

# FUTURE MINING OPERATIONS TO BE CONDUCTED UPON GIGANTIC SCALE.

## New Methods Capable of Handling Immense Quantities of Gravel at Small Cost to be Introduced—Gold Output Will be Greatly Increased.

Possibly there is no subject under discussion at this time of greater importance than that relating to the future conduct of mining operations throughout the Klondike district. It is generally conceded that future operations must be conducted upon more comprehensive and economical lines than the methods now in vogue. The future of the Klondike is one of great promise and there is every reason to believe that the production of gold for the ensuing years will be greatly in excess of the output for the years past. The past history of mining operations in this district has been more or less experimental and the results have proven both expen-

tion has been given to such ground; even the saving of fine and flour gold have it. But all this is of the past. The conditions of today demand the closest attention to every detail connected with the operations of the future, and now that many operators are interested in the solution of this problem, the *Nugget* presents its readers with some reliable information thereon, illustrating with a few cuts some of the modern machinery used in mining which by its economical working has led to a discussion of respective merits, and the advisability of employing them here.

the operation of any method and this article will be confined to mere generalities in the explanation of the operation of these several methods, such figures being given as to their cost and capacities, together with the probable cost of operating them, as may be reasonably deducted from a knowledge of the conditions to be met with and from the results of actual experience in conducting previous operations throughout this district; and as the several methods now under discussion permit a great difference in personal opinion, there will be no attempt to extol the individual merits of one system over another.

Of the various methods upon which future operations may be conducted we will first take up that of hydraulic mining. Among the necessary and important features for the successful operation of a hydraulic plant, is first an abundance of water with sufficient power to disintegrate the gravel, and second the ground must have ample grade to permit the removal of tailings. Such a system where all conditions are favorable is its successful operation is recognized the world over as the most economical method of working placer ground. Where the conditions are less favorable this system has been successfully employed by the addition of a hydraulic elevator, which lifts the gravel from a pit to the sluice boxes above.

The capacity of such a plant depends principally upon the amount of water available. The capacity of an elevator depends upon its size, the height to which it must lift the gravel and the amount of water available for its operation independent of the operation of the giants. The cost of such a plant will depend upon the size of the pipe and the amount required, the size and number of giants, the size and number of elevators, together with the cost of building reservoirs, installing plant, etc.

The following figures are prices quoted at the factory, and are subject to reasonable discount. Freight and duty will of course increase the cost. (It must be borne in mind that the fluctuations in the cost of iron and steel are such that these prices are constantly changing.)

Pipe 7 inches in diameter costs 50c per foot.  
 Pipe 24 inches in diameter costs \$1.90 per foot.  
 Pipe 40 inches in diameter costs \$5.00 per foot.  
 Giants cost from \$125 to \$485 apiece.  
 Elevators cost from \$150 to \$300 apiece.

It would be impossible to give the cost of such a plant, unless the full requirements in pipe, etc., were known, but the probable cost of operating such a system is variously estimated at from 10 to 25 cents per cubic yard. It is of course understood that this method is only applicable to the working of a very large area of ground, and for this reason other means must be found for handling small areas or individual claims.

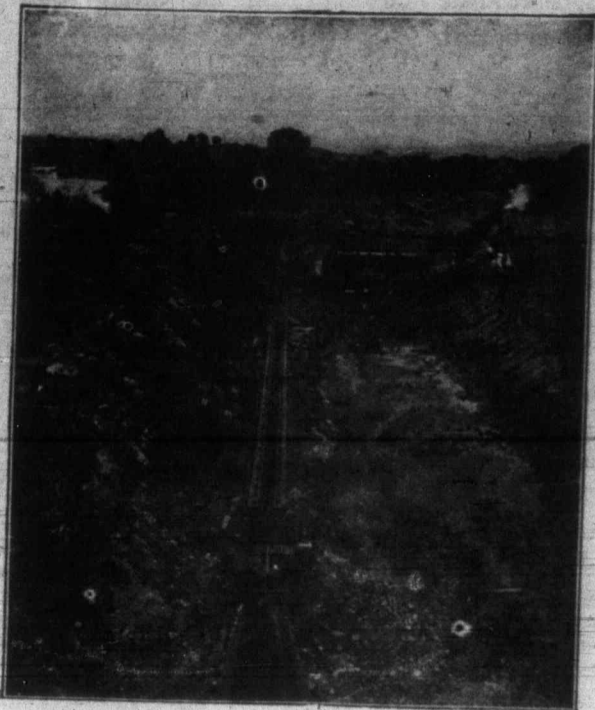
Among the methods for operating small properties attention is first called to the steam shovel. The principle upon which steam shovels are constructed is practically alike in all types, the only distinguishing feature being some special individuality in its construction. The illustration given here fairly illustrates the several styles of steam shovels generally in use, but foundries will construct a shovel for any special work.

of wood or entirely of steel and iron as may be desired. In mining operations shovels may be operated as a separate and distinct plant from the sluice boxes or, as is more commonly the case, in connection with a gold-saving device that by reason of the peculiar yet simple manner of operating it, may be constituted as part of a whole plant.

This device consists of a perforated drum or cylinder set at a slight angle. Through the centre of this drum is a perforated 4 or 6-inch pipe carrying a steady stream of water. The drum is kept constantly revolving and the gravel which is conducted in-

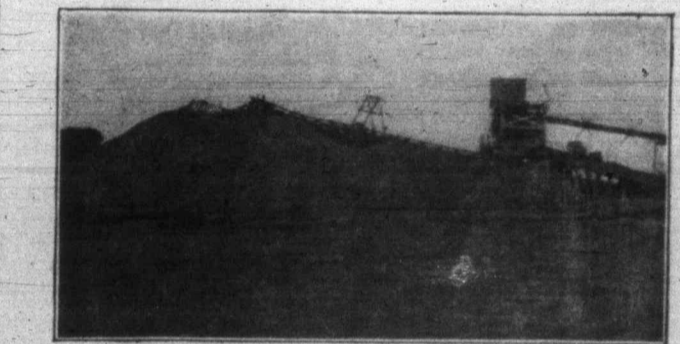
The following figures will show the various items that go to make up the expense of operating a shovel that cost \$30,000, having a daily capacity of 500 cubic yards.  
 Labor, 10 men at \$4 per day, \$40.00  
 Board, 10 men at \$1.50 per day, 15.00  
 Fuel, 4 cords at \$10, 40.00  
 Wear and tear, repairs, oil, 30.00  
 Interest on investment at 24 per cent. per month, 5.00  
 Total, \$130.00  
 Average cost per cubic yard 30 cents.

It will be seen that within a com-



Steam Shovel Operating With a Conveyor Bedrock.

to it is thoroughly washed and in passing through the perforations in the drum, the fine gravel and sand falls either into a pit or is carried on to a series of specially prepared tables, the coarse gravel being conducted to the dump either by means of a bucket conveyor or a straight belt conveyor. If the fine sand and



Conveyor With Moving Tripper to Distribute Its Load of Gravel.

gravel is run into a pit, a centrifugal sand pump lifts it to the riffles at the point desired. Another method is to operate the shovel in connection with a belt conveyor, the gravel being deposited directly upon the belt and carried by the belt to the sluice boxes. The various manufacturers while not



Conveyor Showing the Moving Tripper at Work.

claiming to save all the gold that passes through the drum into the pit or on to the tables, do claim to save 98 per cent of it. The initial cost of a steam shovel is from \$5,000 to \$30,000. It has a capacity to handle from 500 to 5,000 cubic yards of gravel for every 10 hours of operation.

The cost of a dredge is from \$50,000 to \$250,000. Its capacity is from 500 to 2,000 cubic yards for every 10 hours of operation. This capacity, if the ground under the water was as readily thawed as that above, would of course be equal to that of the steam shovel.

The cost of operating a dredge of either description, at present price of labor, fuel and supplies, would be from 50 to 60 cents per cubic yard and it may be possible to operate it at about the same cost as that of a shovel. The items of operating expense are identical but the increased cost is due to the difference in capacity. It must be borne in mind that the steam shovel will not always take the place of a dredge nor will a dredge take the place of a shovel.

The next method that is receiving its share of attention is the belt conveyor. The simplicity of its construction, the ease with which it may be shifted from place to place or transported elsewhere, are some of its admirable qualities, yet it would be a mistake to presume that a conveyor would prove successful under all conditions.

The conveyor consists of a rubber belt and a set of pulleys so arranged that the material never comes in contact with the pulleys and cannot retard or clog them. The belt is one of great durability being made of heavy rubber and will last with constant use from four to five years. Friction is reduced to a minimum. Its great efficiency is shown by its even and noiseless operation. There are no joints, bolts, etc., to break or

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wear-out and it is readily and quickly installed. The material to be handled, whether wet or dry, is delivered directly upon the belt and carried to the point desired. It may be run without any inconvenience at an angle of from 16 to 36 degrees, delivering its load with the accuracy and precision of clockwork.

By means of a simple device called a "Tripper," which acts automatically, the load may be discharged at any point along the entire belt. This feature will enable the operator to handle his tailings at will. Conveyors are now much used in both placer and quartz mines both in Canada and the States.

Several systems of operating a conveyor are now under consideration. One of these is for the purpose of working under ground, where the pay gravel has but little depth, but where its removal necessitates the handling of considerable very low grade dirt or waste. Under such circumstances an incline tunnel would be made to bed rock and a drift run the entire length of the claim. In this incline tunnel and drift the main conveyor would be erected and the tunnel and drift systematically timbered.

Then commencing at the end of the main drift two more drifts, one on each side of the main conveyor, would be constructed and two short conveyors installed. The gravel would be shoveled directly upon the two short conveyors and by them carried to the main conveyor and thence to the sluice boxes. From time to time as the work proceeded, these short conveyors would be moved towards the face of the gravel walk, close enough to permit of rapid and easy shoring.

The other method is similar to the open cut system, where the pay gravel is heavy and well defined, and should all be washed. The entire surface would have to be stripped and, running through the center of the ground, clear to bed rock, an open cut would be made in which to install the conveyor. This would be a continuous belt and would follow the line of bed rock to a point near the head of the cut, allowing sufficient distance in which to rise to the sluice boxes. This belt would be loaded by means of a series of steam wheel scrapers, operated by a wire cable. These have to be specially designed to suit the nature of the ground, and the larger their capacity the greater the economy.

Where the tailings must be specially handled another belt running from the end of the sluice boxes will convey the tailings to the place desired, and by means of the "tripper" deposited at any point along the entire belt.

The conveyor can be used successfully in connection with either a steam shovel or dredge either to convey the gravel to the boxes or to carry the tailings to the place of dumping. The clock-like precision and general uniformity in the amount of gravel delivered to the boxes for washing partially overcomes the shortage of water, which so often causes a cessation of operations. So regular and uniform is its action that at no time would the boxes be jammed on account of the inability of the water to carry off the gravel.

The cost of a conveyor depends wholly upon the width of the belt, its length, the number of pulleys and attachments required.

Its capacity depends upon the size and class of material to be handled and the speed at which the belt is run. Approximately a conveyor is everywhere suitable to handle the material in this district would have a capacity of from 2000 to 4000 cubic yards for every 10 hours of operation.

The cost of operating a belt conveyor depends largely upon its capacity and method of operation. It is variously estimated that gravel can be handled at a cost of from 20 to 30 cents per cubic yard, as the conveyor may be situated under or above ground. The initial cost of such a conveyor is from \$5,000 to \$15,000.

At the present time, while many properties are being worked by these several methods at a profit, the operators are convinced that with the machinery in use and the labor employed, they should handle from 50 to 75 per cent more gravel than they now are handling. This means that present operations are not giving sufficient profits to cover the large outlay, and that to continue with only a percentage of the plants pro-

ductiveness will eventually mean loss. The present cost of operating expenses is placed at from \$1.50 to \$5.00 dollars per cubic yard. Hence the saving that must ensue from the employment of less expensive methods will be enormous.

Machinery of all kinds can now be purchased at least 40 per cent less than it cost two years ago. Notwithstanding this fact, the days of self-dumping and steam hoisting and thawing plants are practically over, at least so far as large operations are concerned, and the future will see the gradual introduction of simpler and more economical methods for the handling of immense amounts of gravel in the shortest possible time.

J. B. PHILIPS.

### A Gusher.

Arrivals on the Newport bring news that a gusher has been struck at the oil fields at Kayak. A company which has been prospecting for oil at the head of Controller bay struck the gusher, and it is said to be a wonder. They had their machinery in operation boring for oil when suddenly the oil burst out forcing into the drills and shooting 60 feet into the air. So unexpected was the oil that no preparations had been made for checking it and it was some time before the hole could be plugged and the flow stopped. Everything was swimming in oil and to make matters worse the gas from the well caught on fire and it looked serious for a time. They finally got it under control, however, and they are now prepared to ship oil as soon as barrels and tanks can be secured. The oil is estimated to be worth from \$4 to \$5 per barrel as it comes from the well and will be a big paying proposition. It is thought that other wells will be opened up in that vicinity in the near future. A number of outfits are prospecting for oil and excellent results have been obtained but nothing so big as this gusher.

Considerable excitement was created in Skagway and Juneau by two parties who were racing for the Kayak oil fields and who were on board the Santa Ana. It seems that Dr. M. W. Brunner and W. A. Abernethy, the latter an oil operator at Kayak, were attempting to reach the oil lands from Seattle before the other party headed by a man named Coy could get there. Coy was equally anxious to get there first and while the boat was at Skagway Coy swore out a warrant for the arrest of the other two hoping to detain them until after the boat sailed. He was disappointed in this, however, as Brunner and Abernethy learned of the warrant being out for their arrest and hid out. The steamer was searched from stem to stern but they could not be found. But when the Santa Ana had pulled out and was down the canal some distance she was hailed by a gasoline launch and Brunner and Abernethy were taken from the launch and brought to Eklamar where they went ashore and secured a steam launch and started for Kayak. Coy came on up to Valdez on the Santa Ana. — Valdez News.

### The Bear Got Into Bed.

The Robinson boys were out prospecting for quartz and have been using a cabin at the head of Ophir creek. About midnight one dark night a bear came scuffling about the door, and the scent seeming good to him he hit the door a smack with his paw, shattered it to pieces, and walked in. There was some bacon hanging over the bunk and he got on the bunk to reach it. The bunk shook with the weight of the bear and the fear of the two boys. One had the nerve to reach up for a rifle. When he fired the bear rolled to the floor, but still the boys never moved. Neither did the bear, so after a time they came to the conclusion that what their system needed most was bear steak, so they had a very early breakfast that morning.

Two more bears were seen near Snyder's cabin at the head of Ophir yesterday, and several hunters were out after them.

### Will Get Delegate.

Senator Turner, of Washington, thinks Alaska will be given a delegate in congress at the short winter session of congress. To a Seattle Times reporter while at Seattle last week the senator said: "I believe that it is practically assured that the district of Alaska will be represented in congress. It is just and right that the people in the

Golden North should have some one to look after their interests, and I think that at the next session in the winter, Alaska will be given a representative. We would have secured it at last session had it not been for the objection of some of the more prominent senators. They hid it up. That was due mainly to the objection of Senator Beveridge of Indiana, who is chairman of the committee on territories. By the time of the next session I think all objections will be done away with, and that the bill as prepared will go through without much of a hitch."

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Conveyor at Work in an Open Trench. Men Shoveling in on the Belt.

sive and unsatisfactory. Yet these years have brought their reward in a vast fund of experience of untold value.

Beginning with the original method of wood fires and hand windlass, we note the various steps in the line of progress as each year's experience determined upon some improvement for the year to follow, until we come to the steam hoisting plants, steam scrapers, steam shovels, dredges, and the open cut systems of today.

Notwithstanding all the improvements that have been the result of the experience gained in conducting operations under the conditions that have been encountered from time to

The success that will attend the installation of any method depends to a great degree upon the condition of the ground, and the kind of material to be handled, so that where one method will be a success, different conditions will require the employment of other methods.

The question of handling frozen gravel may now be said to have passed the experimental stage, and it may be safely assumed that such a condition is no longer a barrier to the successful employment of steam shovels, dredges, conveyors, or hydraulic mining. All that is necessary is to have the ground stripped and a large surface area of the gravel ex-



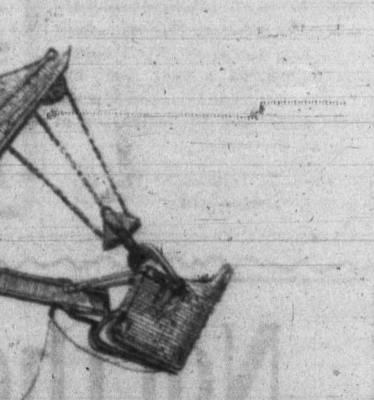
Steam Dredge Operating in Connection With a Conveyor.

time, mine operators are not satisfied to the influence of the sun's rays. Operations that have been conducted on this line have sufficiently determined that the heat of the sun will thaw frozen gravel faster than that the operations of the future it can be readily handled. Of course must be conducted upon a gigantic where the ground is wholly or par-

tially covered with water, the thawing process is much less and consequently much slower than in dry ground. No attempt will be made to go into the many details connected with

The steam shovel is built upon a car body and is run upon rails, or it can be built upon the principle of a traction engine. This permits it to be easily and quickly moved at will.

The shovel frame may be constructed



General Type of Steam Shovel Now Being Used in the Klondike.

scale as compared with those of the past, can hardly admit of argument, when it is seen that such operations will be carried on upon ground, the great bulk of which is classed as low grade. Herebefore but little atten-

tion has been given to such ground; even the saving of fine and flour gold have it. But all this is of the past. The conditions of today demand the closest attention to every detail connected with the operations of the future, and now that many operators are interested in the solution of this problem, the *Nugget* presents its readers with some reliable information thereon, illustrating with a few cuts some of the modern machinery used in mining which by its economical working has led to a discussion of respective merits, and the advisability of employing them here.

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