

In this country the industry cannot be said to be flourishing, though in spite of war conditions, and partly because of them, some notable achievements have been effected. One instance of overcoming a serious difficulty may be cited, as showing the adaptability and resourcefulness of our metallurgists. In this case the ores to be smelted demanded the addition of pyrite, hitherto imported from Spain. Owing to the requirements of the Government for Spanish pyrite for acid-making this source of supply was cut off, threatening the closing down of the smelting operations. A new and hitherto neglected supply was, however, developed by the manager (one of our members) from the pyrite seams of the Welsh collieries, and it is satisfactory to record that this source now meets all the requirements of the works, not only for sulphur, but when calcined it is available as iron flux for smelting oxidized ores. The neglect to make use of this supply in the past is no doubt due to the reluctance of colliery proprietors to admit the existence of sulphur in their mines, as it might reflect on the quality of the coal. However, they now recognize that they have in pyrite an asset of value; moreover, it now pays to mine coal-seams rich in pyrite that hitherto have been left. The pyrite is recovered by hand-picking on belts. In the result the copper-works now secure ample supplies at a cost considerably below that previously paid for Spanish mineral; it is strange that this material has been overlooked by acid-makers in spite of the great demand created by the War.

As producers of copper we can, of course, never expect to compete with the United States, but, given a measure of State assistance, we ought to be in a position to secure for treatment a fair share of ores and matte from our own Dominions. For this purpose increased electrolytic refining capacity is certainly needed, but until some security for the industry be assured there is no inducement to capital to embark in such undertakings. The ever-growing demands of labor, with consequent increase in the price of raw materials, unless checked, must inevitably tend to drive the industry to countries where easier conditions prevail. The recent heavy fall in the price of the metal due to over-production, and the withdrawal of consumption for war purposes, calls for economy in every direction; it also points to the necessity for State action, failing which it is difficult to see how the industry can survive.

The Metallurgy of Gold, in so far as it relates to the recovery of the metal from its ores, shows general improvement, but nothing of first-rate importance except perhaps Crowe's method of precipitating cyanide solution under reduced pressure. He shows that the air dissolved in the solution, has, owing to the different co-efficients of absorption, a composition of 35% of oxygen and 65% of nitrogen, and consequently is a more active oxidizing agent than air of normal composition. He points out that in weak cyanide solutions, consequently with a minimum of hydrogen being generated, the oxidizing action of the dissolved oxygen largely neutralizes the reducing action and may even overcome it. In normal practice this is met by adding lump cyanide at the head of the precipitation box, with consequent increased consumption of both cyanide and zinc. By the adoption of the vacuum process this practice is unnecessary and extraction may be effected with weaker solutions resulting in savings in all departments, including the production of a purer bullion. The Portland Gold Mining Co. reports a saving of \$30,000 per year in zinc and cyanide in a plant treating 2,000

tons of ore per day. It is interesting to note that G. T. Hansen claims similar advantages by heating the solutions to 170° F. before precipitation.

Concentration of gold ores by flotation is making progress, but the field for this process is somewhat restricted, owing to the general high efficiency of the older methods. At Cobalt, flotation has replaced gravity concentration, although at the Nipissing mine this process has been rejected, not on account of its inefficiency, but because of the difficulties in subsequent treatment of the concentrates. On complex gold-silver concentrate involving further treatment, the advantages of flotation compared with ordinary concentration followed by cyanide are not so manifest. The value of flotation as a means of increasing the world's output of gold lies rather in improved recovery of base metals, such as copper, with which gold is so commonly associated.

With reference to the production of gold, and more particularly to the question of a bounty, this is a matter for settlement between the economist and the producer. It is a subject upon which so many varying opinions have been expressed by authorities that it is difficult to arrive at any decided conclusion. So far as our own direct interests are concerned, a bounty on gold would be an obvious benefit, as we have many members engaged in this industry, though the objections to this course are also weighty.

A committee of the Council of the Institution appointed to report on the position of the gold output of the British Empire made an exhaustive inquiry into the subject, and issued their report in March, 1918. This shows that a reduction of 20 per cent of the Empire's gold production is visibly imminent, and this at a time when the need for gold is ever more pressing.* There can be no two opinions as to the vital importance of not only maintaining but also increasing our gold supplies, and with the object of effecting this the committee recommend a 10 per cent bounty on the output of all struggling mines or alternatively a bounty of two shillings (48c) per ton of ore treated. Proposals on these lines, however, were not acceptable to the Government Gold Production Committee.

It seems self-evident that unless relief in some form be granted, the production of gold must necessarily fall by the stoppage of the lower-grade mines; apart from the influence this would have on the general economic position, as to which opinions vary, a serious injury would be done to gold mining as an industry. Lord Inchcape's committee, however, is not disturbed by the prospective stoppage of these mines, and does not consider such an eventuality to be of any great importance to national interests†. Although there may be objections or difficulties in the granting of a direct bounty it would not appear impossible to concede some remission of taxation, and to this extent relieve the industry

*The accuracy of this forecast is shown by a recent question in the House of Commons in which the Chancellor of the Exchequer was asked if he was aware that there had been a drop in the gold production of the British Empire of 13½% in the year 1918, compared with 1915, and that the world's production showed a drop of 20% in the same period. The figures given were not questioned.

†Since these words were written the Chancellor of the Exchequer has stated: "There is nothing in the report of Lord Inchcape's committee to suggest that producers of gold are not entitled to obtain for their produce the best price available in the most favorable market, and I am now considering in what manner this can be secured."