

### Hydraulicking.

Figs. 4 and 5 illustrate the general system of excavating sand and earth, known as "hydraulicking." This method of moving ground is more or less in the experimental stage, but is a unique engineering digression, unfamiliar to many members of the profession, and more especially easterners.

In brief, the process is as follows: Water under considerable pressure is discharged through large nozzles, called "giants," for the purpose of tearing away earth, sand or gravel from the side of a hill which for some reason is to be either excavated or entirely removed. The water, after disintegrating the particles of sand, etc., carries them away in suspension. Consequently, the chief topographical requirement for hydraulic excavating is to secure natural grade sufficient to carry away the water at a rate exceeding the scouring velocity of the particular material to be moved. The operation applies, then, essentially to hillsides.

The frequent occurrence of hydraulic methods in the Pacific West may be partially due to the prevalence there of high-pressure gravity water supply. However, in many places throughout the West hydraulicking is carried on where the pressure has to be supplied by mechanical means; even in this case the cost of excavating enables the methods to be called cheap. The latter is the case in the city of Seattle, which is built on hilly ground. The process of levelling off the hilltops, and also of transporting the same material to "fill" the valleys, is done by hydraulicking, in

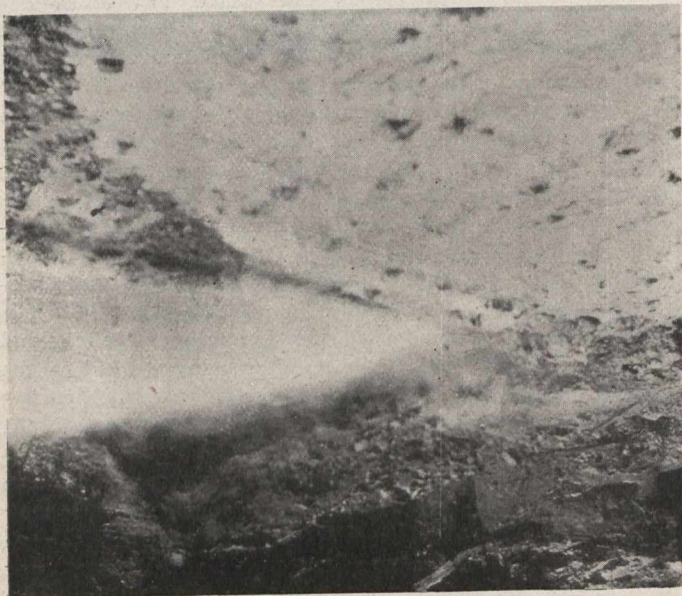


Fig. 5.—The Effect of Hydraulicking.

which the water pressure is supplied from an electrically-driven pumping installation. The operations are eminently satisfactory.

In Fig. 4 there is shown a "giant" nozzle, which is mounted on a swivel pivot, enabling the operator to change the direction of the stream horizontally and vertically. This nozzle is  $3\frac{3}{4}$ -inch diameter size. The head on the nozzle is 110 feet. The water is supplied through the 16-inch diameter wood-stave pipe shown in the illustration. The range of the jet is about 50 feet. The capacity of this giant is about 2,500 cubic yards in twenty-four hours.

Fig. 5 shows clearly the jet and the flow of the water shortly after leaving the cut, and just before it is collected in a sluice-way and transmitted a distance of 2,000 feet or more.

In the Yukon this principle, it will be seen, is readily applicable to mining purposes, the main problem being the source of water supply.

The effect of running water on the frozen ground has a thawing tendency; consequently where water is available hydraulic giants may be used to advantage. Both excavating the ground to bed-rock, and also sluicing the pay sand are accomplished by the method which has been described as hydraulicking.

Hence, we have the specific application of the term, "hydraulic mining." Successful results have been obtained in the Yukon in connection with this important subject. Mr. Coffee, at present hydraulic expert for the Yukon Gold Company, made a report to the Anglo-Klondike Company in 1902, in which he stated that 29,000 cubic yards were sluiced in twenty-two days. The cost of hydraulicking was only 15 cents per cubic yard. The total operating expense was 35 cents per cubic yard, or \$1.96 per square yard of bed-rock. It is also stated that the average cost of mining and sluicing by the ordinary drifting method amounted to \$5.85 per square yard of bed-rock.

### Hydraulic and Mechanical Elevators.

It will be readily seen that a certain lower portion of the hillside is not available for hydraulicking, since some drop is necessary for the usual method of sluicing.

In some portions of Bonanza district it is fortunate that the pay gravels occur on comparatively narrow benches cut into the sides of the valley at elevations of from 150 to 300 feet above the present valley bottom. Speaking generally, however, the ordinary hydraulic and sluice-box method will have the disadvantage referred to; and for the purpose of eliminating these deficiencies an ingenious method has been tried and proven by recent experiments to be successful.

The system involves practically a combination of the two methods previously described, viz., dredging and hydraulicking. A large sump hole is excavated 12 or 14 feet below bed-rock at its lowest elevation in the valley. Channels are cut to rock at desired places from top to bottom of the hill. Hence, it is possible to create a network of these small canals, which are hydraulicked into the common cesspool, from which the sand and water is elevated to a sufficient height (about 70 feet) for sluicing.

The "hydraulic elevator" consists mainly of a system of centrifugal pumps. In the "mechanical elevator" the lifting is done by a chain-bucket line similar to that used on a dredge, but connected with a rigid steel framework, placed on a hillside preferably, so that the bucket line is at a slight incline.

The Yukon Gold Company have acquired large holdings in the vicinity of Dawson City, and are planning very extensive dredging and hydraulic operations. The scheme, which includes water supply and power development, is one of the largest of its kind ever attempted. In a subsequent article, "Hydraulic Engineering in the Yukon," the writer will describe the complete hydraulic and hydro-electric installation, which is nearly completed at a cost which can only be figured in millions.

### CANADIAN ISSUES IN 1908.

#### Nearly \$143,000,000 New Capital Has Been Supplied Since Beginning of the Year.

From the commencement of the year to the end of last month, new capital was supplied to the extent of nearly \$143,000,000 for the development of Canada. The figures, which have been compiled by Mr. E. R. Wood, vice-president of the Central Canada Loan and Savings Company, are as follows:

Government issues . . . . .	\$43,500,000
Railway issues . . . . .	64,000,000
Municipal issues . . . . .	20,270,000
Miscellaneous issues . . . . .	15,075,000

Total . . . . . \$142,845,000

A press telegram from Pittsburg of 27th, speaking of a further decline recently in price of steel-making pig iron, says this makes it more probable that finished steel prices will have to be reduced. And instead of any advance in price of structural steel at once after the election, this advice declares the belief of some authorities to be that the question of a general reduction will be considered seriously.