

plates, pierced for  $\frac{3}{8}$ -in. by 4-in. bolts. Nuts are hexagonal, & lock-washers positive & national.

A double-wire telegraph has been constructed between West Robson & Grand Forks. Poles are 25 ft. long, 8 ins. diameter at the top, & from 150 to 200 ft. apart. This work has been well done.

The right-of-way has been cleared for 50 ft. on each side of the centre of the track.

Side tracks aggregating 19,298 ft. in length have been constructed at West Robson & 8 other points. Y's for reversing engines & cars have been constructed at West Robson, at summit of long tunnel switchback, & at Grand Forks. Water tanks, temporary & permanent, have been erected at 8 points, varying from 10,000 to 40,000 gall. capacity. The buildings consist of 9 neat, well furnished, serviceable section houses, 3 stations & a round house.

The West Robson-Grand Forks division of the C. & W. Ry. has been skilfully, though economically, located, & constructed under careful engineering supervision. For a new road it presents a finished appearance, all embankments & excavations being neatly sloped, the grading regular, the trestles & bridges symmetrically built, & the rails uniformly straight or curved. For a mountain railway the degree of curvature is light, & though nearly 50% of the whole length of railway consists of curves, the total amount is not excessive. The grades are steep, but are rendered necessary by the character of the country traversed. That the road bed is in excellent condition for traffic is proved by the fact that construction trains are being run up to speeds of 25 miles an hour, & no serious derailments have been made public. When the road-bed is fully ballasted, fully equipped with all the lesser details of a working railway, & placed under ample & constant inspection, it may be safely operated at speeds up to 25 miles an hour. Many necessary, though minor, details are still lacking, such as station houses, engine houses, repair shops, turntables, mile posts, fencing, sign-boards, whistling posts, caution posts, etc. The steep broken character of the mountain side-hill renders it probable that trouble will be experienced from snow-slides. So far only one small slide has occurred. Earth & gravel slides will be more or less common for some years to come, as in the case of all new railways.

Mr. Smith's report on the Grand Forks to Greenwood section of the line will be given in our next issue.

As stated in our introduction, Mr. Smith's report was written before the completion of the line. The whole road between West Robson & Midway has since been thoroughly ballasted, & we are informed by competent judges that it is one of the best pieces of new work they have ever seen. No safety switchbacks have been constructed, & we understand that it is not the intention to put any in. It is contended, notwithstanding what Mr. Smith says, that in no place on this continent, & probably on no other, are safety switchbacks used on such grades as exist on the C.

& W.R. All the Howe truss spans which Mr. Smith refers to have been built. The trestle at mileage 68.1, which was temporary, has been replaced. The bridge at the crossing of Boundary Creek, 89.4 miles from West Robson, has been completed.

### Grand Trunk Railway Elevators.

The illustration on this page shows the G.T.R. elevator at Portland, Me., which has a capacity of 1,000,000 bush. It is thoroughly equipped with all the modern conveniences for handling export grain. It is 221 x 97  $\frac{1}{2}$  ft. & 160 ft. high. The engine house is of brick 80 x 41 ft., & has a steel-plate smoke-stack lined with brick, 13 ft. in diameter at the base, & 161 ft. high. The foundation is formed by building granite & concrete piers, & walls on piling. The bins, which are 66 ft. deep, are supported by heavy posts. The basement extends under the entire house, & is well ventilated & lighted, & has a concrete floor. The basement contains a system of cross-belt conveyers by which grain can be

the elevator heads & the spouting from them to the garner. Each elevator head is provided with a switch head so that grain may be spouted into either of two garner. The entire 10 elevators may be used for either shipping or receiving.

There is a complete system of pneumatic sweepers throughout the entire house arranged to discharge dust into the furnace where it is burned. A complete system of fire protection is furnished by a standpipe & hose connection at many points about the house. A duplex pump in the engine-room supplies water.

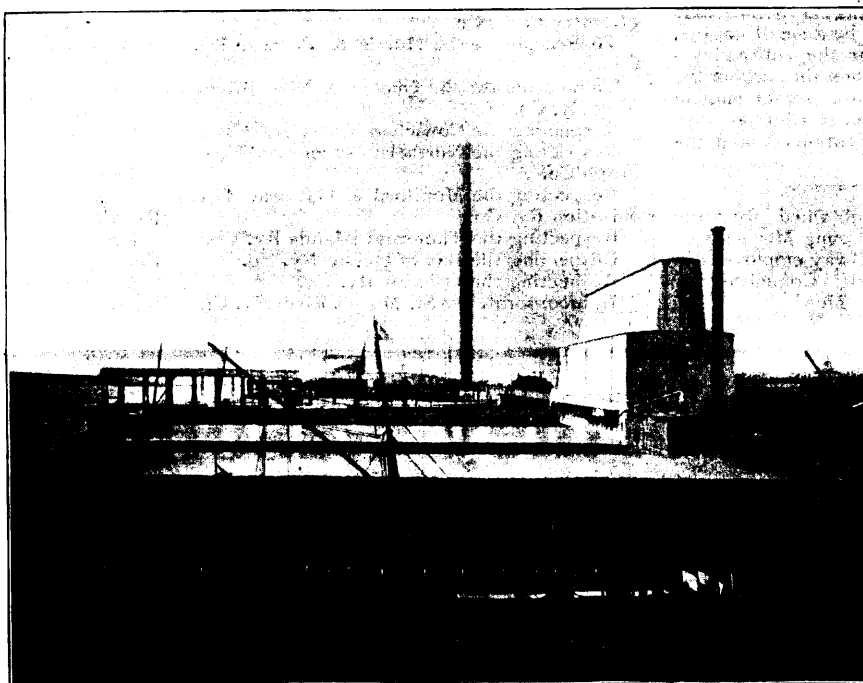
There are two stairways leading from the first story to the cupola, one at each end, & at one end is a passenger elevator, which runs from the first story to the top of the elevator. Along the side of the elevator is a belt gallery which leads to 2 belt galleries running along each side & the entire length of the Atlantic wharf. The galleries are 50 ft. above the wharf. Two systems of belt conveyers traverse these galleries, & are supplied with iron trippers, which will trip grain into any hatchway of a vessel. The shipping capacity is 40,000 bus. an hour, and 3 ships can be loaded simultaneously.

The power plant consists of a battery of four 60-in. boilers, & a pair of horizontal non-condensing Corliss engines, 24 x 42 in. stroke. All power is transmitted by means of rope drives, & all machinery which is required to start or stop while the shafting is in motion is provided with friction clutches.

John S. Metcalf Co., Chicago, were the architects & engineers of the building, etc.

A grain transfer house has recently been completed in the G.T.R. yards at Elsdon, Ill., near Chicago. This elevator is 36x120 ft., & 130 ft. high, with a track shed 15 ft. wide on each side, & extending the full length of the building. The foundation consists of concrete piers, resting on piles. The elevator is a frame structure, the bins being of the usual crib construction, & is equipped with first-class

machinery for rapid handling & transferring of grain. The shipping track runs through the shed on the south side of the house, & the receiving track through the north shed. The elevator is equipped with 3 receiving legs of 8,000 bush. capacity per hour. They have large sinks, & each leg is supplied with a pair of power shovels. The 3 shipping legs are each of 6,000 bush. capacity. On the shipping side of the elevator there are also 4 car-loading spouts, fitted with car-loaders. These spouts are located far enough apart so that 4 cars can be placed on the track & loaded simultaneously. On the 1st floor of the elevator is located the heavy geared car-puller, having 2 wire rope drums so arranged as to pull cars on either track with steel wire cable & heavy car-puller hooks. On the first floor are also located 4 no. 9 oat clippers, arranged so as to spout to 3 elevator legs put in for handling the grain from the clippers. On the roof of the track shed on the shipping side of the house are located 4 dust collectors for the above mentioned clippers. Under these dust collectors is a pipe connected with the sweeper system



GRAND TRUNK RAILWAY ELEVATOR AT PORTLAND, MAINE.

taken from any of the bins. Two receiving tracks extend through the house, & 10 receiving legs, with an elevating capacity of 8,000 bus. an hour, take the grain from the sinks to the cupola. The grain is unloaded from the cars with power shovels. There are also 5 loading spouts equipped with bifurcated loaders. In the first story of elevator or working floor is a car puller with two drums arranged for pulling cars on both tracks at the same time, by means of wire cable.

The first floor of the 5-story cupola is the distributing floor. It contains 20 Mayo trolley spouts & 12 telescope trolley spouts. The Mayo spouts distribute the grain from the scale hoppers, & the telescope spouts distribute grain from a reversible belt conveyor, which runs the full length of the second floor of the cupola. This conveyor is supplied with an automatic travelling tripper. The third story of the cupola contains ten 1,200-bus. Fairbanks' hopper scales. The fourth is the garner story. Along one side of this story, extending the full length of the building, is a line shaft from which power is taken to drive the elevators. The top story is occupied by