under the direction of skilled experts retaining 10 or 15 per cent. of the property to repay the money so expended. The paid-up capital of the first five development companies taken at hazard from an alphabetical list of those floated in England alone is $9,975,000. These companies have as a rule retained 100 per cent. of the properties developed to cover risk of loss. Yet in spite of Mr. Hunter's opinion that in their operations they have robbed the prospector of his due, they have not so far made such colossal profits that 10 or 15 per cent. of the developed property would be amply sufficient to cover the risk of loss involved. But to argue in this way is to take Mr. Gordon Hunter seriously, something no one is likely to do except presumably himself. We are willing to do ample justice to his sincerity at the expense of his intelligence.

The Hon. Mr. Turner stated at Rossland the other day, that so far as he knew, the grant in aid of the local School of Mines was not yet available. As, however, we are now in the winter season, when the chamber work at least of such an institution can well be carried on, the Minister of Mines might certainly do worse than expedite the payment of the grant to the Rossland institution, on conditions of course securing its use to the best advantage.

During the first two months of its existence as a going concern the Granby smelter at Grand Forks has shipped $105,000 worth of copper matte. During six weeks of that period the smelter was only operating one stack of a capacity of 300 tons a day. For two weeks it has been operating two furnaces of a combined capacity of 600 tons a day. It is now treating 18,000 tons a month of copper ore. Eighteen thousand tons a month is higher than the average production of Trail Creek has ever been. Grand Forks possesses wonderful advantages from a smelting point of view. It is already beginning to draw ore from the Republic camp in the State of Washington It has therefore low-grade iron ores, high-grade copper ores and high-grade silicious gold ores to draw from, as well as great natural advantages in the way of flux fuel and power. It would be difficult to exaggerate the possibilities of industrial development here contained. For many a day the problem has been for Grand Forks to get railway connection with other places. That problem has now been changed. Other places begin to figure on the possibility of getting railway communication with Grand Forks. The establishment of a converting plant there for the manufacture of metallic copper is the next progressive step and is already under contemplation.

THE TAXATION OF MINERAL OUTPUT.

(By David B. Bogle.)

THE reason why it pays to mine a large tonnage of low-grade ore may be expressed in the following formula: As the value of ore mined decreases in arithmetical progression the tonnage which it is possible to mine increases in geometrical progression. It is not necessary here to attempt to prove this formula. It is not claimed that the relation between the progressions is exact. This would necessitate the establishment of a unit of decrease in the value of ore per ton. All that is insisted on is that the relation between value and tonnage accommodates itself by an infinite series of gradations to a general principle of which this formula is the expression. This is universally admitted. The action of this principle may be illustrated by certain interesting calculations, but instead of doubling the total quantity of ore in the mine with each decrease in value let us assume that with each decrease in value per ton of one dollar there is twice as much ore developed as was in sight of the grade immediately higher.

Let us suppose a mine to have been purchased and developed at a capital cost of $300,000, where the fixed expenditure per ton to extract the value is $7.50, distributed as follows:—

Breaking and raising	$1.50
Smelting	3.00
Refining and marketing	3.00
Total	$7.50

Here we beg anyone who reads this article and thinks that under the practical conditions of mining ore cannot be broken and raised for $1.50 a ton to stop and read no further. The article is not for him. The figures have been arbitrarily chosen with a view of illustrating the principle involved. It is the variation of results under them not their actual amounts which is important. Let us further suppose that in this mine the result of development is to expose 100,000 tons of ore of a value of $10 a ton. Here it is obvious the cost of development has been $3 per ton. We have therefore the following result:—

Value per Ton.	Tons.	Gross Cost per Ton.	Result.
$10	100,000	$10.50	Capital returned minus $50,000

Now let us suppose that there is also plenty of $9 ore in sight. Under the opening supposition we get the following result:—

Value per ton.	Tons.	Gross Cost per Ton.	Result.
$9.33	300,000	$8.50	Capital returned plus $249,000.

Observe that neither of these ore bodies would have been profitable in themselves. The first would have involved a loss of $50,000, the second no loss indeed, but no profit. Combined they show an exceedingly satisfactory profit. Now let us suppose the $8 ore in this mine to be brought to bear and that there are 400,000 tons of $8 ore in sight. The result of operations is as follows:—

Value per Ton.	Tons.	Gross Cost per ton.	Result.
$810.5714	700,000	7.928	Capital returned plus $450,000,

To go after this body of ore for its own sake would have involved a loss of $100,000.

For purposes of convenience we now adopt 50c. as our unit of decrease in value. The result under the formula is as follows:—

Value per Ton.	Tons.	Gross Cost per Ton.	Result.
$8	1,500,000	7.70	Capital returned plus $450,000

This of course may be easily verified by the very simple consideration that 800,000 tons of ore have been mined and treated for exactly what it cost to mine and treat them. The profit must naturally be the same as it was at the previous stage considered.

Some very important principles in mining finance are illustrated by these calculations. One of these is that it pays to mine all ore in sight which shows the smallest fractional profit over the fixed cost of extracting its value. The treatment of such a tonnage