

# The Canadian Engineer

Established 1893

A Weekly Paper for Canadian Civil Engineers and Contractors

Terms of Subscription, postpaid to any address:

One Year	Six Months	Three Months	Single Copies
\$3.00	\$1.75	\$1.00	10c.

Published every Thursday by

The Monetary Times Printing Co. of Canada, Limited

JAMES J. SALMOND  
President and General ManagerALBERT E. JENNINGS  
Assistant General ManagerHEAD OFFICE: 62 CHURCH STREET, TORONTO, ONT.  
Telephone, Main 7404. Cable Address, "Engineer, Toronto."

Western Canada Office: 1208 McArthur Bldg., Winnipeg. W. G. GOODALL, M. F.

## PRINCIPAL CONTENTS OF THIS ISSUE

	PAGE
General Specifications for Steel Highway Bridges, Ontario, 1917, by E. H. Darling	391
Drainage in the Red River Valley in Manitoba, by G. B. McColl	393
Rainy River Water Power Plants	396
Winnipeg River Water Power Plants	396
Canadian Railway Association for National Defence	397
Report of Committee on Waters and Water Powers, by Leo G. Denis	399
Lining an Irrigation Canal with Gunite	401
A Sanitary Interpretation of Water Analysis, by E. C. Richardson	402
Water Purification in War Time, by George A. Johnson	405
Letter to the Editor	406
Board of Engineers Report Against Hydro Radials	407
Canadian Society of Civil Engineers Elections and Transfers	408
Editorial	409

## THE SURVIVAL OF THE FITTEST

In contradiction to accepted belief, there are always alternative methods of doing anything. Judgment is the choice of expedient, not the determination of the absolute. Politics have been termed a matter of selection between alternative blunders, decision being always wrong but the choice of the lesser evil. In engineering matters, improvement being always possible, the practice of to-day may prove a blunder to-morrow.

If practice were absolute, the ultimate possibility would have been attained, but actually current practice is but one stage in an endless evolution. Improvement is the elimination of past mistake. The business of an engineer is alive, in that growth and evolution are continuous. Adaptation to new environment, to fresh circumstances, is the rule and not the exception.

Experience is not simply the sub-conscious record of our own mistakes. The exact means whereby we hoist ourselves out of trouble certainly adds to our mental stature and enhances our value; yet so far from being confined to this, the shrewd learn from the mistakes of others no less than from their own. To err is human, but it is by elimination of error that mechanical evolution is furthered. If improvement were impossible, invention would be vain.

Practice is conditioned by circumstance; revision is due to many factors. The novel method of yesterday may be medieval after a few years. This is true in every department of engineering activity. There is little permanence. One solution serves to stimulate another. Design, material, method, workmanship, all undergo periodical revision; progress is rapid and each phase necessitates re-

consideration of the whole. Change, not for the sake of difference but made by necessity, alters practice. No profession revises itself more energetically than does that of engineering.

Every other industry has been radically altered by engineering effort. The application of the same unvarying law in the engineer's own work leads to rapid revision and expression. No man can hope to compass the whole field of effort even in a cursory manner. One branch of engineering effort is so far removed from some others as though it were an entirely different world. Still, the fact remains that the classification of engineer applicable to so many related but diverse fields covers one of the most active professions. To be in association therewith in any capacity is a distinction. To be master in one section is a certificate of mental competency.

The evolution of the modern world, of civilization itself, largely rests upon the engineer's shoulders. As his numbers increase and his talents are more and more exercised, the future must inevitably look to him in an increasing manner for the solution of its difficulties. To-day the engineer is a servant to many other interests; to-morrow—since only the fit survive—he may dominate and control those interests. The future largely belongs by right of conquest to the engineer.

## INCREASED RAILROAD RATES

A despatch from Washington last week announced that the Interstate Commerce Commission had given the Pennsylvania Railroad permission to file without formal hearing increased commodity rates on iron and steel from points in eastern trunk line territory to destinations in West Virginia, Pennsylvania and Ohio. This is an important ruling and means virtual approval of the higher rates.

A number of increases have been approved on commodity rates in the United States since the 15 per cent. rate decision, the general plan being to adjust domestic rates on iron and steel on the same basis as the export rates, which were increased some time ago. It is understood that the new rates will mean a considerable increase in revenue, which in connection with the indication of the commission's favorable attitude toward higher rates, relieves railroad officials of much anxiety—in the United States.

What about Canada? We must be prepared to bear also a substantial increase in railway rates. It is not a matter of the relative merits of railroad operation by government or corporations. Were the government to own and operate all our railroads to-morrow, they would find it absolutely necessary to increase rates. The only alternative would be the creation of deficits which the taxpayers would carry, and that would be only another way of paying the increase necessary in railway rates.

Railroad transportation is one of the few commodities in this country which has been compelled to maintain pre-war prices, despite the substantially increased cost of labor, materials, and other things which the railroad corporations have to buy. The Grand Trunk System, for example, is doing at present an immense volume of business. It is using its equipment to the limit, and is getting little or nothing for it. For the present calendar year the company's gross earnings will be the greatest in the history of the company, and its net earnings (owing to increased costs) will be practically the lowest on record. There are in England thousands of debenture holders who