

was done to take the weight of the timber for the next 200 feet instead of letting it rest upon the timbers below. (See Figs. 1 and 2). A station 15 feet long was cut in the side of the raise about every 200 feet, to shelter the men when blasting instead of going down the ladders the whole distance to the level below.

In this manner the raise was carried to the height of 570 feet, which was 51 feet from the surface, when a smaller raise was carried up as is shown in Fig. 3, a test hole being drilled in advance of the top of the raise to ascertain the depth of the sand. When within 18 feet from the surface, sand was reached by the test hole, and the raise continued by carefully working through the sand to within 10 feet of the surface. A hole was then drilled from the surface, blasting the sand through to the opening below.

The work of enlarging the shaft was then begun. The surface at the opening made by the blast was levelled off and two stringers, 2 feet 6 inches in diameter and 25 feet long, were placed in position for timbering through the same. The dimensions of the shaft are 10 feet 2 inches by 12 feet 2 inches within timbers; 12x12 inch fir timber was used and the plan of timbering is shown in Fig. 4. The principal feature of this work was the method used in enlarging the opening made by

the raise to the dimensions required by the permanent shaft. The type of hammer drills used in raising was also used for this work. The rock was drawn off through the chute at the 621-foot level as in raising until it was lowered about 15 feet. The timber from the raise was then pulled out for a distance of 15 feet and the two smaller compartments covered over as before. The holes were drilled upwards as in raising, but at an angle of 45 degrees, and were started 10 feet below the permanent shaft timber and so located as to strip 5 feet of the shaft at one blast, thus making room for one set of the shaft timber.

Ordinarily this work is done by drilling holes downward, but, as the above method proved very successful, it was continued for the entire shaft, and I think the use of the hammer drill a great improvement over the reciprocating type with shaft bars or tripods.

The progress made in the work was as follows:

Raising—621 feet; No. days, 125; average per day, 5 feet.

Cutting down—621 feet; No. days, 114; average per day, 5.44 feet.

Work started September 5th, 1911; completed July 15th, 1912.

CONCENTRATION OF COBALT SILVER ORES

By Reginald E. Hore.

Remarkable success has been obtained in treating Cobalt silver ores by straight concentration. Experience led most of the millmen to screen the ore first, hand pick the large and jig the small sizes, crush the tails with stamps, and concentrate the pulp on tables. At some mills the sorting belt tailings go direct to stamp bins, at others the ore is first recrushed and then sent to the jigs. The tails from the tables are usually run over canvas.

In some cases rolls are used instead of stamps, and

at the Buffalo they are said to work very satisfactorily. At the Coniagas, Krupp ball mills were used at first; but these were discarded in favour of stamps. The equipment of most of the newer mills with stamps indicates that experience has shown this to be the most efficient method of crushing to the desired fineness.

The results obtained by concentration at Cobalt during 1912 are given in the accompanying tables, taken from Mr. A. A. Cole's report to the T. & N. O. Commission:

Concentration in Cobalt During 1912.

	Mills and Mines.	Tons Milled.	Jigs.	Concentrates.		Concentration Ratio.
				Tables.	Totals.	
1.	Beaver	14,602.0	113.4	129.3	242.7	60—1
2.	Buffalo	51,900.0	....	....	1,242.2	42—1
3.	Casey Cobalt	1,585.0	....	43.2	43.2	36—1
4.	Cobalt Lake	1,585.0	182.2	477.3	659.5	36—1
5.	Colonial	7,692.0	....	....	86.0	89—1
6.	Coniagas	52,797.5	253.0	919.0	1,172.0	45—1
7.	Hudson Bay	21,509.0	177.0	453.0	630.0	34—1
8.	King Edward	9,895.5	65.7	200.0	265.7	37—1
	City of Cobalt					
9.	McKinley-Darragh	51,897.0	516.9	1,406.4	1,923.3	22—1
10.	Nipissing Reduction,					
	Cobalt Lake	1,803.4	62.7	16.8	79.5	23—1
	Green Meehan	795.5	7.3	6.9	14.2	56—1
	Nipissing	14,251.0	87.0	97.5	184.5	78—1
	Silver Queen	219.8	2.8	1.6	4.4	50—1
11.	Northern Customs,					
	Drummond	3,427.0	....	111.1	111.1	31—1
	La Rose	33,984.0	....	1,210.5	1,210.5	28—1
	Townsite	27,898.0	....	1,074.0	1,074.0	26—1
12.	Penn Canadian.					
	Penn Canadian	5,400.0	....	....	95.3	57—1
	Hargraves	546.0	....	....	4.2	130—1
13.	Temiskaming	40,056.0	280.7	609.3	890.0	45—1
14.	Trethewey	26,803.9	159.6	435.1	594.7	45—1
	Total	390,473.0			10,527.0	37—1