

two thousand parts of the ore or material under treatment sufficient, but in dealing with some ores or materials which are very rich in finely divided gold it is advantageous to increase the quantity of bromine, for instance, to as much as one part of bromine to each one hundred parts of the ore or material under treatment. The acid should be added in such quantity as to make the solution just sufficiently acid to react on test-paper. The heating of the solution, if it is to be used in a heated condition for leaching, may be effected in any suitable way; for example, by passing the solution through a chamber surrounded by a hot-water jacket or having it in a coil, and the water supplied to this jacket or coil may be heated by the roasting-furnace, or by other suitable means. The solution is passed through the divided ore or material, preferably by means of a force-pump, and in an upward direction in a vat having a filter at the top. The liquid from the leaching-vat is then passed into a precipitating-vessel in which it is agitated with a precipitant, which I prefer to be sulphide of sodium, in quantity sufficient to throw down the greater part of the gold and silver from the solution, copper being left in solution. The quantity of sulphide of sodium should therefore be in accordance with the amount of precious metal in solution, and the quantity necessary can be ascertained by taking a sample of the solution with the precipitate in suspension, filtering and testing the filtrate with ammonia for the presence of copper. If the test shows that the copper of the leaching-solution has been thrown down, the quantity of precipitant must be lessened until the test indicates that the solution retains its normal amount of copper. The liquid is then by preference forced up through a filter for the purpose of collecting the precipitate, and the solution which passes from the filter is strengthened for re-use in the leaching-vats by the addition of hydrochloric acid and bromine, or either of them, and is again passed to the leaching-vats, being first (if the solution is to be used in a heated condition) passed through the heating-vessel. The precipitate may be pressed and treated for the obtainment of the precious metal or metals in the usual or any suitable way. The ore or material from the leaching-vessel may, after leaching, be washed with warm or cold water to remove the last traces of the solution, and such wash-water and solution removed by it may be run into an evaporator to be concentrated before being added to the solution for re-use. The ore may then be washed out from the vat over a plate or surface of zinc, or alloy of zinc, by acidulated water, so that hydrogen is evolved, and thence into contact with mercury, preferably in the form of an amalgamated copper-plate or surface which retains any gold and silver which may remain in the ore in the vat, and which would otherwise be lost.

"I do not limit myself to any one precise form of apparatus for carrying out my invention, but the apparatus described in the specification of my application for letters patent of even date herewith is well adapted for the purposes of my present invention.

"Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

"1. In a process such as is hereinbefore named the use in the leaching-solution of hydrochloric acid or bromine, or both, substantially in the manner and for the purpose hereinbefore described, the leaching solution, after it has passed through the leaching-vat and filter being brought up to normal strength, and again passed to the leaching-vat for re-use in the manner described, whether the solution be heated or not.

"2. In a process such as is hereinbefore named, the use of hydrochloric acid or bromine, or both, for leaching substantially in the manner and for the purpose described, the solution, after it has passed through the leaching-vat and filter being brought up to normal strength, and again passed to the leaching-vat for re-use in the manner described, combined with the use of sulphide of sodium as a precipitant in the manner hereinbefore described.

"3. The treatment of gold- or silver-bearing ores or materials which have been leached by washing or passing the said ores or materials out of the leaching-vats over zinc, or an alloy of zinc, and then into contact with mercury, such as over an amalgamated copper-plate.

"4. The treatment of ores or materials for the obtainment of precious metals by subjecting the ores or materials to a succession of operations constituting the process as a whole substantially as hereinbefore described.

"Dated this 8th day of April, 1890.

"W. D. BOHM."

"I certify this to be a true copy.—W. H. Quick, Solicitor, Wellington."

A WONDERFUL WATER INDICATOR, BY WHICH SUBTERRANEAN WATER AT ANY DEPTH CAN BE FOUND WITH CERTAINTY.

The following is taken from the *Australian Mining Standard* of the 2nd July last, and if the instrument is capable of doing what is claimed for it, the invention may be termed one of the greatest in the age, and will save useless expenditure in boring for water where none exists:—

"No more vain searches for subterranean water. The secret of locating it with certainty has been discovered. The honour of this great discovery belongs to Messrs. Heerden and Schnee, of 48, Exchange Place, New York. The instrumentality is electricity. The construction of the apparatus is a secret, but ample demonstration as to the certainty of the method is afforded. The apparatus is constructed on strictly scientific principles, electricity being the detective medium. Subterranean flowing water can be discovered by this instrument at any depth, and exact width of stream, direction of flow, and approximate depth and quantity determined. The course of a subterranean stream can be followed for any distance, and the proper place to sink a well selected, thus enabling a person who has a well to sink to calculate the cost to a dollar before commencing, and every risk of failure is eliminated.

"This is the only invention hitherto known which insures certainty in all the particulars just stated. In fact it is one of the greatest inventions or discoveries of the age, and moreover one that is destined to be unique in its power and scope to confer increased benefits on the human race at