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CONTENTS OF THIS ISSUE.

Editorial:

The Education and Training of the Engineer	257
Surges in Pipe Lines Conveying Water	257
Daily Newspapers	258
eading Articles:	
The Adamello Water Power Station	243
Conner Smelting Practice in Lake Superior Region.	246
Annual Consumption of Portland Cement	249
Acetylene Welding and Cutting Machine	249
Forest Reserves	251
The Disinfection of Water	251
The Use of Coke Ovens Gas as an Open Hearth	
Fuel	254
Cost of Steam Power in Canada	259
Cost Data of Concrete	261
Canadian National Exhibition	262
A Treatise on Retaining Wall Design	264
The Hydraulic Service of Ouebec	266
Book Reviews	267
Workmen's Compensation	268
Railroad and Company Earnings	260
Engineerin a tut	270
Construction of	270
Market Con Mil	2/1
and Conditions	50

THE EDUCATION AND TRAINING OF THE ENGINEER.

Much has been written, and will continue to be written, on this all-important subject. There has been a good deal of discussion recently on the subject, and, while no definite conclusion has been arrived at, still many interesting facts have been brought out. As the "Electrical Review," which has been following closely the "Conference on the Education and Training of Engineers," recently held in England, notes, "The subject is without finality, just as there is no finality in engineering development."

There is no course of study laid down by any of our engineering colleges which will meet the case of every man successfully, for each individual's mental make-up, his powers of comprehension, his physique and his ambition will mould to a certain extent the result. What will act as an incentive to one man will be a detriment to another. For this reason it would appear as though it were better to only furnish the ground work in the education of the engineer in the faculties of engineering, and allow him to obtain his training either before he enters college, during his vacation, or after he graduates. His course in the schools should give him a mastery of the principles of physics, on which all successful engineering depends, and a firm mathematical basis for future theoretic work. It should teach him to reason for himself, and to be able to apply the essentials of physics and mathematics.

His training and experience are matters which are adjusted almost altogether by influence outside of himself. Opportunity and environment throw him into a certain line from which he will find it hard to deviate. This experience should begin at as early an age as possible. It is a mistake in most cases for a man to take up post-graduate work, unless, of course, he intends to enter academic work. Huxley says: "Those who have to live by labor must be shaped to labor early: the colt that is left to grass too long makes but a sorry draught horse." The lack of commercial element in the college training, while a good thing from some points of view, is apt to leave a man in an unfit condition to go forth in the struggle for existence going on in the business world.

The consensus of opinion of the convention noted above appears to be that the student of engineering should have at least a year of outside training or experience before entering a college of engineering.

SURGES IN PIPE LINES CONVEYING WATER.

In the early days of hydraulic power development, and until very recently, the types of development have been of the short penstock and open canal, or open forebay type. These types were developed first on account of the cheapness of first cost and the efficient regulation obtained thereby. Now, however, the available sites for installations of this kind are taken up, and we are coming to the use of plants with long feeder pipe lines and penstocks. With the advent of these long lines comes the attendant regulation troubles and excessive pressure rises, due to the inertia of the water column.

Many suggestions have been made by hydraulic engineers with a view to ameliorating these conditions, and many devices are now in use. Governor-operated by-passes and deflecting nozzles are the usual methods