Hydraulic Mining at Nome.

BY WILLIAM H. HALE, PH.D.

The primitive, haphazard methods of mining for gold by hand near Nome, Alaska, are rapidly giving way to improved and systematic work, and notably to hydraulicking.

It was my good fortune to be present at the installation and preliminary tests of the great pumping plant just completed by Charles D. Lane, which is one of the largest works of that kind in the world, and especially remarkable because all the ponderous machinery had to be landed across the surf in lighters. Not a piece was missing, however, when they were all collected and put together.

These preliminary tests were made in the presence of a few invited guests on July 30, and the works are now in regular operation, forcing water to the height of 764 feet, and giving a constant supply of 250 miner's inches. The intake is from Snake River, near its mouth; also some pure water is received from drainage of the tundra, the water of Snake River being very muddy. It is forced through a strong steel pipe 18 inches in diameter nearly to the summit of Anvil Mountain, and thence distributed to numerous places, and used to wash out the gold.

The pumping building rests on a bed of concrete, which is built upon a foundation of ice and frozen gravel. In order to prevent heat from the fires and machinery from thawing the ice and thus unsettling the building, air passages are constructed through the concrete, ventilating it thoroughly. This is doubtless the only great structure ever erected on such a foundation.

The cost of building, machinery and pipe is about $350,000, and it is believed that it will more than pay for itself every year.

Encouraged by the success of this enterprise, Mr. J. W. Kelly and the Pioneer Mining Company are about to build a plant to pump water through four pipes, of the diameter of 6 inches each, from Nome River to the summit of King Mountain, which lies a little to the rear of Anvil Mountain and is also somewhat higher. Crude petroleum will be used as fuel.

The Miocene Ditch, so named from the geological formation which it traverses, is another enterprise which takes water by gravity, without pumping, from Hobson, Banner and Glacier creeks. The entire length of this ditch will be twenty-four miles. It was commenced last year, and in its unfinished state it is already furnishing water to wash the rich gravel of Snow Gulch. A tunnel of 1,900 feet will next year pierce the mountain which divides this gulch from Anvil Creek, and will supply many rich claims with power. It has been found that the tundra, mixed with shale or pebbles, makes an ideal bed and walls for the aqueduct, being both strong and impermeable. It is also very cheap to build, because the materials are everywhere at hand.

Many minor hydraulic enterprises indicate that this system will be in general use throughout much of the Seward Peninsula by 1903, resulting in large production of gold at comparatively little expense.

The rapid adoption of hydraulic systems is illustrated by the beginning of work on a canal to be fifteen miles long, and to bring water from Nome River to points along the left bank, which will require a year to complete. The property comprises sixty-four claims along Nome River, which take in also the river bed. At one point is a large bend in the river, and between points of the bend is a low divide, evidently the old channel. This will be washed out and the gold extracted, forming a new channel, or rather the restoration of the old one; then the entire bed of the present bend will be washed for gold.

Pupin's Latest Invention.

As the result of the continuation of his investigations of the propagation of electric waves along conductors, Prof. Pupin has taken out two more patents on a system of multiple telegraphy based on resonance. It is the object of the invention to send a number of messages simultaneously over a single conductor by means of currents of different periodicities. Given a periodic electromotive force acting upon a conductor of adjustable capacity, self-induction and resistance, it is possible, by varying the capacity or self-induction, so to proportion these electro-magnetic constants to each other that the natural period of the conductor is made equal to the period of the electromotive force. When this occurs the conductor and the electromotive force are in electrical resonance. A resonant conductor offers less resistance to the electromotive force with which it is in resonance than to any other, from which it follows that a resonant conductor can serve as a current selecter. If the conductor forms part of a system comprising a number of electromotive forces of various periodicities its resistance will be less to that electromotive force with which it is in resonance. In a system of conductors having adjustable self-induction coils and condensers, the coils and condensers can be so adjusted that each conductor will have a different predetermined natural period, and, therefore, each part will resound to a periodic electromotive force of its own pitch independently of the presence of other electromotive forces. Such a system will, therefore, act as a set of current selecters, and this forms the essential feature of the invention of Prof. Pupin. The system described by Dr. Pupin in his patents has no moving synchronous parts. It is applicable either to selective single or to multiplex telegraphy.

BORING CLAMS OF THE NORTHWEST COAST.

BY JAMES G. M'CURDY.

One of the strangest mollusks known to science is the Piddock, or "Boring clam," belonging to the family of Pholes. The members of this curious family bore

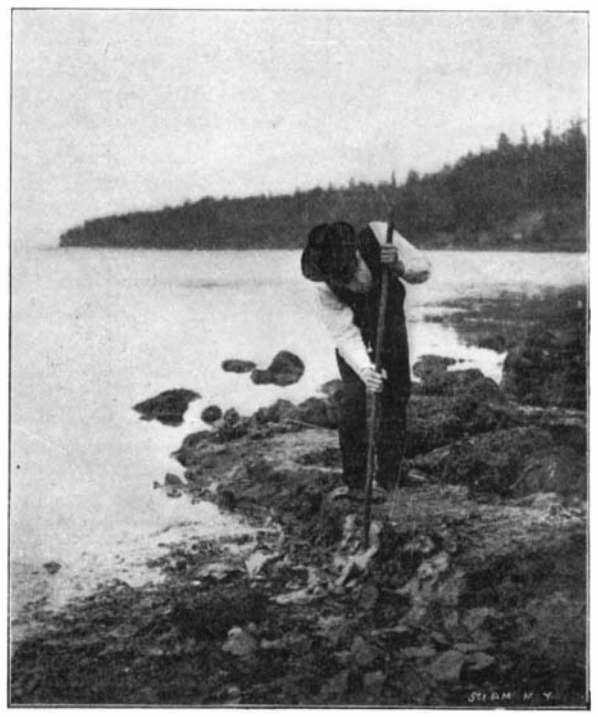
PIDDOCKS IN THEIR ROCK-DWELLING

into the sandstone ledges skirting the sea, and there take up a permanent abode, where they can be found embedded at varying depths in the rock.

Belonging to a family that is scattered world-wide, Piddocks have received considerable attention at the hands of naturalists from the earliest times. But inhabiting as they do only those portions of the ledges that are never laid bare save at extreme low tide, their movements are so screened from man's prying eye that to this day they remain somewhat of an enigma.

Many old ruins along the sea, as well as the rocky coast itself, bear traces of this indefatigable miner of the lower world. The marble columns of the ancient temple of Jupiter Serapis, standing upon the shores of the Mediterranean Sea, are said to be chiseled deep by the Piddocks of by-gone days.

"How do they get into the rock?" is a question invariably asked by those who for the first time see the Piddocks in their peculiar habitations. Authorities have been greatly divided upon the subject. Some have held that the creatures secreted an acid that



DIGGING OUT BORING CLAMS.

ate the rock, while others have declared that it was by long-continued action of the tongue that the burrows were excavated.

Both of these theories can be safely discarded, as it is now universally believed that the clam bores into the rock by aid of its sharp shell, which is replaced by secretions as fast as it is worn away. The muscular foot, which can be thrust forth at will in the working form, being clamped to the rock, forms a fulcrum about which the sharp shell can be brought to bear in any direction. Raspings on the walls of the burrow show conclusively that the shell is used in drilling.

Several species of Piddocks are found on the shores of Puget Sound, some inhabiting the hard clay banks bordering on the sea, while others select exclusively the sandstone ledges as places of abode. Those living in the clay banks are larger and tougher than the rock-dwellers. The latter are usually about three inches long, and are as a rule buried about six inches in the ledge. I have found specimens over four inches long, embedded fully eight inches deep.

They are roughly oblong in shape, the inner end being large and rounded, while the outer end is flattened and terminates in a long tongue or siphon. The siphon lies in the small, tube-like passage which affords the Piddock its only means of communication with the outside world, and is usually thrust out to the surface ready to extract the animalcules from the sea-water, upon which the clam feeds. At the first approach of danger, the siphon is withdrawn and the burrow closed to intruders by means of the long, leathery continuations of the shell.

The shell of the mollusk is thin and brittle. The flesh is very tender and palatable, and along the Oregon coast, where the Piddock is plentiful, "Rock Oyster Soup," as it is called, is considered a great delicacy.

That the creature does its boring while small is evidenced by the burrow, which is rarely over one-quarter of an inch in diameter at the surface of the rock. The passage-way increases in size at a uniform rate, and contains no lateral indentations, showing that the Piddock had not stopped for any length of time at any given spot, while continuing its boring operations.

When the desired depth is attained, the clam ceases from its labors, excepting to enlarge the cavity in which it lies, as its growth necessitates. After discontinuing its boring, its muscular foot is gradually absorbed and the orifice through which it formerly protruded closes up.

As far as the writer can ascertain, no one has been able to watch a Piddock actually at work. All the forms described by naturalists were at rest, having the foot more or less absorbed. The writer in his investigations has been no more fortunate than others, as all his endeavors to secure a working form ended in failure.

Like other marine borers, Piddocks show remarkable engineering skill. If a portion of rock be broken off, it may be found honey-combed by burrows dug by the enterprising creatures, yet no passage will be found breaking into that of another.

As may be surmised, digging out boring clams from the rocky ledges in which they lie domiciled is no easy task. On the Oregon coast, when the demand from the neighboring sea-side resorts warrants, portions of the ledges are loosened with dynamite, and the clams secured with but little additional effort. But elsewhere, a pick and crow-bar are the implements commonly used.

Being desirous of obtaining some specimens to photograph, the writer made a visit to the Piddock bed lying at the head of Port Townsend Bay, during the low summer tides. In spite of his care, every clam secured from the ledge had the shell broken or was otherwise mutilated.

He was about to give up the quest, when he noticed a fragment of rock lying close by which had been detached from the ledge some time before. A blow with the crow-bar shattered the rock and in the fragments a number of the coveted Piddocks were found intact. These were photographed in their original rock-dwelling, while still alive.

Geologically considered, these mollusks are of considerable importance, as they undermine and gradually break down rock shores and reefs. Breakwaters and harbor works have also suffered from their incursions.

Sails for the Seven-Masted Schooner.

The recently launched seven-masted schooner "Thomas H. Lawson" will probably receive the most remarkable canvas equipment ever prepared. Eighty-three thousand square feet of duck will be used. Of this quantity, 43,000 square feet will be employed for the twenty-five sails of the vessel, while the rest will be utilized for sail covers and awnings. Three tons of pure manila beltrope made from special stock have been used in making the ropes. When it is considered that the sails will be subjected to an enormous strain, it becomes evident that special precautions were taken in designing particularly strong fastening devices. The thimbles are retained in place by wire cringles instead of sewn tar rope. The clew rings are said to be unusually large and heavy. Eight thicknesses of heavy duck were put into the clew patches at the corners of the sails.

Over fifty species of fish never before known to scientists were discovered by the United States Fish Commission steamer in the Hawaiian waters. Most of the specimens were hauled from depths to which the light of the sun can never penetrate. Still the fish were equipped with eyes, from which the scientists of the party inferred that they saw by phosphorescence. At a depth of 1,500 fathoms a rare specimen only four inches long was captured.