

obtainable; subsequently some powder was obtained and blasting tried on the frozen ground. Apart from its prohibitive cost, the results were unsatisfactory. Recourse was taken to firing.

Free Miners' License.—The creek bottoms and hill-sides were fairly well wooded with birch and stunted spruce, and by virtue of the Free Miners' License, any miner had the right to cut all the wood he required for the use of his claim, on any government land not previously covered by a concession. The cost of fuel at this period was that of cutting and hauling. The rapidity with which the prevailing timber was removed and used from the surrounding country seemed incredible. Every one resorted to firing; the whole country teemed with burning shafts, discharging smoke in volumes, darkening what little was left of daylight.

Channel Mining.—The channels are exploited and mined by means of shafts sunk 30 feet apart when in pay gravel. Drifts opening faces for breasts are driven half way from each shaft forming air connections, the distance of a "box length" (12 feet) being considered the most convenient for skidding. All the gravel with-

of the shafts having been determined on, mining then commences.

As preliminary to shaft firing, the moss is first removed from the ground with a mattock, then the muck which varies in places from six to forty feet in depth, is attacked with a pick. In a shaft 4 x 6 feet sinking progresses at the rate of five feet per ten-hour shift.

Gravel.—When the gravel is encountered firing is begun, eight to fifteen inches being thawed per burning, depending on the character of the gravel, moderate-sized cobbles carrying the heat deeper than the fine sandy material.

Fires.—The fire made with dry kindling and logs covering the bottom of the shaft is lighted and allowed to burn out, when the shaft is cleaned of the thawed gravel and the burning continued till bed rock is reached. It can be frequently arranged so as to have two fires on a ten-hour shift. The bed rock being reached, drifting fires are started around the sides of the shaft.

Firing for drifting and breasting is totally different from firing for sinking. Dry kindling is prepared and cut in convenient lengths for splitting, say 2½ feet long.

This kindling is laid along the face of the ground to be thawed, on cross pieces spaced 2½ feet apart. Over the kindling dry wood and odds and ends of brands left over from former fires are piled, which are in turn closely covered with green wood piled lengthwise, the whole forming an angle from the ground to the top of the pile against the face of the gravel to a height of 2½ feet, carefully banked.

The space between the cross pieces under the kindling is left for purpose of draft and lighting. A fire built, as described on the following page, against a breast 25 feet long and 2½ feet high, requiring half a cord of wood, will thaw about five cubic yards of gravel as it lies in the deposit. Wood for firing formerly cost \$25.00 per cord.

Time of Burning.—When the weather is very cold and the draft strong, the fires are not lighted before 10 p. m., and should burn out between 5 a. m. and 6 a. m. the following day, in time for the works to be cleared of smoke and gas to

permit the morning shift to resume operations.

Firing on Dominion Creek.—During the winter of 1898-9 on Dominion creek, at No. 13 above Lower Discovery claim, it was found that firing four faces, each 30 feet in length, required the labour of one man two hours daily to cut sufficient shavings with a draw-knife to make the fires, or a daily cost of \$2 for shavings. Messrs. Waterman and Mayon, who were working the claim, substituted rags soaked with kerosene. The results obtained were most satisfactory. Ten gallons of kerosene costing \$28 last six weeks, as against \$84 for shavings. Apart from the saving of time and money the burning of the fires was assured, a most important feature.

This system of mining only allows seven hours' work for the handling of the gravel, the remaining time being required for sawing, splitting the wood, and laying the fires.

Action of Heat on Ground.—When the fires have started and the ground becomes heated the gravel soon drops from above and buries the green wood covering, retaining the heat, which with the smoke creeps along the roof of the drift or breast, making for the shaft. There results a caving of the material along its entire course, particularly around the shaft, the caves extend-



FIRE JUST STARTING IN SHAFT, KLONDIKE REGION.

in that distance being worked through the respective shafts.

Shafts.—As a rule shafts are located as near the line of present surface drainage as circumstances and conditions permit. Their depths vary in accordance with their location and the position of the deposits on the creeks. On Dominion creek they may be averaged at 20 feet, on Bonanza, Eldorado and Hunker creeks from 12 to 25 feet, while on Sulphur 40 to 50 feet will be the average required to work the pay streak.

Timbering.—Timbering is rarely required on account of the compact overlying muck, which, after the gravel has been mined, settles down at the point of least resistance, until it rests on bed rock. The surface dirt around the collar of the shaft is generally secured by cribbing with round poles, and as the dumps are raised the mouth of the shaft is built up with notched timbers closely set together. What is most noticeable is the number of shafts required by this system of mining, entailing an enormous expenditure for dead work.

The field presented to the miner is not especially an inviting one for work. The surface in winter is covered with snow or ice, under which lies the moss one or two feet deep, reposing on the soil and muck already described, which in turn overlies the gravel. The location