

article is to show that by a careful analysis of the facts outlined, essential accuracy may be obtained without delving into laborious calculations. At present the usual method employed is either to assume the spans as discontinuous instead of extending unbroken over the supports, allowance being made for the negative moment in accordance with the judgment of the engineer, which method is based on a fallacy, or else to use the tentative formulæ now in common use with large factors of safety.

Numerous articles have been written on the merits and demerits of continuous beams and research is continued. But with all the diversity of opinion upon this subject, to the impartially minded engineer, it is evident that a structure designed in a manner that will permit of a saving of 25 to 30% of the material in comparison with other types and yet fulfil all the requirements in regard to strength and durability is to be preferred, since it is the most economical.

The employment of continuous beams is opposed in some quarters because of the danger of an unequal settlement causing material changes in the stresses. The proper way to guard against this danger, however, is by a study of the structural geology of the region, and by greater care in the design of the foundations, rather than by condemning the use of continuous beams.

### PROPOSALS TO ADVANCE BRITISH ENGINEERING.

The Council of the Institution of Electrical Engineers of Great Britain has adopted resolutions stating several measures which it advocates as a means of advancement for British engineering. It is in favor of a broader recognition of high technical attainments, and among the changes it advocates is that the use of the metric system be made compulsory after a reasonable period, and that during this period all trade catalogues make use of both the British and metric systems. The resolutions, which are printed in the Journal of the Institution of Electrical Engineers in its issue of June, 1916, are:—

Some combination of British electrical firms, especially with regard to over-sea trade, is desirable.

A government tribunal of the most independent character that can be devised, to be appointed to control the electricity-supply industry of the country, and also to prevent indiscriminate addition or extension of power stations or systems undesirable from the point of view of size, locality, or system.

In view of the necessity of securing the home market and that none other than British electrical apparatus be purchased in the United Kingdom, a protective tariff to be set up, notwithstanding such benefits as will in any case result from patriotism.

A permanent advisory committee to be appointed to insure that, as far as possible, raw materials and parts as well as whole apparatus necessary to the trade of the British Empire shall be produced within the Empire.

British-born electric attachés to help in the consular service, and trade commissioners (scientific and technical commissioners) to be appointed.

British engineering standards to be adopted throughout the Empire.

The use of the metric system to be made compulsory after a reasonable period, and during this period all trade catalogues to make use of both the British and metric systems.

The institution to be granted a charter so as to improve the status and training of electrical engineers.

A central engineering board, consisting of representatives nominated by all the important institutions, to be established whom all engineers (other than mechanics) would be required to satisfy as to the sufficiency of their technical training and general education before they could be recognized as proficient, so as to insure that every engineer shall qualify for his profession in the same manner as a doctor or solicitor.

Closer co-operation of manufacturers and other employers of electrical engineers with the technical colleges is desirable to insure that students are trained to meet the future needs of the industry.

### THE RARER METALS.

An interesting paper on "The Metallurgy of the Rarer Metals" was presented by Prof. J. W. Richards, of Lehigh University, South Bethlehem, before the eighth semi-annual meeting of the American Institute of Chemical Engineers. He said that in 1866 aluminium was one of the rarer metals selling at \$10 per pound. The silicon industry furnished another example of great reduction in the cost of a metal, as in 1900 it was selling as a chemical curiosity at over \$100 an ounce; now 10 cents per pound was a good market price for it. The speaker referred at length to the number of metals that at present command high prices, but which by improved metallurgical processes might be made very cheaply. He said the present methods of reducing beryllium were tedious and costly. This metal being white, malleable, and unchanged in air, with a specific gravity of 1.64, would be particularly useful for objects where great lightness and permanence in air were the first consideration, cost being secondary. Although magnesium oxide cost only a few cents per pound the metal sold for about as many dollars per pound, and was scarce. But it was believed that, by improving the methods, the reduction of magnesium could be effected at 25 cents per pound. After the war, under normal industrial conditions, magnesium would sell at a price which would take it out of the class of rarer metals and put it among the common ones. As the price went down its industrial uses would increase in geometrical proportion, and instead of the production being expressed in thousands of pounds per year it would reach thousands of tons. Its alloys might largely displace aluminium alloys, which were now used by thousands of tons annually in the motor-car industry, with a saving of one-third in weight which would compensate for the higher first cost. He predicted that the metallurgical use of magnesium would also be greatly extended by its lower price, such as for deoxidizing brass, copper, bronze, nickel, and monel metal, since it was a much stronger deoxidizer than aluminium. A small addition of metallic calcium might be used to reduce the amount of sulphur and phosphorus in steel, and other metals and alloys whose properties were damaged by sulphur or phosphorus might be similarly refined or improved. Chromium electroplating was white and durable, and for many purposes might be superior to nickel and almost equal to platinum plating, but the technique of always getting perfect plating had not been mastered. The metallurgy of chromium was full of attractive possibilities, and the usefulness of pure chromium in the field of alloys was only beginning to be investigated.