

No. 768,035.

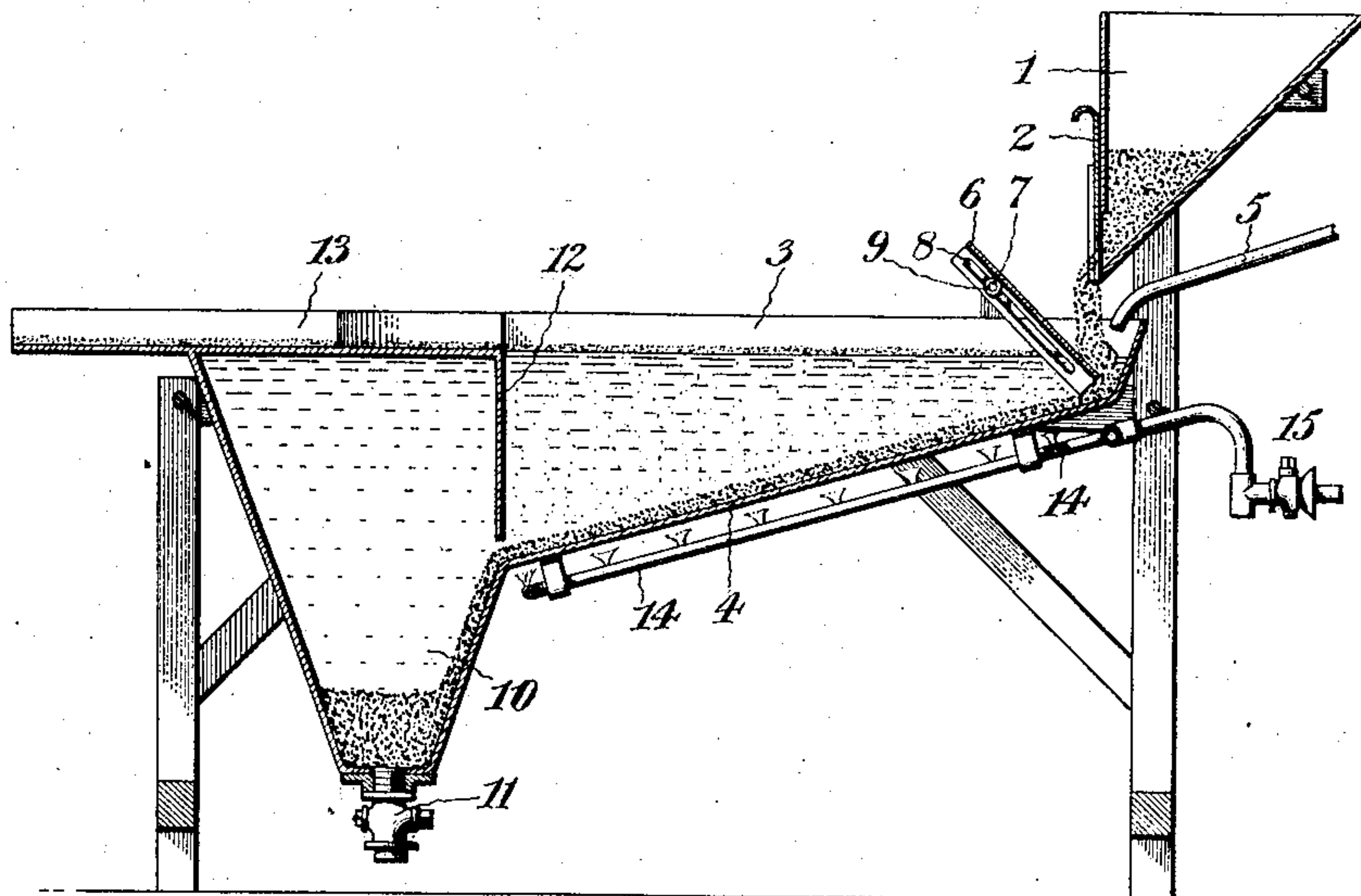
PATENTED AUG. 23, 1904.

G. D. DELPRAT.

EXTRACTING ZINC OR OTHER SULFIDS FROM THEIR ORES.

APPLICATION FILED JAN. 2, 1903.

NO MODEL.



Witnesses:

W. A. Ober.

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by *Henry Orth*
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UNITED STATES PATENT OFFICE.

GUILLAUME D. DELPRAT, OF BROKEN HILL, NEW SOUTH WALES,
AUSTRALIA.

EXTRACTING ZINC OR OTHER SULFIDS FROM THEIR ORES.

SPECIFICATION forming part of Letters Patent No. 768,035, dated August 23, 1904.

Application filed January 2, 1903. Serial No. 137,585. (No specimens.)

To all whom it may concern:

Be it known that I, GUILLAUME DANIEL DELPRAT, a subject of the Queen of the Netherlands, residing at Broken Hill, in the State of New South Wales and Commonwealth of Australia, have invented certain new and useful Improvements in Extracting Zinc or other Sulfids from Their Ores, of which the following is a specification.

10 The finely-divided ores are immersed in a hot but preferably not boiling solution of salt cake or of sodium sulfate and sulfuric acid, and the sulfids rise to the top and are skimmed off or otherwise removed.

15 A suitable apparatus for carrying out the process is shown in section in the accompanying drawing.

Below an ordinary bin or feed-hopper 1, having a regulating discharge-door 2, is the pan or vessel 3, having a sloping bottom 4. The liquor or chemical solution is supplied by pipe 5 from a suitable reservoir (not shown) at an upper level. Just below the door 2 is a plate 6 on pintles or pivots 7 in slots 8, adapted to be clamped by set-screws 9 when the plate is adjusted to the required angle and with the required extent of opening between the lower edge of said plate 6 and the bottom 4, the directing-plate being primarily to insure the total immersion of all particles of ore in the fluid or liquor. At the lower end of the inclined bottom 4 is a tailings-receiver or sump 10, having a tailings-discharge 11. At the receiving end of the sump 10 is a baffle-plate 12, extending close to the face of said bottom 4, the object of which is to prevent accumulation of concentrates above the sump 10. Extending from the pan 3 is a launder or trough 13 to receive the overflow and the concentrates. Under the bottom 4 is piping 14, forming with the air-inlet cock 15 a Bunsen burner for gas, so that the solution or liquor may be raised to any desired temperature. The ore fed from the hopper 1 drops into the heated bath and slides by gravity over the bottom to the sump, the ore particles being raised by the gas-bubbles to the surface of the liquor during the travel of the ore over the inclined bottom and are floated off with the

overflow through the trough 13 or, if desired, skimmed off. This apparatus forms the subject-matter of a separate application for patent filed March 9, 1903, Serial No. 146,895, to which I therefore make no claim in this application.

In practice the "sulfid ores," including in such term the products and waste from other metallurgical processes, are finely pulverized, as well understood, and are then ready for immersion in the hot bath. This bath consists of a solution of salt cake in water of a specific gravity approximating to 1.4, (one and four-tenths,) which is kept hot, but preferably is not allowed to boil. As an alternative the bath consists of a solution of sodium sulfate in water, to which is added free sulfuric acid, so that the resultant will approximate the stated specific gravity of 1.4, (one and four-tenths,) and this bath is also kept heated and likewise preferably not allowed to boil. As the ore immerses itself in the heated bath the sulfids with gas-bubbles of sulfureted hydrogen attached disengage themselves from the gangue, rising to the top, whence they may flow away or be skimmed off. The tailings or waste may be removed from the bottom of the sump at intervals as desired.

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

1. The method of separating ores from their gangue, which consists in forming an aqueous solution of an acid capable of reacting with the ore to form a gas and increasing the density of said solution by adding thereto a suitable substance, then feeding the mixture of ore and gangue to the solution, decreasing the density of the gas as it is formed on the ore particles, and removing the ore particles raised to the surface, substantially as described.

2. The method of separating ores from their gangue, which consists in forming a solution of a suitable acid capable of reacting with the ore to form a gas, increasing the density of the solution by adding thereto a suitable salt soluble therein, then feeding the mixture of ore and gangue to the solution and decreasing the density of the gas as it is formed, whereby

the size of gas-bubbles will be increased and the ore raised to the surface of the solution, substantially as described.

3. The method of separating ores from their gangue, which consists in forming a solution of an acid capable of reacting on the ore to form a gas, and increasing the density of said solution by a suitable substance, then feeding the finely-ground mixture of ore and gangue to the solution and finally removing the ore particles raised to the surface, substantially as described.

4. The method of separating sulfid ores from their gangue, which consists in forming a solution containing sulfuric acid, and adding thereto a substance soluble therein and capable of increasing the density of the solution, feeding fine ore thereto capable of reacting with sulfuric acid to generate a gas and thereby raise the ore to the surface, and removing the ore so raised to the surface, substantially as described.

5. The method of separating sulfid ores from their gangue, which consists in forming a solution of sulfuric acid and a sulfate, maintaining the solution heated below the boiling-

point, feeding finely - ground ore thereto, whereby the acid will react with the soluble sulfid-ore particles present to form sulfureted hydrogen and be lifted by bubbles of said gas to the surface of the solution, and removing the ore so carried to the surface of the solution, substantially as described.

6. The method of separating sulfid ores from their gangue, which consists in forming a solution of sulfuric acid and sodium sulfate, maintaining the solution heated below the boiling-point, feeding finely-ground ore thereto, whereby the acid will react with the soluble sulfid-ore particles present to form sulfureted hydrogen and be lifted by bubbles of said gas to the surface of the solution, and removing the ore so carried to the surface of the solution, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GUILLAUME D. DELPRAT.

Witnesses:

FRED WALSH,
PERCY NEWELL.