

A PROPOSED NEW SYSTEM FOR THE CYANIDE TREATMENT OF SLIMES.

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Having lately visited various cyanide plants in the Republic while gathering data for the book which I have just published on the subject, I was greatly interested by the almost perfect settlement of slimes performed by the Dorr Continuous Slime Thickener installed at the San Rafael Mill in Pachuca, and it occurred to me that by extending the field in which this apparatus is at present employed, an entirely new system of cyanide treatment of slimes might be devised.

The elaboration of this idea has resulted in the following proposal of a system which I will call be Dilution System, in contra-distinction to the Decantation System of Slime treatment. This system consists in the establishment of a series of slime thickeners, following the agitation tanks, with a dilution of the thickened pulp as it enters each successive thickener.

The apparatus which I would recommend for the purpose is the Dorr Continuous Slime Thickener, or any apparatus acting on the same principle, not only on account of its marked superiority over cones and spitzkasten as a settler, but also on account of the fact that the tanks and agitating apparatus used in the present installations of mechanical agitation in flat bottom tanks, could by very slight modifications be used as thickener tanks, so that the cost of the conversion of a decantation plant into a Dilution plant would be small.

The advantages which I believe may be obtained by this new treatment over the decantation treatment are:

A. Less cost of installation, as less tanks are required.

B. Less time required in the treatment, with a consequent increased capacity for a plant already installed.

C. Less labor, as the manipulation of the decantation pipes is entirely eliminated.

D. Less values in the solution that is discharged with the tailings, with consequent increased extraction.

E. The same bulk of solution to be precipitated.

The advantages which may be obtained by this installation in connection with a plant, practising mechanical agitation in flat bottom tanks, with semi-decantation and filtering, comprise those mentioned under headings A, B, C and D, and in addition, there would be:

F. Greater capacity and efficiency for the filtering plant.

The disadvantages in such a plant would be that:

G. A greater bulk of solution would have to be precipitated.

The advantages and disadvantages with plants using "Pachuca" tanks would be those mentioned under headings D, F and G.

Method of Working the Dilution System.

In order to explain the working of this system let us assume that we have an ore assaying 500 grams of silver per ton, which has been slimed in the ordinary manner and introduced into an agitation tank in proportion of 50 tons dry slimes to 150 tons of solution con-

taining 0.3 per cent. KCy, and that the pulp thus formed is agitated continuously for 48 hours. We can assume, according to results obtained in Pachuca by continuous agitation, that at the end of that time, a washed and dried sample of the slimes will assay 70 grams of silver per ton, so that the 150 tons of solution will contain 21,500 grams of silver dissolved from the ore, or 143 grams per ton of solution.

By passing this pulp through a Dorr Thickener we will obtain a thickened pulp containing 55 per cent. of moisture. Therefore we will have:

(1) An overflow of 89 tons of clear solution assaying 143 grams of silver per ton, and 0.3 per cent. KCy; and

(2) 111 tons of thickened pulp, containing 61 tons of the same solution.

By mixing this thick pulp, thoroughly, with 549 tons of barren solution; i.e. 9 tons of barren solution for every ton of rich solution contained in the thickened pulp; we obtain, as a charge for the second Dorr Thickener, a dilute pulp composed of 50 tons of dry slimes, mixed with 610 tons of solution assaying 14.3 grams of silver per ton.

From this second Dorr Thickener we obtain:

(3) An overflow of 549 tons of clear solution assaying 14.3 grams of silver per ton and 0.3 per cent. KCy; and

(4) 111 tons of thickened pulp, containing 61 tons of the same solution.

By mixing this thickened pulp with 549 tons of water and passing it through a third Dorr Thickener, we have:

(5) An overflow of 549 tons of clear weak solution assaying 1.43 grams of silver per ton and 0.03 per cent. KCy; and

(6) 111 tons of thickened pulp, which as it contains but 61 tons of solution assaying 1.43 grams of silver and 0.03 per cent. KCy, may be thrown away, as it will not pay to extract the values in solution by further handling.

The preceding statements regarding the cyanide contents in the various solutions does not refer to free cyanide, as of course a certain amount will have combined with the silver, etc.

The only precaution required in this treatment is that, in each dilution, there should be a perfect mixture of the thickened pulp with the diluent, as otherwise the dilution would be imperfect, and the thick pulp, in falling to the bottom of the successive thickener tanks, might carry undiluted solution enclosed within its mass.

This mixture might be performed by a centrifugal pump, receiving both pulp and diluent, and throwing them together into a bucket or other small receptacle, which would not only act as a mixing apparatus, but also enable the diluted pulp to overflow without much current into the successive Dorr Thickener.