

UNITED STATES PATENT OFFICE.

CARL V. PETRAEUS, OF JOPLIN, MISSOURI, ASSIGNOR TO OLIVER H. PICHER, OF SAME PLACE.

METHOD OF SMELTING GALENA.

SPECIFICATION forming part of Letters Patent No. 556,691, dated March 17, 1896.

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To all whom it may concern:

Be it known that I, CARL V. PETRAEUS, a citizen of the United States, residing at Joplin, in the county of Jasper, in the State of Missouri, have invented a new and useful Improvement in the Method of Smelting Galena, of which the following is a true and exact description.

My invention relates to the smelting of galena ore, and has for its object to reduce substantially all of the lead contents of such ore to the metallic form and with the least possible cost of production. This I accomplish by first treating the galena ore in a Scotch hearth or other similar open-hearth blast-furnace. In this a large percentage of metallic lead is produced, but a portion of the lead is driven off as a lead fume, consisting mainly in sulphate, oxide and sulphide of lead, while another portion of lead is left in a rich slag, called "gray slag." I intercept and save the lead fume by passing the furnace smoke into a screen system, preferably consisting of fabric bags, and I then agglomerate the collected fume, which is easily done by igniting the mass, the carbon and lead sulphide burning freely, and the product, mainly lead sulphate and oxide, being cinkered together in hard sticks or lumps in good condition for treatment in a reducing-furnace. I then charge the lead-slag of the open-hearth furnace, together with the agglomerated fume, into low cupola-furnaces for further smelting, and I intercept and save the large amount of lead fumes driven off from these furnaces in a separate screen system. This fume, when screened, consists largely of lead sulphate with comparatively little lead oxide, and even if it contains enough carbon and lead sulphide to ignite the product will not be cinkered together but form a light and chalky mass. When the fuel in the low cupola-furnace is carefully chosen and precautions are used to burn out all the carbon and lead sulphide, the fume can be and is extensively used as a pigment, and is known as "sublimed white lead," and the steps of the process hereinbefore described are in use for its manufacture. My treatment, however, is directed solely to the manufacture of metallic lead, which permits me to use fuel of inferior grade and to omit

the steps of a pigment-producing process required for the purification of the fume. The lead sulphate, however, is, as already stated, not capable of agglomerating by its own combustion. It is of too light and flocculent a nature to permit of its being recharged into a furnace, and, if mixed with the fume from the open-hearth furnace, it makes the cinkering or agglomeration of the fume very imperfect, even if not in sufficiently large proportion to destroy its combustibility. These causes have led to the abandonment of attempts heretofore made to resmelt this product, but I have discovered that the sulphate fume can be agglomerated into masses suitable for charging into a blast-furnace by subjecting the fume to pressure, preferably, though not necessarily, slightly dampening the fume before pressing it. Other methods—such as cinkering the fume in a furnace or cementing it by the addition of some solution, as of lime and water—can also be used, but will be found more expensive and less satisfactory than my preferred method.

Having agglomerated the sulphate fume I charge it into the low cupola-furnace, and with the result of securing practically the entire lead contents of the galena under treatment and at a low cost.

Of course it will be understood that the charge of the low cupola-furnace may consist of other ores and compounds in addition to the products of the hearth-furnace, my process of treating galena being unaffected by the presence or absence of such additional matter.

It is preferable, but not necessary, to smelt the agglomerated fumes from the open-hearth furnace in a low cupola-furnace. They may also be smelted in the open-hearth furnace mixed with galena ore. In this case only the slag and lead-ashes—fume settled close behind the open-hearth furnace—are smelted in the low cupola-furnace, together with the agglomerated fume from this low cupola-furnace.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of smelting galena which consists in treating the ore in an open-hearth

blast-furnace and saving the lead fume driven off therefrom by screening, agglomerating said fume saved by screening and subjecting it to further smelting for the purpose of reducing it to metallic lead, treating the metal-bearing slag of the open-hearth furnace in admixture with agglomerated fume obtained by similar previous treatments in a low cupola-furnace and saving the fume driven off thereby in a separate screen system, agglomerating the fume so saved and charging it into the low cupola-furnace as aforesaid as part of the charge thereof.

2. The method of smelting galena which consists in treating the ore in an open-hearth blast-furnace, and saving the metallic fumes driven off thereby by screening, agglomerating the metallic fume saved in the screening, treating the metal-bearing slag of the open-hearth furnace in admixture with the agglomerated fume in a low cupola-furnace, and saving the fume driven off thereby in a separate screen system, agglomerating the metallic fume so saved and charging it into the low cupola-furnace with products of the open-hearth furnace.

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3. The method of smelting galena which consists in treating the ore in an open-hearth blast-furnace, and saving the metallic fume driven off thereby by screening, agglomerating the metallic fume saved in the screening, treating the metal-bearing slag of the open-hearth furnace in admixture with the agglomerated fume in a low cupola-furnace and saving the fume driven off thereby in a separate screen system, agglomerating the metallic fume so saved by pressure and charging it into the low cupola-furnace with products of the open-hearth furnace.

CARL V. PETRAEUS.

Witnesses:

W. H. PICHER,
GALEN SPENCER.