

## BROMINATION TREATMENT OF GOLD.

The Englehardt Bromine gold extraction process is now in operation at La Plata, Colorado, and the following description of the ores and their treatment is condensed from the Engineering and Mining Journal:

"The principal ore bodies so far uncovered occur in diorite, and judging from the geological formation of the La Plata mountains we believe that all the mines now mineralized with gold will be continuous with increasing depth. The amount of silver being so limited in most of the ores we are treating at the present time, that its recovery can be omitted is another point which we had fully considered when selecting the above process in preference to any other.

"At the beginning of this season we treated the most refractory ores from different mines and had ample opportunity to confirm our calculations as to the size and value of ore bodies, and, furthermore, our belief that we had selected the most suitable method of treatment. The works originally intended for the treatment of custom ores have for the last two months been running continuously on ore from one of our own mines, and we have demonstrated that the character of the ore has not changed. The development work on this property consists of a shaft 125 feet deep, with 400 feet of drifts. At this depth the gold and silver values correspond with those of the ores mined close to the surface. We made exactly the same observations on all those veins of the La Plata mountains where the mineralized eruptive portions consist of diorite. Sometimes the chemical analysis shows a slight variation as to the percentage of silica and iron (75 to 85 per cent.), but the whole composition of the ore we are treating now is quite uniform. The analysis of an average sample, taken from 100 tons of ore, gave the following results: Silica, 80.5 per cent.; iron sesqui-oxide, 10.0 per cent.; lime, 1.05 per cent.; magnesia, none; alumina, 3.7 per cent.; sulphur, 2.80 per cent.; total, 98.05 per cent. The remainder of 1.95 per cent. is covered by small quantities of copper, arsenic, chromium, titanium and tellurium, which are found and easily detected in solutions after treatment. The values in silver and gold of different shipments were found to be from 1.25 oz. to 2 oz. in gold and from 0.5 oz. to 1 oz. in silver per ton. As already stated a small portion of the gold is found to be in a metallic state, though the largest portion is combined with tellurium and probably as sulphide of gold in arsenical iron pyrites.

Like any other chemical process, this bromine process requires careful attention, and the service of a man who is familiar with the principles of chemistry should be procured for its management. With this knowledge and some practical experience in milling no difficulty will be encountered in introducing this process with success. Although our roasting facilities are not of the latest pattern (we are using the Bruckner furnace) we succeed in getting a perfect dead roast in 8 hours, including time for charging and discharging the furnace. The roasted ore is elevated from the cooling floor and charged into a lead-lined revolving barrel with water and the necessary amount of chemicals. The strength of solution employed is on an average 0.25 per cent., but we found that a 0.15 per cent. solution, equal to 1½ lbs. of bromine per ton of ore, can be used to advantage. The extraction of the gold takes place in 2 to 3 hours. Generally 1 to 1½ hours is sufficient time to obtain a high extraction, but owing to the presence of free gold in our ores we prefer to have the bromine solutions long enough in contact with this more or less coarse gold. The leaching from the barrel takes place in 35 to 45 minutes, even on slimy charges containing, for instance, large quantities of flue-dust. The solutions being free of slimes and perfectly clear do not require any settling. We may state here that this is in our opinion an important advantage over the use of barrel chlorination where the slimes of sulphate of lime produced by chloride of lime and sulphuric acid require from 12 to 24 hours setting. It is evident that in consequence much time can be saved and the capacity of the works materially increased.

"The small amount of bromine which is still present in the gold solutions—but so small, that its recovery can be dispensed with—is easily eliminated by sulphurous acid. This gas is produced in a generator by burning sulphur and introduced into the tanks

with the aid of compressed air, which at the same time supports the burning of the sulphur. The gold (bromide of gold) is then precipitated by means of sulphuretted hydrogen as sulphide of gold. This gas is introduced in the same manner as sulphurous acid, being produced in a lead-lined generator from iron matte and sulphuric acid. The elimination of the free bromine and precipitation of the gold takes from 15 to 25 minutes per tank holding 3,500 gals. of gold solution. The precipitates are allowed to settle in the tanks for about 2 to 3 hours and the supernatant liquor drawn off, running through a Johnston filter press. The main bulk of the gold precipitates is left accumulating in the bottom of the tanks until a clean-up is made and then run through the press, from which it is taken to the regning process. This being the same operation as used for the product of barrel chlorination it is not necessary to go into details. The average extraction of on ores pulverized to 16-mesh varied from 93 to 96 per cent.; in some instances even a higher percentage was saved, all depending upon character of ore and occurrence of gold."

"As to cost of treatment per ton of ore we are not yet in a position to give correct figures, but we are so far convinced that this process handles our ores more cheaply than could be done by any other method. In conclusion we wish to say that the process has been patented in the United States, Mexico, Australia and South Africa.

## THE TIMES ON KOOTENAY.

The London Times of Sept. 12 has a long article on British Columbia mines. The article is quite commonplace and is not quoted for its intrinsic merit, but because of the extrinsic value which its appearance in the great newspaper gives it.

The western division of the Kootenay, which is separated from the eastern by the Purcell range, has only sprung into prominence during the last two years. It is almost entirely mountainous and there is a scarcity of land suitable for farming, but it contains every other natural advantage that a mining camp could desire. The climate is delightful, always bracing and it is difficult to say whether the cloudless days of summer or the dry, frosty winters are the most enjoyable. Water never runs short, the creeks being fed from the snow-capped mountains; timber is abundant, the Douglas-pine, cedar, hemlock and tanitack being found in great quantities, and, most valuable of all, in the number and extent of its lakes it possesses a claim of water communication unrivalled by any other mineral field yet discovered. The Upper and Lower Arrow Lakes, expansions of the Columbia River, runs through this district from north to south. The Slocan Lake is of the utmost value to the Kasko-Slocan division, while the Kootenay Lake, together with the Kootenay River, afford over 100 miles of water communication, and mines situated on the bank of these great waterways can ship their ore to the Pilot Bay smelter at a minimum cost of carriage.

"Until the Canadian Pacific branch via the Crow's Nest Pass is completed coal and coke have to be imported, some of the latter being obtained from Cardiff, but the building of this line cannot be long postponed, and then one of the greatest coal fields of the world will be opened up. It is estimated that the extent of the coal deposits at the Crow's Nest amounts to 140 square miles. Twenty seams have been discovered on the surface with a total thickness of from 132 to 448 feet, and the coal has been proved to be of excellent quality and to make good coke, which promises a bright future to the smelting industry. The activity with which development work has been carried out is shown by the fact that the value of the output of gold, silver, copper and lead rose from £160,000 in 1894 to over £1,000,000 in 1895, almost the whole of which increase must be credited to West Kootenay. The silver-lead ores of the Ainsworth and Slocan districts are of great value and the silver-copper ores on Toad mountain in the Nelson district have proved very profitable, but the chief interest attaches to Trail Creek on account of its gold. These ores do not run much over \$40 per ton in gold on the average, but the veins are of such great width—from 40 feet to 50 feet not being unusual—that these properties are of great value. Moreover, the veins have the characteristic of increasing with depth, one of the lodes in a Red mountain mine when tapped at a depth of 68 feet proving to be 80 feet in width. Good

asbestos and petroleum have been discovered in West Kootenay which will be worked when the projected railways are completed and many additional smelters will then be built. There are three at work in that district at present. The Nelson smelter, which has a capacity of 100 tons per diem, and mainly treats the ore of the Silver King mine; the Trail smelter, which can handle 250 tons, and devotes its attention to the Red mountain ores, and the Pilot Bay smelter, which handles argentiferous galena only.

"For the prospector no country could offer a more tempting field, wild fruits are found in the greatest abundance, trout in every lake and stream and grouse and deer so plentiful that a supply of fresh meat is assured without any unusual trouble. What wonder that Brother Johnathan has flocked into this El Dorado so near to his borders, and now either completely owns or controls many of the choice tit-bits in mining property. English capitalists have lately appeared at the feast, and so much of the country is unexplored and so many new discoveries are daily chronicled that they will not go away empty."

Just imagine running a crosscut 280 feet at a depth of 68 feet! Take also with a grain of salt, the discovery of petroleum and asbestos in West Kootenay.

## THE COLONNA GOLD MINING COMPANY.

The Colonna Gold Mining Co. has just been incorporated for \$1,000,000 in one million shares of one dollar each. Two hundred thousand shares have been placed in the treasury and the first issue of the treasury stock is offered at 12½ cents. The directors of the company, Charles Schmidt, George E. Pfunder, L. Lienemann, F. M. McLeod and A. Klochmann, have issued a prospectus describing the property, every statement in which is capable of verification and has been verified by the editor of this paper, who is prepared to go on record as of the opinion that this treasury stock is the cheapest and most reliable stock ever floated on the local market.

The property of The Colonna Mining Co. is in a very aristocratic neighborhood lying, as it does, between the Monte Cristo, Evening Star, Silverine and Eddie J. There are three distinct veins running through the property, each one characterized by very strong and wide iron cappings. On two of these no work has as yet been done, although one of them has been opened up on the Silverine. On the Colonna vein, proper, a shaft has been started and sunk 25 feet and at the bottom it shows two feet of solid ore. This ore assays all the way from \$7.60 to \$84.80 in gold and up to 37½ per cent copper.

About 200 feet east on the line of the vein ore has been opened up again and forms at the time of writing the most remarkable showing on the property. The vein at this point is not less than 14 feet wide. Just how wide the streak of ore is it is impossible to say accurately, but it looks to be at least four feet wide. The croppings consist of almost every conceivable species of copper ore, from native copper down, in all stages of oxidation. It is supposed to be the same streak of ore as that opened up in the shaft, but it may quite well be another pay streak in the same vein. West of the shaft a tunnel has been started to tap it at a depth of 125 feet and has been run 47 feet. This tunnel does not appear to have yet got under the broken up country rock with which the seam of ore is capped at this point, probably slide rock such as may be looked for on a steep side hill. At one point in the tunnel the ore is to be seen wedged up between the rock on the side of the drift. It presents the same characteristics as the surface croppings 300 feet away.

The Colonna has two circumstances greatly in favor of its becoming a rapid dividend payer, the first, that every pound of ore taken out is of shipping value, and the second that little or no deadwork has to be done before the mine can ship ore. It looks like a very simple problem in mining. Sink the shaft a hundred feet and drift in by the tunnel till connection is made and then proceed to stop out ore and sell it for currency. Of course breaks and faults may occur but the vein is so strong and the pay chute so continuous on the surface that they are not likely to occasion much delay or trouble. It is to put a mine which has a fine body of shipping ore in sight on the surface, in shape to market that ore, that the public is asked to subscribe to the treasury stock.