winter. They were free from knots, of good quality, and with the grain running straight from end to end.

Beam IV showed annual rings somewhat oblique, as in Fig. 6. At 16,720 lbs. it failed by shearing longitudinally along a plane A B at right angles to the annual rings. After the beam had sheared longitudinally the load was again applied until it amounted to 15,000 lbs., when fracture occurred by the tearing apart of the fibres on the tension face.

Beam V showed annual rings as in Fig. 7, and failed byt he tearing apart of fibres on the the tension face under a load of 23,610 lbs.

Beam VI showed annual rings as in Fig. 8. Under a load of 15,480 lbs. it failed in the same manner as beam V.

Beam VII showed annual rings as in Fig. 9. Under a load of 17,615lbs. the beam sheared longitudinally along the plane A B, Fig. 10, the distance between the ends of the portions above and below the plane of shear being 3-16 of an inch. The load was again applied until it amounted to 11,840 lbs., when there was a second longitudinal shear along the plane C D at the other end, Fig. 11. After this second shear a load of 8,990 lbs. was applied, when the beam was fractured by the tearing apart of the fibres on the tension face.

In Beam VIII the annual rings were oblique, as in Fig. 12, and at a load of 11,700 lbs. it failed by the tearing apart of the fibres upon the tension face.

Beams IX to XVI were sent to the laboratoryby Mr. P. A. Peterson, chief engineer of the Canadian Pacific Railway.

Beam IX was grown on the mainland half way between Vancouver and New Westminster, in a flat country not much above the sea level. It was cut from a log 26 inches in diameter and 34 feet in length, felled in the month of May. The log lay in fresh water for ten months. It was of first quality, with grain straight and running parallel to the axis. It contained a season crack on the widest face about 11 feet long, 3½ inches below the edge and about 1½ inches deep. Annual rings were as in Fig. 13, the heart of the tree being in one of the vertical faces. Under a load of 51,600 lbs. the beam failed at the support by the tearing apart of the fibres.

Beam X, with annual rings as in Fig. 14, was cut from a log 32 inches in diameter grown on the mainland 120 miles north and west of Vancouver, on a hillside about 100 feet above the sea level. The log was felled in the winter and remained in salt water six months. The grain in this beam ran crosswise, and it failed by a cross fracture along the plane A B, Fig. 15, under a load of 18,000 lbs.

Beam XI—History same as that of beam X. Timber was of first quality, and grain parallel with axis. The beam contained the heart of the tree, with annual rings as in Fig. 16. Under a load of 35,800 lbs. the beam failed by the tearing apart of the fibres upon the tension face.

Beam XII, with annual rings as in Fig. 17, was cut from the log 28 inches in diameter grown about 30 feet above the sea level about eight miles from Vancouver. Tree was felled in August and remained in salt water nine months, being alternately wet and dry, according to the tide. The timber was of good quality, straight grained, with several knots of medium size and a few season cracks ; beam contained the heart of the tree. Under a load of 49,000 lbs. the beam failed by shearing logitudinally along the season crack A B.

Beam XIII History same as that of beam IX., with annual rings as Fig. 18. Timber of good quality, several small cracks along the back of the beam, and small season cracks along the whole of the front about three inches above the face in compression. At 29,300 lbs. the beam failed by the crippling of the fibres on the compression face, commencing at a small knot at the back (Fig. 19).

Beam XIV is in reality beam XIII re-tested. The beam was replaced in the machine with the crippled side reverse, so as to be in tension. At 17,600 lbs. it failed on the tension side by the tearing apart of the fibres along the surface at which the crippling took place on the previous test.

Beam XV, with annual rings as in Fig. 20, was timber of first quality, clear and straight grained, and free from knots, its history being same as that of beam XII. At 37,000 lbs. it failed by the crippling of the fibres on the compression face, Fig. 21.

Beum XVI is beam 15 re-tested. The beam being reversed, it failed under a load of 25,580 lbs. at the point at which the crippling had previously taken place. A load of 32,000 lbs. was then applied, when the beam fractured a second time on the tension side.

Beams XVII to XXI were sent to the laboratory by the British Columbia Mills, Timber & Trading Company, and were cut on the coast section of British Columbia.

Beam XVII was coarse grained, contained a number of small knots on the compression side, was cut from the heart of the tree, with annual rings as in Fig. 22. At 48,600 lbs. it failed by the tearing apart of the fibres on the tension face, which was followed immediately by a longitudinal shear coincident with the neutral plane at the centre of the beam and extending for a distance of eight feet from the end, Fig. 25.

Beam XVIII was cross grained, contained several knots, was cut from the heart of the tree, and showed annual rings as in Fig. 26. At 69,400 lbs. the beam failed by shearing longitudinally, the shear being immediately followed by the tearing apart of the fibres on the tension face, Fig. 27, 28, 29.

Beam XIX was of exceptionally good quality, with clear, close grain, no knots, and annual rings nearly vertical, as in Fig. 30. At 59,540 lbs. it failed by longitudinal shearing, followed by the splinting of the upper edges on the tension side, Fig. 31, 32.

Beam XX was cut from the heart of the tree, with annual rings as in Fig. 33, was coarse grained and contained a number of knots. At 40,000 lbs. it failed by the crippling of the fibres on the compression side in the neighborhood of a small knot 1¼ inches above the compression face, Fig. 34, 35, 36. The load was gradually increased to 49,600 lbs., when the beam again failed by tearing apart of the fibres and tension face.

Beam XXI—Annual rings as in Fig. 37. At 17,960 lbs. a sharp fracture took place by the tearing apart of the fibres on the tension side, accompanied by a simultaneous crippling of the fibres upon the compression side, Fig. 38, 39, 40.

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Beams XXII-XXV were four old stringerstaken from trestles. Beam XXII had been in position for nine years, in a dry country, with very little rain fall, and