

The water enters the flume from a dam constructed of cribbing filled with rock and clay, with two thicknesses of sheet piling driven into the clay on the upper side. The distance from the lowest mudsill to the crest of the weir, which is 18 feet long, is 8 feet. The length of the dam from wing to wing is about 50 feet.

At the machinery in the mill, with the exception of the water wheels and boiler, was supplied by Messrs. Fraser & Chalmers, of Chicago. The water wheels were supplied by the Oakland Iron Works, of Oakland, California, and the boiler was supplied by the Jenckes Machine Co., of Sherbrooke, Quebec.

#### AIR COMPRESSOR.

In order to use for power the water running to waste from the mill wheels, the compressor was placed about 1,000 feet down the gulch.

The plant consists of one half of a Rand Duplex class D compressor, with the Dodge system of rope power-transmission from the water wheel. The compressor is mounted on a good concrete foundation, with bolts set for the other half. The cylinder is 14x22 inches, and the fly wheel, which is also the driving wheel, is 10 feet in diameter. The distance between the centres of the fly wheel and the pulley on the water wheel shaft is about 60 feet, and the difference in elevation about 20 feet. The transmission rope is 4-strand Manila, and passes eight times round the pulleys in V grooves which prevent slipping. It also passes over a winder pulley and a tightener.

The water wheel is a four-foot Pelton and works under a head of 300 feet. The water is conveyed to it from the flume in a 10-inch sheet steel spiral riveted pipe, with flanged joints. The length of the pipe is about 750 feet. The pressure box at the head of the pipe is 6x6x8 feet, and contains sand-trap, submerged screen and overflow. The flume, which extends from this point to the mill, is about 1,100 feet long. It is built on a 0.4 per cent. grade and has a capacity of about 500 cubic feet per minute. It is built of dressed cedar. The sides are held tightly against the edges of the bottom boards by wedges which can be tightened if necessary. The understructure is the same as that of the mill flume. A set of waste gates is placed in a convenient gulley near the pressure box.

At the upper end of the flume is a box 4x2x6 feet. This box receives the water from the mill wheels as well as the water from a small flume 500 feet long, which collects water from the main creek and from small streams along the way. The flume is built of rough 1 inch boards, on a 2.0 per cent. grade, and has a capacity of about 400 cubic feet per minute.

The air as it comes from the compressor, is discharged into a receiver 10 feet long and 42 inches in diameter, which is placed in the back part of the building. From this it is conveyed to the mine in 3,500 feet of 5-inch pipe of the kind known as casing. This pipe is thin steel, and has a brass thread instead of the usual standard. Its chief advantages are that it is cheaper and much lighter to haul than standard pipe, and, where it is used for a permanent line, it is quite satisfactory. The line is fitted with flanged joints at frequent intervals, and has two expansion joints along it.

The compressor and receiver are housed in a two-storey building, 20x30 feet. The upper storey has living rooms for the engineer in charge. The rope drive is well protected by a building six feet wide, and the water wheel shaft is enclosed in a building 12x16 feet.

This plant was supplied by the Canadian Rand Drill Company, of Sherbrooke, Quebec.

#### TRAMWAY.

The ore is brought from the mine to the mill on a three-rail gravity tramway. The cable is  $\frac{5}{8}$  of an inch in diameter, and is of crucible steel, by Roebling & Sons, and has a breaking strain of 13 tons. The cars are of a nominal capacity of two tons each. The bodies are of hardwood, lined with heavy sheet steel, and reinforced outside with heavy bands of wrought iron. The wheels and axles are of the Anaconda type, and run very smoothly. At the head of the tramway is a 50-ton ore-bin. Placed directly under this is the brake which is of the usual three-wheeled type, with rubber lined sheaves and two wood shod band brakes.

The rails weigh 12 lbs. to the yard, and are spiked directly to the hewed surface of the three stringers which run from bent to bent. The bents, which are composed of a mud-sill, two posts, and a cap, average about 12 feet apart, and are of a minimum height of four feet and a maximum of about 10 feet. They are securely cross-braced and braced to one another and to stumps near by, with poles. The timbers used in the bents and stringers are of a minimum thickness of 10 inches.

At the bottom of the tram is a 150-ton bin into which the cars dump automatically. The bin at the head of the tramway is fitted with balanced gates, operated with a lever. This bin is filled by a chute into which the mine cars dump directly.

At the lower end of the tramway is about 200 feet of light snow shed, but other than this, no such protection is required.

The length of the tramway is 2,150 feet, and the difference in elevation between the top and the bottom is 1,120 feet. The grades on the line are such as to not only permit of a load of 1,000 lbs. being hauled up without any undue loading of the descending car, but also to make any speeding of the cars above the ordinary rate unnecessary at any part of the line.

The lower end of the tramway requires no attention other than to load freight. The work of maintenance is performed by the man in charge of the brake. This, however, only takes a few hours of his time per week, and consists chiefly in replacing the wooden rollers which support the rope along the line.

Judging from its performance under present conditions, we estimate that without unduly taxing its capacity, this tramway will lower 75 tons per ten-hour shift, or 150 tons per day, when running steadily. At this duty, allowing \$7.00 per diem for service and \$3.00 per diem for repairs, cost of rope and general maintenance, the cost of ore handled would be 6½ cents per ton.

#### TAILINGS DAM.

This is situated below the mill. It consists of two parallel walls of logs about 7 feet apart, and measures 128 feet along the front and 29 feet on each wing. As originally built, the front wall had an average height of 12 feet, and at this height the capacity when levelled off, is about 1,000 tons of tailings. Several small additions have been made, however, so that the capacity is now about 1,500 tons, and others will be made as the occasion demands, until the present capacity is at least doubled.

#### TELEPHONES.

Three separate lines are maintained, one from the