PROGRESS IN TRANSPORTATION

CONDUCTED BY EDWARD HUNGERFORD

Piercing the Cascades

IT is barely six years ago that the Chicago, Milwaukee & St. Paul Railway finished its long traffic arm that it threw out of the grain States of the upper Missouri valley straight to the Puget Sound country. It is hardly half that time since its long, yellow passenger trains, the *Olympian* and the *Columbian*, began their daily travels back and forth between Chicago, the twin cities of St. Paul and Minneapolis, and those other two lively twins of the Pacific coast—Tacoma and Seattle. Yet the route is already well established, the yellow trains are familiar to the many thousands of through travelers who use them on the long span between the Great Lakes and the Pacific. The entire line is filled with interest, particularly those more westerly portions where the genius of the engineer was exercised to form an efficient route; which means a line with the minimum of grade and of curvature, through the crests of both the Rocky Mountains and the Cascades.

The difference between these two ranges of mountains is apparent even to the man who is bound from the east coast to the west for the very first time. The size and the extent of the Rockies are appalling to him. yet there is something about the way in which the Cascades seem to rise right out of the sea, rough-sided and garbed with stately pines, that compels his admiration.

At noon of its third day west from Chicago, the *Olympian* comes to the easterly slopes of the Cascades. The earlier part of the day has been given to traversing the treeless ranges of southeastern Washington, a region of magnificent desolation. At noon the Columbia is crossed, at the tiny water-station at Beverly, which, with the great railroad bridge over the river, remains in sight a long time from the observation platform. In another two hours the desolation is past. You are traversing the flat floor of a fertile valley, where prosperity seems to come up out of the ground everywhere and thrust its ringed hand into your face. The train stops at a little station and, if the day be unusually fine and clear, one of its crew will beckon you out and point over a distant hill to something, cloudlike at first glance, but finally resolving itself into the snow crest of a very distant conical peak.

That's Rainier," says the trainman.

And as you catch that faint glimpse of the most famous of all America's peaks he tells you that you are at the beginning of the Cascades. In another half-hour he need not have told you that. The tugging of the engine at the *Olympian's* ten steel cars, the quick occasional glimpses that you gain of deep cañons beneath and towering mountain sides above are their own guide posts. Suddenly the lonely mountain pass seems inhabited—civilized. There are camps under the pines and up from them comes the faint but unmistakable fragrance of coffee on the fire. There are railroad tracks down there, too—a broad shelf for extending their rails. You turn to the brakeman for further information.

"That's the Snoqualmie," he says, and straightway begins to tell you about the first of the very great railroad tunnels to be bored upon the Pacific coast—the two-mile-long tube which to-day is just now approaching completion and which should be ready to accommodate the "See America First" folks who are going west by the hundreds of thousands next year.

It seems that when the coast extension of the St. Paul was first pushed forward, in 1908, that portion of the line in Washington between Rockdale and Keechelus was built over the Cascade's summit to expedite completion, with the expectation that a tunnel would be built as soon as traffic conditions warranted. Those conditions became so immediately pressing that work was begun on the big project in 1912 with the intention of completing it within five years, but snow trouble in the mountains that year was of such extent and so costly that in the spring of 1913

(C) Panama-California Exposition

HALL OF EDUCATION, SAN DIEGO EXPOSITION

In architecture, exhibits and amusements, this exposition will be supplementary to the larger one at San Francisco

it was decided to crowd the work with all possible dispatch. From that time to the present drills have been chewing the heart out of the mountain, incessant champing of their steel teeth, and the men employed in the bore have hardly seen daylight.

The improvement makes it certain that the four heavy tonnage freight trains passing east and west over the road daily will be able to run on schedule, no matter how deep the snow may lie on the summit of old Snoqualmie. Up to now it has been necessary to use two helper engines on eastbound traffic through the pass where heavy trains were handled, while one helper has been required to negotiate the summit with westbound trains.

When the tunnel is opened only one extra engine will be required to assist heavy trains eastbound, while those westbound will go the route under their own power. Moreover, while the elimination of operating expenses is under discussion, it may be pointed out that the only alternative to tunnel building lay in the construction of many miles of snow-sheds, which do not insure complete protection and are in constant need of repair, owing to heavy slides.

The construction of the tunnel has been handled entirely by company forces. With the exception of the shift bosses, who work twelve hours, the work has been carried on in three shifts, six hours on and twelve off. The concreting force is divided into two shifts of ten hours each. Normally about two hundred and fifty men have been employed in the actual tunneling operations at either end of the works, and a crew of eighty is engaged in placing the concrete lining. Giant air compressors keep the bore supplied with fresh air. Pulmotors and long rows of oxygen helmets are kept handily at either portal to safeguard the men.

IN THE SNOQUALMIE TUNNEL

This vast engineering project, now nearing completion, contrary to all precedent has not involved the loss of a single life, although employing over 300 men

The tunnel has been driven under the "bottom heading" system, to use a technical term. A first bore is made high enough to permit the crews to work freely, this being timbered heavily and an overhead platform or bench of great strength erected. Above this vertical openings were driven to the extreme height of the tunnel at intervals of 150 feet, and from these openings the excavation is pushed in each direction by drillers and blasters. The material broken down is supported on the benches and loaded through traps into narrow gauge cars on the lower level, when it is hauled out and dumped down the mountainside. The floors of the benches or platforms are covered with steel plates, which are moved forward as the successive shots are fired, so that the material broken down from overhead in extending the tunnel to its full size falls upon them and is more readily shoveled into the cars that wait below.

When working with average material the tunnel force shot one round of holes every twelve hours. From six to ten bench openings were worked at one time, affording double that number of working faces. In this way the drill runners were constantly moving from one face to another, thus making the progress of the work continuous.

One of the remarkable features of the work is that it has been brought to practical completion without killing a man. The gang on the job calls the Snoqualmie "the lucky tunnel," and so it will always be known among rock men and muckers as they drift about the world, for it is practically the only big engineering project of the kind that has ever been brought to completion without more or less loss of life.

A Lusty Engine for the Burlington

TO build an engine with pulling capacity and yet without a too healthy appetite for coal is the problem of the locomotive designer of to-day. The Burlington system is just now boasting some freight-pullers that seem to have come near solving this problem. They are tremendous engines in the first place, each weighing with its tender and ready for service nearly 300 tons —576,580 pounds, to be exact. The length over all for each of these engines is 83 feet 9½ inches, which brings it within the limitations of most of the big 90-foot turntables along the system.

While these engines are not of the extreme size of some of the giant pushers along the Erie and the Santa Fé, they have begun to make service records out along the Burlington. One of them has already drawn a train of 85 cars over a division 136 miles long and possessing maximum and steady grades of three-tenths of one per cent. This perpormance was accomplished while the locomotive consumed 6.64 pounds of coal to the 100-ton mile—at eighty-five cents a ton, equal to nearly thirty cents' worth of coal for 10,000 ton-miles. Put the other way around and reduced to actual figures, this lusty little boy on the Burlington hauled 10,000 gross tons of freight one mile for 29.7 cents. No wonder that the "stove committees" out in the round-houses along the Burlington's busy line—those shrewd old fellows who on every road know more about its running than all of the executive heads put together—forget to brag about the engines of yesterday and begin to grant an ungrudging praise to this new comer among the motive-power units of the "Q."

New Dining Cars for the Northwestern

CHANGED conditions in dining-car etiquette make changed conditions necessary in these itinerant restaurants. When eating on the train was a comparatively simple feature—generally table d'hôte and bolted between stations—dining-car accommodations were not apt to be overcrowded. Indeed, their patronage was ofttimes so dubious as to make a partial diner an economic feature for many trains. In more recent trains, however, the dining-car habit has grown, while the man who eats upon the cars has become more leisurely in his tastes—and eating. In recognition of this fact the Northwestern and some of the other large roads has begun to place twelve tables in their diners, instead of ten, as was formerly the custom. Just how the car-designers manage to do this is their own problem. They borrow the space enclosed by the platform vestibules, and by a marvel of ingenuity make a complete restaurant kitchen in a space that is hardly larger than four by fourteen feet.

The Northwestern is passing proud of its new twelve-table steel dining-cars, with their provisions for cooking and serving a complete

lunch or dinner to thirty-six persons at a single sitting. The cars are simple and dignified. There is not a modern or a sanitary feature that is omitted in them.

Progress on the California Expositions

A RECENT visit to the expositions which are to twinkle next year on the Pacific Coast, at San Francisco and at San Diego, has convinced this department that they are to be practically completed before they open their gates—the one on January 1 and the other on February 2. If they succeed in doing this, exposition records in this country will be broken. Persons who went to the shows at St. Louis and at Norfolk in their beginning days felt that the outlook was well nigh hopeless. It did not look as if those shows would be completed by their closing days. It is but fair to say, however, that St. Louis at least made remarkable progress. By the first of August its grounds, its buildings and the exhibits that they housed were spick and span and quite complete.

THE ROCKDALE SIDE OF SNOQUALMIE TUNNEL

Snoqualmie, the first of the great railroad tunnels on the Pacific Coast, pierces the Cascades for a distance of two miles through solid rock

But the San Francisco and the San Diego expositions bid fair to have that first-of-August look like the Ides of March. Grounds and buildings will be ready, and as for exhibits—while exhibitors are traditionally and notoriously tardy in their preparation—the exposition managements are doing all that is within their power to have these keep pace with the buildings. The big exhibit "palaces" have been ready since mid-summer. The exhibitors have had the entire autumn in which to prepare their showings. Some of the wisest of them are finished to-day, their booths and cases covered with dust-cloths until the hour comes for the opening of the expositions.

No person will want to go to the one show without visiting the other. Each is radically different from the other—different in location, different in architectural planning and decoration, different in the character and the showing of its exhibits. The San Francisco fair, blue-domed like a Turkish city, unnaturally clean, is at the very water's edge of the Golden Gate; the fair at San Diego nestles on a hill-top, with the sea in the distance. San Francisco's exposition is a riot of color, all executed under the command of that master colorist, Jules Guerin; San Diego is symphonic in the cold grays and exquisite modelings of concrete. San Francisco exhibits the manufactured products of the world; San Diego has not only taken up the showing of American goods in the making, but of California goods in particular. The two expositions are supplementary rather than competitive.

A good deal has been said and written about the possible effect of the European war upon the expositions—upon the San Francisco exposition in particular. But, after all has been said and written, the fact remains that the chief effect that the war will probably have upon them is to increase their attendance from the eastern portions of the country, to send to them many folk who in ordinary years would cross to England or the Continent. And as far as the exhibits are concerned:

"People don't go to expositions any more to see exhibits," says Mr. Average Man. "They go to ride camels or shoot-the-chutes or have a regular Coney Island sort of time. But they don't go to see deadly and stupid exhibits."

That is why Mr. Average Man remains—Mr. Average Man. He is not right. People do go to expositions to see exhibits. There is a large element of American population well removed from close contact with the large cities, and to these a great exposition, showing in complete and thoughtful fashion the progress of the world, is at once a help and an inspiration. It was the Chicago Exposition that brought good architecture into its own in the United States; the impress of the St. Louis Exposition upon American house furnishing and interior decoration was long ago felt. And the San Francisco Exposition is not dependent upon foreign exhibitors, although there is to be a respectable showing from all of the neutral and one or two of the warring nations of the world.

If ever there was a "See America First" show created, that show is due at San Francisco in 1915—to say nothing of San Diego, which never held aspirations for foreign exhibits. The Americanism of the San Francisco fair dominates the entire enterprise. You find it even on "the Zone," which is to be to the Panama-Pacific Exposition what the Midway was to the Chicago Exposition and the Pike to the St. Louis. At other expositions the foreign note has been the dominant one upon the streets of the concessions. The streets of Cairo, with carpet-selling Moslems and awkward camels finding their way between the flimsy houses, have fought for precedence against German beer-stubes and Alpine villages. There have been Parisian cafés, and even the skies above the world and the unknown beneath have been invaded. These have done—and done very well, indeed—for other expositions. But not for San Francisco.

Its two great rival attractions upon the Zone are theGrand Cañon of the Colorado and the Yellowstone National Park. Each is sponsored by the chief railroad-route which leads to the real attraction, and each will have cost about a quarter of a million dollars before the fair opens its doors. If you are inclined to doubt that quarter of a million and to let your mind run to French actresses and their press agents, you should have seen them in their building. The Grand Cañon covers some six acres in the very heart of the exposition. There are some acres of painted canvas, and yet it is not all painted canvas. The Santa Fé Railroad hauled up a train filled with red rocks, taken from an Arizona quarry in the neighborhood of the cañon, and used to give the exact colorings for the reproduction of that great work of nature, as well as to form a pavement for the Navajo village that forms so important and distinctive a part of the show.

Old Faithful, of the same size and perhaps even better builded than its namesake, is the dominant feature of the Union Pacific's Yellowstone Park show. It is to have for its chief feature a great restaurant and concert hall, while in front of its open-air dining terraces is a great circular bas-relief map of the park, one hundred feet in diameter. In this, miniature geysers will spout and real rivers run their rough courses through the cañons. It will be like seeing the Yellowstone from balloon or aeroplane.