.

In Patent No. 563,144, granted to me June 30, 1896, a process for extracting copper from solid cuprous chlorid suspended in an electrolyte by electrolysis is set forth and the resultant products are metallic copper, an acid compound of chlorin, which remains in the fluid electrolyte, and chlorin or gaseous compounds of chlorin, which escape from the vessel in which the operation is effected. This gas, which has acid properties, can be absorbed by slaked lime, as in the ordinary bleaching-powder process; but I have discovered that it can also be used as a solvent of copper by bringing it into contact with moistened copper ore or copper matte whether the ore and matte be oxidized or not. The absorption of the chlorin or chlorin compound by being brought into contact with the moistened copper ore or matte can be effected in any of the appliances usually employed for such a purpose; but I prefer to fill towers or large earthenware tubes with the absorbent and connect them with the vessel in which the copper is extracting from the cuprous chlorid in the manner aforesaid.

While the process can be effected in a variety of apparatus, I prefer that shown, which is substantially the same as that illustrated in my Patent No. 563,144, herein referred to, with the addition of a tower or tube to receive the absorbent to be reduced.

The vessel or vat 1 is closed by the cover 2 and receives the solid cuprous chlorid 3 and electrolyte 4, which varies under different conditions. For instance, at one stage of the

process the electrolyte may consist of solid cuprous chlorid, into which the cathode is placed, and water slightly acidified with, say, hydrochloric acid to enable it to conduct the current. As the process goes on the current deposits metallic copper and liberates chlorin and chlorin compounds, and at the end of this stage the electrolyte is a more or less acid solution of the above gases. This electrolyte may be used for leaching purposes, and when the solution so obtained is used directly as an electrolyte it will contain principally various chlorin and other compounds of copper in addition to various compounds of other metals present as impurities. The electrolyte therefore is composed of solid cuprous chlorid and a solution containing acid and various compounds of copper and other metals. The anode 5 is immersed in the electrolyte and the cathode 6 is inserted in the cuprous chlorid. The tower, tube, or receptacle 8 is connected with the vessel 1 by means of a pipe 7. The copper ore or matte 9 is placed in the receptacle 8 and is dissolved by the chlorin or gaseous compound of chlorin evolved from the electrolytic separation of the cuprous chlorid in the vessel 1.

When the copper ore or matte 9 in the receptacle 8 is subjected to chlorin or gaseous compound of chlorin, the compounds of copper formed consist in part of cupric chlorid, which is soluble in water, and in part of cuprous chlorid, which is insoluble in water, but may be dissolved by a solution of any of the alkaline chlorids, such as chlorid of sodium or chlorid of calcium, or by the acid electrolyte, which, as stated, is one of the results of the electrolytic operation in the vessel 1. If the electrolyte from the vat or vessel 1 be used to dissolve the cuprous chlorid, the solution may be allowed to flow back into the vat, where the copper can be deposited electrolytically.

Having thus described the invention, what is claimed as new is—

1. The process of reducing copper ore and matte, which consists in electrolyzing solid cuprous chlorid and employing the gases evolved in the treatment of copper ore and matte, substantially as described.

2. The process of reducing copper ore and matte, which consists in electrolyzing solid

cuprous chlorid, employing the gases evolved
in the treatment of copper ore and matte, em-
ploying the electrolyte resulting from the
electrolyzing of the solid cuprous chlorid as
5 a solvent for the cuprous chlorid so produced,
and recovering the copper from the solution
by electrolysis, substantially as specified.

In testimony whereof I affix my signature
in presence of two witnesses.

JAMES DOUGLAS. [L. s.]

Witnesses:

F. C. MAUSER,
GEORGE CHAPMAN.