

gradually improved, and the shareholders were in a much better position than those possessed of ordinary mines which were gradually being worked out.

The Chairman, in reply to Mr. Strange, said that the Canadian Pacific did not take coal from them, but got it from the Comox Mine, where it was cheaper. In China and Japan there was much competition and under-selling. The McKinley tariff would not affect them, as their contracts were all made.

The motion for the adoption of the report was put to the meeting and unanimously agreed to.

**Tier Cove Copper Co., Ltd**—The annual meeting of this company was held in London on 25th instant. The accounts showed that the mines of the company made a gross profit of £15,189.11s. 3d., leaving, after charging the account with the interest and discount payable to the Cape Copper Co., and the rent representing the interest on the company's debentures, a net profit of £5,235 6s. 7d. This sum has been applied to a reduction of the debt due to the Cape Copper Company.

The East Mine, Costs and Returns Account, shows:

DR.	£	s	d
To Mining costs . . . . .	16,444	2	6
Smelting costs . . . . .	9,490	4	5
Freight, insurance and Swansea charges . . . . .	27,863	10	5
Balance—Profit . . . . .	15,189	11	3
Total . . . . .	£68,987	8	7
CR.			
By Ores and Regulus . . . . .	£68,987	8	7

**New Over-head Tramway at the Noble-Five Silver Mine, B.C.**—The new Finlayson Tramway built by the Colorado Iron Works, of Denver, Col., has been installed at the Noble-Five Silver Mine, Cody, B.C., and is working very satisfactorily.

It consists of two standing or stationary steel ropes one inch in diameter on the unloaded side and one and one-eighth inch rope on the loaded side, laid upon towers from 100 to 300 feet apart. In the case of the one under discussion the towers are from 30 to 900 feet apart and vary in height from forty to eighty feet. On this rope run the bucket trucks. These buckets in this case number fifty-two. Below the standing rope is an endless rope three-fourths inch in diameter, to which the buckets are attached by patent detachable clips 244 feet apart. This is known as the traction or hauling cable. The weight of the loaded cars pulls the empty ones up, the cable being controlled by powerful brakes at the two terminals. The clips referred to above are stationary on the rope and it is the automatic action at the terminals which attaches and detaches the clips to the buckets, dumping the latter at the lower station, which excites the wonder and admiration of all beholders. Space forbids a minute description of this action, but briefly, there are two buckets, one at the upper terminal being loaded and one at the lower terminal being dumped and waiting for the arrival of the next bucket, which are always detached—the moving bucket on arriving at the station is detached, the cable with its stationary clip moves along a few feet engages a dog on the waiting bucket, never stopping, and moves with it around the station; before beginning its upward climb it engages a projecting arm, which action dumps the waiting bucket on the other side. The same operation is continued, the bucket arriving every 75 seconds. The same automatic action obtains at the upper end with the exception that, instead of being dumped, the waiting bucket is loaded. The buckets are now being loaded with 350 pounds of ore but will carry 700 pounds.

The Noble Five tram is 6,100 feet in length and has a drop in that distance of 2,100 feet. At one place it crosses the famous Noble Five slide with a 900 foot span at a height of 443 feet.

A leading feature of the Finlayson tram is the cheapness of operation, a trifling cost compared with other systems. Another feature is its great convenience as an up-carrier; supplies for the mine, timbers, rails, etc., can be placed in the up-going buckets and taken up without cost. The capacity of the tram now in operation is about 400 tons in twenty-four hours.

#### Counter for Winding Engines.\*

The methods used in many mines for counting how many times the cages are brought to bank are very primitive, and being mostly manipulated by workmen above ground, it may be doubted whether the counting is always correct. There are various apparatus for registering the number of windings automatically, but none are satisfactory, all requiring too much personal attention. The author describes an instrument invented by him which, in his opinion, combines simplicity and ease in working, registers automatically and accurately the number of times the cages are wound up in a double shaft, and requires no adjustment by hand. To procure this result, the action of the winding engine is indicated in such a way that one cage has reached the pit's mouth, and the other is nearly at the top, before their positions are registered. Once fixed on the engine, this apparatus always indicates from whatever level in the pit the cages are wound. It has been working successfully for three years at the mines at Pribram, in Bohemia.

The instrument consists of a small prolongation, fixed centrally on the shaft of the winding-engine, rotating at the same speed as the shaft working the cages. A projection attached to it terminates in a helical wheel, which drives in opposite directions two vertical screws by means of worm-wheels set at right angles to the motor-shaft. Two nuts, resting against a central scale, work up and down two screws, and represent in miniature the two cages in the shaft. Each nut carries a projection, and every time they pass a pawl in the middle of the scale connected to a counter the pawl pushes the counter round a quarter of a revolution; the pawl is so adjusted that not until both cages have reached the bank is a complete number marked on the dial-face. As the two cages must have reached the pitmouth before the counter moves on, the engineman cannot make the counter work by wind-

ing the empty cages up and down the shaft. Of course, the windings are thus counted in sets of two, and the number entered in the book must be doubled.

To make the apparatus work automatically, it must be easily and quickly thrown in or out of gear, and allowance made for winding up the coal from different levels. The instrument is coupled by turning a screw which adjusts the lower projection to the helical wheel in any given position. Sometimes the position of one cage in the shaft is altered, while the other is stationary at the pit's mouth. To avoid altering by hand the position of the corresponding nut, it is adjusted on the screw to a height agreeing with the highest level in the mine from which coal is wound. When it reaches the pawl it indicates this height, when it exceeds it, it marks the position of a cage wound from the lowest level. It is adjusted by bringing the nuts into positions on the screws corresponding to the cages in the shaft, the left-hand nut representing the left-hand cage, and so on. The screws and pawl are protected by glass, and the apparatus, once fixed, is permanently adjusted, and needs no further attention. It is made in one size, and indicates for drums from 6½ to 26 feet in diameter, and shafts from 1,370 feet to 5,200 feet in depth. However high the cage may be lifted in the pulley-frame, the indicator is not thrown out of gear. It is said to work well and easily, and to require little lubrication. Drawings of the apparatus are given in the original paper.

B. D.

#### Plain Talk on Ore Testing.

There are men in every line of business who differ greatly upon the principles underlying their special branch and the methods under which it should be conducted. Some are honest in their differences, while others are willing to sacrifice their real opinions to any matter of expediency which promises more ready and full returns of cash to their coffers. There are assayers who believe that the prospector should be "encouraged" by overstating the value of his ore and who habitually give small returns, from a "trace" to a few dollars per ton, upon ore which they know to be totally barren, thinking by this fraud to keep the miner at work for days, or perhaps months, upon a prospect which will yield nothing, spending valuable time and money to no purpose, save that of giving a few dollars worth of work to the assayer. Perhaps the prospector sends samples to two different assayers, and one returns him "no trace" while the other gives him a value of a few dollars per ton. The biggest return is almost invariably accepted as correct, and the "no trace" man is charged with a failure. Some assayers say it makes no difference whether they return "no trace" or a dollar or two a ton, because in neither case is the ore of any value. I claim the contrary and assert that the accuracy of an assay of ore of very low grade is much more important than that of an ore carrying a hundred dollars per ton, for the reason that in the first case a difference between "no trace" and a dollar or two may decide the expenditure of hundreds or perhaps thousands of dollars in development; while in the latter, the ore will be shipped anyway; and we have all learned that the smelters will pay for nothing but the actual contents of the ore. Then, too, these returns of value from valueless ore are often the result of accident or carelessness in the hands of an assayer who has every intention of being honest. A particle of rich ore in the grinder left from the last sample, a salted crucible, a loaded cleaning brush, a dirty mixing cloth, flukes containing a little precious metal, these and other matters of carelessness, uncleanness or disorder about the laboratory are continually making the difference between reliability and worthlessness in the result of assaying. The general public is not competent to judge of the qualifications of an assayer any more than those of a physician. Any man may buy an outfit for a hundred dollars and stick out his shingle "Chemist and Assayer," when in reality he knows no more about the correct application of the principles underlying the trade he professes than the man in the moon. Such instances are more common than many would believe, and sometimes people of intelligence who would at once realize the foolishness of hunting out the cheapest lawyer or doctor will give their patronage to such an assayer just because they can get his services a little cheaper than those of a man who is competent in his profession and who realizes the importance of taking pains.

A good assayer is often charged with failure because his customer is ignorant of the first principles of sampling ore. Sometimes a piece of rock is broken in two, the halves sent to different assayers, widely varying results are obtained, and one of the operators is charged with an error, when in fact both are correct, and the results are chargeable to the fact that the metal was unevenly disseminated through the sample. It is well to remember that like results can only be reasonably expected when the sample is finely crushed, thoroughly mixed and carefully divided. The careful miner will treat his sample in this way, grinding as fine as his circumstances will permit, mixing and dividing carefully, and in every case reserving a portion of the sample so that a check assay can be made if desired. As the best men are liable to an occasional mistake, no conservative miner will expend any large amount of labour or money upon the result of a single assay, but will base his future work upon the concurring results of two or more reliable assayers.

The best practical test of the qualifications of an assayer is his ability to check with the smelters on their shipment pulps, and if you are in doubt with whom to trust your work go to our friends who are ore shippers and get them to tell you who they patronize. No man can be honest in this business without making many enemies among those customers who have had higher assays elsewhere than he can give them and who had rather believe their assayer dishonest or incompetent than that their ore is less valuable than they hoped. Remember that good men as a rule can get a fair price for their work. I have in mind an assayer in Colorado who probably does more business than any man in the West and who charges \$2 for a gold and silver assay while others in the same town charge 50 cents, and the chances are that, considering the real value of the results turned out, the two-dollar man comes the nearer to earning his fee. If there is any trade in which "cheap and nasty" work is utterly valueless it is in that of the assayer.

\* Der Aufzähler für Fördermaschinen. By V. Mayer. Oesterreichische Zeitschrift für Berg- und Huttenwesen, 1895, vol. xliii., page 651 and plate.