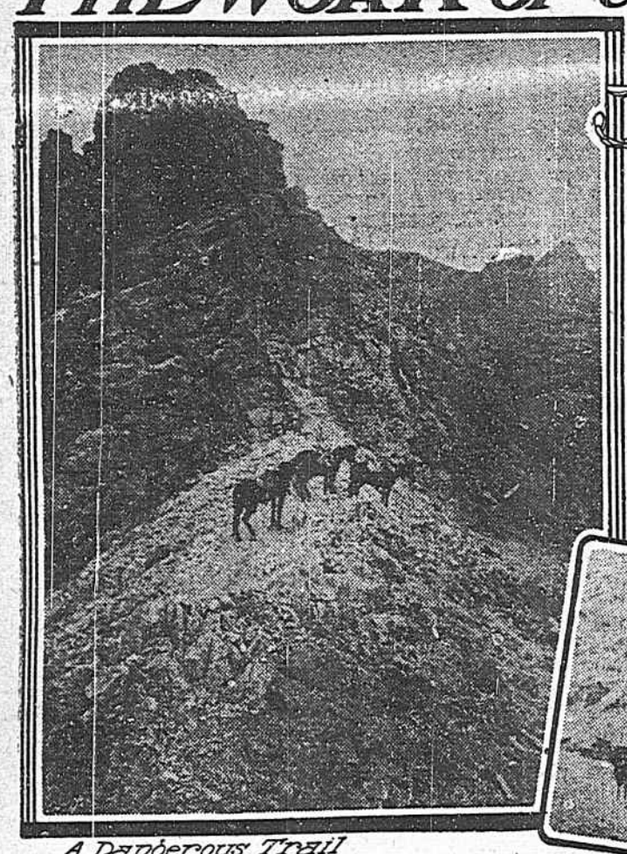
THE WORK of the GEOLOGICAL SURVEY



A Dangerous Trail for the Packmules

Working a Heavily Laden Canoe up the Rapids

Dog Freighting in Alaska

With the breath of spring comes to all of Uncle Sam's Geolological Survey men the call of the vast stretches of sagebrush and shortgrass country of the West, the mountains and glaciers of the backbone of the country, and the snow-bound territory of Alaska. During the winter months they have been busy at their desks in the office at Washington, but now the reports and maps of the last field season are completed and the geologists, the hydrogaphers, the topographers, the animal and plant fossil experts, and other specialists are spreading throughout the United States and into the vast silent places of Alaska.

There are over five hundred of these field men of science. The topographers will invade the remote places in many western States that are yet unsurveyed, and will also push their way into unknown parts of Alaska. Among the newly discovered coal beds of Arizona, Utah and other states the coal geologist will busy themselves in the land classification work that has proved to be of such great economic value.

The topographers and hydrographers are perhaps more widely traveled than any other of the field men, for they are going to carry their map-making and their study of water power and lakes and streams into the Hawaiian Islands. Phosphate beds are constantly being discovered and classified The discovery of another fertilizer, no less than potash, is confidently hoped for in the great prehistoric lake basins of the arid region, where vast beds of the mineral, so vital to our farmers, were undoubtedly deposited in the early ages of the world.

Summer finds the men of the Survey scattered through the swamps and deserts, the mountainous regions and the rural districts of the country, leaving only a small administrative body at the headquarters at Washington. If one might obtain a bird's eye view of the United States and its territories it would be interesting to note the progress of these small bands of workers.

Among the snow-covered mountain ridges and through swollen rivers they struggle. Forest fires threaten them and in some districts so numerous are the dangers by which they are surrounded that even the new field assistant, thirsting for experience, is more than satisfied. But seldom are there any real mishaps, for adequate preparations are made to overcome most difficulties. As a matter of fact, what seems to the first year man daily adventures, oftime too thrilling, become, after a year or two of service, simply a part of the days work, and not of sufficient importence to mention. Men who have gone through trials and experiences in the high Sierra country, along the vast Continental Divide, or who have placed their maps on the untrodden sections of Alaska in the hands of "explorers" who come later, can scarce be prevailed upon to admit that they have ever had any "experiences."

Laden with their telescopes, their plane tables and other surveying instruments, the topographers are generally first on the field unexplored by survey men. All the mbountans, canyons, and plains of the country are duly sketched; no lake, marsh, stream, spring or inequality of the ground escapes the surveyor's eye. The Geological Survey maps are made in the field, upon the ground and are more acrurate than would be a series of photographs.

In the closer populated districts all the routes of travel, the cities, the towns and even the farm houses are carefully indicated on the topographer's field map which is later engraved and published at Washington. During the thirty-one years of the Survey's existence, the topographers have surveyd in this fine detail more than one-third of the United States and much territory in Alaska. Besides the country actually mapped, large areas have been covered in a reconnaissance way, and this is especially true of Alaska, where the Survey has been active only about ten years.

Indeed, of the 600,000 square miles of that north country there is less than a third that has not been explored in a greater or less degree by the Geological Survey men The work in Alaska, which, with the exception of a few centers, is almost totally undeveloped, is naturally more difficult than in the United States proper. In some of the districts the men can not depend on pack trains or even dogs, but must rely upon the sturdiness of their own legs, or resort to canoe travel. In many instances, especially during the earlier purely exploratory work, advantage has been taken of the enormous length of some of the Alaskan rivers. Worikng their way up one stream as far as possible with canoes, they portage to the head-waters of another stream flowing in a different direction, and descend that stream, emerging perhaps into another ocean.

In such cases it has been no holiday jaunt to work a couple of heavily laden canoes, carrying five months of provisions, up the rapids of some swiftly flowing mountain stream with the glacial water at a temperature of 40 to 50 degrees Nor when the stream shallowed to get out into the icy water and push and pull. One twelve mile portage across the central part of the Seward Peninsula occupied a week. Several trips were necessary, the men carrying their canoes and their provisions and camp outfit over a mountain divide 1200 feet high.

For four or five or six months—until the snows of the fall drive them in—many of these field men live and work in the wilderness apparently oblivious to the outside world. They map out practically untrod ground, occasionally meeting some prospector, but for the most part having only an intercourse with each other. Living three or four of them in a little world of their own for perhaps half a year do they become homesick? Well naturally, as the leaden skies of autumn forecast the close of the field season, there may be a wish to get in touch with the haunts of men.

"Look, fellows, the northern lights are wonderful to-night." enthusiastically cried one member of just such a party.

"Northern lights!" groaned a weary traveler. "Good heavens! for a sight of the white lights of some town."

Yet when the sap begins to swell the buds the next spring, these same men will be the most eager to fare forth again in the wilderness.

The result of the topographer's labor is a map so wonderfully accurate that it is noted throughout the world, and the United States Geological Survey men have been called upon to teach topograhic mapping in many foreign countries and to organize governmental topographic surveys from Canada to Argentina. During the past year 36,530 miles in the United States proper were topographically surveyed in great detail. The survey has its own engraving plant and it is one of the greatest map engraving establishments in the country. The maps are used in all government departments and by engineers and miners engaged in private enterprises. They are ideal automobile maps.

In the western part of the United States are about 70,000,000 acres of coal land still owned by the government, in addition to the great coal fields of Alaska. It is the work of the coal geologist to examine these coal beds, to estimate the tonnage per acre and to fix the sale price. This land classification work has proved to be of great economic value to the government. Until 1906, all of the government coal land was sold at a price of $10 to $20 an acre, fixed according to its proximity to railroads and without regard to its real value.

Now, however, Uncle Sam is managing his vast coal property on a business basis. His geologists are examining every forty acre tract, measuring the thickness of the coal seams and calculating the tonnage. Then the old landlord is fixing the price according to the quality of the coal. But how can a geologist tell how many tons of coal an acre will yield, when the coal bed is 1000 feet underground in a virgin field perhaps 100 miles from a mine shaft? He does, however, for the business of the geologist is to look deeper into the ground than anyone else.

Equally active is the Survey in its work of classification of the petroleum lands belonging to the government as well as the phosphate lands and the water power sights. In all these great resources additional legislation is necessary to protect the interests of the people to the same extent that they are safeguarded in their coal property. A leasing law is needed to prevent waste in the development of oil lands. Another law is needed for handling of water power sites on the public domain. And a leasing law is badly needed to enable the mining of the western phosphate lands, but with the provision which will enable the government to prevent the exportation of this wonderfully valuable fertilizer.

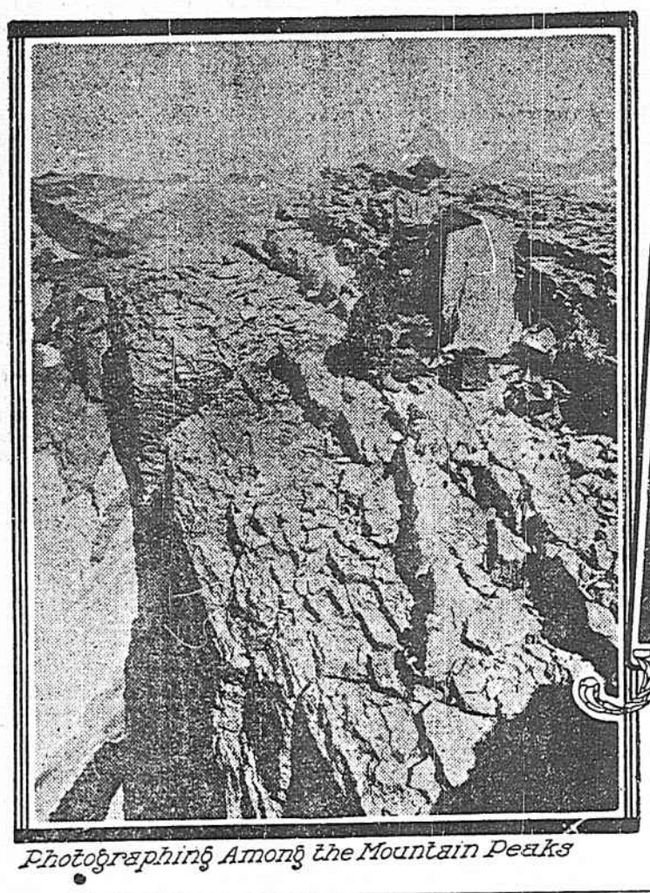
If the Survey geologists shall discover this year great deposits of potash salts, a law to provide for their mining through leases will become necessary. Such a discovery as the great German potash deposits would be worth hundreds of millions of dollars and obviolsly it would never do for the government to sell them and thus perhaps foster an American potash monopoly.

Most all underground water flows through grave lor rocks. Knowledge of the rocks therefore means to a great extent, knowledge of the presence of water. Just as the coal geologist can see a bed of coal way down in the ground, so the water geologist or the "hydrologist" can locate underground water. He deals in black magic. Geologist Darton advised a railroad to drill for water at Edgemont, S. D., and told them they would strike a strong artesian flow at 3000 feet. They drilled and got a flow of half a million gallons a day at just 2982 feet.

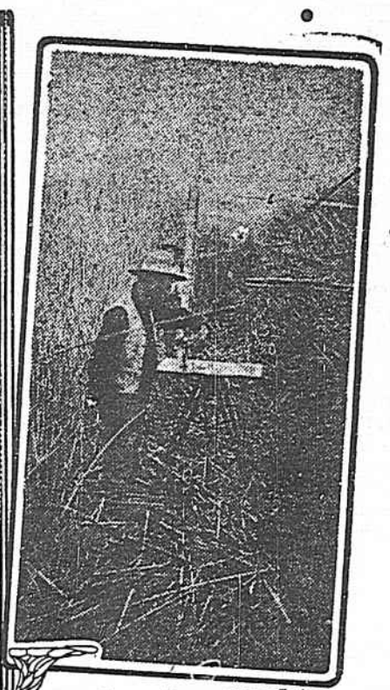
Very similar to the hydrologist is the man who can tell in just what territory an oil well is located and at about what depth the oil will be struck. He is a wizard who makes underground maps of an oil district.

Another important man of the Survey staff is the hyrogapher—the man who measures the flow and studies the rivers and streams of the country. Where the government or where corporations contemplating irrigation enterprises, or where it is desired to know the available horse power that can be developed on a stream, the data furnished by these water experts is utilized. The hydrographer by determining through a long series of gaugings, the amount of water the stream carries and the fall of the river, can attain the desired result. But this often means wading into icy streams throughout the winter and working under other conditions that are not exactly play.

The natural resources of the United States are barely scratched, and discoveries of useful and precious minerals are being made every day. The work of the Geological Survey has proved this country to contain greater natural resources than any other of its size. The men who have so successfully undertaken this work of exploration, discovery and classification have been forced to demonstrate their capacities before going into the field. The efficient geologist, after spending several years in specialized university work must pass a government civil service examination before he finds himself launched in a field of scientific research, and then, within the Geological Survey, his real schooling begins. Thus it is that the field men are capable and well trained, while they are all enthusiasts and willing to tackle any difficulties.



Photographing Among the Mountain Peaks



Topographers Working on Swampy Ground

Which Are You?

I'd rather be a Could Be,
If I cannot be an Are;
For a Could Be is a May Be,
With a chance of touching Par.

I'd rather be a Has Been,
Than a Might Have been by far;
For a Might Be is a Hasn't Been,
But a Was was once an Are.

Also an Are is Is and Am,
A Was was all of these;
So I'd rather be a Has Been
Than a Hasn't, if you please.

Felder worked off a bluff on Gov. Brown when he said he was coming to South Carolina soon. There are not mules enough in South Carolina to pull him across the line.