

the pipes are disconnected and the water pumped from the sump.

Ground Thawed.—An examination of the ground will show that the breast has been thawed thoroughly six ft. high and eight ft. deep. In contradistinction to the firing system the thawed mass does not require to be immediately removed, the cobbles and stones in the gravel retaining the heat and doing efficient thawing 24 hours later. (The details of the working of the steam thawer were given by Douglas Waterman, who had charge of the "Points" at No. 45 above Discovery, on Sulphur creek).

Illustration of what can be accomplished by steam thawing is readily seen from the following data showing a day's work done in the spring of 1900, on No. 46 above Discovery, Sulphur creek. The owner, Mr. Warren, purchased and erected a 20-horse power pipe boiler and connected up with a one-inch steam pipe, 80 lb. pressure to supply ten points, regulation length, $\frac{3}{4}$ -in. diameter, 1-8 inch discharge.

The points were spaced three feet. The breast had 30 ft. face and the ground was thawed fully eight feet in and to a height of six feet. The man in charge of the points went on shift at 6 p. m. By 10 p. m. all the points were in their full length, and were run until 5.30 a.m. the following day, when they were disconnected to drain and prevent freezing.

The expense account was as follows :

| | |
|--------------------------------------|---------|
| Four miners at 80 cts. per hour..... | \$32 00 |
| Two surface bucket men | 16 00 |
| One day engineer..... | 8 00 |
| One point man..... | 15 00 |
| One night fireman..... | 8 00 |
| Three-quarters cord of wood | 15 00 |
| Total | \$94 00 |

Work performed was : 600 buckets = 360 lb. gravel each = 180,000 lb. hoisted to surface 50 feet and discharged, costing per cubic yard \$1.69. These figures speak for themselves.

Yield and Cost per Cubic Yard.—In discussing this question of yield and cost per cubic yard, one must bear in mind the condition of the labour and supply market, at the periods mentioned. Material not available to-day for mining may five years from now be very remunerative as the country is developed, transportation and supplies cheapened, and rates for labour lower.

The pay streak of to-day refers only to such width of channel as contains sufficient gold to stand the present enormous cost of production. It was considered in '97-8 that ground containing less than 15 cents per pan (a pan is estimated to contain 20 lb. of gravel) was unprofitable to mine.

Labour Rates.—Though labour still remains at 80 cts. to \$1 per hour (July, 1900) with the progress in mining, seven cents per pan will now pay handsomely, provided it exists in fair quantities. In a region like the Klondike subjected to many changes, fast and hard lines in the cost of production cannot be drawn. Pioneers are wedded to their own ideas, which they persist in following. In time many of their abandoned and now worked out deposits will be reopened and found profitable to work.

Experience Gained '97-8.—The experience of 1897-8 demonstrated the suicidal policy of the firing system of mining. The easily satisfied wants of the old prospector, and the rich placers alone permitted its use, resulting in the bulk of the gold finding its way into the hands of the trading companies, and little accumulated by the miner.

Outside capital is gradually being invested and a few enterprises will be carried out on a scale commensurate with the requirements.

Winter work is performed at a sacrifice of energy and loss of money compared with the equivalent of labour in temperate zones, which has been attested in the hundreds of cases in the Klondike, and evidenced by the numerous civil suits in His Majesty's Courts. Mining is necessarily carried on in the dark ; the costs of handling the gravel are excessive, and it is not uncommon to lose a dump by floods before it can be sluiced.

Dumps.—The dumps represent capital expended, and the longer they lie the larger the interest account, which in a country where money draws from two per cent. to ten per cent. per month, is worthy of consideration, especially where people without capital are compelled to borrow to carry on mining.

Delays.—The long tedious working season, continuous delays, slowly accumulating dumps, a late spring, anxiety over the water, with the uncertainty of the value of the clean-up, and the knowledge of a large expense account for labour and supplies have been a nightmare to many an honest miner.

Advantage of Steam Thawing.—Steam thawing obviates these troubles ; the exploration of the claim and its preparation for mining can be done most expeditiously and economically, the rapidity with which ground can be worked permits the selection of the most favourable season for mining. The simultaneous washing of the gravel enables the miner to know exactly what he can do.

A 500-foot claim, with a pay streak 60 feet wide and 6 feet deep, well managed with a properly-equipped plant, can be opened, developed, and cleaned up in 120 days from the date of the erection of the machinery, pre supposing a fair water season of 60 days. Such a property will pay a handsome profit, with dirt yielding four cents a pan.

Having determined by prospecting the general course of the pay gravel in a claim (500 ft. location), five or six shafts should be located (100 or 125 feet apart) along the centre line of the deposit. Two steam thawers can then be placed in position. Each plant should consist of one 35-h. p. boiler complete as already described in this paper. One 15 h. p. hoist complete, with sheaves, ropes, buckets, two car tracks complete ; one set of 10 points, necessary pipes, valves and tools. A small circular crosscut saw, which can be attached and run by the hoisting engine, will be found an invaluable adjunct.

The thawers should be located to divide up the work evenly and be, without endangering them, as near as possible to the workings. The six shafts can be sunk simultaneously. For this work each plant will require one engineer ; one fireman ; four labourers. One point man for day and one for night shift will be all that is necessary for sinking and drifting.

As the shafts reach bed rock, drifts should be started to connect them up. The two down-stream shafts should be connected without delay, and a sump excavated in the lower one. A bed-rock drain carefully covered and protected should, as soon as practicable, be cut in the bottom of the connecting drift, and its extension carried on in accordance with the requirements of the situation. Provision being always made for the pumping of the water from the lowest shaft in case drainage is required.

When the shafts have been connected, a crosscut should be run from the centre of each drift, the crosscut being driven at right angles to the main drift across the width of the pay channel. A track should be placed along the main drift, and a movable turntable laid at each crossieg as occasion demands. With the completion of this work and the placing of the sluices arranged for direct dumping of the gravel into them as