

In valuing an iron mine one must apply very largely the rules and principles which are used in getting at the value of any other kind of property. The standard by which the valuation must always be gauged is the earning capacity of the mine. It would be a mistake, however, to accept as evidence the cost sheets of its office. Mr. Nelson P. Hulst, in an able article on this subject in the "Engineering Magazine" for April, says that sometimes the balance sheet may show, or may be made to show, a gratifying profit in the mining work, by continually charging up to the inventory account, at full cost, the machinery and the various permanent improvements required for the business. The veriest tyro in the business ought to know that their value is only that of tools which are steadily wearing out, like the shovels or hammers, or are becoming obsolete, and must soon be abandoned for something more economical which will place the mine at equal advantage with competitors; and that, in the event of the exhaustion of the mine, they can have only a tithe of the value accorded them in the book accounts. On the other hand, a mine may not be worthless because it has shown a debt producing capacity, for sometimes a good mine may have a bad manager. Judgment of a mine must therefore be independent of its existing management, as well as of its books of account.

After showing a number of other factors that have to be considered in the valuation of a mine, Mr. Hulst concludes that the determination of value involves questions of business, of mining, of engineering, and of chemistry. Only intelligent and conscientious effort can estimate the value of the different factors with any degree of accuracy. The questions to be solved require a thoroughly reliable, capable man, who is up-to-date in mining practice. He should be thoroughly conversant with the market value of iron ores, and familiar with their chemical qualities. He should have a clear conception of the ways in which economies, big and little, are obtained in mining—a conception which has been disciplined by successful superintendence of an iron mine, as well as by the studies of its cost sheets. He should have worked upon the problems of the opening of iron mines, and the adaptation and installation of mine equipments. Only with such qualifications can a man be expected to furnish a reliable estimate of the value of an iron mine, or of the cost of opening it, and putting it into effective working order.

At a recent meeting of the South Wales Institute of Engineers, an interesting discussion arose as to the merits of a new hydraulic pumping plant described by Mr. James Barrow, of Maesteg. Some of the members were struck with the statement that only a three feet stroke could be got out of the pump when there was a four feet stroke in the engine; but it was argued that the percentage of loss was small when the great distance of transmission was taken into account, and that a 75 per cent. effective output compared favourably with the compressed air or other methods. The president, Mr. A. J. Stevens, of Newport, did not know of any valve that would last long under a pressure of 800 or 900 lbs. for a number of hours per day, and he explained that such valves, at the works of Messrs Armstrong, had to be renewed once every three weeks. This would be most inconvenient in a colliery. As to the loss of 25 per cent. in the Moore pump, he believed that elasticity of the air in the water had much to do with the loss. If that were so, it could hardly be reckoned as loss, for some of the elasticity would be given back at the return stroke. Most engineers who have had anything to do with mine pumps will consider that a 75 per cent. efficiency is a high one, and will concur in the opinion of the president that such loss was accountable to a large extent to the elasticity of the air within the water.

The phosphate market shows no sign of improvement. The great bugbear of the phosphate producers in every land has been Algeria. It was bruited that the output of this section was going to be enormous, and many brokers prevailed upon producers to sell at a fall by taking advantage of such a pretext. The output from this source for the year, however, was only 121,475 tons, which, when compared with the large

and growing consumption of fertilizing material in Europe, is but a small matter. The output of phosphates in other parts of Europe and America shows a decrease. Commenting upon this *L'Engrais* says:—"Since moreover the consumption of phosphate increases rather than diminishes, we must look elsewhere for the cause of the slack in purchasings. The reason is found, in the fact that, for two years, the superphosphate manufacturers have exhausted their old stock which they hold in reserve and have, in the presence of the steadily increasing fall, been accustomed to supply themselves only to meet the demand of their actual needs. But the low prices have proved too much of a good thing and the producers, reduced to the alternative of being ruined or of defending themselves, have wisely chosen the latter. The ball has been started rolling by the superphosphate producers of France and Belgium, who after engaging in a bitter war against each other, are now united in a general trust. We much desire to see a trust take place soon between the phosphate producers of Europe and America. The thing is not impossible and it is the best wish we can make for them on the opening of a new year."

Exploring with the Govt. Diamond Drill.

By THOS. W. GIBSON, Bureau of Mines, Toronto.

One of the most important aids to mining yet invented is the diamond drill, which has been widely adopted since its invention by Leschot, and is now in almost universal use. Its value consists in the opportunity which it gives the miner at a minimum of expense of actually seeing and handling a section of the material whose character it is all-important for him to ascertain, yet which is concealed from his gaze by a covering usually of rock, scores, perhaps hundreds of feet in thickness. This the diamond drill enables him to do without sinking shafts or excavating drifts and tunnels, which, after all, might turn out to be so much time and money wasted. It is equally of service in testing new ground and in exploring for bodies of ore in working mines. By its means the prospector may satisfy himself at a comparatively small cost whether the property he is investigating contains ore sufficient in quality and quantity to warrant regular mining operations. If he finds that it does, he knows beyond peradventure where to sink his shafts and how to lay out the work to be done; if it does not, he is saved further trouble and loss. The mining manager is enabled on the one hand to locate masses of ore in advance of actual drifting, and on the other to prove what parts of his territory are dead ground from which no returns can be hoped, and so to conduct his operations in either case intelligently and economically. In almost every large mine diamond drills for exploratory work are part of the regular plant and are constantly in operation. There can be no guess work as to the strata penetrated by the drill; the cores brought to the surface speak for themselves, and, what is no small advantage, supply samples large enough for detailed examination and analysis. The only point open to question is whether the cores themselves are thoroughly representative of the strata or deposits from which they are taken. As to this, in the matter of gold ore, for instance, there is sometimes room for doubt. The drill may pierce a rich pocket in a gold vein and so bring up a core showing a value quite out of proportion to the average contents of the vein, or it may run through a barren stretch and exhibit a core altogether worthless; producing a record in one case unduly flattering, and in the other unjustly condemnatory of the property. Such results, however, are only to be feared where variable and irregular deposits—as gold veins are occasionally found to be—are being examined by the drill. This drawback is absent where large bodies of ore or mineral, such as deposits of iron, copper, nickel, or beds of lithographic stone or marble, or similar masses are being examined.

There are various makes of diamond drills, but the principles on which they are constructed are substantially the same in all. The boring tool is an annular steel bit set with diamonds, which is attached to the