amount at 400 days, and about 5,000 at 700 days. In the longitudinal steel a maximum value of 13,600 pounds per square inch is obtained on the 700th day. The fluctuations in these curves show the same seasonal variations noted in the previous tests.

Since the shrinkage had been retarded until but a few days before loading the "initial" compression stress was probably slight, but had loading been postponed for another 80 days the initial stress would have been somewhat higher than that shown for the 80th day on these curves; that is, possibly 6,000 or 7,000 pounds in the transverse and twice as much in the longitudinal steel. That such initial stresses represent the condition in every building cannot be said, for the high strength of the concrete in tension and bond before shrinkage began (having been kept wet for nine weeks), undoubtedly had considerable influence; but that they may occur in many structures is highly probable.

What effect these initial stresses have on the final stress condition in beams and slabs the writer is not prepared to state at this time. It seems probable, however, that once the concrete in tension has become thoroughly cracked the conditions do not differ greatly from those assumed in designing. There is, however, a very large influence on the behavior under the first load which, as will be discussed later, may affect materially the interpretation of test data.

The one conclusion from these results that seems most important is the possibility of high steel stresses in columns or in the compression steel of beams. With a compression from shrinkage alone of from 5,000 to 13,000 pounds per square inch where tension would be expected, it seems quite reasonable to predict steel stresses of from 20,000 to 30,000 pounds where the time yield and shrinkage are acting together.

The deflection curve of Plate 6 shows the same downward tendency even after two and one-half years, as exhibited in the other tests. This shows the effect of shrinkage and time yield in producing the continued sag with the uncertainties of design and construction completely eliminated.

(Continued in next week's issue.)

WEEKLY RAILWAY EARNINGS.

The following are the earnings of Canada's transcontinental railways during August:—

Canadian Pacific Railway.

	1916.	1915.	
August 7	$2,985,000	$1,787,000	+ $1,198,000
August 14	2,943,000	1,815,000	+ 1,128,000
August 21	2,860,000	1,956,000	+ 904,000
August 31	4,092,000	2,856,000	+ 1,236,000

Grand Trunk Railway.

August 7	$1,256,376	$ 993,773	+ $ 262,603
August 14	1,236,989	1,004,412	+ 232,577
August 21	1,304,848	1,052,483	+ 252,365
August 31	1,952,163	1,535,213	+ 416,950

Canadian Northern Railway.

August 7	$ 868,000	$ 438,500	+ $ 429,500
August 14	841,500	427,600	+ 413,900
August 21	846,300	465,400	+ 380,900
August 31	1,129,100	652,100	+ 477,000

The Canadian Pacific Railway July's return, the first of the company's current fiscal year, is as below:—

	1916.	1915.	
Gross	$12,247,440	$7,895,375	+ $4,352,064
Expenditure	8,230,348	5,094,972	+ 3,135,376
Net	$4,017,091	$2,800,403	+ $1,216,688

THE LOSSES IN CABLES AT HIGH FREQUENCIES.

Messrs. E. F. Northrup and R. G. Thompson in a paper contributed to the Franklin Institute remark that when current passes through solid metal conductors at the high frequencies employed in wireless telegraphy and telephony the heat-losses are needlessly excessive, and, to diminish these, various types of stranded cable are employed. The authors have investigated if there is any appreciable difference in the losses in cables which depends upon the arrangement, the size, and the insulation of the individual strands which make up a cable, and endeavored to determine what combinations of these various features will give a cable best suited for use at high frequencies under specified conditions. They find that in a cable the strands of which are parallel the loss is appreciably greater than it is in a solid wire having the same cross-section; and, surprising as it may appear, if this same cable is very much twisted, so that the wires lie in concentric spirals, the loss decreases 50 per cent. or more and becomes less than in a solid wire. The tests appear to show that the more the cable is twisted the greater is the reduction in the loss. With the exception of the case just mentioned, the alternating-current resistance of a cable is less than that of a solid wire of the same cross-section. The smaller the individual wires and the better they are stranded or braided and the more perfectly they are insulated from each other, the more nearly does the alternating-current resistance approach the direct-current resistance for a given cable. It is, further, important that individual wires should be stranded or braided so that in passing along the cable an outside wire becomes an inside wire, and then again vice versâ. Well-insulated cable-strands are obtained by using enamelled wire, though good insulation may be partly obtained by thoroughly treating the cable with an insulating varnish. The tests seemed to indicate that the decrease in loss obtained by using enamel-insulated wire in cables would hardly warrant the extra cost of this kind of insulation, particularly in cases where only a portion of the total current which flows is high-frequency current. A case of this character is where the secondary of a high-tension transformer feeds an oscillating circuit, some of the high-frequency oscillating current finding its way into the secondary winding of the transformer.

IRON OUTPUT INCREASED

The production of pig iron in Canada during the first six months of 1916 was 507,750 tons, compared with 366,825 tons in the first half of 1915. This represents an increase of 40 per cent. These figures are gathered from an official compilation of the American Iron and Steel Institute. At the rate of production in the first half of the year it is possible that the output for the full twelve months will exceed the high record established in 1913. The total production of pig iron up to June 30th, this year, compares with 366,825 tons in the first half of 1915, 458,595 tons in the second half, 1,015,118 tons for the full twelve months of the record year of 1913.

Production of steel ingots and castings in Canada, according to the Institute, promises to break all records in 1916. Last year, production was very near the high record of 1,042,503 tons in 1913. The output in 1915 was 912,755 tons, compared with only 743,352 tons in 1914, an increase for the year of approximately 22 per cent.

The Panama Canal, now practically completed, has, so far, cost $400,000,000 and the commission has $16,800,000 more to spend on perfecting details and for permanent equipment, outside of an additional $4,500,000 for fortifications.