vitality failed, however, to respond, as usual, to the recuperative environments.

Dean Galbraith was not a seeker of renown. His world-wide reputation is of the kind that will wear through ages, gathering as it has done from without the horizon of his sphere of labor. He merely sought to do his part, faithful to himself, loyal to his profession, a friend of every student, and every man a student like himself. With the close of his career the continent loses the person of one of its greatest educators, but one who had accomplished so much in the upbuilding of the engineering profession that the personalty behind it all will go down through the ages an archetype of the life of the engineer as it should be lived to do the most good to mankind.

LETTERS TO THE EDITOR.

Concrete Arches.

Sir,—I note with considerable interest, in your issue of June 11th, 1914, the five conclusions drawn from the paper on concrete arches in Proceedings of the American Society of Civil Engineers for Vol. 39, page 1193.

The writer of your article has not referred to the discussion which followed in subsequent numbers of Proceedings. Some recognition of the same should be made, for, in the writer's opinion at least, these discussions, made by the most eminent engineers of the country, are of great value.

As I am at present away from Toronto and have not these numbers of Proceedings with me, I am unable to give names or figures, but the following general discussions are, I believe correct:—

*(1) and (2) are generally confirmed.

(3) This statement is questioned by a large number of engineers. In the first place, there will not be very much more concrete in a fixed rib than in a three-hinged rib, if both are properly designed, and the cost of forms will be very nearly the same. Consequently, the saving in using a three-hinged rib will be only in material, and the estimate should be so prepared. On the other hand, the cost of the hinges is very considerable, and will usually offset, or even outweigh, the saving in concrete.

Secondly—The fixed ring is without doubt more rigid and stable than the hinged ring.

Thirdly—The greater reliability which is attributed to the hinged ring is largely a matter of facility and certainty of design. A fixed ring is susceptible of a very rigid and accurate design, and can be carried to a scientifically fine point. Of course, the labor of designing a fixed arch is somewhat greater than of a hinged arch.

The value of a hinged arch ring is its greater adaptability to small motions of the abutments. But in the general condition of rigid, immovable abutments the fixed ring is generally considered not only better design, but more economical.

Permit me to refer your readers to the last chapter in David A. Molitor's "Kinetic Theory of Structures," which the writer holds in high esteem.

(4) The rib of I-section is not in general favor, since any small settlement which may occur before forms are removed tends to crack off the flanges. (For want of a better word I employ the term flanges, which will at least be understood.)

In addition to this, the extra amount of formwork which is necessitated by this form of arch ring will reduce, or even eliminate, the economy of concrete material.

(5) The value attributed to the form of pier mentioned in the article is also somewhat questioned, chiefly on account of the agitation and obstruction of the current of the stream. This difficulty can, no doubt, be overcome by carrying a solid pier to above high water.

These remarks can be amplified and verified by an examination of the numbers of Proceedings in which these discussions are published. I trust they will be of some interest to your readers.

Ernst G. Kaufmann, C.E.

Schomberg, Ont., July 21st, 1914.

*See *The Canadian Engineer*, June 11th, 1914, page 872.

Improved Roofing Materials.

Sir,—We have read with interest a paper by W. E. King, C.E., published in your July 16th issue under the title of "Economical Design of Industrial Works," and we note therein a paragraph referring to the roof.

We would like to inform your readers that we have had a series of experiments with two styles of roof, which have proven very efficient and permanent. A great many industrial establishments in Montreal and elsewhere in Canada have been covered with a thin slab of fine cinder concrete, ordinary cement mortar, and finished with felt or asphalt material.

The idea of construction is to attach to the roof small shapes for purlins at 5-ft. centres, and to these purlins attach ¾-in. or 1-in. channels at 12-in. centres and transverse, and to these channels apply a 24-gauge expanded metal lathing. To this lathing apply a fine cinder concrete, and when the slab is dry finish the exposed side with a roofing compound and plaster inside with ordinary cement mortar. This makes a permanent roof, and by the use of the two different compounds condensation is reduced to a minimum.

Another very superior style of fireproof and permanent roof is procured by the use of ferro-dovetail plates. The idea is to attach purlins from 4 to 6 ft. centres, and to these purlins attach the plates in the same manner as you would attach corrugated sheets. When these sheets are affixed, cover with cinder or fine stone concrete, applied to a thickness of 1 in. above the plates, and then apply your roofing compound. The underneath side of the plates can then be plastered with ordinary lime mortar, cement mortar or gunite.

The Pedlar People, Limited,
Per W. E. Ramsay.

Montreal, July 17th, 1914.

Two books have been published dealing with the proceedings of the Fifth National Conservation Congress, held in Washington, D.C., last November. One of them treats of Water Power subjects exclusively, and is an important contribution to constructive literature in this subject. The other book contains the Forestry reports and addresses, which were conceded to be the most valuable ever presented at a similar meeting in this country. The books may be had through N. C. McLoud, Treasurer and Recording Secretary of the Congress, 1201 Swetland Building, Cleveland, Ohio.