Trees Date Alaskan Glaciation

Geology

Though Far North, Most of Alaska Escaped Ice Age

IN Spite of its far northern latitude, Alaska was at no time completely covered with ice during the Glacial Period, according to Dr. Stephen R. Capps of the United States Geological Survey. Even during the so-called Wisconsin stage of the Pleistocene glaciation, when practically all of Canada and most of the northeastern quarter of the United States was submerged beneath a great ice sheet, scarcely half of Alaska was glaciated. In the south, glaciers filled the valleys and crept down the slopes of the Alaska Range and of the coastal mountains; and a continuous ice front fringed the southern shores of Alaska. Similarly in the north glaciers descended from the slopes of the Brooks Range. But the broad central valley of Alaska, drained by the Yukon and Tanana rivers, was practically untouched by glacial action. Only small local ice streams descended from the few scattered elevations which here and there interrupt the level surface of the central valley.

The age of the principal glaciation in Alaska has been determined rather ingeniously by a study of post-glacial peat beds and of the spruce stumps embedded in them. These stumps are remarkable for having, not one set of roots radiating out horizontally from the trunk as a center, but two or more parallel sets of radiating roots, one above the other. As the peat accumulated about the spruce trees and the line of permanently frozen ground rose higher, the roots of the trees were frozen and the tree was compelled to put forth a second set of roots. By measuring the distance between these sets of roots and counting the rings of annual growth of the trees, it has been possible to determine the length of time that has elapsed since the retreat of the glaciers. These calculations put the date of the principal glaciation in Alaska back from 20,000 to 30,000 years, and make it about contemporaneous with the so-called Wisconsin advance of the ice sheet in northeastern United States.

Transported boulders, scratched and grooved rocks, faceted pebbles, and beds of boulder clay show that Alaska was glaciated at least four times during the Pleistocene period. Traces of these earlier ice invasions, however, have largely been obliterated by the last and principal glaciation, during the Wisconsin stage. The existence of similar beds containing glacial boulders shows that Alaska had an ice age as far back as the Silurian period of the early Paleozoic era; and some geologists believe that several glaciations occurred during the Paleozoic era.

At present, Alaska is believed to be in an interglacial period between two ice invasions. The total time that has passed since the retreat of the "Wisconsin" ice sheet is much less than the time calculated to have elapsed between glaciations during the Pleistocene period.

The effect of glaciation on southern Alaska was not altogether fortunate. Many rich accumulations of gold-bearing gravel were swept away by the advancing glaciers; the present placer deposits are merely the few remnants that somehow escaped destruction. In many places the top soil has been carried away by the ice, and the land spoiled for farming. In other places however the land has been enriched by soil deposited by streams flowing from the melting ice front.

Science News-Letter, January 18, 1930

Huge Shovel Can Lift Car of Coal

Engineering

THE largest shovel in the world, with a scoop big enough to pick up an automobile is the subject of our cover illustration. It is in use at the Fidelity mine of the United Electric Coal Co., near DuQuon, Ill., the greatest coal-stripping enterprise in the world.

Electrically operated, the shovel obtains its power from a cable that trails behind. It was made by the Marion Steam Shovel Co., and powered with General Electric equipment.

Although the dipper capacity is rated 15 cubic yards, it is estimated that the dipper will hold 20 cubic yards, heaping measure. One scoop-load of dirt would be sufficient to fill a trench a foot wide, six feet deep and 68 feet long, or a room 7 by 7 by 8 feet—about the size of the bathroom in an ordinary home.

The reach of the dipper is sufficient to place material about 85 feet above the ground. The dipper has a pushing and lifting power of around 100 tons, which would easily be sufficient to lift an ordinary railroad car full of coal.

As speed of operation is essential, it is necessary that the shovel operate quickly. It takes a bite, dumps it, and is back for another bite in less than a minute. The dipper, when moving around to dump at full speed, travels at the rate of about 20 miles an hour.

The complete shovel weighs approximately 1,600 tons. This is about twice as heavy as the largest shovel previously made. The deck of the shovel on which the electric machinery is mounted is about 20 feet above the ground, and measures 60 feet long and 30 feet wide, or 1,800 square feet. The highest point on the shovel is about 110 feet above the ground.

The electric equipment on the shovel aggregates the equivalent of approximately 4,500 horsepower, but all the operations are controlled by one man. The control is of the variable voltage type, by means of which the generator voltage is varied by varying the generator field. This allows rapid maneuvering and quick reversing, and also limits the torque to a definite safe value so that mechanical parts will not be subjected to undue strains or stresses.

The power supply is alternating current at 4,000 volts. This drives a 5-unit motor-generator set consisting of a motor, three generators and an exciter. The motor, which drives the other four units, is a 1,700-horsepower, 4,000-volt, 720-r.p.m. synchronous unit. One 860-kilowatt generator supplies direct current up to 800 volts for operating the hoist motors; two 350-kilowatt generators supply direct current up to 1,000 volts for operating the swing and crowd motors and a 50-kilowatt exciter supplies 125 volts, direct current, to excite the fields of all the motors and generators.

The hoisting motion is provided by two 450-horsepower, variable-voltage, heavy-duty, steel mill type motors operating at speeds up to a maximum of 500 r.p.m., the speed being variable to suit the nature of the work performed. Two 150-horsepower variable voltage motors of the same type, with a maximum rated speed of 1,000 r.p.m., provide the swing motion, these also having variable speeds.

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