W. F. BLEECKER.

PROCESS OF EXTRACTING VANADIC ACID FROM INSOLUBLE COPPER VANADATE.

APPLICATION FILED APR. 21, 1909.

1,049,330. Patented Jan. 7, 1913.

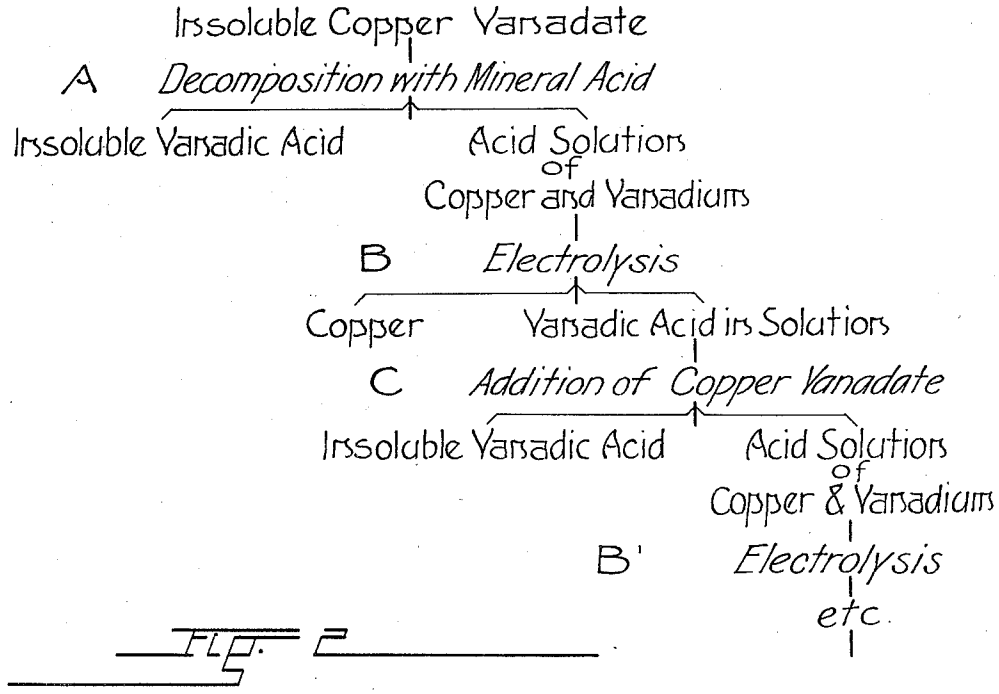

Fig. 2

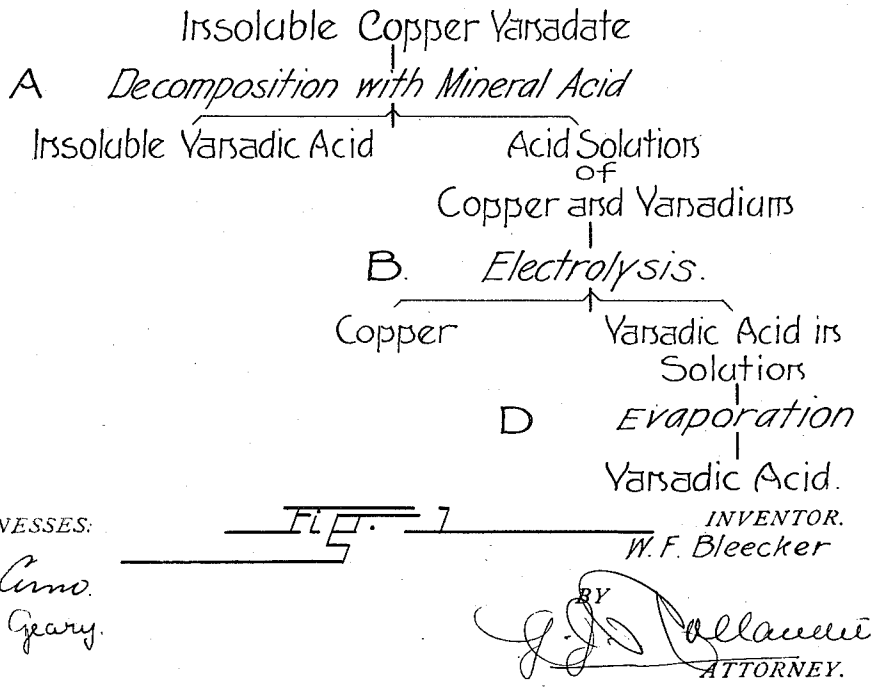

Fig. 1

WITNESSES:
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UNITED STATES PATENT OFFICE.

WARREN F. BLEECKER, OF BOULDER, COLORADO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE RARE METALS MINING AND MILLING COMPANY, A CORPORATION OF COLORADO.

PROCESS OF EXTRACTING VANADIC ACID FROM INSOLUBLE COPPER VANADATE.

1,049,330. Specification of Letters Patent. Patented Jan. 7, 1913.

Application filed April 21, 1909. Serial No. 491,342.

To all whom it may concern:

Be it known that I, WARREN F. BLEECKER, a citizen of the United States of America, residing at Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Processes of Extracting Vanadic Acid from Insoluble Copper Vanadate, of which the following is a specification.

This invention relates to a process of producing vanadic acid from insoluble copper vanadate and its object is to expeditiously and thoroughly extract the vanadium by separating it from the copper with which it is associated.

Although the method by which the copper vanadate is produced from the vanadic constituents of vanadiferous ores, has no bearing on the present process, I preferably employ the product of the process described in the application for patent Number 491,341 filed by me synchronously with the present one. A combination of the two processes into one will produce an effective method of extracting vanadic acid from vanadiferous ores.

In the following description, reference is had to the accompanying drawing in which—

Figure 2, shows the various steps of the process if carried on continuously and Fig. 1, the steps comprised in the completed process.

The process as shown in the drawings, is performed by the decomposition of the insoluble copper vanadate with a proportionately small quantity of dilute mineral acid (preferably H_2SO_4) the product of which is an acid solution of copper and vanadium. The insoluble vanadic acid (V_2O_5) comprised in this product being of a purity of about eighty or ninety per cent., is now separated by filtration leaving copper and vanadic acid in solution (Cu plus V_2O_5 plus H_2SO_4). To extract the copper from the last named solution for the purpose of obtaining the vanadic acid with which it is associated, I preferably employ electrolysis in which the Cu plus V_2O_5 plus H_2SO_4 is employed as an electrolyte including a copper cathode, while the anode is preferably composed of carbon or platinum. The copper will by these means, be deposited on the cathode while the vanadium remains in solution (V_2O_5 plus H_2SO_4.) By evaporating all or part of the sulfuric acid from the last named solution, the vanadic acid may now be recovered, the mother liquid upon dilution having sufficient power to be used again in the process of producing copper vanadate.

By making the process continuous, as illustrated in Fig. 2, it is rendered simpler and more economical and for these reasons, preferable where circumstances permit its practice. The residue of the step B is in this instance, enriched by the addition of a quantity of insoluble copper vanadate after which the vanadic acid is again removed by filtration, while the residue is once more subjected to electrolysis. These actions may be repeated indefinitely without necessitating the use of more mineral acid except the small quantity required to replace that lost by evaporation.

I wish it understood that when using the term "copper vanadate" any of the compounds of copper and vanadium such as $Cu_3(VO_4)_2$, $CuVO_3$, CuV_4O_{11}, etc., are included therein.

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

1. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with mineral acid and separating the insoluble vanadium oxid.

2. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with sulfuric acid and separating the insoluble vanadium oxid.

3. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with mineral acid, separating the insoluble vanadium oxid, extracting the copper from the solution, and recovering the vanadium oxid from the acid solution.

4. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with mineral acid, separating the insoluble vanadium oxid, extracting the copper from the solution by electrolysis and recovering the vanadium oxid from the acid solution.

5. The process of extracting vanadic acid from insoluble copper vanadate consisting

in decomposing the vanadate with mineral acid, separating the insoluble vanadium oxid, extracting the copper from the solution by electrolysis in which the said solution is used as an electrolyte.

6. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with mineral acid, separating the insoluble vanadium oxid, extracting the copper from the solution, and recovering the vanadium oxid from the acid solution by evaporation.

7. The process of extracting vanadic acid from insoluble copper vanadate consisting in decomposing the vanadate with mineral acid, separating the insoluble vanadium oxid, extracting the copper from the solution, adding copper vanadate to the vanadium in solution, and separating the insoluble vanadium oxid.

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

WARREN F. BLEECKER.

Witnesses:

M. L. GEARY,

G. J. ROLLANDET.