

there is a battery of five on car work. Work on track tools, etc., is done with economy. The hand forges are grouped, with steam hammers working in conjunction with each group, thus facilitating the work of hand forging and decreasing helping labor. By the use of mechanical forging machines, bulldozers and other modern iron-working tools, material can be turned out much more cheaply than before.

One source of great economy has been the systematizing of work so that parts for cars and locomotives are carried through the blacksmith shop on store orders, the parts being made in large numbers and carried in stock, instead of manufactured by hand, one at a time, as formerly. All of the furnaces use crude oil for fuel. The large furnaces are equipped with modern water-tube boilers, which not only furnish steam for running the steam hammers and heating the buildings, but supply considerable steam for the power plant.

It is the policy to provide the most healthful possible conditions for employees. To that end the Sturtevant system for carrying off smoke from the forges and furnaces has been installed in the blacksmith shop; also a lantern in the top of the building for ventilation in the summer, and the suction or exhaust system of ventilation in the roof for relieving the inside of the shop of any smoke which may escape from the other system. With this triple system of ventilation the atmosphere is always clear and agreeable.

The drop-forging department has been developed to a wonderful extent and a great many locomotive parts which for years have been made by hand are now made under the drop hammers much more cheaply. The method of working up the scrap and of forging old axles and heavy iron by the regular furnace or hammer gangs is a great economy.

In connection with the blacksmith shop is the nut, bolt and stud machinery in an annex to the shop, where all threaded articles are manufactured. This bolt shop, which is shown in one of the photographs, is equipped with bolt cutters, nut tappers, screw-cutting machines, stud machines, staybolt drills, etc., and delivers the finished product from the blacksmith shop direct to the storehouse.

Material is conveyed from the iron house to the different machines on 24-in. gage push cars. From a machine it passes to a second push car, and so on, being handled through the shop without touching the ground. The cars are moved in trains by a storage-battery truck.

The foreman of the Omaha blacksmith shop is R. A. Mould. He has an assistant and a clerk.

Progress on the Western End of the St. Paul's Pacific Extension.

The route of the western end of the Pacific coast extension of the Chicago, Milwaukee & St. Paul from Butte, Mont., to Missoula, parallels in a general way the existing main line of the Northern Pacific. From Missoula the route parallels the Coeur d'Alene branch of the Northern Pacific to a point near St. Regis, Mont., where it turns southward and crosses the Bitter Root mountains through a new and hitherto almost unknown pass. The work in this district is in charge of Winston Brothers Company of Minneapolis. This firm has the contract for a big tunnel west of St. Regis. Very little active construction has taken place. The work now being done consists mainly of preparation and organization. Active work on the big tunnel will begin shortly.

From the Bitter Root tunnel to Tekoa, Wash., the new line follows the valley of the St. Joseph river, crossing the south end of Lake Coeur d'Alene near Chatcolet and paralleling the operated line of the Oregon Railroad & Navigation to Tekoa. This stretch has a light, water grade, with heavy rock cuts and fills necessary along the bluffs and cliffs of the river. This division is being built by H. C. Henry, of Seattle, Wash., who is general contractor for all of the line west of the Bitter Roots. At present it is largely in the initial stages of organization. The engineers are busy cross-sectioning, while the contractors are clearing the right-of-way and getting ready for active construction. At the same time most of the heavy cuts have been opened and station men are at work on the light grading. No bridge work has been done. This is probably the least completed section of the new line.

The construction from Tekoa, Wash., to Ellensburg is in a more advanced state. The general route is from Tekoa directly southwest through Whitman and Adams counties, crossing the Northern Pacific at Lind, Wash. Thence the line goes southwest to the village of Othello in the southwestern corner of Adams county; then follows Crab creek to the Columbia river. From the Columbia river crossing to Ellensburg the general direction is northwest through the Poisoned Spring district. Several townships in this district, in Adams and Douglass counties, have been platted and will shortly be on the market. The region is literally covered with contractors and the work is well under way; most of it has advanced beyond the line-changing stage. Considerable progress has been made on bridges.

From Ellensburg, Wash., to the Cascade mountains the line parallels the Northern Pacific. A great deal of grade has been

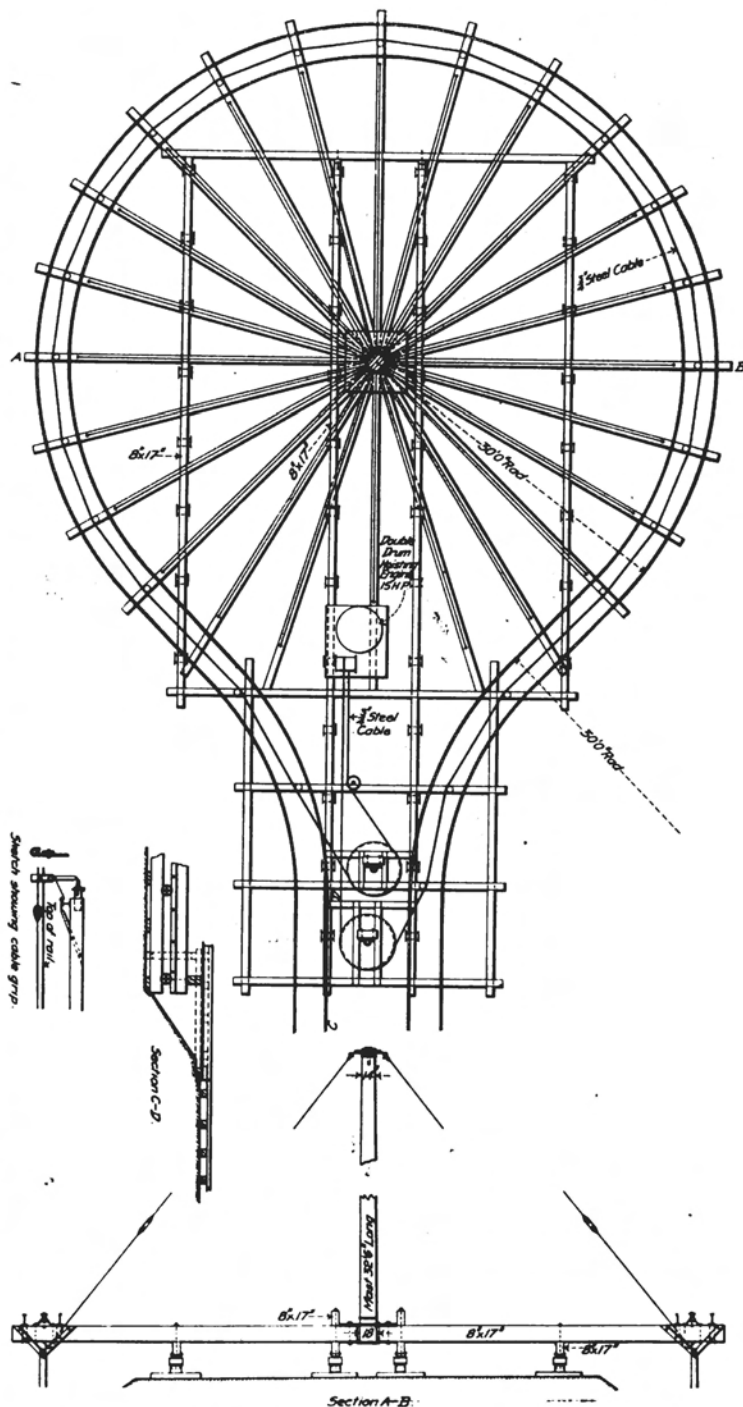
finished between Ellensburg and Easton, but there yet remains several months' work on the heaviest cuts and fills. The line crosses the Cascades through a long tunnel under Snoqualmie Pass at the north end of Lake Kilchelos and goes down the west slope through the North Bend region. Near the tunnel the work is in its first stages; in some sections the right-of-way clearing has just been begun. West of North Bend construction is much further advanced; miles of grade and considerable bridge work have been finished. This district will be the first to be ready for track laying. Between Seattle and Tacoma the grade is half completed but no bridge work has been done. No work has been done on either the Seattle or Tacoma terminals.

In general, the line has been finally located, and throughout the whole stretch from Butte to Seattle actual construction has begun. Some sections will shortly be ready for the track, but it will be at least 18 months before many parts of the heavy solid-rock work is finished.

An Unloader for High Fills.

The E. B. & A. L. Stone Company, of Oakland, Cal., is one of the contractors who are building the Western Pacific Railway. It has been necessary for them to make a number of high fills, and to expedite these a machine has been designed which is shown at work in the accompanying photographs and in detail in the accompanying drawing.

The machine consists of a circular track supported on 8 in. x



Unloader for High Fills.