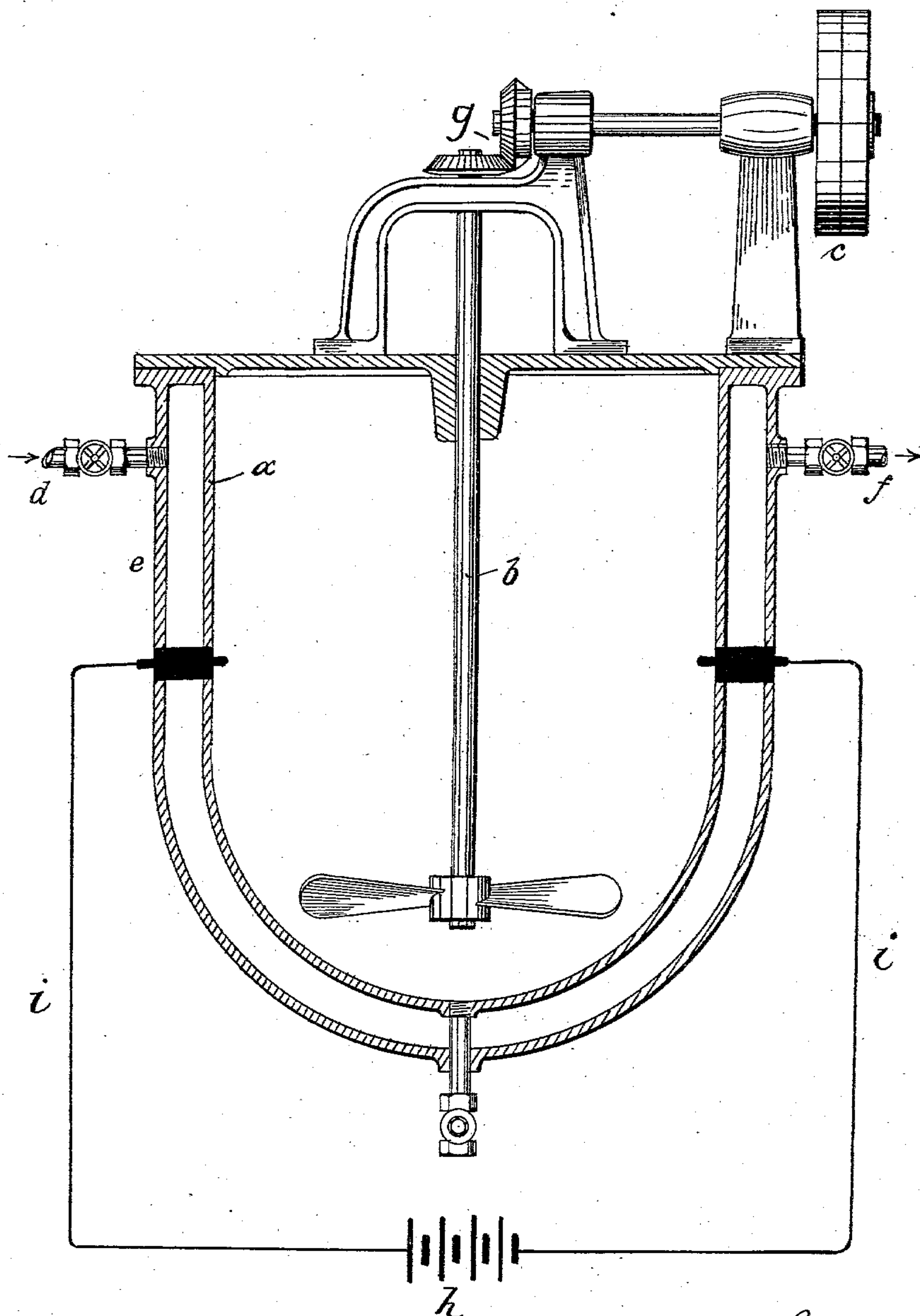


No. 743,668.

PATENTED NOV. 10, 1903.

R. SUCHY & H. SPECKETER.
EXTRACTING CHROMIUM FROM CHROME IRON ORE.
APPLICATION FILED FEB. 6, 1903.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT SUCHY AND HEINRICH SPECKETER, OF GRIESHEIM-ON-THE-MAIN, GERMANY, ASSIGNORS TO THE FIRM OF CHEMISCHE FABRIK GRIESHEIM ELECTRON, OF GRIESHEIM-ON-THE-MAIN, GERMANY.

EXTRACTING CHROMIUM FROM CHROME-IRON ORE.

SPECIFICATION forming part of Letters Patent No. 743,668, dated November 10, 1903.

Application filed February 6, 1903. Serial No. 142,227. (No specimens.)

To all whom it may concern:

Be it known that we, ROBERT SUCHY, a subject of the Emperor of Austria-Hungary, and HEINRICH SPECKETER, a subject of the German Emperor, both residing and having our post-office address at 1 Bahnstrasse, Griesheim-on-the-Main, Germany, have invented certain new and useful Improvements in Extracting Chromium from Chrome-Iron Ore, of which the following is a specification.

It has hitherto been impossible to effect in a simple and cheap manner the extraction of chromium from chrome-iron ore, which is the source of all chromium preparations. Hitherto the extraction of chromium from chrome-iron ore has been effected by long and intensive burning with soda and chalk or saltpeter; but this method is very expensive and slow. We have discovered that the chromium can be extracted in a very simple manner by treating the chrome-iron ore in hot acid solutions with oxidizing agents—such as peroxid of lead, peroxid of manganese, permanganate, chromic acid, &c. The dissolving action of these oxidizing agents is explained by their turning the protoxid of iron contained in the chrome-iron ore into peroxid of iron, whereby a dissolution is rendered possible.

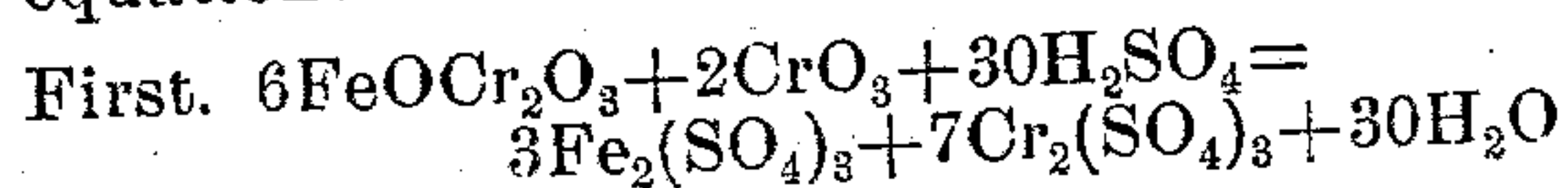
It is already known that chloric acid or chlorate of potassium in nitric acid can be utilized for analytical purposes in the treatment of chrome ore. (See, for instance, the "Zeitschrift für Analytische Chemie, Vol. 8, page 109.) This method is, however, quite distinct from the new method of our present invention in that the oxidation of the protoxid of iron is obtained in the presence of sulfuric acid.

Our method not only renders the extraction of the chromium profitable, since nitric acid is about fourteen times as expensive as sulfuric acid, but also has the advantage that the temperature during the reaction can be increased at pleasure by electing a suitable degree of concentration of the sulfuric acid, while nitric acid requires a much lower temperature. Concentrated nitric acid boils at 86° centigrade, at which temperature the extraction of the chromium is very slow, and

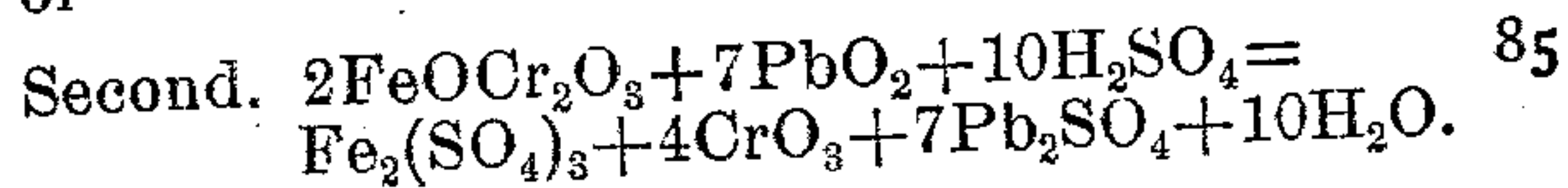
it is only at a temperature above 130° centigrade that a very quick reaction will set in.

The new method is preferably carried on as follows: Two hundred kilograms of chrome-iron ore and about double that quantity of sulfuric acid, which is required for combining with the bases of the ore to form salts, are heated in a suitable vessel, while a quantity of chromic acid exceeding that required for oxidizing the protoxid of iron to peroxid of iron is added. This excess of acids is not absolutely necessary; but it accelerates the reaction. The excess of sulfuric acid forms chromo-sulfo-acid ($\text{Cr}_2(\text{SO}_4)_3\text{H}_2\text{SO}_4$) from the sulfate of chromium, and thus facilitates the separation of the chromium from the iron. The mixture is heated up to a temperature of 120° to 150° centigrade. The dissolution goes on smoothly and easily. It is best to employ sulfuric acid of 50° to 52° Baumé. At a temperature of about 150° centigrade iron will be precipitated as a white sulfate of iron, which is hardly soluble in water, while the sulfate of chromium forms with the excess of sulfuric acid chromo-sulfo-acid, and can thus be easily separated from the sulfate of iron by filtration. In this manner the separation of the iron from the chromium can be attained without difficulty.

The process takes place according to the equation:



or



Instead of using the amount of oxidizing agent necessary for the dissolution a smaller quantity may be used and constantly regenerated by electrolysis. This is effected by adding to the sulfuric acid and chrome ore a small quantity of sulfate of chromium or sulfate of lead or other salt capable of undergoing a high degree of oxidation by electrolysis. This mixture is heated while an electric current is passed through it, chromic acid being thereby produced, which dissolves

the chrome-iron ore while being itself again reduced. By the electrolysis the oxidation is kept going on until the whole quantity of chrome-iron ore is dissolved.

5 Chromic acid can be obtained directly in the well-known manner by using peroxid of manganese or peroxid of lead in suitable quantities.

10 In all cases it is essential that the oxidizing agent employed in this process remain fixed at the temperature of the solution.

In the accompanying drawing we have illustrated in sectional elevation an apparatus capable of carrying our invention into effect.

15 *a* is a closed vessel provided with an agitator *b*, which may be rotated by the pulley *c* and the gearing *g*. The vessel is provided with a jacket *e*, and steam or other heating fluid may be admitted into the space between
20 the vessel and the jacket through the pipe *d* and escapes therefrom through the pipe *f*.

h is a battery, from the opposite poles of which conductors *i* lead into the vessel at opposite points, the conductors being insulated
25 from the vessel in any suitable manner. Any other source of electricity may be employed, and any suitable means may be employed for controlling the current.

30 What we claim as our invention, and desire to secure by Letters Patent, is—

1. The herein-described process of making soluble chrome-iron ore and obtaining chromium compounds, which consists in heating the ore together with sulfuric acid and an oxidizing agent, substantially as and for the purpose set forth. 35

2. The herein-described process of making soluble chrome-iron ore and obtaining chromium compounds, which consists in heating the ore together with sulfuric acid and an oxidizing agent, and passing an electric current through the solution, substantially as and for the purpose set forth. 40

3. The herein-described process of making soluble chrome-iron ore and obtaining chromium compounds, which consists in heating the ore together with sulfuric acid in excess and an oxidizing agent and separating by filtration the precipitated insoluble ferrisulfate from the chromo-sulfo acid, substantially as and for the purpose set forth. 45 50

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ROBERT SUCHY.
HEINRICH SPECKETER.

Witnesses:

FRANZ HASSLACHER,
MICHAEL VOLK.