

N. V. HYBINETTE.  
ELECTROLYTIC CELL.  
APPLICATION FILED MAY 22, 1913.

1,239,012.

Patented Sept. 4, 1917.

Fig. 1.

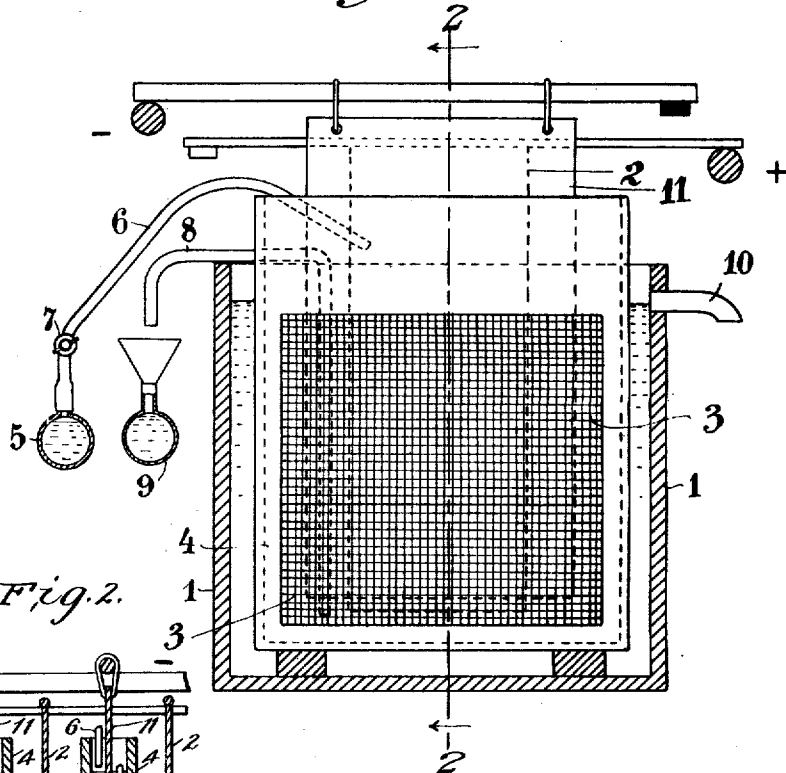
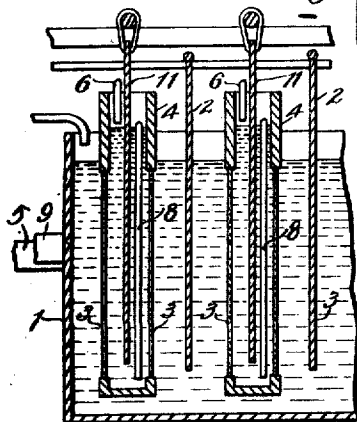


Fig. 2.



Witnesses  
B. Dommers  
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# UNITED STATES PATENT OFFICE.

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## ELECTROLYTIC CELL.

1,239,012.

Specification of Letters Patent.

Patented Sept. 4, 1917.

Application filed May 22, 1913. Serial No. 769,211.

### *To all whom it may concern:*

Be it known that I, NOAK VICTOR HYBINETTE, a subject of the King of Norway, residing at Christiania, Norway, have invented certain new and useful Improvements in Electrolytic Cells; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has for its object means for use in the electrolytic deposition of copper from solutions containing iron and copper.

The invention is particularly designed for use in connection with a process of leaching roasted ore described and claimed in my copending application Serial No. 769,208, where the bulk of the copper is present as oxid soluble in sulfuric acid and the remainder as sulfid which is calculated to be extracted by the use of a strong solution of ferric sulfate.

In such processes it is an important problem to construct a cell in which copper will be deposited out of a solution containing copper and iron and in which there is produced one solution suitable for the dissolving of oxid of copper and another for the dissolving of sulfid of copper.

In the following an embodiment of the invention is described, reference being had to the accompanying drawings in which Figure 1 is a cross section of a cell constructed in accordance with this invention. Fig. 2 is a section on line 2—2 of Fig. 1. In the drawing 1 is the tank in which the anodes 2 are suspended and in which is also placed the diaphragm bags, each of which consists of filtering walls 3 carried by a wooden frame 4.

Solution to be electrolyzed is introduced into the bags from the pipe 5 through flexible tubes 6, provided with regulating valves 7. Each bag is provided with an overflow pipe 8 which reaches to the bottom of the bag and which passes out of the bag just above the edge of the tank 1. The solution from these pipes 8 flows into the pipe 9, which leads to one set of leaching tanks.

The tank is also provided with an overflow pipe 10 which is so arranged as to be revoluble about its own axis. This pipe has a bent end so that by turning the pipe as indicated in dotted lines the level of liquid in the tank may be regulated.

In each diaphragm bag is suspended the cathode 11.

Solution from the leaching vats is led into the pipe 5 from which controllable amounts of solution flows into the bags 3, 4 through the pipes 6. Copper is deposited from this solution on the cathodes 11, and at the same time solution passes through the walls of the diaphragm bags into the anode compartment, while another part of the solution leaves the bag through the overflow pipes 8. The supply of solution through the tube 6 is regulated by means of the valve 7 in such manner, that the level of liquid in the bags stands higher than the level of liquid in the tank 1. By regulating the difference between the levels the amount of liquid passing through the bags may be regulated as required.

The dissolving action of the cathode liquor depends mainly upon its content of sulfuric acid which will dissolve the oxid of copper of the roasted ore, while the sulfid of the ore, which is not soluble in sulfuric acid, is dissolved by the more highly oxidized liquor coming from the anode compartment and containing ferric sulfate, which, as known, is a very good solvent for sulfid of copper.

Besides the solution introduced into the diaphragm bags solution may also be introduced directly into the anode compartment.

The solution discharged from the bags at 8 is passed through the pipe 9 to one set of leaching vats containing freshly roasted ore to extract, by the action of its content of sulfuric acid, the copper oxid content of said ore. The solution enriched in copper is then led into the pipe 5 from which it is passed back into the bags. The solution leaving the tank at 10 is in a highly oxidized condition and suitable for the solution of copper sulfid. This solution is led into another set of leaching vats containing ore from which the main content of copper oxid has been extracted by means of the solution from the cathodes compartment. The so enriched solution is then also led

back into the diaphragm bags through the pipe 5.

As will be seen the arrangement is so made that the level of solution in the cathode bags is higher than the upper edge of the tank 1. By this arrangement the overflow pipe 8 comes above said edge and thereby it is made possible to lift a bag out of the cell without disturbing in any way the rest of the apparatus, which may be continuously run even during repair of one of the bags. This is in practice a very great advantage above other known apparatus.

I claim:

1. An electrolytic cell for depositing copper from copper sulfate solutions containing iron sulfate, comprising a tank, electrodes suspended therein, a plurality of vessels removably suspended in said tank each having a non-porous portion, and a porous portion separating the anodes from the cathodes, means for supplying cathode solution directly to the cathode chambers, said non-porous portion arranged to maintain the solution under atmospheric pressure in the cathode chambers above the level of the solution in the anode chamber, means for withdrawing solution from the anode chamber and overflow channels passing over the edge of the tank for withdrawing so-

lution from the cathode chambers to remove said solution from electrolytic action.

2. An electrolytic cell for depositing copper from copper sulfate solutions containing iron sulfate, comprising a tank, anodes suspended therein, a plurality of vessels removably suspended in the tank each having a lower porous portion below the top of the tank and an upper non-porous portion extending above the tank, a cathode suspended in each vessel, means for supplying the solution to be electrolyzed directly into said vessels, the non-porous portions of the latter cooperating with the supply means to maintain the level of the solution in the vessels above the level of the solution in the tank, means for regulating the difference between the levels to control the amount of solution passing through the porous portions of the vessels, overflow channels passing over the edge of the tank for withdrawing cathode solution from the vessels, and means for withdrawing anode solution from the tank.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

NOAK VICTOR HYBINETTE.

Witnesses:

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RUTH LINDSTRÖM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."