WOODEN POST'S AND BEAMS.*

By H. B. GORDON.

OWING to the lateness of the hour I shall not occupy any time in speaking on the subject I was to have spoken on, "Wooden Posts and Beams," but there is a matter I wish to bring to your notice. For years past when making calculations in regard to the strains and loads upon posts and beams we have been using Kidder and other books, written by men whose ideas have been formed upon very imperfect data. The tests made in 1882 and other tests with regard to the various woods have been very imperfect tests. You all know the element of dryness is very important in getting at the correct sustaining power of any timber, whether it be its power to support transverse strains or pressure strains. The latest authority I have consulted on the subject is I think borne out by the tests made by the Forestry Commission in the United States during the last six years. They have borne out this fact, that a dry stick is 75 per cent. stronger than a green stick, so when no idea of the amount of moisture in a stick has been recorded any test of that stick can be of little value. Another thing which I have learned recently is that even after a stick of wood is thoroughly seasoned, if exposed to moisture again it becomes as weak as a green stick, so that a stick of wood fairly seasoned if exposed again before the test, by being allowed to lie in a damp place, would be very misleading ; so, as has been said by a recent author, the factor of safety in wood construction is largely a factor of ignorance ; we have been placing it pretty high, just in order to cover all these unseen contingencies. Now that is a very unscientific and very wasteful way of proceeding, and it seems to me highly necessary that we should have a proper investigation of the building timbers commonly in use in Canada. I notice in the tests that have been going on during the last six years under the Forestry Commission of the United States that they have up to the present time made some six or seven thousand experiments or tests on 32 different kinds of woods, but really the only woods there that in any way compare with ours are some pine from Michigan, and some southern pine that is occasionally imported here for special work, and in limited quantities. The range of strictly Canadian building material is not touched upon. Even with those seven thousand tests there are many points they have not yet touched upon, structural points which require further experiment. There is, therefore, before any body which will take this up a very large and extended work, and an expensive work as well, and I am told that while there is a somewhat efficient testing machine here, though not so large as we would like to see, and hence not able to test some of our specimens, the great drawback now is that they have not the funds to carry out proper tests. In order to carry out the tests properly it is necessary that the wood should be selected by an expert. Then a record should be kept of the aspect in which it is grown, and the soil, the time at which cut, and a great many other things, which entail considerable expense, and that simply for the selection and preparation of the specimen. Then before the specimens are tested there should be a reduction of each specimen to a certain amount of moisture, such moisture as would ordinarily be found in the inside of a house, or in a dry place, say 12 per cent. In that way there is an immense amount of work and considerable expense necessary before we can have the proper data from which to form our calculations, and, such being the case, I have prepared a little resolution which I would like to have passed by this convention that it may be placed in the hands of a committee to present to the government :

"Whereas there exists no satisfactory compilation of the results of tests of Canadian building materials. And whereas no ex-haustive or even relatively complete system of tests has heen made of Canadian woods used in building. And whereas the architectural and engineering professions are thus left without ac-curate information about the materials they are constantly re-quired to use. And whereas the safety of the public and econo-mical use of our native building materials require that such tests should be made. And whereas the Ontario Leeislature has emshould be made. And whereas the Ontario Legislature has em-phasized the importance of this matter by providing the School of Practical Science with expensive and efficient testing apparatus. And whereas the benefit of having such apparatus is largely nulli-fied by lack of funds to select and prepare suitable specimens and

fied by lack of funds to select and prepare suitable specimens and carry on a complete system of tests. The Ontario Association of Architects in annual convention as-sembled respectfully petitions the Ontario Government to place at the disposal of the School of Practical Science an adequate fund for the purpose of selecting and preparing specimens of Canadian building materials and making extended tests of the same for the purpose of preparing reliable data for use in the building trades. And the convention is of opinion that a sum of not less than \$5,000 should be given to institute such tests."

* Introductory paper presented at annual convention Ontario Association of Ar-chitects, Jan., 1898.

I do not think it necessary for me to further enlarge upon the necessity of these tests. The amount I have named may seem large, but it is sufficient to make preliminary tests, so that a preliminary report may be brought in, and the utility of the system of tests demonstrated. I am sure that a further grant could be obtained. In conclusion I may say that I have had much pleasure in looking over a recently published book which is very useful along this line, and I would suggest that it be got for our library. It is called "The Materials of Construction," a treatise for engineers on the strength of engineering materials, by J. B. Johnston, civil engiueer, of Washington University. In it there is a deal of material not necessary for an architect, but also a great deal that is necessary and helpful.

DISCUSSION.

The President : I am sure we are all very thankful to Mr. Gor-don for his remarks on this subject, and although we have not now time to discuss it I would like to see the resolution seconded and carried.

The resolution was seconded by the Registrar and carried.

The resolution was seconded by the Registrar and carried. Professor Galbraith : I think that if some work of the kind pro-posed could be systematically carried out the results would be of great benefit. Professor Johnston has had a wider experience in timber testing than any investigator in America, if not in the world. The tests carried out by him for the American govern-ment were on a very large scale. The staff and equipment em-ployed in the work were altogether independant of Washington University. The work was not done by students nor hampered by the necessities of an educational institution. The object of his investigations was to trace as far as possible the causes of the variations in the strength of timber. The timber tests hitherto made in the School of Practical Science were on the other hand for the instruction of students and not for purposes of research. On this account they have not been published. The results of research ought undoubtedly to be given to the world. I have no intention in making these remarks to throw cold water on the proposition. At the same time I think the Association ought to understand that they are dealing with a large question. As the resolution is quite general I would suggest that it be taken to mean that we carry out such a line of tests as we may decide understand that they are draining would suggest that it be taken to mean that we carry out such a line of tests as we may decide upon after discussion with a committee of the Association. It is quite possible that we may be able to select a line of work which will fit in with our opportunities and at the same time yield results which may repay the time, labor and money which will necessarily be spent.

The Registrar : I fully understand the value of such tests as Prof. Galbraith has in his mind, but for the ordinary purposes of the architect here they give no satisfaction. One cannot tell when he gets a stick of wood where it comes from, the conditions under which it was grown, or anything of that kind. What one wants is to pick out of any lumber yard timber free from large or loose knots, shakes or other marked structural defects such as we wants is to pick out of any lumber yard timber free from large or loose knots, shakes or other marked structural defects such as we specify the builder must use, and ascertain at what strain it will break, and what is the margin of safety to be recommended. That is what is really and practically useful to ordinary architects not doing engineering work. But there is more than that in-tended in the resolution; there are certain native stones we use which are not tested by American testers. There are other stones in the country which are not yet known, and the fact of their being tested will introduce these materials. Such a test need not be published by the School as an effort of research for the finest scientific data, but by the Association as an ordinary test for architects of materials ordinarily used. I do not know whether the Association will bear me out in thinking that this is a whether the Association will bear me out in thinking that this is a practical test, but I think there is weakness in applying the data of very fine tests to very common material.

of very fine tests to very common material. Professor Galbraith: What I meant was that tests of natural building materials such as wood and stone, unless made as Baus-chinger and Johnson made them are almost useless. The kind of testing which Mr. Langton proposes would not, I think, be of very much value. The case is quite different with artificial building materials such as steel, iron, brick, etc. With these the processes of manufacture in general are such that the various specimens in a given class differ but little from the average. Average results in the case of stone and timber are of little value because of the great differences between them and the individual because of the great differences between them and the individual results. Sticks of timber apparently similar will sometimes differ in strength 100 per cent. Investigation to be of value should be devoted to determining the causes to which variations are due. A knowledge of these causes will enable the engineer or architect to make and amentical excellent to make safe and practical specifications.

Mr. Gordon; What I had in my mind is entirely different from what Mr. Langton speaks of, although he is the seconder of the resolution. What was in my mind was that the School of Practical Science would start with say four or five of the most common and most widely used woods in Canada, and make a thorough inand most widely used woods in Canada, and make a thorough in-vestigation, as far as possible, and, that being done, bring in a report on those. That would so demonstrate the utility of the matter that we would easily get a further amount of money to take up other lines of building material, and it is by doing a little and doing it thoroughly it can be possible to attain greater ends. The President : I think myself that any test made and reported as official would cartain have to be something beyond the or

as official would certainly have to be something beyond the or-dinary test. I quite agree with Mr. Gordon, and I am glad Prof. Galbraith is prepared to make tests somewhat of the character of those reported by Professor Johnson, although we cannot hope to eave them so exhaustive, still we can make a start in the work,