quantity of mineral oil, in a specially designed apparatus.

After the mixing the pulp and the oil run into a settling tank when the oil carrying the whole of the pyrites floats on the surface of the water. The tailings are run off at the bottom of the tank and the oil is run to a special form of centrifugal machine which separates the oil from the concentrates. The oil is then ready for reuse and the concentrates are ready for shipment.

It is claimed that the total loss of oil does not exceed one gallon per ton of ore treated.

The apparatus is of the simplest description, the wear and tear being reduced to a minimum. Mr. Rolker, in his paper, above referred to, says:

"The mechanical contrivances brought into action by the inventor are excellently adapted to the work demanded, and bespeak very careful thought as well as patient, systematic, and highly intelligent work. Seemingly insuperable mechanical difficulties in the initial stage have been ingeniously overcome and the process has arrived at a practical working stage."

Tests have recently been carried out on samples of British Columbian gold copper ores, and have given excellent results, the extraction of gold, silver and copper being at the rate of 90 to 98 per cent. of the assay values. It is claimed that such ores cannot be treated by the ordinary wet concentration process without heavy loss from the fine state of division in which the mineral exists.

In the Elmore process it is immaterial whether the ore slimes in crushing or not, as the oil picks up all the float mineral that would be entirely lost on a vanner.

The ore concentration syndicate which controls the patents is located at 4 Bishopsgate Street (Within) London, E.C. They will be glad to receive samples which they will treat free of cost to mine owners and report results.

PYRITIC SMELTING AND HOT BLAST.

IN view of the erection of pyritic smelting works in the Boundary creek district and the possible adoption of ores in other localities of the province to this method of treatment, the following article, which recently appeared in the Engineering and Mining Journal of New York, is of local as well as of general interest:

Pyritic smelting is the utilization of sulphides as both flux and fuel, the metallic bases, excepting copper, uniting with the silica to form a slag, and the copper acting as a collecting agent to gather the precious metals into a copper matte, the sulphur uniting with the oxygen of the blast to generate heat, just as the carbon from the fuel does. Some of the first questions asked by parties contemplating the erection of a matting furnace for the reduction of a great variety of ore—especially if it is to a custom plant—are:

1. Can as high a percentage of the values, gold and silver, be saved with copper as with lead?
2. Can the ore be smelted as cheaply as with lead?
3. Can as many tons of ore be put into one ton of shipping product as in lead smelting?
4. Can copper matte be sold as readily as lead bullion?
5. Can refractory ores be smelted as in lead mining?
6. Can as cheap a slag be made?
7. Will the ore require more preliminary crushing and roasting?
8. Will a plant of the same capacity cost more than if the ore is to be smelted in a lead furnace?
9. Is the matting process as suitable for as many different characters of ore?
10. Will the copper matting process cost more or less than smelting ore with lead for a saving agent?

Question No. 1 can be answered positively by stating that the writer—who has been in the lead smelting business twelve years, and the copper smelting business five years as superintendent and metallurgist in both cases—found that after introducing his large heater matte settling arrangement there was no loss of gold, slightly over one per cent. loss of silver, and an immense gain of copper over the dry assay, and only a slight loss from the wet assay. This was done at a custom plant which is still running, where the ore was all purchased, sampled by the regular coning and quartering methods, and assayed. The concentration was from eight to fifteen tons into one ton of fifty to sixty per cent. matte, first operation.

2. If the ore contains sufficient sulphur to act as fuel, and hot blast is used, the ore can be smelted for less than half the regular cost of lead smelting; in fact, for about what the preliminary rolling and roasting alone costs in lead smelting.

3. As twelve per cent. lead is about the minimum amount which can be used in lead smelting to do the work, eight tons into one is about the best concentration; but in copper smelting one or two per cent. copper in the ore can be the minimum amount and do good work, and the concentration is that much greater accordingly.

4. There is a greater demand at the present time for copper than for lead.

5. On account of the more rapid smelting of the charges in the blast furnace, greater heat and more silicious slag, as a rule, much more zinc can be smelted without trouble when matting than when lead smelting.

6. On account of being able to force more silicia and zinc into the slag, it costs less for flux.

7. As there is no preliminary roasting required, if hot blast is used, nothing but the ordinary coarse crusher is required for the largest lumps.

8. A 200 ton plant where all the ore would have to be roasted, unless roasted in heaps and then there is the capital tied up for months in the ore, if hot blast be used, so as to dispense with fine crushing and roasting, can be built for about one-third the regular cost.

9. On account of being able to make a greater variety of slag without danger of serious losses, when copper matting, it is suitable for a greater variety of ore, excepting ore rich in lead, which should go to a regular lead furnace.

10. On account of the advantages just enumerated for pyritic smelting it does not cost more than one-third to one-half the ordinary cost of lead smelting. Of course, if cold blast is used, and ordinary matting resorted to, the system has but little advantage over ordinary lead smelting, excepting that it requires less copper to save values than it does lead, and a more silicious slag can be made when matting.

The question came up, what ore is suitable for pyritic smelting, or, as I would call it, semi-pyritic smelting? The ore should contain sufficient sulphur to make the desired matte necessary for clean work in the first operation, using fuel. Then, as the sulphur is in excess of the amount required to form the matte, the percentage of fuel can and should be reduced in the blast furnace, so that the oxygen from the blast will unite with the sulphur and not carbon. Quite often, in my experience, after using hot blast, when the matte got over sixty-five per cent. copper, too rich for clean work, the foreman would add either more coke or more sulphide ore, to reduce the grade of the matte. I found mixtures—the lime usually has to be added—of three per cent. and over copper, twenty to thirty per cent. iron, eight to thirteen per cent. lime, and up to ten per cent. zinc, ten per cent alumina, thirty to thirty-six per cent. silica, ten to thirty per cent. sulphur the safest limits. The original ore may carry a very high per cent. of zinc, alumina or sulphur, but the percentages are reduced by the time the ore is fluxed; that is, the excess of bases properly neutralized with silica. Of course, too much zinc is objectionable, but it can be utilized to better advantages as a base in copper smelting than in lead smelting; in fact, zinc blende seems to give less trouble in a blast furnace with hot blast than when roasting in a reverbertory furnace, as it requires so much more heat to liberate its sulphur than when roasting ordinary pyrites; and it must be with hot blast that the oxygen, not having to unite with fuel, has a better chance to combine with the sulphur where such an intense heat exists as in the blast furnace. Of course, at times, when it is necessary, copper as low as one per cent. will answer to save the values. Some metallurgists claim that no copper is necessary, and an iron matte will save the values, and mixtures containing much less iron and more silica can be smelted to better advantage than those I have