(No Model.)

B. MOEBIUS.

PROCESS OF TREATING BASE BULLION AMALGAM.

No. 480,956. Patented Aug. 16, 1892.

Fig. 2.

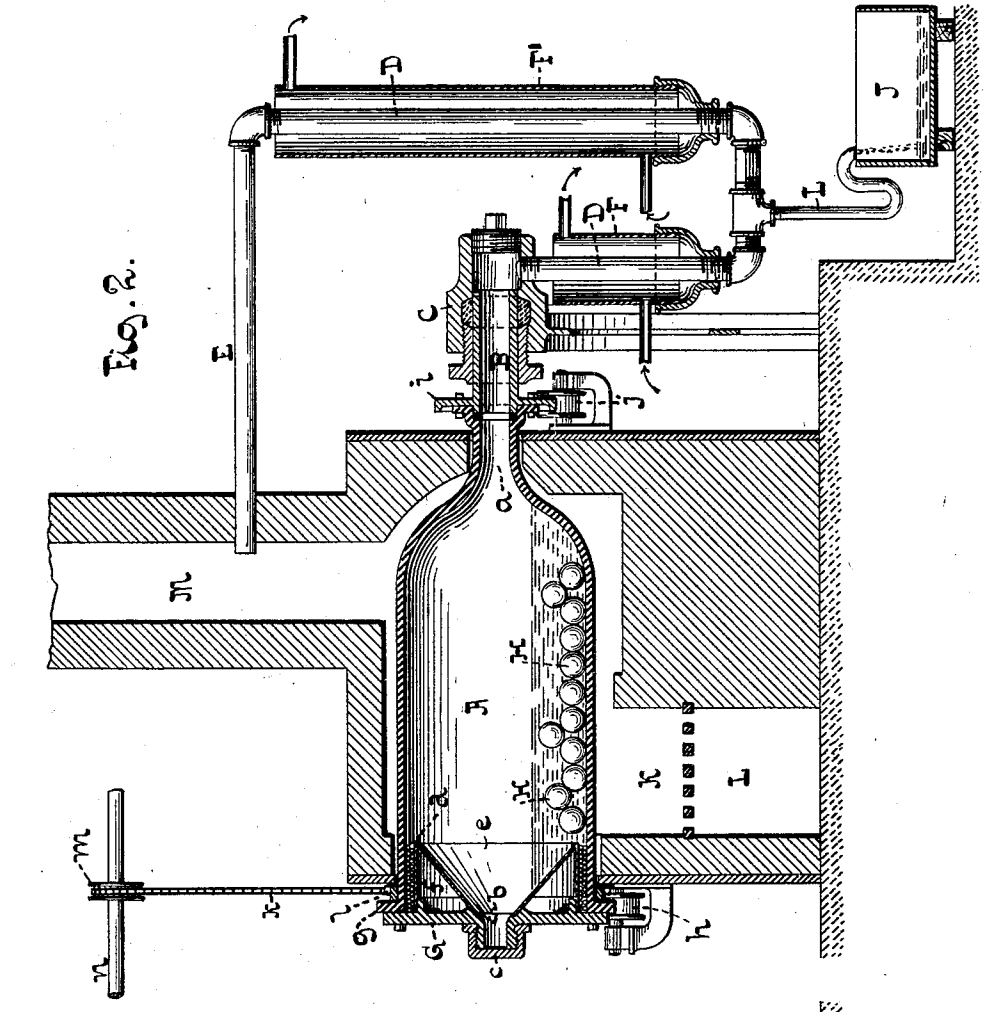
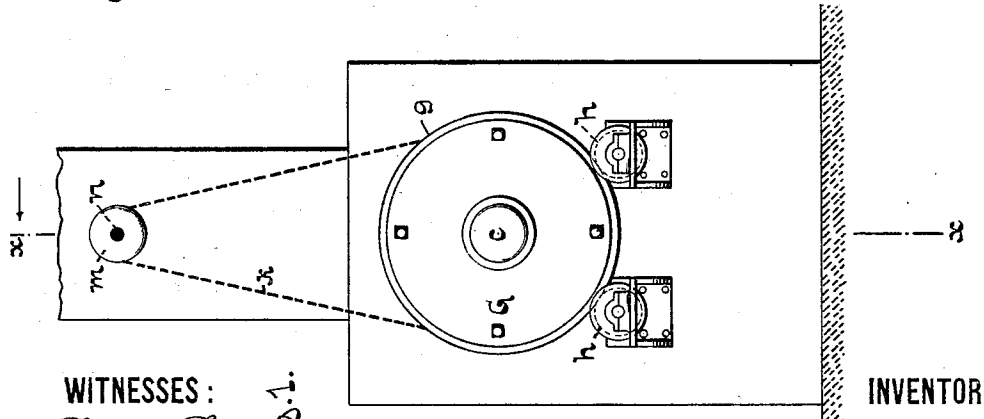


Fig. 1.



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UNITED STATES PATENT OFFICE.

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PROCESS OF TREATING BASE-BULLION AMALGAM.

SPECIFICATION forming part of Letters Patent No. 480,956, dated August 16, 1892.

Application filed December 31, 1891. Serial No. 416,663. (No specimens.)

To all whom it may concern:

Be it known that I, BERNARD MOEBIUS, a citizen of the German Empire, having declared my intention to become a citizen of the United States, and a resident of New York, in the county and State of New York, have invented a new and useful Improvement in the Process of Treating Base-Bullion Amalgam, of which the following is a specification.

Heretofore the bullion resulting from retorting (distilling off the mercury) of the amalgam containing, besides silver and gold, a large percentage of copper and variable quantities of lead, antimony, &c., has been refined by different more or less tedious and expensive methods, subject to great loss of silver by volatilization. The method most generally used consists in cupelling the bullion with lead, whereby the impurities—such as copper, &c.—go into the litharge, but with them also considerable silver. As the by-products have to be worked over again, this method can only be employed at smelting and refining works. Another method frequently used consists in melting and granulating the retorted bullion and heating the same in a reverberatory or roasting furnace, so as to oxidize the copper. The oxidation, however, does not penetrate deep into the granules, but only affects the surface. The roasted material is treated with sulphuric acid, which dissolves the scale of oxide of copper, and the remaining part goes to the roasting-furnace again, and so on, until all of the copper is oxidized and dissolved. This method involves a great loss of time, labor, and fuel.

The object of my invention is to have the base-bullion resulting from retorting in such a condition that the greater part of the copper is already oxidized, and therefore readily dissolved by acids without requiring any further roasting, and for this purpose, during and after retorting, I subject the heated mass to a comminuting action, while at the same time exposing it to the oxidizing action of a current of air, so as to obtain a finely-divided residue containing oxidized base metals, together with the precious metals, and which residue after leaching leaves a bullion sufficiently rich to be parted by any parting process.

In the annexed drawings I have shown an example of an apparatus for carrying out my process.

In the drawings, Figure 1 is a front view of the apparatus, and Fig. 2 a longitudinal section of the same in the plane $x\,x$, Fig. 1.

Similar letters refer to corresponding parts.

A is a cast-iron cylinder or retort with a flanged neck a. The front end of the retort is closed by a door G, having a hole b in the center, which is closed by a screw-cap c. The door G is bolted to a flange g of the retort and forms a stopper, having an extension $d\,d$ $e\,e$, the cylindrical part $d\,d$ of which is surrounded by asbestus rope or other suitable packing material. The air-space f between the cover and its extension keeps the heat from the front part and also prevents the accumulation in front of the material to be treated.

The retort A is mounted in a suitable furnace, so as to be free to rotate. K is the fireplace, L the ash-pit, and M the chimney, of the furnace. The flange g is supported upon rollers $h\,h$, mounted in brackets secured to the furnace-plates. To the neck a of the retort is bolted an extension B, the flange i of which is supported upon rollers j.

Slow rotary motion is imparted to the retort A by suitable means, such as the chain k, passing over a sprocket-flange l on the retort and over a sprocket-wheel m on driving-shaft n. Iron or stone balls H or other suitable bodies serve to comminute the material within the rotating retort.

By means of a stuffing-box C the extension B of the neck a is connected with a U-shaped condenser-pipe D, the upper end of which is connected with the chimney by a pipe E. Draft through the retort may be increased when desired, by well-known means. The two vertical branches of the pipe D are cooled by water in vessels F F′, the water entering near the bottom and leaving near the top. The lowest part of the condenser-pipe is provided with a small discharge-pipe L, forming a trap, so that the condensed mercury can run into a tank J, but preventing air passing into the condenser.

My invention is not restricted to the use of the apparatus shown and described, since a great variety of apparatus may be designed for accomplishing the same result.

In carrying out my process I remove the door G and charge the retort with the amalgam in small lumps, together with a number of balls H, and then replace the door G with the cap *c* screwed on, whereupon the cylinder is set in rotation and a good heat given. When distillation is fairly under way, I remove the cap *c*, so as to allow atmospheric air to be drawn through the retort for the purpose of oxidizing the base metals. The mercury is condensed in the pipe D and flows through the pipe I into the tank J. This arrangement admits of the close observation of the progress of distillation by the quantity of condensed mercury discharged through the pipe I. After distillation has ceased and a test sample of the retorted bullion shows that the base metals are sufficiently oxidized, firing is stopped, the door G removed, and the mass withdrawn from the furnace. The bullion thus obtained as a powder is leached in the well-known manner with diluted sulphuric acid, which dissolves the oxide of copper as sulphate, which is used over again in the process of amalgamating. In remote localities where sulphuric acid is expensive I use by preference sulphurous acid for leaching. I produce the sulphurous acid by burning sulphur in the usual manner and drawing the products of combustion by a lead-lined steam-jet apparatus (exhauster and compressor) into the leaching-tanks containing the retorted bullion-powder and water. In the presence of metallic oxides, air, and steam the sulphurous acid is rapidly converted into sulphuric acid, which rapidly dissolves the oxide of copper, while forming with the oxide of lead a sulphate which remains undissolved with the precious metals, but goes into the slag when the bullion is melted.

While by the ordinary retorting the resulting bullion is in lumps which are scarcely oxidized, by my process it is obtained as a powder because during the process the charge is subjected to a comminuting action and to oxidation, whereby the whole or the greater part of the base metals is oxidized and prevented from agglomerating. Different means may be used for comminuting the mass in the distilling apparatus, although a rotary retort and balls are the simplest. For some material the rotation of the retort without balls will sufficiently agitate the mass to prevent sticking together.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of treating amalgam of the character specified, which consists in charging the same into an apparatus for distilling off and collecting the mercury and subjecting the heated charge to a comminuting action, while at the same time oxidizing the base metals by a current of air.

2. The process of treating amalgam of the character specified, which consists in charging the same into an apparatus for distilling off and collecting the mercury, subjecting the heated charge to a comminuting action, while at the same time oxidizing the base metals by a current of air, and leaching the finely-divided residue, substantially as specified.

3. The process of treating amalgam of the character specified, which consists in charging the same into an apparatus for distilling off and collecting the mercury, subjecting the heated charge to a comminuting action, while at the same time oxidizing the base metals by a current of air, and leaching the finely-divided residue by sulphuric acid, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 30th day of December, 1891.

BERNARD MOEBIUS.

Witnesses:
A. FABER DU FAUR,
JOSEPH ELIAS.