tion. It is, therefore, necessary that the high-priced shovellers get as much gravel into

rows or buckets as possible. The bucket, 37 inches square on top, 35 inches square on bottom, and 25 inches deep, holding two-thirds of a cubic yard, is dropped into a crib built in the bottom of the pit, 'o which the shovellers wheel their dirt in wheelbarrows. From four to six wheelbarrows are necessary to fill the bucket. There is no mobility to the bucket; it must always rise and fall to the same spot. Men instead of occupying all their time in shovelling are employed nearly half of it in wheeling and dumping. Five operations are necessary to get the gravel from the bank to the sluice, namely, (1) shovelling into wheelbarrows, (2) wheeling to bucket, (3) dumping to bucket, (4) raising bucket to carrier, (5) conveying and dumping to sluice.

The cost of steam shovel operations in Alaska is not evident from the cost sheet printed above, as the figures there given cover the sluicing, often with purchased water, stripping, amortization, etc. With a plant operating at Anvil Creek the actual working cost of digging the gravel, transming and hoisting, and tripping the cars to the sluice box, including also superintendent's labour, crude oil fuei at \$3.00 a barrel, lubricants, etc., is estimated as follows:—

Cost of steam-shovel work at Anvil Creek, per cubic yard:

Digging	\$0.045
Tramming to incline	.025
Hoisting	.oı
Dumping	110.
Proportionate superintendence on ground,	
and incidentals	.021
<b>`</b>	
Cost per cubic yard	.120

But this does not take into account the labour of shovellers, cleaning bed-rock after the shovel. The steam shovel plant at the junction of Bear Creek and Klondike River occupies the flood plain of the latter-stream, a fact that influences greatly the economical excavation and disposal of material. This shovel digs in a pit twenty feet below the surface of the flat. The machine weighs thirty-five tons and has a capacity of 1,000 yards in ten hours, but cost of operating are not given.

Drift mining is carried on to some extent in the Yukon, the mines being opened up by main tunnels or runways  $6 \ge 6$  feet, which generally require timbering with logs  $8 \ge 8$  inches and 6 feet long, the sets having 5 feet centres. The cost of driving a tunnel 5 1-2 feet high, including steam thawing, excavating, tramming, timbering and laying tracks of twelve pound rails was \$6.25 per foot on Solomon Hill in the Klondike.

Drifting operations in the creek deposits of the Klondike, Birch Creek, Forty Mile, and Fairbanks districts of the interior are yearly always carried on in solidly and perpetually frozen ground. A necessary accompaniment of the work is the thawing of the ground by artificial means. Mr. Greenleaf W. Pichard has thoroughly investigated for this report the possibilities of using any form of the electric furnace for thawing the frozen gravel, and has reached the conclusion that electric thawing is impracticable.

Artificial power, through the agency of the steam point, is only in rare cases applied in open-cut work. The Klondike district affords a few examples of this application of power, notably in connection with dredging operations on Bonanza Creek, the steam-shovel operations on Bear Creek, and in two open cuts on Upper Dominion and Hunker creeks. It is difficult to determine the efficiency in open work, as, naturally, a portion of the thawing is done by the sun. From the data collected, however, by Mr. Purington, it does not appear to be any greater than its underground efficiency. But it is stated that the method of thawing gravel under ground by wood fires is expensive, and, except under special conditions, is not practiced in districts where transportation facilities permit the bringing in of boilers. Referring to the future of hydraulic mining in the Klondike, Bird's Creek, Forty Mile, Eagle and Tamana, Mr. Purington expresses the opinion that the outlook is not promising. The gentle slopes of the mountain, the low grade of the creek valleys, and the insufficient quantity of water are, in themselves, unfavourable factors. Where hydraulicing is possible in the Klondike the goldsaving appliances are generally adequate to the needs of the operations.

One of the most interesting chapters in the report is devoted to dredging, and the writer remarks that, notwithstanding the difficulties encountered in the northern fields, the possibility of successful dredging under certain favourable conditions is not to be denied. A small dredge for prospecting purposes, operated on the Stewart River, and digging to 30 feet, handled 750 cubic yards in 24 hours, at a cost of seven cents per cubic vard, last year. dredge of the New Zealand type has been in operation on Bonanza Creek, the ground being thawed by means of 11 feet pieces of gas pipes, twelve in number, driven vertically into the ground. The bedrock here is a sericite-schist, and the dredge is said to clean it well. The season for operating is from May 15th to Oct. 1st, and it is understood that this dredge was successfully operated during the season of 1904, on ground that had been previously drifted. It is estimated that in the Interior of Alaska the costs of dredging averaged forty-nine cents per cubic yard for unfrozen, and eighty cents for frozen ground.

## **QUEBEC'S NEW MINERAL REGION.**

## By John E. Hardman.

## (Concluded from last month.)

The first deposit of economic interest which was investigated was a wide bed, band or "vein" of quartz carrying occasional spots and masses of pyrite and chalcopyrite, and frequently showing small particles or "sights" of free gold. This quartz body