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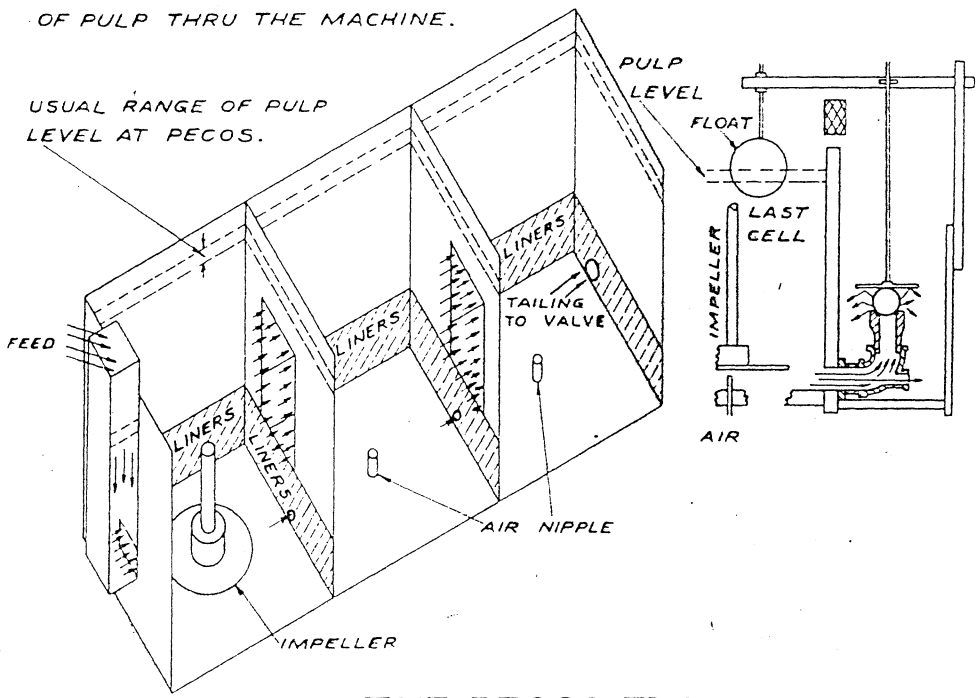
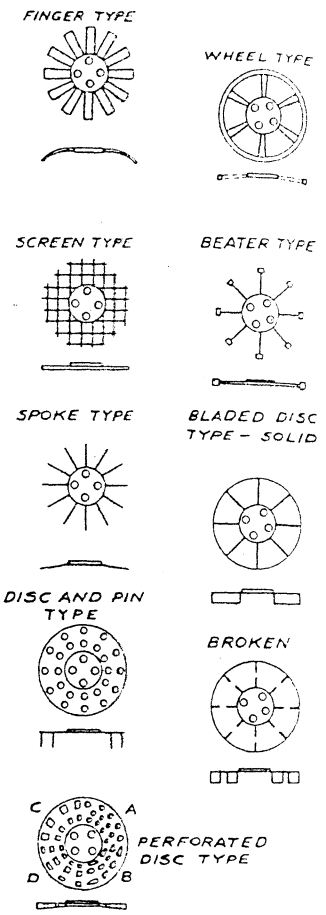
THE AMERICAN METAL CO. OF NEW MEXICO

PECOS FLOTATION MACHINE

H. D. BEMIS

JUNE 22, 1934





THE PECOS FLOTATION MILL

H. D. BEMIS
Former Student
and
Mill Superintendent
American Metal Co.
Alamita, N. Mex.

This operation was fully described in the U. S. Bureau of Mines Information Circular number 6605 ,May 1932, in which was presented the 1931 arrangement and results.

The object of this article is to present such changes as have been made since that date, and for the sake of brevity, the reader is referred to that publication for the basic description of the plant. A revised flow sheet is given.

No change has been made in handling the ore up to the point of the first stage of flotation, except that five inch balls have lately taken the place of the four and one-half inch size. They are slightly cheaper, and three months of operation has shown no changes in results.

The first stage is the selective flotation and cleaning of the sericite minerals. The concentrate has industrial uses, but the long freight haul has prevented it from being marketed.

The roughing is done in cells of the Hebbard type. These machines were formerly Minerals Separation Sub A cells. All the Sub A cells in the mill have been changed to this type, and this will be discussed later.

The cleaning operation is now performed in two air operated cells, one for each rougher. This was formerly handled by one cleaner, very heavily loaded. The addition of the second cleaner has removed the one and only point in the mill where the product of one unit can in any way mix with the other unit before sampling takes place. This has cleared the way for testing chemicals used in the sericite flotation, as well as pulp treatment during grinding.

In the lead-copper mineral stage of treatment there was a division made in the froth from the twelve rougher cells of each lead machine. The first nine went to the cleaner and the last three froths returned to number nine cell. This has been dropped and all twelve now go to the cleaner.

In the zinc mineral flotation, the air operated scavengers have been abandoned as they no longer were able to pick up a valuable product. The pilot action is now had by passing the last two rougher cell froths over the table which formerly handled the scavenger froth.

No other mechanical changes have been made.

In the reagent list, potassium secondary butyl xanthate has replaced the pentasol in the lead circuit, and the sodium ethyl in the zinc circuit.

The following table gives the reagent list for April 1931 as published in the I. C. 6605, as compared to that of October 1934.

	Pounds per Ton	
Sericite Circuit	**April 1931**	**Oct. 1934**
Cresylic Acid	0.175	0.130
Lead Circuit		
Lime Hydrate	0.574	0.781
K Pentasol Xanthate	0.161	
K Butyl		0.080
Zinc Sulphate	1.395	0.701
Cyanide (130%)	0.060	0.040
Zinc Circuit		
Lime Hydrate	1.848	2.593
Copper Sulphate	0.783	0.539

Na Ethyl Xanthate	0.500	
K Butyl Xanthate		0.160
Pine Oil	0.151	0.097
Total	5.647	5.121
Cost	$ 0.249	$ 0.145

The operating costs of the Positive Flow Sub A machine are relatively high, the major item being power. In this three stage operation, power amounts to roughly four cents per ton, although costing only 0.5 cents per kilowatt.

In this Positive Flow type all the pulp passes through each impeller, and in the eighteen inch machine, the impeller must support a pulp column of about thirty inches above the cell bottom without back flow.

It was thought that perhaps here was a use of energy that was not actually contributing to the best metallurgy although vitally necessary to the operation of the machine.

A plan was evolved to block off the outlets from the cells to the weir compartments, cut large holes through the cell partitions, and let the pulp flow horizontally through the machine, over, through, or around the impellers as the case might be. The impellers would naturally suck up considerable amounts of pulp from cell bottom, due to their normal pumping action. The nose or inlet point of the impeller is about three-fourths of an inch above the bottom and it was planned to vary this clearance so as to limit the amount of pumping to just what might be required for the proper pulp treatment.

To test out this idea a six cell, eighteen inch Positive Flow machine was divided into two sets of three cells each, one set unaltered, and one embodying these changes. This machine was cut into one of the regular three hundred ton mill circuits and the flow was equally divided to the two sets with provisions for sampling of the feed, concentrate, and tailing from both sets of cells.

It was also learned at this time that such a pulp flow was something like the 1916 Hebbard machine.

The test machine showed no difference between the two sets of cells except that the power input was 0.4 H. P. less per spindle on the experimental cells. This was what we were hoping for, as there were ninety spindles or mechanical cells in the main circuits.

In March 1933 one full unit was converted. A two weeks test run confirmed the results from the test machine. The other unit was converted at once, and in the following period of nearly twenty months, during which the grind has been considerably coarsened, there has been no trouble.

This cut in power involved no change in the impeller or its position above the cell bottom. Then we started a series of tests, (still going on), using a large variety of impeller forms and including variations of diameter, air pressure, and some work on speed.

The standard eighteen inch double shrouded impeller, turning 340 r.p.m., exerts a pull of fifty-eight to sixty ounces on the air inlet nipple. Most of the impellers tested have little or no pull, being designed purely for air dispersion.

Some of these would not keep the cells clear. Others, more powerful, would do this but some air nipples would choke up. The air pressure for this type impeller cannot safely be reduced below the back pressure of the pulp, which in our case, is about twenty ounces depending on pulp density, and this will not do unless the impeller has from four to six ounces pull. A general survey of some two hundred tests indicates that the best metallurgy and power input were had at about twenty-four ounces pressure on the mains with one-half inch inlet nipples. The volume of air used has a marked influence on power due to the changed pulp density around the impeller.

The testing has lately been directed toward impellers with a pull of between eight and twelve ounces, and using 1.8-2.0 h. p., as contrasted with the standard double shroud eighteen inch which uses an average of 2.4 h. p. in the modified machine and 2.8 h. p. when operating as a Positive Flow Sub A.

In this type of cell the impellers should be designed so as to produce powerful vertical currents as this energy has to be killed in order to permit froth separation in the upper zone. It is better that these currents be directed horizontally from the impeller toward the cell walls, and thus give useful agitation in the lower zone where it is most needed.

The accompanying sketches illustrates the three cell experimental test set, as well as several of the impeller designs.

—H. D. BEMIS.

First Alumni Contribution

Joel N. Van Sant, '33, has the honor of being the first member of the new Alumni Association. Van also sent in a liberal opener for the reserve fund.

The GOLD PAN joins the Organization Committee of the Alumni Association in extending congratulations to Van for being the first man on the Association roll.

NEW MEXICO MINING BRIEFS

The Black Bear Mining Company, operating near Magdalena, New Mexico, has nearly completed the erection of a 150-ton cyanide plant. A force of 45 men is regularly employed, preparing the mine for production and erecting the plant. It is planned to have the mill in production early in December. The company is managed by D. B. Leake. Other operating officials include: J. J. Jones, meatllurgist, formerly chief chemist of Nevada Consolidated Copper Corporation, at Santa Rita, New Mexico; James W. Boyle, mine engineer, and L. L. Davis, mine superintendent.

The Peru Mining Company resumed production from its zinc mines at Hanover, New Mexico, on December 1, and will employ about 100 men and produce 300 tons daily. During the recent suspension of operations improvements were made in the shaft and ore loading pockets. The company's milling plant at Wemple, near Deming, resumed operations on December 3. The new treatment plant at that point is nearing completion. According to Glenn L. Allen, acting manager of the New Mexico Division at Deming, the company is considering resumption of custom milling of complex sulphide ores containing gold, silver, lead, zinc and copper. A limited tonnage of siliceous gold and silver ores may also be accepted if amenable to flotation.

District Judge Colin Neblett in the federal court at Santa Fe, New Mexico, has ruled that the affairs of El Oro Mines Company, Hillsboro, New Mexico, will be liquidated by Trustee E. L. Medler of Las Cruces. A reorganization plan contemplating sale of $60,000 of trustee certificates was unsuccessful. Medler will advertise for bids to be offered within the next 30 days, under direction of the court. The company is said to owe more than $60,000 to creditors, in addition to the 600,000 to 700,000 shares of stock held by investors.

—*Mining Journal.*