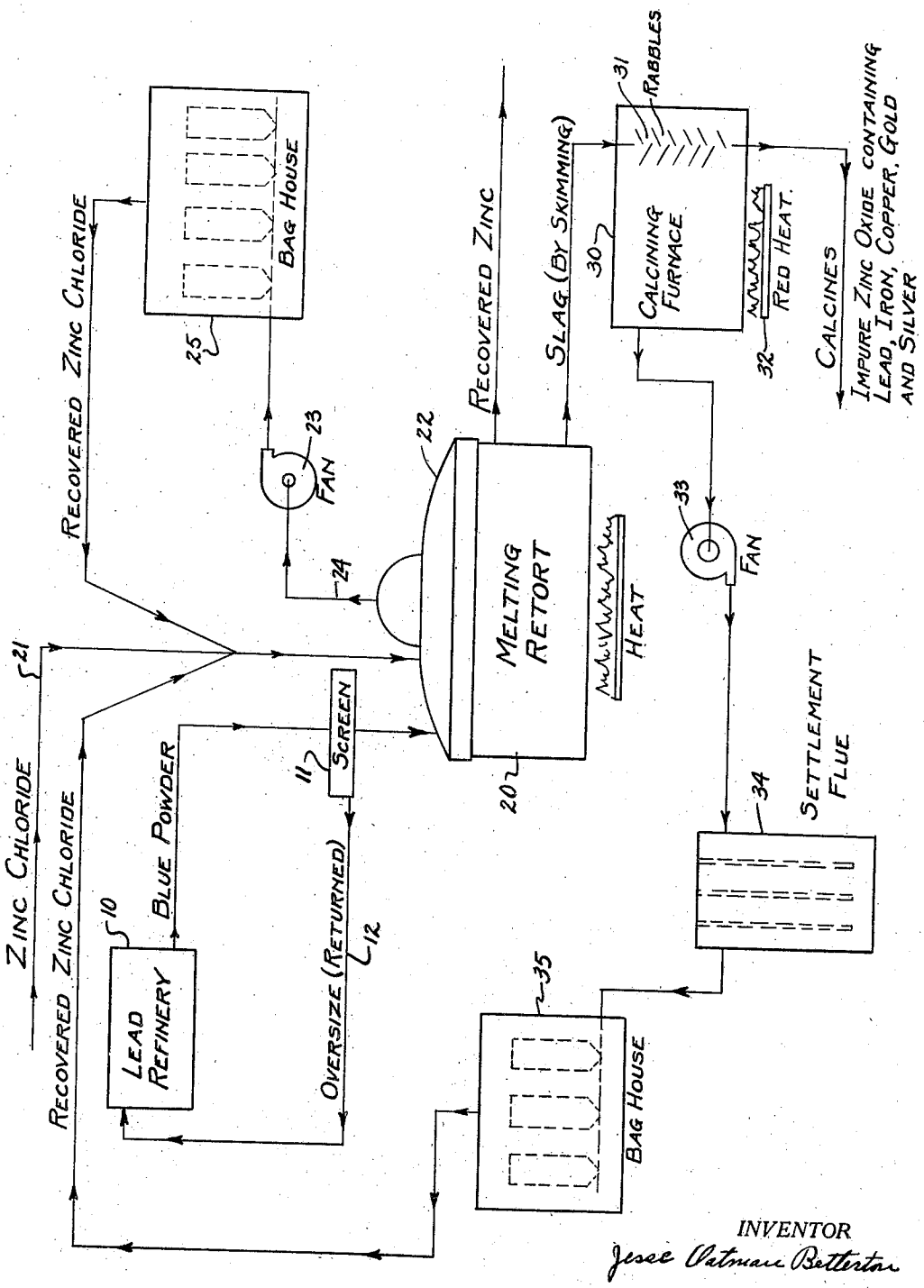
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RECOVERING METAL

Original Filed June 28, 1923



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RECOVERING METAL.

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This invention relates to the art of metallurgy and has particular reference to improvements in methods of recovering zinc from the residue produced in lead refining.

The present invention has for one object the utilization of materials heretofore wasted, thus reducing costs and increasing efficiency. Another object is to produce calcines containing valuable metals. Another object is to recover metallic chlorides in such manner as to reduce the losses to a minimum and thus provide a process that is cyclic in operation.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one method of practicing my invention, and the invention also consists in certain new and novel features hereinafter set forth and claimed.

In the accompanying drawings, there is shown a flow sheet of the several steps of the process, the parts of a refinery being shown symbolically.

The blue powder produced in well-known processes of lead refining is taken from the lead refinery 10, and passed through a suitable screen 11. The oversize screenings rejected by the screen 11 are returned to the intake of the lead refinery 10 over flow path 12, for re-treatment.

A suitable melting kettle 20, of well-known construction, is provided and there is placed therein a flux of zinc chloride. The initial charge of zinc chloride (see flow path 21) is sufficient in quantity to initiate the operation, and thereafter there is added only such quantities as will compensate for mechanical handling losses. Heat is now applied to the kettle 20 of such degree and for a sufficient length of time to expel all water. The last of the water will not come off until fusion has taken place and volatilization of the salt has commenced. The blue powder from the refinery 10 is next added to the kettle 20, and stirred in thoroughly with the fused zinc chloride. The kettle 20 is provided with a closely fitted hood 22 communicating with a suction fan 23 through a connecting passage 24, the outlet of the fan leading to a bag house 25, and during this operation it is necessary to keep the fan 23 running in order to prevent excessive loss of the volatilized zinc chloride. The zinc chloride carried off during this step of the process may be readily recovered from the bags of the bag house 25.

The molten zinc chloride in the kettle 20 serves to dissolve the zinc oxide coating from the particles of blue powder and thus allows the metallic zinc to coalesce. A bath of molten zinc is thereupon formed underneath the fused slag. I have found that it is usually, though not always, necessary to increase the temperature considerably to cause this action to be reasonably rapid. As the zinc chloride absorbs zinc oxide from the blue powder it tends to become less fluid in nature until when fully saturated it is fairly solid. It may then be removed from the mass of molten zinc by skimming. Thus the metallic zinc content of the blue powder is efficiently removed, and the oxidized zinc content thereof is absorbed into the slag.

The zinc recovered at this step of the process has been found to contain lead, copper and nearly all the gold and silver content of the original blue powder received from the refinery. This metal can be utilized for the purpose of replacing zinc in the so-called Parkes process of desilveration of lead bullion.

The slag contains, in addition to zinc, some lead and copper, and a trace of gold and silver, as well as some fire clay from the zinc refining retorts of the refinery, necessarily present in the blue powder.

The slag is next charged into a muffle, roasting or calcining furnace, shown symbolically at 30, comprising rabbles 31 and means 32 for applying a red heat. The furnace 30 is connected by a suction fan 33 to a settlement flue 34 and a bag house 35, of well-known construction. The slag is heated and rabbled at a red heat. During this operation the metallic chlorides, mainly of course, zinc chlorides, are volatilized and recovered in the flues and bags of the settlement flue structure 34 and bag house 35, respectively. The recovered chlorides are then supplied to the melting kettle 20 as previously described, and thus are used over again and again.

The calcines remaining consist of an impure zinc oxide, containing lead, copper and a trace of gold and silver. It is a valuable

zinc product and has utility in spelter production.

Thus it will be seen that I have provided an improved treatment for the blue powder residue of lead refining, whereby the zinc chloride used in the treatment is recovered, and in addition useful and valuable products are extracted from the material being treated.

The process herein described has the additional advantages that the calcines produced are a commercial product which may be disposed of to spelter producers, and the loss of valuable material is reduced to a minimum.

While I have shown and described and have pointed out in the annexed claims certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the several steps of my process and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:

1. In the art of metallurgy, the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of adding said residue to fused zinc chloride, maintaining the mass at a temperature to dissolve the zinc oxide from said residue, and causing the particles of metallic zinc to coalesce and separate from the mass.

2. In the art of metallurgy, the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of adding the blue powder to fused zinc chloride and forming a slag, heating the mixture to a relatively high temperature, collecting the volatilized substances from the heated mixture, and separating the zinc chloride from said substances.

3. In the art of metallurgy, the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of heating zinc chloride, to fusion, adding said residue to the fused zinc chloride, subjecting the mixture while heated to negative pressure to draw off volatilized products, causing the metallic zinc to settle out, so as to form a slag, heating the slag to collect the volatilized products therefrom, and precipitating the zinc chloride from said products.

4. In the art of metallurgy the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of heating zinc chloride to fusion, adding the blue powder to the zinc chloride, subjecting the mixture to increased heat to form a slag, removing the slag and heating the same at red heat, collecting the volatilized products therefrom and recovering the zinc chloride.

5. In the art of metallurgy the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of heating the zinc chloride to fusion, adding the blue powder to the zinc chloride, agitating the mixture while heated, subjecting the zinc chloride while heated to a negative pressure to draw off volatilized matter, increasing the heat applied to form a slag, separating the slag from the remainder of the material heating the slag at red heat, collecting the volatilized products therefrom.

6. In the art of metallurgy the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of heating the zinc chloride to fusion, adding the blue powder to the fused zinc chloride, agitating the mixture while heated, subjecting the mixture while heated to negative pressure to draw off the volatilized zinc chloride, increasing the heat applied to form a slag, heating and rabbling the slag at red heat, collecting the volatilized products therefrom and recovering the zinc chloride from said volatilized products.

7. In the art of metallurgy the process for the recovery of zinc compounds from the blue powder residue of lead refining, which includes the step of heating the zinc chloride to fusion, adding the blue powder to the blue zinc chloride, agitating the mixture while heated, subjecting the zinc chloride while heated to a negative pressure to draw off volatilized matter, increasing the heat applied to form a slag, heating the slag at red heat, collecting the volatilized products therefrom, and recovering the zinc chloride from said volatilized products.

8. In the art of metallurgy the process for the recovery of zinc compounds from the blue powder residue, of lead refining, which consists in mixing the blue powder with an excess of fused zinc chloride thereby to dissolve the zinc oxide coating of the blue powder, and causing the particles of metallic zinc to coalesce.

Signed at Omaha in the county of Douglas and State of Nebraska this 6th day of June A. D. 1923.

JESSE OATMAN BETTERTON.