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MISSING

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—THE—

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Negotiations have been in progress of late between the Brick and Stone Masons' sections of the Toronto Builders' Exchange and delegates from the unions representing the journeymen in these trades, as to what should be the rate of wages on the termination on the first of May of the agreement entered into by the employers and employees five years ago. The employers are understood to be averse to making a new agreement except the rate of wages be reduced to correspond in some measure to the universal depreciation in values. On the other hand they show no disposition to depreciate wages beyond this point. No understanding has yet been reached, but it is entirely probable that the matter will be amicably adjusted, either by the renewal of the agreement, it may be on different terms, or by mutually consenting to do without an agreement. There is no doubt that a satisfactory agreement would be the most advantageous settlement of the matter for all concerned.

THE Ontario Association of Architects has decided to hold an exhibition of architectural drawings in connection with the Royal Canadian Academy exhibition, which is to take place in Toronto next May. The Academy have very generously granted the Association the exclusive use of one of their rooms, which in point of light and location is equal to those allotted to paintings. Such a favorable opportunity of exhibiting their work was never presented to the architects of this province at least, and we trust they will not be slow to manifest their appreciation of it. A hanging committee, composed of members of the O. A. A., will be appointed, who will select from the drawings submitted those which by merit would be entitled to a place in the exhibition. No drawing which has previously been exhibited in Toronto wil be allowed a place in the exhibition. It is important to the success of the exhibition that the hanging committee should have in its composition sufficient back-bone to unhesitatingly reject without fear or favor such drawings as fall below the proper standard of merit. It is no less important that those submitting drawings should determine that they will cheerfully bow to the judgment, favorable or otherwise, which the committee shall pass on their work. If these points are strictly observed, we may expect that the approaching exhibition will be one which will be creditable and in every respect advantageous to the profession.

THE greater part of our space in the present number is given to a report of the proceedings of the recent annual convention of the Ontario Association of Architects. Notwithstanding that the number of pages has been increased, the space at our disposal is insufficient to present all the excellent papers read at the convention. Those which we are obliged to hold over will appear in our March number. In point of interest the convention was probably the most successful in the history of the Association. As regards the attendance, there is still ample room for improvement. Each year serves to emphasize the fact that there is a useful work for the Association to do, principally on the line of the education of future generations of architects. It is to be hoped that there will be manifest on the part of students of architecture a greater appreciation of the self-sacrificing efforts which are being put forth on their behalf by the older members of the profession in the Association. Instead of shirking the

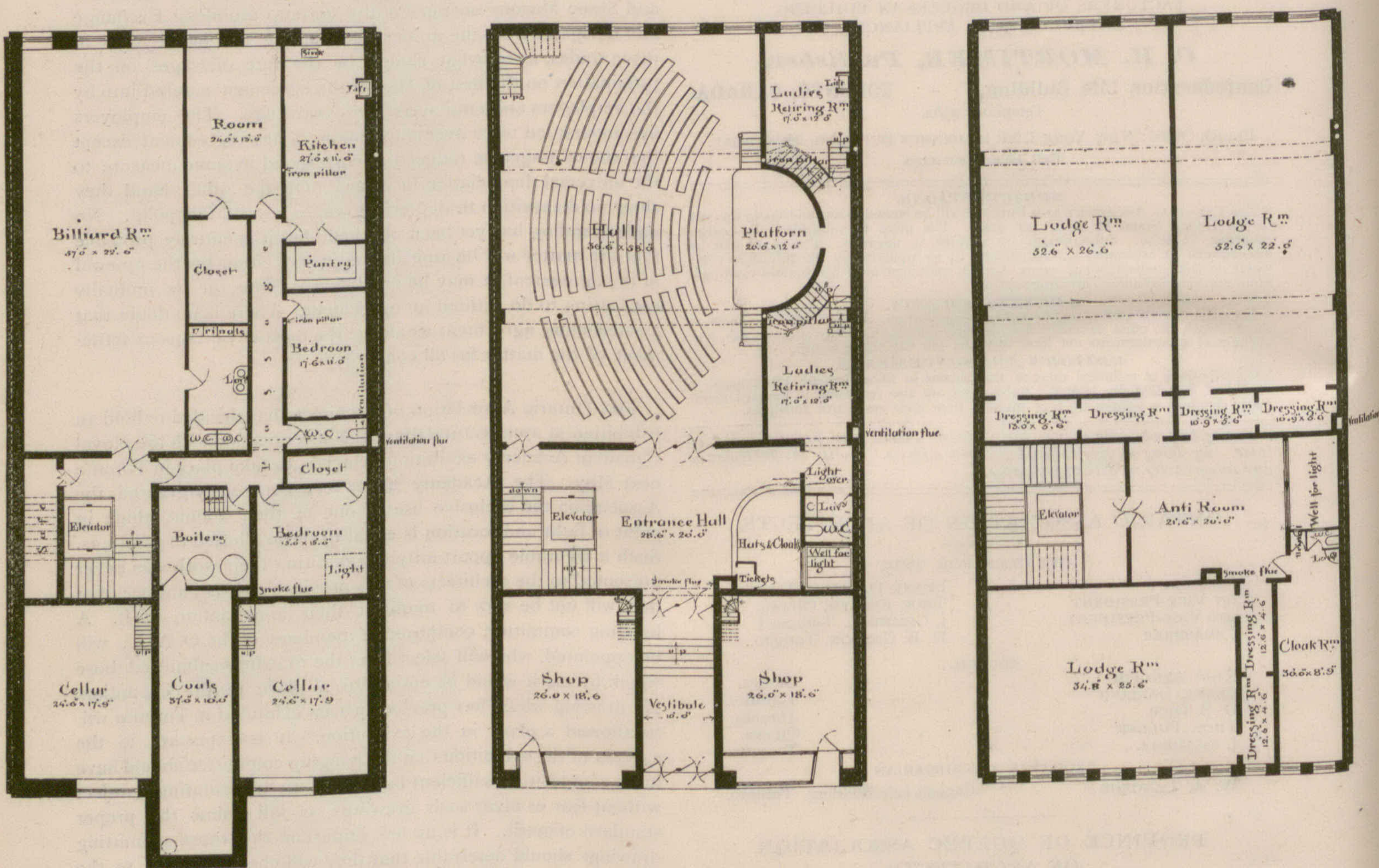
Association examinations, because they do not happen to be of a compulsory character, every student who hopes to succeed in the profession should gladly present himself as a candidate for examination for the sake of the benefit which must accrue to himself from a thorough mastery of the examination subjects. It is to be hoped that the recommendation embodied in Mr. Gordon's resolution with regard to the Association Library, may be successfully carried out.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE monthly dinner and meeting of the Province of Quebec Association of Architects took place on Tuesday, the 15th January. Mr. A. T. Taylor, F. R. I. B. A., gave a very interesting lecture on "The Three Cathedrals of St. Paul's, London," accompanied by numerous sketches and drawings of the different structures that succeeded one another on the present site of the Cathedral. The present St. Paul's rests on the site previously occupied by two other churches; it is even claimed that on the same site was erected a temple to Diana. Very little is known of the Saxon church, which must have been of a primitive character, and built of perishable material as were most of the buildings of that agitated period. The structure that replaced the last named was well worthy of notice; it was in the gothic style and of a typical English character. Its spire was the highest in Europe at the time, and was rich in "souvenirs" and legends, and also contained in itself two parish churches, which had, strange to say, preserved its servitudes and priveleges. At about the period of the Reform it was used successively as a market and exchange and even as a stable. Later on Sir Christopher Wren, the architect of the present St. Paul's, was commissioned to repair the building, and added to its principal facade a porch in the Renaissance style of that period. The great fire of London put a stop to the restoration of the church. Sir Christopher Wren then prepared numerous drawings and schemes for the cathedral destined to replace it, but as often happens, the scheme recommended by the architect was not accepted, and Charles II adopted the plans of what he thought was a more ecclesiastical looking building, but leaving to the architect the liberty of altering and improving the original design. The architect took advantage of this latitude and produced one of the finest monuments in existence. This cathedral is the only building of any magnitude erected under one architect, the cross surmounting the dome having been set in position thirty-five years after the laying of the corner stone. Its dome is reputed the finest and best proportioned in the world.

A discussion took place after the lecture, and a vote of thanks was tendered to the lecturer for his interesting paper, proposed by Mr. J. E. Resther and seconded by Mr. J. Venne.

At the last monthly dinner of the Association held on the 12th instant an interesting lecture was also given by the Secretary, Mr. J. Venne, on "The Interior Management of the Architect's Office," and was discussed amongst others by Messrs. Jas. Nelson, A. Raza and J. E. Resther.



PLANS ACCOMPANYING COMPETITIVE DESIGN FOR MASONIC TEMPLE, MONTREAL.—J. R. RHIND, ARCHITECT.

BRITISH COLUMBIA AFFAIRS.

VANCOUVER, B. C., Jan. 29th, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—Please find enclosed P. O. order for renewal of my subscription to your journal, which in my opinion is making steady progress and becoming of more value to men in my line of business with each issue. I am much pleased with the current number, but notice several errors in your building notes from this city. Mr. N. Hoffar and not Mr. Fripp was the architect of the court house. Mr. Fripp was the architect of the "Inns of Court," a large office building costing about $30,000, which was built opposite the court house last year. Mr. N. Hoffar was also the architect of the Horne block (stores) $10,000. Another neat building built last year was the Garnbrinus Hotel, Mr. Thos. Hooper, of Victoria, B. C., architect. This building was faced with pressed brick; cost $10,000. "O. Wick" is rather an obscure contraction for C. O. Wickenden, the name of the architect of the Hudson Bay Co.'s building.

An article on the rights and privileges of owners who wish to build basement buildings adjoining those which have none, would be appreciated here I think. I know of no law (local) governing such cases. This question should include another, that of putting outside footings on foundation walls which extend to the adjoining property. There has been no trouble that I am aware of on these points as yet, though there have been several cases which might have resulted in a law suit. We ourselves have had some narrow escapes. In one case we put a footing out on a lot adjoining the lot on which we built a building having no basement. This footing was about six inches over the line and the whole length of the lot, 120 feet. The owner, as many Vancouver owners do, resides in Europe I think. If you can give us some information about the laws and customs regulating these matters I am sure they will be much appreciated.

Yours respectfully, A. E. CARTER.

ONTARIO ASSOCIATION OF ARCHITECTS

Proceedings of the Fourth Annual Convention.

At 2 o'clock p.m. on Tuesday, January 15th, the President, Mr. Edmund Burke, called the Convention to order. The minutes of the last convention were read and approved. The President then delivered the following address :—

PRESIDENT'S ADDRESS.

Gentlemen : It is my pleasing duty to meet the members of the Ontario Association of Architects in this, the fifth annual convention since our incorporation. The year has been comparatively uneventful as far as our own history is concerned.

In response to the expressed wish of the convention, the Council inaugurated a system of lectures under the auspices of the Association. Two lectures have been given. The first, by Mr. Grant Helliwell, was open to the public, and was given in the hall of the School of Practical Science. It was a well prepared paper on "Current Architectural Styles," splendidly illustrated by Mr. Wright, of the School of Practical Science, with the aid of the fine lantern of the institution. The attendance, especially of members of the Association, was much less than the merits of the lecture deserved. The second lecture, given in the Canadian Institute by Mr. Wright, on "Graphic Statics," was a thoroughly good and practical exposition of the subject, and deserving of a much larger audience than was present—the total attendance, including lecturer and assistant, being only 18. Half of that number, only, were members of the Association, and the rest mainly students and draughtsmen. These facts are noted in view of the tendency to criticise the Council by some members of the Association who are prone to hint that this body is inactive and not alive to the interests of the Association. It is safe to assume that not one of these critics took the trouble to attend either of these meetings. Other critics have from time to time been invited to lend their aid to advance the interests of the Association, and have either refused or ignored the request. The members would do well to remember that their attendance at the meetings would not only be of benefit to themselves, but an encouragement to the gentlemen who, at much expense of time and thought, have prepared papers. The interchange of thought in the after discussions on the subjects presented, may be made most interesting, especially when the attendance is large—numbers always adding to enthusiasm and interest. It is an encouragement, however, to those who so kindly prepare papers for the enlightenment of others, to discover, as so many have by experience, that, while adding to the information of others, the knowledge they impart becomes doubly their own.

An event of decided interest, and having possibly an indirect bearing on the future of the Association, was the election of a new legislature for the province, a few months since. Your Council seized the occasion to endeavor to enlist the members of the Association in an effort to obtain an expression of the views of the various candidates with regard to the proposed change in our act. Our efforts were very poorly received, few of our men reporting any action in the premises.

Now that a new House has been elected, it is of the utmost importance that every member be up and doing from this time on. If each man would make a point of seeing his representative, of urging upon him our claims and explaining fully our position and aim, the chances of success in the next session of the legislature would be greatly improved. Leading men on both sides of the House have expressed themselves as favorable to our cause and have assured us of their support, at the same time warning us that we must work hard to secure the support of a large number of the rank and file, if we would look for success.

We were advised, as was stated in the address of our President at the last convention, that the temper of the House in its closing session was not favorable to the increase of close corporations. As we unfortunately were in the company of other organizations seeking, for them, unusual powers, discretion seemed to be advisable, and we withdrew our bill. Such may have to be our course again, and as the composition of the House has been considerably altered, no forecast of the situation is possible. But even if we do fail in our object at the coming session, we must not be discouraged, but hope on. We believe our cause is just and right, and that not only ourselves but the public will share, in days to come, in the benefits that will accrue to the profession in the elevation of the standard of education and professional training which will assuredly follow the legislation sought. We must, therefore, not swerve from our goal though it take years to reach it.

Education must ever be our watchword ; the higher we reach in professional attainments and knowledge, the farther away will we get from charlatanism and unprofessional conduct, and the nearer will we approach the highest type of professional ethics. The question of education means for the older men considerable self-sacrifice ; for the examiners much time and trouble ; for the principals, the yielding to their students of considerable time for study and examinations, and the prospect of raising up competitors, who in years to come, by reason of their better preparation, will outstrip their masters in the race for employment. But what of this ? Shall the profession stand still that the older men may not be outstripped ? This would indeed be a low platform for men aspiring to be artists and the leaders of artistic thought in the community. The coming Canadian architect needs a better education for another and more sordid reason, but a very present one nevertheless, and one which we have very severely felt in this country of late years, namely—the competition of foreign architects. Some of our most expensive buildings have been erected from the designs of aliens. The apology for this is the alleged want of experience and ability on the part of the native architect. We do not admit for one moment the validity of this contention, the fine buildings erected by local men attesting to the contrary ; but that this is, to a considerable extent, the condition of affairs is a well known fact. This contention is not advanced with regard to the employment of other professions in Canada, because they have aimed at and attained a high standard of professional education. The lesson for us is evident.

We need also an education, or lifting up, in the matter of professional ethics. Too often an architect is confronted with the competition of two or three of his fellows in a case where he supposed he had a client. He submits a sketch, perhaps without a definite engagement, talks it over with his client and leaves the matter with him for a few days' consideration. On his next visit he is confronted with the information that Mr. So-and-So has submitted a sketch (a catchy, showy one), probably backed up with the assertion that the design can be executed for 30 or 40% less than his, and at a commission far below the regular fee. There is little use in telling the client that your rival is not speaking the truth. The aforesaid rival has offered to guarantee the cost, and the client does not see why he should pay so much more for his building to oblige you. You are accordingly allowed to depart without a commission, meeting, perhaps, one or two more hungry applicants on your way out. It is small satisfaction to be informed, after the building has been erected, that your rival has run his client into an expenditure far greater than your estimate.

Good men are sometimes drawn into this unseemly form of competition from the fact that they do not feel like being ousted in such a manner—losing work which to all intents and purposes is theirs. And what is, what only can be, the inference drawn by the client ? Simply that architects are a parcel of fools, and that he can use them as tools, one against the other, and thus dictate his own terms.

I speak thus plainly, because I notice a growing tendency along this line since the advent of an Ishmaelitish element into the craft a few years since. The other professions are an example to us. Physicians and lawyers observe their codes of ethics ; they set their standard high and are rated by the public accordingly. When will we be wise enough to learn the lesson ? Closer association and more intimate acquaintance with each other has helped us greatly ; but ever and anon are some found who resort to the original type when assailed by the temptation of a possible commission. It is a pity that men, especially young and clever ones, should descend, even for the sake of obtaining work, to anything in the shape of unprofessional conduct. In an experience of 25 years, I have found that none have succeeded permanently and obtained a good name in the community who have endeavored to build their success at the expense of their professional brethren.

No competitions of importance have been inaugurated in the province this year. The few small ones, notably the London Free Library, have been unsatisfactory in results, as usual, the two chief reasons being the lack of proper judges and the absence of a properly prepared programme of requirements. Both these necessary accompaniments of a well conducted competition are embodied in the form suggested by the Council and approved by the Association, and it rests entirely with the architects themselves as to whether satisfactory methods of competition be insisted upon. The remedy is in our hands. Are we going to be always so miserably selfish as to ignore proper methods in ridiculous scrambles for the opportunity to obtain a commission ?

The question of an exhibition of drawings in connection with our annual meeting was broached a few weeks since, but it was felt that the time was too short in which to assemble a representative collection. Possibly a mid-year exhibition would be practical and popular, and while keeping up an interest in the Association would avoid a possible clashing with the business of the convention.

Our sister Association in the Province of Quebec has not been idle during the year. A reading room for members and students has been opened, classes for students organized and examinations conducted. A very successful exhibition of drawings was organized in connection with the annual meeting last October. It had the advantage of being held in the galleries of the Montreal Art Association and drew a fair attendance. A considerable number of drawings was sent by members of the Ontario Association, under arrangements for transport made by our Registrar.

The Quebec Association has followed up the suggestions of Mr. A. T. Taylor, who read a paper at the annual meeting, advocating an Advisory Art Committee, by passing a resolution proposing to the City Council of Montreal the appointment of such a committee, consisting of artists, architects and others to supervise the erection of public monuments and the laying out of public parks, squares, etc. A league having similar objects in view is being formed in Chicago, while Boston and New York have their municipal art societies. Other cities and towns in Canada should join in a similar movement. Monuments are being located and erected without that thought and supervision which would add greatly to their character and effect, and committees and officials often take upon themselves responsibilities for which they are unfitted, not through any fault of their own, but simply for lack of education and taste in such matters.

The architectural department of the School of Practical Science is making considerable progress and appears to have developed as fast as the funds at disposal will permit. The period of study embraces a course of 3 years with a 4th or post graduate course. An expansion of the course, however, is a prime necessity if this department is to be fully and properly developed. If this is not done, there is a danger that the architectural schools in the United States will attract many of our young men, who can afford the additional expense, by reason of the more complete courses of study afforded, including training in design, a most necessary phase of an architectural student's education. The architectural library of the school is growing by judicious purchases including valuable photos of ancient and modern buildings. Having begun the work it behooves the Ontario Government to as wisely forward the development of this department as it has that of the engineering department. Failing this, much that has already been done will fail of its expected result.

In connection with the School of Science, I would here refer to the series of tests which have been made during the past year in the institution by Mr. Wright with our local Portland cement. This industry has witnessed a remarkable development during the past decade which is an evidence of the increasing demand for more enduring methods of street paving and better building construction.

The Toronto Technical School conducting evening classes is an institution which is doing a considerable service for Toronto architectural students in helping to prepare them in mathematics for the Ontario Association of Architects examinations. Eleven architectural students and ten draughtsmen were in attendance at the classes of 1893-94.

The three chief architectural bodies in the mother land appear, from their reports, to have been actively engaged during the past year. The Royal Institute of British Architects in November last inaugurated a system of progressive examinations, which have succeeded the former and partly tentative arrangement. The President, Mr. F. C. Penrose, F. R. S., in a late address considered that these examinations "could not but have an excellent effect; first and directly in securing to future members of the Institute the reputation of having satisfied a certain standard of proficiency; secondly and indirectly by excluding from the Institute in the first instance and by reaction from the profession at large, young men whose abilities would have been more advantageously directed towards the pursuit of some other calling." Some conception of the work of the Institute and the number of architectural students may be found from the following figures, viz: In the preliminary examinations 165 students attended, 28 were conditioned and 136 passed. In the intermediate 55 attended, 19 were conditioned and 36 passed, while in the qualifying or final examinations 150 attended, 84 were conditioned and 63 passed. The Journal of the Royal Institute forms a quarterly volume of exceeding value and interest, many of the papers being profusely illustrated.

The Architectural Association appears to be a model institution, and doing good work in the matter of architectural education. Its classes are divided into two groups—the lecture and the studio side—with courses or years divided into four divisions, with examinations, medals and certificates in each. In addition there are valuable prizes as follows: Architectural association medal with a prize of the value of 10 guineas; measured drawing prize; essay prize, value 10 guineas, and silver medal; Cates scholarship tenable for two years; travelling studentship with bronze medal and the Oliver prize. These prizes were awarded at the opening of the session, and the President, Mr. Mountford, F.R.I.B.A., in stating that the past session had been the most successful one under the present order of things, announced that of the 96 new members who joined their ranks last session no less than 73 joined either the classes or studio, while 78 students took up complete courses of lectures and classes.

The third of the Associations referred to—the Society of Architects—is also a flourishing institution, with over 500 members and associates on the roll. The Society is ten years old and has been incorporated one year. It supports a journal which includes in its columns the proceedings of the Society, architectural notes and queries, notes on new books, etc. A somewhat unique feature of this Society is the periodical visits of the secretaries to the members residing in various provincial towns. It is also in contemplation to hold meetings in large provincial centres if the members in those districts indicate a substantial interest in the scheme. The Society has decided that after Oct., 1896, election to membership will only be open to candidates who have passed certain prescribed examinations, making exceptions however in favor of applicants over the age of 35 and who have practised for seven years. The adoption of this scheme by the third great architectural body has given rise to some dissension regarding the question of confining the examinations to a sole examining body, one of the past presidents maintaining that all examinations ought to be in the hands of the older and representative body, the R. I. B. A.

The R. I. B. A. is named in the registration bill as the sole examining body, the promoters belonging to various architectural societies having made this concession to the Institute. The Institute, however, persists in opposing the bill, taking the high ground that the members of a great profession should carry on their work in a manner perfectly free from the trammels of legislation. The R. I. B. A. at the same time admits that its provincial members, especially, are subject to the "depredations of unprincipal quacks." The only remedy suggested by the Institute is, that the provincial newspapers be used in disseminating the fact that the members of the Institute have signed a declaration that they will not accept illicit, or surreptituous commissions, and that they will be bound by the rules of the Institute. It is to be feared that it will take a great many years to educate the public by this means. Legislation has not curtailed the usefulness of the legal and medical societies, neither should it that of the architectural, and the quackery complained of would soon be a thing of the past were it obtained.

The various architectural societies in the provinces of the United Kingdom are being affiliated with the Royal Institute, under the name of Allied Societies, with centres in the various large cities, thus very greatly extending the influence of the Institute and the prestige of the profession.

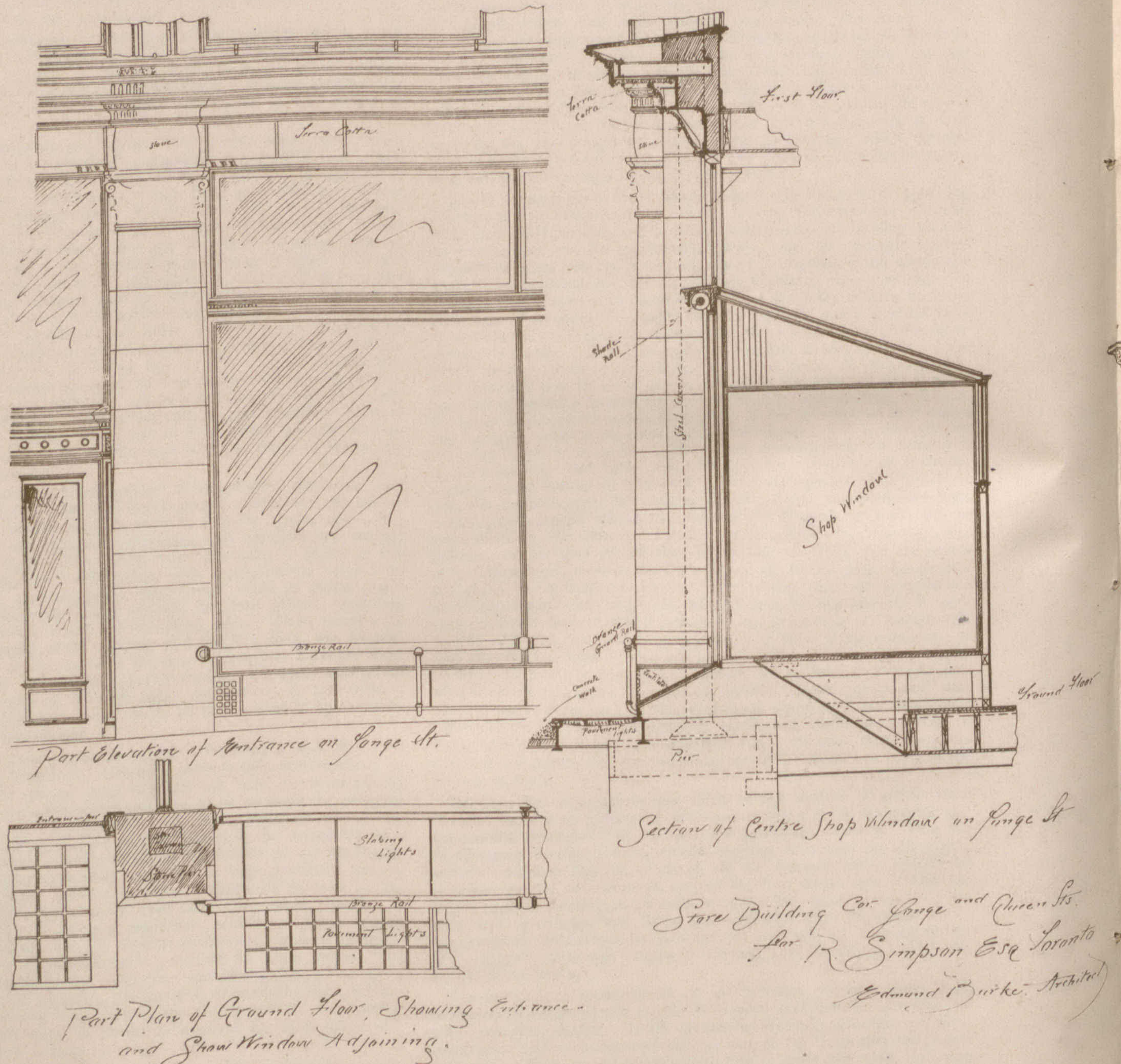
The 28th annual convention of the American Institute of Architects was held in New York in October last. The membership of 475 Fellows was reported the same as the preceding year, the increase having exactly equalled the falling off. The chapters of the Institute number 26, with an aggregate membership of about 600. A most important amendment to the by-laws was passed. By this amendment, an architect, in order to become a member of the Institute must first join one of its chapters, and every practising member of a chapter must become a member of the Institute. There is quite a possibility of friction arising out of this state of affairs, as some of the local bodies, notably the Boston chapter, have a greater voting strength outside than inside the membership of the institute. The two most important reports presented at the convention were, that on Education through Mr. H. Van Brunt, and on Competitions through Mr. Geo. B. Post. The report on education is a notable production of literary merit, and will repay a careful perusal, as it advances several good suggestions regarding the present phases and necessities of a proper architectural education. An important measure in the interests of architecture is now before Congress. It is known as the McKaig bill, and deals with the much vexed question of the preparation of designs for the government buildings. Under it a commission is to be appointed by the President, consisting of a board of two government engineers and three architects of high attainment and large practical experience. This Board is, in the case of buildings costing less than $100,000, to select an architect without competition, employing him to prepare the designs, working drawings and specifications. In the case of buildings costing more than the above amount, the Board is to inaugurate a limited competition, selecting at least five firms, and all competitors to be paid at the rate of one-tenth or 1% on the estimated cost of the building. It is fully expected that the inauguration of this departure from the present method will mark the commencement of a new and brilliant era in the character of government buildings in the United States.

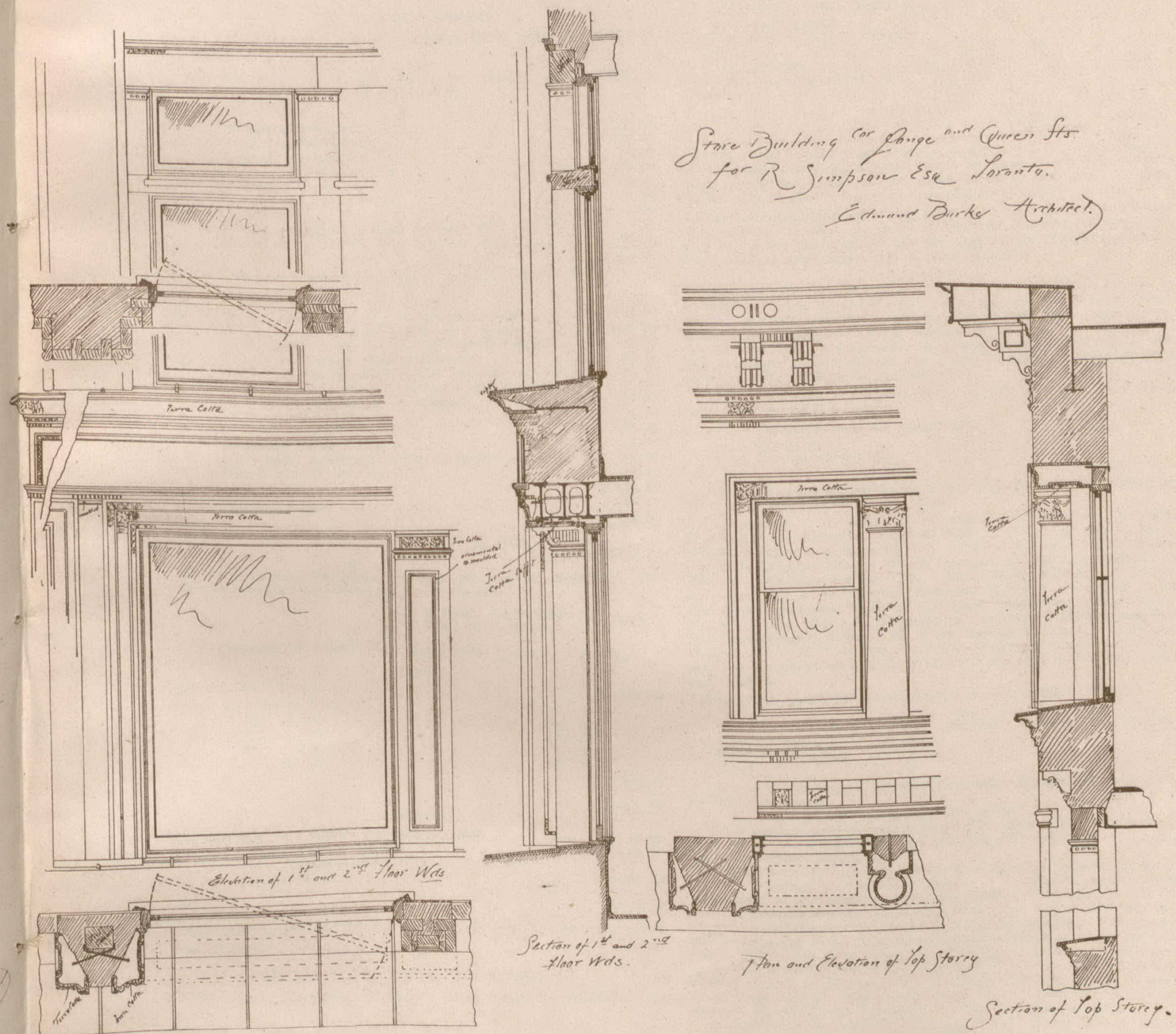
It will be seen from these brief outlines that the English speaking societies of the architectural world are making the education of architects their chief business. The British societies are all looking towards an educational test for membership; they, with the strength gained through numbers, are conducting classes with progressive and systematic studies and examinations which are yearly becoming more exacting. In addition to the work of the societies, most of the large centres have the advantage of splendidly equipped technical schools, many of which have special classes for preparing students for the examinations of the architectural societies. The University of London is also abreast of the times, having a chair of architecture ably filled by Mr. T. Roger Smith. Our association is to some extent following the lines of the English societies in regard to examinations, preliminary, intermediate and final, the latter admitting to membership; but, so far, through lack of means and strength, without the establishment of classes. The Americans, on the other hand, have, so far, instituted no examinations for admission to membership, and have not, through their chapters or institute, organized any system of classwork. The development of architectural departments in many of the United States colleges, however, has been very marked, largely taking the place of the English methods, and in some of them the courses of study have become very thorough, the influence of the Paris school being predominant. This, with the return of American students from the Paris Ecole de Beaux Arts, has greatly stimulated the spread on this continent of that phase of Renaissance architecture which has long been the fashion in Europe and which bore such abundant fruit in the buildings of the great Fair at Chicago. A Society of Beaux Arts has been organized in New York, composed of men who have studied in the Paris school. The primary object of this society is to preserve among its members the traditions of the French school and to propagate its methods in the United States and thus educate the younger men in the profession along its lines. Quarterly competitions have been established, conducted similarly to those in Paris, and open to all students of architecture. Several of the members have opened ateliers and conduct them on similar models to those of the patrons in Paris.

But from the expresssions sent forth by the leaders of architectural thought, there is an evident movement towards a more thoughtful and appropriate treatment of the architectural problems of to-day. They are depreciating the selection and slavish copying of certain historic styles, and yet insisting that the study of all the historic styles should be systematized and co-ordinated, not, as Mr. Van Brunt says, "with the minute patient scrutiny of the archaeologist; but with the spirit of the artist seeking to learn how forms and ornament were developed out of the genius of civilizations and peoples and how, as they were significant of the progress of human culture in the past, they should be used in the service of modern art."

The need of our architectural era is therefore without doubt such education in design as will enable us to make architecture as a fine art keep pace with science. In the mediaeval times the scientific practical constructor and the artist were one person; in our times they are practically two. Must we not at least learn how to unite the two into one with our new problems and new materials? Engineering needs to be converted into architecture and the architecture of the near future must therefore be made to conform to this new character. Practitioners engrossed with the details of business are too busy to solve these problems or to enter into the study necessary to satisfactorily solve them without a long process of evolution, with many hideous examples and failures on the way, as we are witnessing in the high structures of to-day. The schools then must needs help us with, to again quote Mr. Van Brunt, "a much more scientific co-ordination of precedent, a much more philosophic analysis of the architecture of the past than is secured by our present methods of education."

I must not close without reference to the severe visitation of fires which has caused such a stir and comment in Toronto during the past few days. Advantage should be taken of the occurrence by all architects to inculcate and advocate the necessity of erecting a more solid class of structure in the business districts. It may not be possible to accomplish this with clients who are anxious to erect the largest buildings for the least money; but we can at least lend our aid to the enactment of more stringent building laws and the enforcement of closer and more intelligent inspection of buildings under course of erection. It seems to me that the chief


Part Elevation of Entrance on Yonge St.
Section of Centre Shop Window on Yonge St
Shop Window
Part Plan of Ground Floor. Showing Entrance and Show Window Adjoining.
Store Building Cor Yonge and Queen Sts. for R Simpson Esq Toronto
Edmund Burke Architect


Store Building Cor Yonge and Queen Sts. for R Simpson Esq Toronto.
Edmund Burke Architect
Elevation of 1st and 2nd Floor Wds
Section of 1st and 2nd Floor Wds.
Plan and Elevation of Top Storey
Section of Top Storey.

lessons to be learned from an examination of the burned structures are :—The necessity of thick walls, including party walls; the resting of wooden joists wherever practicable, on corbelling, instead of the ends being built into the wall; the necessity of fire-proof shutters on all openings which are exposed to risk of fire from adjacent premises; the unreliability of steel unless thoroughly protected from even a moderate degree of heat, and the necessity of fire-proofing all business premises which exceed a height of about seventy feet.

And now I will not detain you farther from the business for which you have met than to say, that I hope we may enjoy our annual reunion; that the papers and addresses may be as beneficial to the hearers as they have doubtless already proved to those who have so kindly prepared them; that our criticisms and remarks may be uttered in the spirit of frank brotherly kindness, that the occasion may be one of refreshing to us all, and that we shall be encouraged to enter upon another year with fresh impulses towards the highest development of our powers in our noble calling, and with a firm resolve to observe the golden rule in all our dealings with one another.

TREASURER'S REPORT.

The Treasurer, Mr. H. B. Gordon, then read his report as follows :

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

Dr.

1894. Jan. 1	To balance from 1893	$1,930 50
Dec. 31	Members' Annual Fees	217 00
"	Members' Registration Fees	75 00
"	Students' Registration Fees	42 00
"	Students' Examination Fees	16 00
"	Sale of Examination Papers	1 25
"	Library Fines	1 00
"	Interest on Registrar's Bank Account, 1893	2 35
"	Interest on Treasurer's Bank Account, 1894	69 73
		$2,354 83
	To balance forward to 1895 ...... $1,780 00	

Cr.

1894. Dec. 31	W. A. Langton, one year's salary as Librarian	$ 100 00
"	W. A. Langton, one year's salary as Registrar	200 00
"	W. A. Langton, one year's disbursements (1894)	42 27
"	Travelling expenses, Members Council	19 54
"	R. W. Gambier Bousfield, fees as Examiner and Sec'y	51 12
"	Caretaker, Sch. P. S., re Convention and Examinations	15 00
"	H. Webb, Luncheon for Convention	17 00
"	W. R. Butcher, Typewriting	2 70
"	C. H. Mortimer, Printing	81 75
"	Bingham Printing Company	3 00
"	Curry Bros., printing Examination Papers	25 00
"	Hart & Riddell, Stationery	17 45
		$ 574 83
"	Balance on hand	1,780 00
		$2,354 83

H. B. GORDON,
Treasurer O.A.A.

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

HENRY LANGLEY,
WM. R. GREGG, } Auditors.

STATEMENT OF ASSETS AND LIABILITIES, JANUARY 1ST, 1895.

Assets.

Cash Balance in Bank		$1,780 00
Unpaid Membership Fees,		
1891, 9 Fees	$ 42 00	
1892, 21 Fees	270 00	
1893, 52 Fees	182 00	
1894, 98 Fees	334 00	
		828 00
		$2,608 00

Liabilities.

Half year salary of Librarian due Jan. 1st, 1895	$ 50 00
Proportion of Registrar's salary due (Half year due February 19th, 1895.)	74 20
Balance	2,483 80
	$2,608 00

On motion by Mr. M. B. Aylsworth, the Treasurer's report as adopted.

REPORT OF REGISTRAR AND LIBRARIAN.

Mr. W. A. Langton, Registrar, then read the following report :

REPORT OF THE REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 15, 1895.

Members.

The following is the state of the roll of membership of the Association :—

Membership on December 31st, 1893—

Resident Members	65	
Non-resident	70	
Residing out of the Province	4	
Total		— 139

The names of four resident members who had left the country were omitted from the printed register of 1894. One resident member subsequently resigned and a non-resident member died. There were three resident members registered in 1894, and one member residing out of the Province. The roll of membership on Dec. 31st, 1894, therefore, was as follows :—

Resident members	63	
Non-resident	69	
Residing out of the Province	5	
Total		— 137

The status of members with regard to the annual fee is as follows :

In good standing	35
Honorary	1
In arrears for 1894	49
" " and 1893	31
" " " and 1892	12
" " " " and 1891	9
	— 137

The classification of members with regard to the grading of fees, and the amounts of fees due and paid, are as follows :—

CLASSES.	No.	Fee.	Amount Due.	No. P'd.	Amount Paid.
I.—Practising in York County, 5 years and over	53	$5.00	$265.00	9	$45.00
II.—Practising in York County, under 5 years	4	3.00	12.00	4	12.00
III.—Practising in cities outside of York, 5 years and over	34	3.00	102.00	7	21.00
IV.—Practising in cities outside of York, under 5 years	2	2.00	4.00	2	4.00
V.—Practising in towns, villages, etc	23	2.00	46.00	4	8.00
VI.—Civil servants	13	2.00	26 00	4	8.00
VII.—Not practising in Ontario	7	2.00	14.00	3	6.00
Honorary	1	....	....	...	....
	137		$469 00		$104.00

NOTE.—The number of members in Classes II. and IV. is variable, and is established by application for the rebate by those who are entitled to it when paying their fees. In the above list the number fixed for these classes is the number of those who have paid the reduced fee in 1895.

Of fees overdue at the end of 1893 there have been $113.00 paid during 1894, making the total payments of fees from members during the year $217.00. There have also been four new registrations and one registration fee of last year, which comes into this year's accounts.

Students.

Seven new students were registered during the year. There are now 92 students on the list, but of this number there are less than 50 with whom I can feel reasonably sure that I am in actual communication. Some are not in the country; some are, I think, engaged in other work; some I hear of as practising, having abandoned or postponed the idea of registration. But their indentures are still with me, and I have received from them no notice of their withdrawal from the Association.

Classified according to the examination required of them, the roll of students is subdivided as follows :—

For first intermediate examination	14	
For second " "	27	
For final examination	51	
		— 92

Of the 51 students who must pass the final examination before registering there are 45 who have served their time.

The members of the Board of Examiners are :—Professor Galbraith, Principal of the School of Practical Science Chairman; Mr. C. H. C. Wright, Lecturer in Architecture of the School of Practical Science, Examiner in Mathematics, Graphic Statics, Strength of Materials, Nature and Property of Building Materials; Mr. Edmund Burke, M.O.A.A., Examiner in Design; Mr. R. W. Gambier Bousfield, M.O.A.A., Examiner in the History of Architecture, Technical Terms and Architectural Jurisprudence; Mr. S. G. Curry, M.O.A.A., Examiner in Foundations, Heating and Ventilation and Sanitary Science; Mr. Frank Darling, M.O.A.A., Examiner in Design; Mr. S. H. Townsend, M.O.A.A., Examiner in Elements of Construction, Structural Iron Work, Practical Knowledge of Building Trades and in Design.

There were 13 students examined this year, with results as follows :—

	No.	Passed at first exam.	Passed at supplemental exam.	Plucked.
First intermediate	8	4	2	2
Second intermediate	2	1	1	.
Final	3	2	..	1

There is no supplemental examination granted to candidates who fail in the final examination.

Proceedings of the Council.

The Council, in order to keep down the running expenses of the Association, met only on the day after the Convention (Jan. 18), and on the morning of the present Convention.

In fulfilment of the instruction from the Convention to consider the advisability of calling an occasional meeting in Toronto of members of the Association, or of encouraging the formation of a local branch, it was decided to have two lectures in the course of the year, one to be of interest to the public, and one of a more technical nature for members. The first lecture was given on March 8, at the School of Practical Science, by Mr. Helliwell. The lecture was an expansion of his paper on Current Architectural Styles read at the Convention, and was illustrated by Mr. Wright by a large number of carefully selected views of buildings thrown on a screen by means of the magic lantern. The second lecture was on Graphic Statics, and was given by Mr. Wright on November 16, at the Canadian Institute.

An application was received from the Royal Military College Club requesting that graduates of the Royal Military College be placed on an equal footing with graduates of the School of Practical Science, with reference to the requirements of the Association from its students. The question arose whether the Association has the power to grant such a concession. The matter was referred to the Minister of Education, who decided that it was not within the power of the Association to so enlarge the scope of the Ont. Architects' Act. The Minister expressed himself in favor of granting the concession if found warrantable, and undertook to investigate the character of the work done in the architectural course at the Royal Military College.

Renewed efforts were made during the year to press upon the attention of the Dominion Government the need of an exact method of collecting the customs on foreign plans. Copies of the memorial presented to the Minister of Customs by a deputation from the Association in 1892 were presented again by Members of Parliament representing Toronto. The Controller of Customs replied that the system proposed in the memorial was already in operation.

The Library.

There have been no books added to the Library this year.

The number of lendings was 111, or 41 less than in 1893.

All of which is respectfully submitted.

W. A. LANGTON, Registrar and Librarian.

Mr. Billings took exception to the sense in which the terms "Resident Members" and "Non-Resident Members" were used in the report. He thought the Association being a Provincial one, that all members residing within the Province should be termed resident members, and not only those living in the City of Toronto and the County of York.

Mr. Townsend said the use of the word in that way was merely an error, which had no doubt occurred in the endeavor to distinguish between members residing within the City of Toronto and the County of York and those living elsewhere in the Province. He felt sure there was no intention on the part of the Toronto members to regard themselves as the only resident members.

The Registrar stated that the term referred to had been used in the by-law governing the classification of members, which was passed by the Council, and had in that way come into use, but he never made use of it in sending out notices in regard to the payment of fees, &c., without feeling its inappropriateness.

The President said he had no doubt if it was felt by the meeting that a change in this particular was desirable, the Council would willingly make it.

On motion by Mr. Aylsworth, seconded by Mr. Gibson, the report was adopted.

Mr. Paull expressed his appreciation of the comprehensiveness and instructive character of the President's address, and desired to call attention to some points referred to in it which he considered of great importance. One of these was the allusion to what was being done in Montreal in the appointment of a committee to look after monuments, &c., and to impart a more aesthetic spirit to the way in which such works were designed and carried out. Such a committee of architects, he thought, would be of great advantage to Toronto in the way of inducing authorities, where opportunity offered, to widen our streets and give open spaces such as were found in Detroit and other American cities. The President had also referred to the London competition. It was understood that in that competition there had been very considerable variation from the instructions issued, and he thought it would be well if the Ontario architects would take the practice of English architects as their example in that respect.

In a competition for civic buildings in Birmingham, England, some twenty years ago, the umpire, Mr. Waterhouse, declined to give the award to the plan which he thought had most merit simply because it departed from the instructions in the fact that a bridge not called for by them connected the public buildings and the new hall. A different system from that prevailing here was adopted in England regarding the premium given competing architects. In the case of the law offices they offered a premium of £1,000 to each of ten or twelve architects for their plans, and paid the one whose design was chosen, five per cent.

Mr. Tully said that before the discussion closed he desired to refer to the recent fires that had taken place in Toronto. He thought the civic authorities had made themselves subject to adverse criticism by the changes made in the fire by-law regarding the thickness of walls. After the great fire of 1849 the corporation asked the architects of the city to frame a by-law and he had been one of the architects on that occasion. After a full discussion of the matter, extending over a month, a by-law was framed by the architects and adopted by the Council, and remained in operation for a few years, but through the pressure brought to bear by speculative builders and others interested in putting up inexpensive buildings, this by-law was eventually amended, and had been at different times since amended in a way not at all in the public interest. Had the by-law framed by the architects remained in force he had no doubt much loss would have been saved to both owners of buildings and insurance companies. He thought it would be well before the convention adjourned to adopt a resolution calling attention to these facts, and offering, if the Corporation would refer the matter to the Association, to frame a new by-law, or suitably revise the existing by-law regarding building and fire limits in such a way as would prevent a recurrence of the late calamities. He thought such an offer would convince the citizens that the Association had their interest at heart, and if a proper by-law was framed it might be adopted not only in Toronto, but in other cities in the Province, and thus decrease the loss by fire now sustained by the community. He was much pleased with the manner in which the matter was alluded to in the President's address.

Mr. Gordon said that the matter had been alluded to at the meeting of the Council in the morning, and before the convention adjourned a resolution very much along the lines suggested would be submitted.

The President remarked upon the great pleasure he, and he was sure all the members, felt in having among them to-day Mr. Tully. When Mr. Tully referred to the year 1849, most of the members would realize that that was before they were born. In regard to the proposed revision of the fire by-law, he would say that two or three years ago the Toronto Architectural Guild was asked to appoint a couple of members to co-operate with a commitee from the City Council in regard to that matter. The work of the committee, however, was so intermittent, and the gentlemen from the Council appeared to know so much more of the subject than the architects, that many of the suggestions made were ignored, and the architects never saw the revised by-law until it was printed, and therefore could not in any way be held responsible for the inadequacy of the present regulations. It was the intention of the Council of the Association that the matter should be brought to the attention of the Mayor and Council.

Mr. Tully did not think the Association should consent to act in conjunction with persons not professional men in this matter. The City Council should refer the whole matter to the Association, who would draw up an amended by-law and send it on to the City Council as what they recommended. If that body then chose to amend the by-law the responsibility would rest upon them. He thought it would be most objectionable for the members of the Association to be placed on a committee of laymen, with whom they would have to wrangle in regard to the matter. He felt sure the public at large would support the architects in any by-law they would frame.

Mr. Paull thought the matter was one of the highest importance, and that it was imperative that some such action as that proposed by Mr. Tully should be taken, and he had prepared a memorandum dealing with the subject which he would read. "The recent experiences in this city in regard to the large fires; the great loss of property by owners; the great loss by insurance companies; the great and providential escape by the falling of snow from even greater calamities—but for snow we might have had a similiar experience to Chicago and Boston. Now a very important question arises, what is to be done for future protection against fire in Toronto? The answer to this question is a problem worthy of solution by the architects of the Ontario Association. No doubt with proper precaution and watchfulness much danger may be avoided. Outside of the buildings themselves there exist some means of salvation, as for instance, the procuring by the City Corporation of suitable and effective steam fire engines; the substitution of larger mains than those now in use, as recommended by Mr. Keating, the City Engineer. More care should be taken by the fire insurance agents themselves; more watchfulness by selected nightwatchmen, by the warehouse men and others of Toronto. But the erection of the buildings themselves is what more immediately concerns the architectural profession, so as to have all the available safeguards that can be possibly and prudently introduced during the erection of such buildings for the best protection against fire.

"First, as great care as possible to be taken by isolation from the surrounding buildings either in space or by effective outside walls.

"Second, the introduction by the Corporation of Toronto of the London (England) Building Acts as to brick walls and other building appliances now in operation in the largest city in the world.

"Third, great care in the selection, as far as possible, of indestructible materials, and such as will stand the action of great heat and steam.

"Fourth, greater introduction of hydrants into any newly erected buildings.

"Fifth, careful general supervision.

"Sixth, special care in the heating and ventilation.

"Seventh, introduction of new methods by the architectural profession, such as automatic apparatus, &c."

Mr. Tully, while agreeing that Mr. Paull's remarks were practical, considered that in any action it might take, the Association should confine its attention strictly to buildings. As an engineer he had his own opinion on the question of water mains, and he thought that defective methods in introducing electricity into buildings was a source of danger, and might possibly have been the cause of the recent fires, but these were matters which should be dealt with by the engineers and electricians. He did not think the insurance companies appointed proper surveyors when insuring buildings, many of them being men having no knowledge of architecture, and he could not believe that any man without that knowledge or a practical knowledge of the value of material could make an accurate estimate.

NEW BUSINESS.

The President invited the Association to consider the suggestion thrown out in his address in regard to an exhibition of architectural drawings annually.

Mr. H. B. Gordon, in order to bring the matter before the Association, moved "that it be a recommendation to the incoming Council that it is desirable to have an exhibition of architectural drawings held in Toronto at the time of the Industrial Fair, or about that time, when cheap railway fares would be an inducement to outside members to come in."

Mr. Harper seconded Mr. Gordon's resolution.

Mr. Billings (Ottawa) called attention to the fact that such an exhibition was a feature of the meetings of the Royal Academy. Though poor, so far as numbers were concerned, the exhibit was good in quality.

The Registrar suggested the holding of the exhibition in connection with the annual exhibition of the Royal Canadian Academy.

Mr. Billings approved of the suggestion, the more so that the Canadian Academy, like the Association, was "a struggling industry."

Mr. Gordon expressed his willingness to so amend his motion that the exhibition could be held at the time of the Canadian Academy's exhibition.

The motion as amended was then carried.

The Registrar said that, beginning at Chicago, and taken up in Montreal and Quebec, a movement was on foot for the formation of societies to have the supervision of the ornamentation and laying out of those cities. He thought the Association ought to keep this in view, and inaugurate some similar action in Toronto. It might be some time before such an association was thoroughly recognized by the city, but he moved that the Council of the Association be instructed either to communicate with the City Council, with a view to establishing, if possible, such an association, or to consider how best to form such an association as would be recognized by the City Council.

Mr. Townsend, in seconding the motion, said he considered it a matter of very great importance that some standard of good taste should be established in connection with the matters referred to, and he could see no other way of establishing it than by the formation of such a body as suggested.

Mr. Paull agreed as to the importance of the suggested step, and instanced the proposed utilization of the Old Upper Canada College grounds as a hotel site as a matter in which such a society might find something to do. There was no site in the city better adapted for making a display worthy of it, similar to the Champs Elysee in Paris. The tendency in Toronto seemed to be towards covering every open spot of ground with buildings. If the promoters of the hotel project, instead of putting the hotel in the east end, would contribute $100,000 more and place the hotel in the centre of the block, there would be room for ornamentation. Unless something was done very shortly this opportunity would be lost.

Mr. Gregg thought that too much was being put into the hands of the Council, and that the present matter was one in which the Association as a whole was interested. Would it not be well to leave it in the hands of a committee of the Association residing in Toronto?

The President suggested that there were other places besides Toronto in which such action as was proposed might be desirable. A committee might be formed, representing all the cities of the Province, who would be in close touch with each other. He thought that a pronouncement on this subject coming from the Association would have much weight, and there was no reason why the movement should be restricted to Toronto.

Mr. Townsend was of the opinion that a representation coming from the Association as a whole would carry more weight than one from a local committee.

Mr. Aylsworth favored Mr. Gregg's view, because the Council met so seldom that it had little time in which to deal with such matters, and the Council did not seem to be very well known to the public. Instead of attempting anything so ambitious as the plan in connection with the hotel, he thought much might be effected in a smaller way to the advantage of the city. For instance, at the head of Bay St., opposite the new city buildings, the corners might be cut away to give an open area, and a fountain or statuary placed in the vacant space. Something of the same kind might be done at the corner of King and Yonge Streets, as it would not cost very much, now while the old buildings remain, to acquire the two north corners and cut them away, leaving a resting spot in the centre.

Mr. Gregg moved in amendment that the Council appoint a committee of members to consider the question of forming a larger committee of citizens.

Mr. Gouinlock thought the matter was one which could be better handled by the "Guild" than by the Association; he was unable to see in what way outsiders were interested in it.

Mr. Paull provoked some laughter by inquiring, "What is the Guild?" or "Who are the Guild?" He had supposed that when the Association was formed the Guild was at an end. He felt assured that action taken by the Association would be more effective than if taken by the Guild.

Mr. Wickson expressed himself in favor of action being taken by the Association rather than by the Guild. He did not think it well for the latter body to bring itself before the public.

Mr. Gouinlock said that leaving the Guild entirely aside, the matter was one of interest only to city architects; it was something referring to the City of Toronto, and not the Province at large.

Mr. Wickson dissented from that view. Other cities in the Province were interested both in the matter of improved fire bylaws and more systematic ornamentation of their open spaces.

The President thought Mr. Gouinlock misapprehended the object of the Guild. That body had no more to do with Toronto than the Young Liberal or Young Conservative Clubs, as it held its meetings merely for social objects. He thought, with the Registrar, that action by the Association as a whole would have more weight. He could see no reason why there should not be a committee having sections in different cities. There was no need of frequent meetings, as action could be had as a result of correspondence.

At the suggestion of the President, after a little further discussion, the following committees were appointed on motion of the Registrar, seconded by Mr. Townsend, to prepare resolutions and report to the Association to-morrow:

On the fire by-law: Messrs. Tully, Gordon and Burke.

On the city ornamentation: Messrs. Billings, Baxter, D. B. Dick, W. R. Gregg, A. A. Post and W. B. Aylsworth.

Mr. A. H. Gregg called attention to the apparently decreasing popularity of the examinations of the Association, there being only 13 students who presented themselves at those held last year. He thought all would admit that the examinations were one of the chief bulwarks of the Association, as they fixed the standard they were attempting to raise. He thought that some tangible recognition in the shape of a diploma given to those who had already passed the examinations, as well as to those who might be successful in passing them in the future, would be an incentive to students to come up to them, and therefore would move, "That diplomas be granted to all students who have passed the final examinations up to the present time, and also to those passing them in the future."

Mr. Baxter seconded the motion.

The Registrar said he had some time ago received a letter in regard to this matter from the mover of the resolution, and it had been spoken of at the Council meeting in the morning, the only question being as to the expense of getting up a diploma of such artistic merit as would be creditable to the Association. He himself thought the idea a good one.

Mr. Billings, referring to the objection of the expense, said that in the civil service men had to pay $7 for their commission, and similarly, a charge might be made for the proposed diploma.

The President asked in the event of non-payment of fees or for other sufficient cause, the diploma, if given, could be withdrawn?

To this there seemed to be a general dissent.

Mr. Wickson thought it a feasible plan to make a charge for the diploma as suggested. He had been surprised to learn that in the medical profession, in certain hospitals at St. Louis, even when medals were earned, they were not given out until a certain amount was paid for them.

Mr. Gordon threw out the idea that one item of the expense be reduced by holding a competition among the members for a suitable design, which would leave only the mechanical part of the work to be paid for.

The motion was then carried.

Mr. Aylsworth said there was a matter rising out of the minutes regarding which he wished to speak. It appeared from the Librarian's report that, while the annual expense of his department continues as usual, the number of books called for had so declined that each loan cost the Association something over a dollar, besides the first cost of books, &c.

Could we afford to be so generous to the few members or students who seemed to appreciate or desire the books?

At a former meeting he had questioned the wisdom of founding a library which must remain so weak and unattractive, and that view had now been confirmed. There is a much more valuable collection of architectural works in the Toronto Public Library, free to all. The library of the Provincial Parliament contains a number also easily accessible, and the School of Practical Science has here a magnificent collection, not only of books, but photographs and plates of everything worthy of study. This collection is growing and is freely offered for our use and benefit. Would it not then be a graceful act to offer the donation of our small library to be added to that of the School?

Mr. Paull depreciated the tendency to despise the day of small things, and could not believe that Mr. Aylsworth was serious in his proposition. Speaking for himself, he would rather give a subscription for the purpose of increasing the efficiency of the library.

Mr. Aylsworth assured the last speaker that he was quite sincere in what he had proposed. It did not seem feasible to maintain a library that would be serviceable to an Association whose members were scattered all over the province. Then again there were so many libraries started in the city that not one of them was what it might be. He would like to see all the books on architecture now scattered in the various libraries brought together where they would be more accessible and consequently more made use of.

Mr. Helliwell seconded Mr. Aylsworth's motion, expressing his concurrence in the views of that gentleman regarding the desirability of concentrating the works on architecture now scattered in different libraries in some one place at which members of the Association might avail themselves of them for reference, and could also have the privilege of taking them out if necessary.

The Registrar reminded the members that as the Association held examinations, it ought to have a library that at least embraced all the text books necessary to the examinations. The lack of these books had been made an excuse for not coming up for the examinations.

Mr. Paull stated that he had learned from the chief librarian that the medical books in the reference department of the public library had been handed over to the medical profession and he thought proper action and representations would result in similar action by the architectural works being handed over to the custody of the librarian of the Association.

Mr. A. H. Gregg thought the committee should consider the desirability of enhancing the utility of the library rather than wiping it out of existence.

The President said he understood Mr. Aylsworth's motion to be that the committee should consider the propriety of doing away with the library.

Mr. Aylsworth said his motion was that the committee should take into consideration the subject of the library, and bring in a resolution to deal with it one way or the other.

The motion was then carried and the President nominated the following committee to consider and bring in to-morrow a report concerning the future of the library: Messrs. Aylsworth, Wright, Wickson and A. H. Gregg.

Mr. Aylsworth then read a paper entitled "A Chapter from my Note Book—Building Methods in Rome," which will appear in our March issue.

The President asked how the vaults referred to by Mr. Aylsworth were held together.

Mr. Aylsworth presumed they were built a good deal in the same way as bakers' ovens. In the case of a room 15 feet square or thereabouts, a scaffold might be erected and covered with sand and the vault formed over that. In some cases they were of brick work, but not at all carefully done, seeming rather to depend on the strength of the mortar.

The Registrar stated that the Italian vault was something he had had an opportunity of seeing something of, having been shown through a mansion at Florence, owned by an American, who had described to him the way in which it had been built. Every floor was vaulted with an elliptical brick vault. The walls were not very thick, as even the top floor, which was unused, had the benefit of a good deal of vertical wall. It had occurred to him that the process was one which might be adopted in other countries, even our own. The process of vaulting, as described to him, was to outline on each wall with chalk the form the vault was to take; then to mark the courses on these outlines and stretch strings across, laying the courses to the string as in ordinary walling. Every third or fourth brick was propped up by a stick from the platform the bricklayers were working from, until the course was completed and held itself. The bricks were not laid as in an arch, but edge to edge, and as the Italian brick is thin the vault was not more than two inches in thickness—and this over quite a large room. The moment the last brick was in, while the mortar was still new, the workmen got on the back of the vault to continue building. On one occasion a derrick pole had fallen and broken through the crown of each floor, but only made a small hole. If fire-proof building is to be talked about a construction of this kind might well come in for consideration.

Mr. Aylsworth said there was no reason why we should not have fire-proof buildings, using concrete more than we do. He believed in California they used concrete beams in which sufficient iron rods were laid and the concrete floor laid at the same time.

SECOND DAY.

The convention resumed its session at 10 o'clock a. m., when Mr. D. G. Baxter, of Stratford, read a paper on "Points on Acoustics," which will be printed in a later issue.

At the close of Mr. Baxter's reading the President called on the members for any remarks they might have to make on the subject, and the Registrar suggested that the President, having a wide experience in the erection of churches, would be able himself to give the convention some valuable information.

The President said one method he had found very effective was to have a flat wall behind the speaker. He had known instances where by reason of an octagon form behind the speaker, the echo had been such that he could hardly be heard, and this was in a great measure remedied by cutting off the octagon.

Mr. Wickson enquired if there was not some theory about the ellipse being the most perfect form; he had been given to understand that it was, although he had not found any authority for the statement.

Commander Law remarked that the Mormon Temple at Salt Lake City, Utah, was said to be almost perfect in its acoustic properties, and was shaped like half an egg.

Mr. Edwards added that the form of the pavilion at Grimsby Park was suggested by the Mormon Temple referred to by Commander Law, but although, as that gentleman had said, the Salt Lake building was believed to be acoustically the most perfect on the continent, the Grimsby imitation bore the reputation of being the very worst in that respect.

Mr. Wickens said he had heard it remarked by a musician that any building which was good to speak in was poor to sing in. It seemed almost universal that a church or any building which pleased singers was not one that pleased speakers.

The Registrar suggested that if the choir was placed in a recess of resonant wood above the level of the speaker, he would not be effected.

Mr. Baxter said the objection to seating the choir in a groined recess behind and above the speaker was, that it formed a volume of air behind him which he had to maintain in vibration all the time he was speaking and which weakened the sound. The higher the recess could be raised behind the speaker the better. He had noticed one church in which the chior was directly above the speaker, the front of the chior gallery being brought out about four feet, the under side of it forming a cove, which to a great extent kept the sound vibration directed from him out to the audience, and leaving a clear and sympathetic vibration which did not affect the main church at all.

Mr. Edwards agreed with the essayist that it was difficult to formulate any definite laws on the subject of acoustics; it was a case in which "doctors differ." The whole theory of wave sound was doubted by some, who adduced very good reasons in support of their unbelief, contending that it takes so much effort to set in motion the atmosphere which is the means of communication, or which is the matter on which the wave sound has to act. As an illustration of that they contended the distance the sound of a grasshopper is heard would require tons of power to produce the wave sound at such a distance if the wave theory were correct. That being the case, it was necessary to look carefully at the beginnings on this subject, and to avoid building up any superstructure before the foundations were securely laid, and he thought the foundations of the matter required some further negotiation yet.

Mr. Geo. Browne (of Winnipeg) related his experience of a church in Winnipeg which on account of its great height was very defective in acoustic properties, and in which it was almost impossible to speak effectively. It was at last decided to take down the building and re-erect it on the same foundations, but with the height greatly reduced, and after that was done the pastor stated that whereas the old church was one of the very worst he had spoken in, after being so rebuilt it was one of the very best. He thought this demonstrated that not only length and width, but height also, had a very important bearing on the subject of acoustics. He had this summer completed a Presbyterian church, which was built exactly square, about sixty-five feet square, in which he had adopted the American system of placing the preacher in a corner. It had a gallery on two sides and coved plaster ceilings, and the tie beams formed deep panels in the ceiling. The result had been one of the finest buildings for speaking in the city, so much so that whenever religious meetings were held requiring a building with good acoustic properties, the persons interested tried to get this church to hold them in. In the Convocation Hall of Manitoba College they had a hall 65 x 35 feet, and he was told by the principal that he found no difficulty whatever in speaking in it. There was a gallery at one end of the room and a coved ceiling. From his experience he believed that the coved ceiling aided very materially in causing the sound to travel freely throughout the hall.

Mr. Wickson asked if a coved ceiling at the end of an audience room opposite the speaker had the effect of causing an echo.

Mr. Browne said he always continued the cove all around the building; he thought it reflected the sound.

Mr. Baxter said he had observed in nearly all the Chicago buildings that the cove on the rear wall was far deeper than around the sides, in fact they drew the cove line right round so that the entire body of sound was directed right down, and there was no chance for the formation of an echo, whereas, if there were any straight line between the curve and the floor of the gallery, it would not have so good an effect.

Mr. Paull said an important matter was what should be the limit of size in a church in order to secure proper acoustic qualities. He had heard it said that 1200 persons was the greatest number that could be accommodated so that the preacher could command their hearing. The church in Winnipeg spoken of by Mr. Browne as 65 feet square would have about that capacity. He would like to ask Mr. Browne how the extremities of the panels in the ceiling of that church were finished? Were they coved at the ends.

Mr. Browne stated they they were finished simply by running up a false rib. The tie beams came across and then they ran them down on the cove to a small projecting cornice.

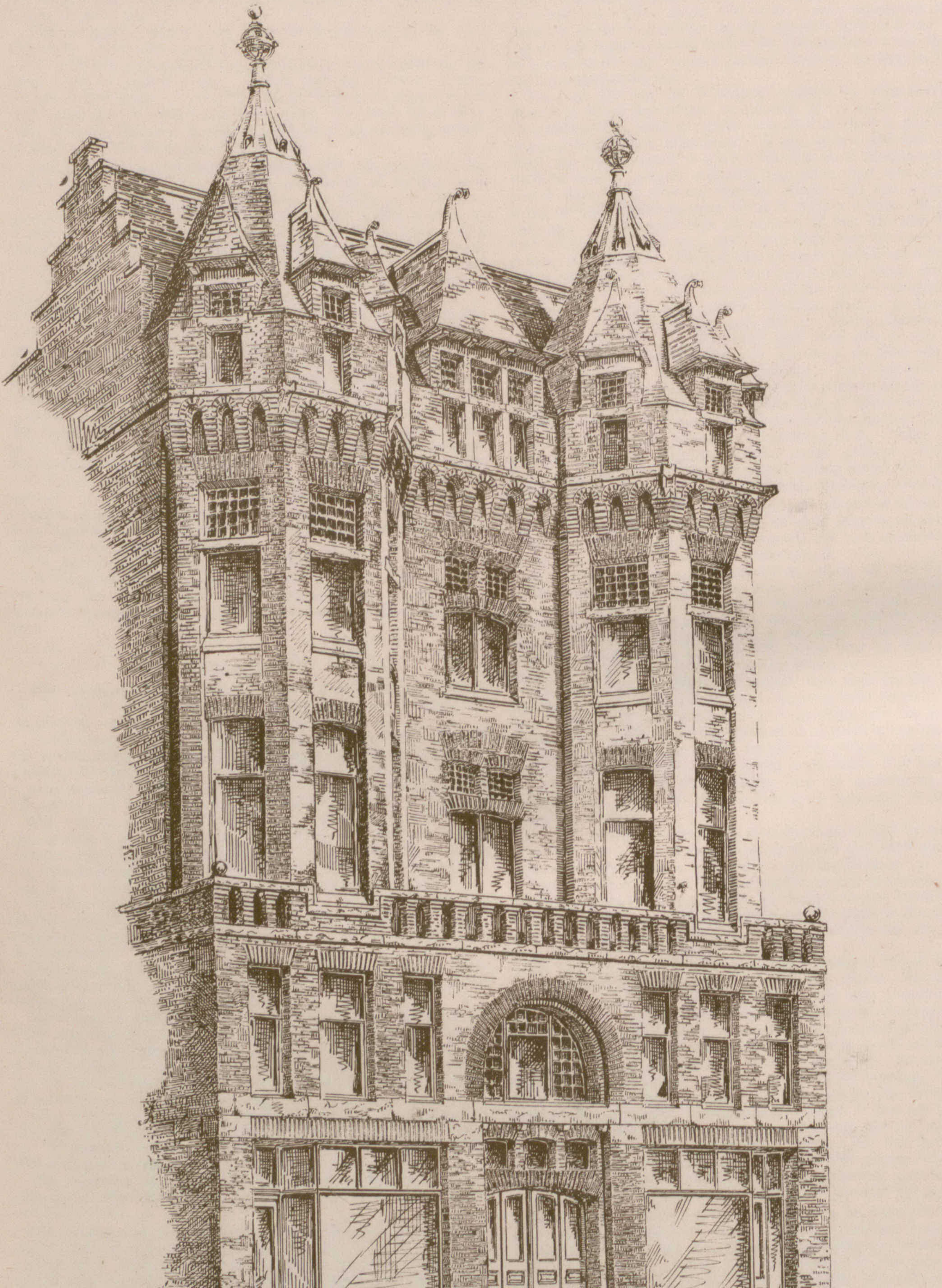
The President stated that in regard to the remarks of Mr. Edwards about the grasshopper, he thought it was necessary to take into consideration the number of vibrations in the air; he supposed the more rapid the vibrations of the air the more penetrating the sound would be.

Mr. Edwards said he had not the confidence in coved ceilings that had been expressed by some of the members. He had in his mind a large room or auditorium which was almost as bad acoustically as the Grimsby temple, the ceiling of which was very deeply panelled and with a very extensive cove and all the other features which had just been pronounced of no great advantage. It was really a most miserable place to speak in. At one time the platform was placed on the long side of the building, but the echo was so bad that it had to be changed to the other side, which produced slight improvement, though it was not perfect by a great deal yet. These things did not always work in accordance with one's preconceived ideas. He had happened to have a building somewhat similar to the Winnipeg church rebuilt by Mr. Browne, and he had recommended putting in a gallery, which he hoped would remedy the trouble that existed.

Mr. Browne said he regarded a gallery as necessary to secure good acoustic properties in a church. Another matter he wished to mention was that the windows in Westminster church had circular heads, cutting into the cove, just the same as a vault or groin, and he would not at all wonder but that assisted the sound.

Mr. Edwards said one of the best auditoriums he had ever been in, speaking from the acoustic point of view, was the Casino, of New York, which was built very much after the style of the Massey Hall in Toronto, only the recesses were much deeper all round. This had a very beautiful effect from the artistic standpoint, as well as being very beneficial to its acoustic properties.

The President said that in view of Mr. Browne's opinion that a gallery was necessary to good acoustic properties in a church, it would be interesting if any one could tell what had been the effect in St. James Cathedral in this city, from which the galleries



COMPETITIVE DESIGN FOR MASONIC TEMPLE, MONTREAL

J. R. RHIND, ARCHITECT—AWARDED SECOND PLACE.


CHURCH OF ST GREGORY OSHAWA
POST & HOLMES ARCHITECTS TORONTO

had lately been removed. He thought an instance of the detrimental effect on good acoustics of a high ceiling was to be found in the chamber of the Parliament Buildings in Toronto, which was one of the worst rooms possible for hearing in.

Mr. Wickson facetiously suggested that that might be due to the influence of having been designed by an American architect.

Commander Law asked if the Massey Hall was regarded as a good building acoustically, and what effect the "gingerbread" work had on its acoustic properties.

Mr. Edwards said he had no knowledge of the acoustic properties of the building referred to, and had only spoken of it with reference to its structural resemblance to the New York Casino.

Mr. C. H. C. Wright, Lecturer in Architecture at the School of Practical Science, then read an interesting paper on "Portland Cement," which is printed elsewhere in this issue.

A paper was also read by Mr. McCarthy, which, with the discussion thereupon, will be printed in a future number.

Mr. Townsend, on behalf of the committee appointed to consider the matter of the library, presented the following report:

REPORT OF COMMITTEE APPOINTED TO CONSIDER THE STATE OF THE LIBRARY:

Your committee—while recognizing the absurdity of attempting to furnish the members of the Association with architectural books to read, at a cost to the Association of something over one dollar for each reading, feel that to dispose of the library—constituting as it does one of the strongest bonds of union in the possession of the Association—would be a very serious mistake.

They are of the opinion that, notwithstanding the fact that but few members have availed themselves of the privilege of reference to the books, this privilege is of considerable value to many members of the Association, particularly to those members who are so placed as to be unable to make use of the larger city libraries, and therefore recommend that in place of disposing of the library or transferring it to other institutions, every effort should be made to increase its efficiency, both by purchase of additional books—so far as the funds at the disposal of the Council will admit—and by endeavoring to obtain donations from members and others interested in architectural education.

They believe that books of a strictly technical nature being of comparatively little value to persons outside the profession, a properly circulated appeal might result in considerable increase to the library from bequests and donations from members giving up practice. Such an appeal is meeting with a very hearty response in the society of engineers.

The Architectural Association of the Province is unquestionably a most qualified custodian for architectural works of reference which have become public property, and your committee believes that if the Association library becomes properly established and generally used, it is reasonable to expect that other bodies having control of architectural books will transfer them to the Association, just as the Public Library Board has recently handed the medical books of that institution over to the Medical Association.

They would further recommend that until the finances of the Association are in a better condition, purchases should be confined to books necessary to the students in preparing for their examinations, and those dealing with the most modern methods of construction, nature and properties of building materials, and other matters of a practical nature.

In conclusion, they would suggest that the cost of managing the library be reduced to a minimum, and that a circular be sent to all members explaining the conditions upon which the books are loaned.

S. H. TOWNSEND,
M. B. AYLSWORTH,
C. H. C. WRGHT,
A. H. GREGG,
A. FRANK WICKSON.

The President said he had listened to the report just read with more pleasure than to anything else during the present convention.

Mr. Aylsworth moved the adoption of the report, seconded by Mr. Townsend.

The President said he understood it was the intention to send on the report as a recommendation to the Council.

Mr. Townsend replied that was the intention.

The President then asked for discussion on the report of the committee.

Mr. W. R. Gregg suggested that a certain sum of money be each year devoted to the improvement of the library, no matter how small that amount might be.

Mr. Gordon approved of the suggestion, and thought a resolution should be passed to the effect that the yearly revenue over and above the sum necessary for the economical administration of the Association should be applied to increasing the library.

Mr. Townsend thought the recommendation on the subject contained in the report was in better form than that suggested. The Council was certainly in a better position to judge of the financial standing of the Association than the convention could be.

Mr. Gordon thought too many things were being thrust upon the Council, and the members throughout the province consequently felt little responsibility with regard to the work of the Association. He would embody his ideas in a motion that all revenue received by the Association over and above that which is necessary for the efficient administration of the affairs of the Council, should be devoted to improving the library.

Mr. Billings seconded the motion.

The President said the motion could be made after the report had been adopted.

Mr. Power thought Mr. Gordon's remarks pointed in the right direction, and the course he proposed would, as he said, throw the responsibility more on the members, which was desirable in his opinion.

The report of the committee was then adopted.

Mr. Gordon then moved that it be an instruction to the Council that all surplus revenue yearly over and above what is necessary for the efficient and economical administration of the affairs of the Association, be devoted to the increasing of the efficiency of the library.

The President said if there were a surplus of fees over expenses amounting to say $500, it would be rather a questionable proceeding to spend it all on the library.

Mr. Aylsworth said he understood the resolution only contemplated dealing with the revenue of each year. Last year there had been no surplus, but during the coming year it is hoped there would be a small amount.

The motion was then carried.

The members partook of luncheon served in an ante-room of the School of Practical Science at 1 p. m.

AFTERNOON SESSION.

On resuming proceedings at 2.30 p. m., Professor Coleman, of the School of Practical Science, read a paper on "The Weathering of Building Stones," which appears on another page.

Mr. Darling spoke of the peculiar way in which some of the projecting stones in a building erected by him, and in which great care was exercised in selecting the stone, had become damaged, apparently by water soaking through; the exposed surface being perfectly sound and good and the damage occurring where it was perfectly dry. He was unable to understand how the water could soak through.

Professor Coleman inquired if it was a white efflorescence?

Mr. Darling said it was.

Professor Coleman suggested the presence of iron pyrites in the stone.

Mr. Darling stated that it was chosen because of its supposed freedom from iron.

Prof. Coleman expressed his willingness, if furnished with specimens, to endeavor to ascertain the cause of the action.

The President enquired if there was any likelihood of the water soaking through vertically.

Mr. Darling said that was exactly what seemed to have taken place.

Professor Coleman said there must be some soluble salt in it —perhaps a sulphide.

The President had noticed in the Bank of Commerce, that the underside of the Connecticut brown stone of which it is constructed was becoming friable.

Mr. Townsend said there were indications of the same kind in a great many stones in Paris, and the explanation was offered that the water gets into the stone and gets down a certain distance, and not being able to dry out, forms certain salts.

Professor Coleman said unless there was something in the stone that would dissolve that could not happen; there must be some sulphide or something of that kind.

Mr. Power said there was a limestone in Kingston which was affected in the same way, in St. George's Cathedral in that city.

Mr. Billings referred to a similar effect at Ottawa in certain balustrades of Ohio sandstone in the Parliament buildings which had crumbled away.

Mr. Tully said that some years ago his attention was drawn to the yellow sandstone at Osgoode Hall, the balusters at the centre entrance being all decayed away—the surface completely gone. As architect for the Government, it gave him some concern, and he spoke to a painter about it, who invented a paint which was effective in arresting the decay. On finding the paint efficacious he induced the Commissioner to have all the stone work of the building painted with it, because the surface of all the stone was becoming affected in the same way. Some critic in the newspaper had referred to the bad taste displayed in painting the stone work of a beautiful building like Osgoode Hall, but it was a necessity in order to preserve it. He would not advise architects to permit the use of that yellow stone.

Mr. Darling pointed out that in the Molsons Bank and the old Board of Trade building, constructed of Ohio stone, the surface was in almost perfect condition.

The committee appointed to bring in a report in regard to a revision of fire by-laws, then presented a report dealing in detail with several points in which buildings could be better protected from damage by fire.

Mr. Aylsworth was of opinion that some provision should be made that elevators and stairs should be separated as far as possible.

The President suggested as changes desirable in the report the addition of fire proof shutters on all windows above ground floor, on main areas or narrow thoroughfares, and a reduction of the weight to at least 100 pounds for offices, increasing in buildings devoted to mercantile purposes.

Mr. Aylsworth was opposed to the report in its present form being adopted. It might serve as a recommendation or suggestion to a committee who should give it more time than could be spared now in convention.

Mr. Power was in favor of taking more time to consider the matter, so as to prepare a by-law carefully that could not be picked to pieces. He thought the committee in the time at its disposal had done well, but he would like to see a little more time allowed for consideration.

Mr. Symons thought the report could only be regarded as a partial report, and advocated giving the matter further consideration. He moved that the whole matter be referred to a committee of city architects to be named by the President for further consideration.

Mr. Gouinlock seconded the motion.

Mr. Darling thought it advisable to have as wide a discussion as possible regarding so important a matter; he thought too much time could not be expended on it. He felt that in the short time that could be devoted to it now a satisfactory conclusion could not be reached, and he did not deem it wise to adopt the report in its present shape as an expression coming from the whole Association.

Mr. Gregg thought the discussion so far had shown that there were many additional points to be considered, and he supported the motion of Mr. Symons, that it be left to a local committee to consider it in all its respects, including the state of the present city by-law.

Mr. Symons' amendment was then carried.

The President requested the former committee to retain the matter in their hands and to place it in as good shape as possible, and then to call a meeting of the city members to further discuss it.

A paper entitled "Electricity for Architects," was then read by Mr. John Langton, which is published elsewhere.

Mr. Aylsworth then presented the report of the temporary committee on the improvement of cities, approving of the idea and suggesting the appointment of a permanent committee for carrying it out.

On motion of Mr. Aylsworth seconded by Mr. Baxter, the report of the committee was adopted.

The Civic Adornment Committee was then appointed by the President, as follows:

For Toronto, Mr. Aylsworth and Mr. D. B. Dick; for Kingston, Mr. Power; for Hamilton, Mr. Edwards; for Stratford, Mr. Baxter; for Ottawa, Mr. Billings, with power to add to their number.

EXHIBITION OF WORK BY MEMBERS.

A number of slides prepared from drawings and photographs of designs by members were then exhibited by means of the stereopticon, and as the views were thrown on the wall comments were made by the meeting upon points in the design of the buildings. There were about eighty slides exhibited and much interest was shown.

On motion of Mr. Gouinlock, seconded by Mr. Belcher, the thanks of the Association were tendered to Mr. C. H. C. Wright for preparing the slides for the views shown.

ELECTION OF OFFICERS.

Messrs. Post and Helliwell having been appointed scrutineers, the President suggested that it be a recommendation that retiring members of the Council shall not be eligible for one year after their period of service.

Mr. Edwards moved that the Association adopt the suggestion made by the President.

Mr. Gordon seconded the motion, which was carried unanimously.

The election was then proceeded with, and the following gentlemen declared elected as members of the Council: Messrs. F. J. Alexander, of Ottawa, G. M. Moore, of London, and W. R. Strickland, of Toronto.

Votes of thanks were passed to the Minister of Education for the use of the building; to Messrs. Galbraith and Wright and the members of the School of Practical Science for assistance on this and other occasions; to Professor Coleman, Mr. John Langton and Mr. Hamilton McCarthy for their valuable papers.

The convention then closed.

THE DINNER.

Following their usual custom, the Toronto members of the Association gave a dinner in honor of the non-resident members. The event took place this year at McConkey's restaurant, at the close of the Convention. About fifty members and guests participated in the enjoyment of the many good things, of a physical and intellectual character, which the occasion afforded.

THE ARCHITECTURAL GUILD OF TORONTO.

At the annual meeting of the Architectural Guild of Toronto, the following officers were elected: Sec.-Treasurer, Geo. W. Gouinlock; Trustees, D. B. Dick, Henry Langley; Executive Committee, W. R. Strickland, Com. F. C. Law; Auditors, S. H. Townsend, C. H. C. Wright; Representatives on Technical School Board, Edmund Burke, A. F. Wickson.

PORTLAND CEMENT—A PLEA FOR A GREATER UNIFORMITY IN THE TESTS AND SPECIFICATIONS.*

By C. H. C. Wright, B. A. Sc.

At the present time when the American Society of Civil Engineers are using a uniform system of testing and the Canadian Society of Civil Engineers is endeavoring to get its members to work along more uniform lines, it may not be out of place for me to draw your attention to this question.

In a publication of last year (1893) by Geo. L. Sutcliffe, Associate R.I.B.A., on "Concrete," we find the following:—"The variety of specifications for Portland cement is somewhat bewildering." He is speaking of English specifications. This is not so in Germany, for there they have standard regulations. In England they are taking steps to remedy this evil, and there is no reason why we in Ontario should not do likewise.

The object in testing Portland cement is not that pursued in testing other materials of construction, viz: to determine their absolute strength, except in a few special circumstances—the reason being that the cement is seldom employed where it is subjected to stresses in the vicinity of its safe load. What we do wish to know, however, is that the cement will set, harden and continue to increase in strength, and not subsequently disintegrate or blow. Many of you have heard the statement that there is no use in testing cement, as the proper test is experience. There is no doubt but that the test of time in any actual construction is the very best, but how expensive when the material proves a failure. Or again, having proved that a particular brand is good, we are uncertain but that the very next shipment may prove to be utterly worthless, as illustrated by the following cases in the laboratory of the School of Practical Science: In August, 1894, there were two samples of the same brand of German Portland cement. The first was unfit for use, while the second was an excellent cement. In June and July, 1893, there were two samples of the same brand of English Portland cement—the first being unfit for use, while the second was a good cement. In February, 1892, there were two samples of Canadian Portland cement—the first being unfit for use while the second was a cement of excellent qualities.

I have made the above classification because it is very common in Ontario at the present time. We are then expected in the laboratory to make certain observations and from these predict the most probable behavior of the Portland cement in the work under construction. In order to determine with any degree of certainty the properties of a Portland cement, the observer requires from 1 to 3 months, as will be shown later, but unfortunately in practice in Ontario he has but a week or two at his disposal. The observations usually made are: 1. Fineness of grinding; 2. Tensile strength; 3. Soundness; 4. Specific gravity or weight, the latter being omitted quite frequently, while we have occasionally added chemical analysis, compression and transverse tests.

With a complete knowledge of the above we are able to say what may be expected of the samples of Portland cement under consideration.

Fineness of Grinding.—It has been demonstrated and admitted for some considerable time by all who use Portland cement, that any particles which will not pass a No. 50 sieve, i.e., 2500 meshes per sq. inch, are inert and act as sand. It is now, however, generally held that particles not passing a 100 sieve are inert. From this point alone it will be seen that the question of fineness is a very serious one. The cement in practice is mixed with definite proportions of sand; is it not therefore of first importance to know how much sand is already in the barrel labelled "Portland Cement?" Further, as the duty of the resulting fine cement is to form an envelope around the particles of sand and unite them together, it follows that the finer the grinding the less the amount of cement required, or the greater the amount of sand which may be mixed with it. One of our English authorities, Mr. H. K. Bamber, in discussing this point says, that these large particles (retained in a No. 50 sieve) not only remain inert while the cement around them is setting, but after the process of hardening is well under way, they absorb water, causing internal expansion and the disruption of the cement in the same manner as small lumps of lime disintegrate.

Mr. W. F. Reid says he had not been able to produce such expansion experimentally, and did not think it took place in good cement. Whether it is true or not that these particles do afterwards absorb moisture to the detriment of the cement, it is still desirable to have the cement properly ground, and the German and Canadian manufacturers are paying special attention to this question.

The majority of English cements that we receive in Ontario are not properly ground. While on this point I would like to say that the spirit of our Canadian manufacturers as evinced in this matter of grinding is deserving of commendation—for they have done this in the face of the following facts: (1) the consumer—our architects and engineers—are willing to accept a much more coarsely ground cement than they are producing; (2) that the more coarsely ground cements stand a higher tensile stress than the finer ones when tested neat; (3) that the coarser a cement the higher its weight per striked bushel; and (4) that

*Paper by Mr. C. H. C. Wright, B. A., Sc., School of Practical Science, Toronto, read at the fifth annual convention of the Ontario Association of Architects.

the expense of grinding is very considerable. I would like to urge upon you the propriety of so writing your specifications as to induce the manufacturer to produce a better article instead of tempting him to do otherwise.

It is apparent then, that while they have been under a much greater expense in producing an article which they think a better one, and is as a matter of fact better, they have produced a cement which, when tested by you, has appeared worse than if they had not so improved it.

FINENESS OF GRINDING.

	Residue in percentage on sieve No. 100.	Residue in percentage on sieve No. 80.	Residue in percentage on sieve No. 50.
Averages of 180 determinations of German Cements of various brands........	8.9	3.9	0.9
Averages of 210 determinations of Canadian Cements of various brands........	10.5	3.9	1.7
Averages of 450 determinations of English Cements of various brands........	23.7	16.3	9.56

The following might be quoted as instances of the grinding of Canadian Portlands :—

	Residue No. 100 sieve.	Residue No. 80 sieve.	Residue No. 50 sieve.
Star (Deseronto)..........	5.4	1.8	0.6
Sampson (Owen Sound)....	13.9	7.4	3.7
E.P.C (Marlbank)........	9.8	4.0	1.0
R.W. (Hull)..............	11.3	3.3	1.2

In the writer's opinion, the cement should completely pass the No. 50 sieve and leave a small residue on the No. 100 sieve. This, however, is out of the question, considering the present market, but we ought to refuse a cement if the residue on No. 50 is greater than 5%, and after every year or so it might be reduced until the desired end is reached.

I might say that the average requirements of the architect and engineer of Ontario is that the residue on a No. 50 sieve shall not exceed 10%, but I am equally certain that the cement would not be refused if it left a residue of 12 or 13%. There are specifications in this province calling for a cement with a less residue than 20%—in fact the text-book as set by this Association mentions 20%. It is time we were following the example set by our manufacturers, and encourage them to grind as we like and not as they please.

TENSILE STRENGTH.

The method of determining the tensile strength most commonly followed in Ontario is to mix a little water with the cement, then place it in a mould and leave it in the air for 24 hours, after which the briquette is placed in water and kept for six days; it is then broken and the strength determined. In a few cases (in Ontario), in addition to the above neat test, a sand test is made. Simple as the above seems, there are many conditions which affect the strength very materially. Among these may be mentioned :

1. The fineness of grinding.
2. The percentage of water used in gauging.
3. The thoroughness of the gauging.
4. The style of grip used in breaking the briquette.

In support of the fact that the fineness has a material effect upon the resulting tensile strength, I would quote the following results from a paper read before the British Institute of C. E., by Mr. Grant.

QUALITY OF CEMENT.		Ult. ten. strength at 3 mo.				Ult. ten. strength at 6 mo.			
		Neat.	1 sand 1 cem.	2 sand 1 cem.	3 sand 1 cem.	Neat.	1 sand 1 cem.	2 sand 1 cem.	3 sand 1 cem.
Fineness, &c.	w't per bus.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.
Cement as received from manufacturer.	116	504	286	117	103	527	350	229	151
The same passed thro' a sieve of 1296 meshes per sq. in., which rejected 20 per cent.	102	457	324	212	143	492	424	281	173
The same passed thro' a sieve of 2500 meshes per sq. in., which rejected 30 per cent.	99	449	377	250	173	486	439	323	228

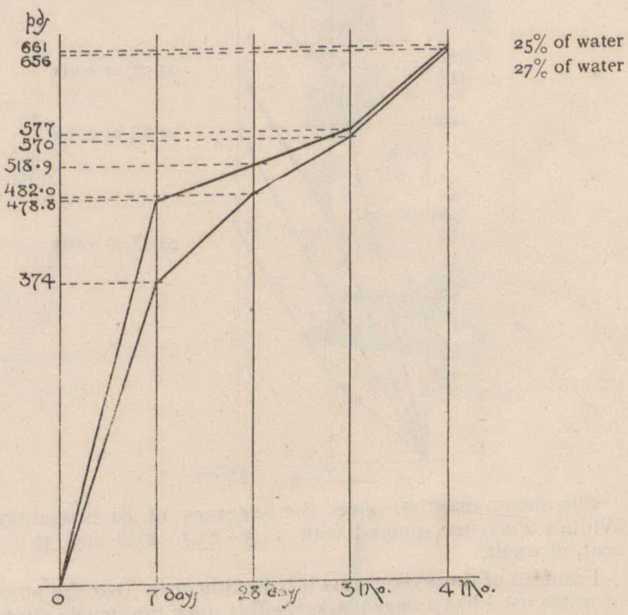
By referring to this table it will be seen that if gauged neat, coarse grinding increases the tensile strength, while if gauged with sand, coarse grinding decreases the ultimate tensile strength.

A. E. Carey, M. Inst. C. E., gives the following results gauged 3 sand to 1 of cement :

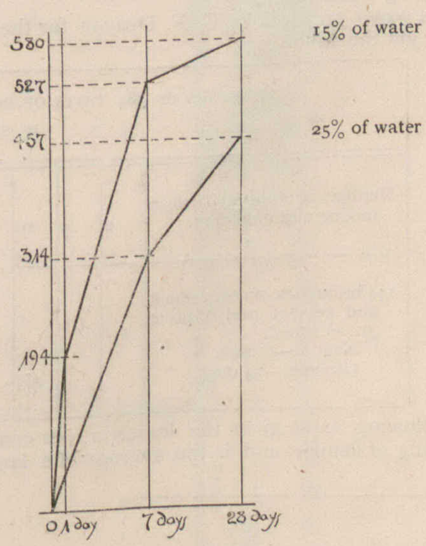
As ground with 9% residue.	Pds. per sq. in.
On a No. 50 sieve (2500 meshes per sq. inch)......	220
With residue on 2500 sieve removed.............	304
" " 5625 " "	311
" " 32,257 " "	360

While in the longer tests the percentage of water used in gauging may have very little effect upon the tensile strength, yet for the ordinary 7 day or 28 day tests of neat cement, the amount of water used will alter the strength between wide limits. The less the amount of the water used and the firmer the cement is pressed into the moulds, the stronger the resulting briquettes, as the following tests made in the laboratory of the School of Practical Science will show.

The following diagram gives the record of the averages of 200 briquettes of Owen Sound Portland, gauged neat, one half being gauged with 22 per cent. (by weight) of water, and the other with 27. As will be noticed the difference between the two gaugings is very marked at 7 days, gradually growing less as far as the experiment lasted.



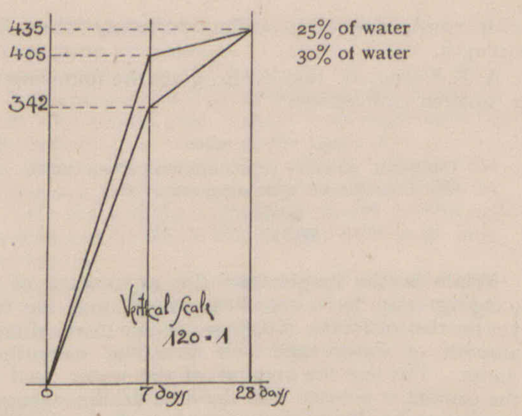
Sieve.	Residue in percentage by weight.
No. 100 (10,000 meshes to the sq. in.)..........	13.9
No. 80 (6400 " " ")...........	7.4
No. 50 (25,000 " " ")...........	3.7



The above diagram gives the averages of 50 briquettes of Hull Portland gauged with 15 and 25, 6 per cent. of water.

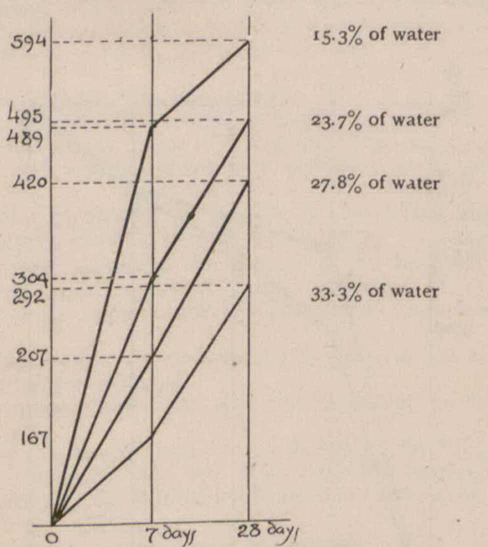
Sieve.	Residue in percentage by weight.
No. 100....................................	41.3
No. 80.....................................	32.8
No. 50.....................................	22

It should be mentioned here that this series of tests was made some time ago, and that the grinding of this brand is much improved.



The above diagram gives the averages of 40 briquettes of Star (Deseronto) Portland, gauged with 25 and 30 per cent. of water. This sample was very fast setting so that the amount of water used is larger than in the two preceding cases.

Sieve.	Residue.
No. 100	6.1
No. 80	2.55
No. 50	1.225



The above diagram gives the averages of 80 briquettes of White's Portland gauged with 15.3 – 23.7 – 27.8 and 33.3 per cent. of water.

From all of these diagrams it is readily seen that the amount of water used has a very marked effect upon the tensile strength at the end of seven days, and that this difference gradually becomes less in time as far as the experiments are carried.

In making briquettes of neat cement not more than 1 or 2 should be attempted at once, for the water and cement must be thoroughly incorporated, and yet placed in the mould before any initial setting takes place.

From a paper prepared by G. F. Deacon for the British Inst. C. E., we get the following :

In discussing the personal errors in cement testing, Clifford Richardson, Ass. Am. Soc. C. E., gives the results of the following tests made under his supervision. A batch of cement mortar (2 to 1) sufficient to make 45 briquettes was mixed by one individual and divided into three equal portions. The mortar was then handed over to three persons (⅓ to each) to be placed into the moulds. Observer A was unskilled in making briquettes ; observer B had considerable experience, but no extended practice but endeavored to follow C, who has been engaged for years in making briquettes. A filled his 15 moulds and had mortar left, B crowded his into 14 moulds, while C just filled 15. The briquettes were treated exactly alike by the same dividual after the gauging, with the following results :

AGE OF BRIQUETTES.	Round Top Cement.			Antietam Cement.		
	A	B	C	A	B	C
7 dy	64	127	138	47	91	58
28 dy	122	196	255	139	189	171
3 mo.	175	315	399	147	201	204
6 mo.	258	345	363	150	214	221
12 mo.	340	365	411	146	219	230

That the style of the grip used in breaking the briquettes has a very decided effect is well established by the following table, taken from the report of a sub-committee of the commission of French government engineers. The increase in tensile strength due to the rubber cushioning will also be noted :

TABLE SHOWING COMPARATIVE REGULARITY AND STRENGTH OF FRACTURE OF NEAT CEMENT BRIQUETTES BROKEN WITH JAWS OF GRIPS UNPROTECTED AND CUSHIONED WITH RUBBER.

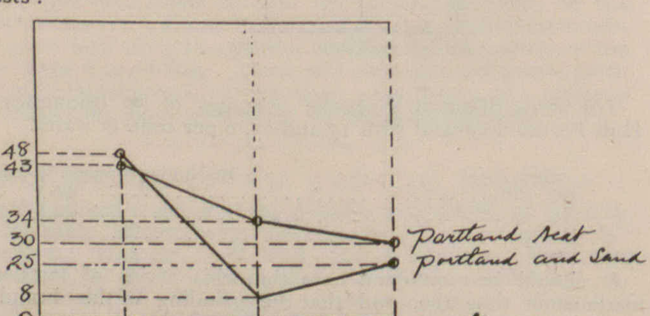
UNPROTECTED.				CUSHIONED WITH RUBBER.			
Eccentricity of Fracture.	Sectional Area* of Fracture in sq. inches.	Resistance per** sq. inch of Minimum Section in pounds.	Resistance per sq. inch of Fracture in pounds.	Eccentricity of Fracture.	Sectional Area of Fracture in sq. inches.	Resistance per sq. in. of Minimum Section, in pounds.	Resistance of sq. inch of Fracture in pounds.
+7.5	.937	426	352	–6.0	.850	496	455
+0.5	.796	398	386	+1.5	.791	461	448
–5.0	.867	461	412	–2.0	.806	489	470
+3.0	.875	475	452	–1.5	.797	504	488
+1.5	.785	447	441	+2 5	.830	496	464
–1.0	.800	412	382	–3 0	.830	518	483
0	.792	291	283	+1.0	.789	447	439
+4 5	.836	511	414	–1.5	.781	496	483
+5.5	.883	418	412	+3.5	.875	518	493
+4.0	.875	511	448	–0.5	.792	455	441
+1.0	.789	331	328	+1.0	.790	440	431
–5 0	.852	475	433	–3.5	.837	496	461
–6.0	.867	426	380	–3 0	.799	454	392
–1.5	.800	362	375	+1.0	.815	419	398
+8.0	.892	489	426	–2.0	.797	447	432
+1.5	.795	454	441	–4.5	.823	483	452
+2 5	.813	418	447	–1.5	.797	475	461
–6.0	.824	496	467	+3.5	.831	475	444
+2.5	.813	432	414	–1.5	.761	390	398

*In computing this area the air bubbles have been taken into account.
**The Minimum Section is exactly .775 sq. inch.

AVERAGES OF 384 TESTS OF PORTLAND CEMENT AND PORTLAND CEMENT CONCRETE, PLACED IN SITU AT VARIOUS INTERVALS OF TIME.

Number of minutes between mixing and moulding.	0	5	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100	110	120
144 briquettes of neat cement and cement and Oporto gravel tested. Neat at—7 days. Concrete—14 days.			263		262		258		257		258		261	258	25[illegible]	242	251	249	23

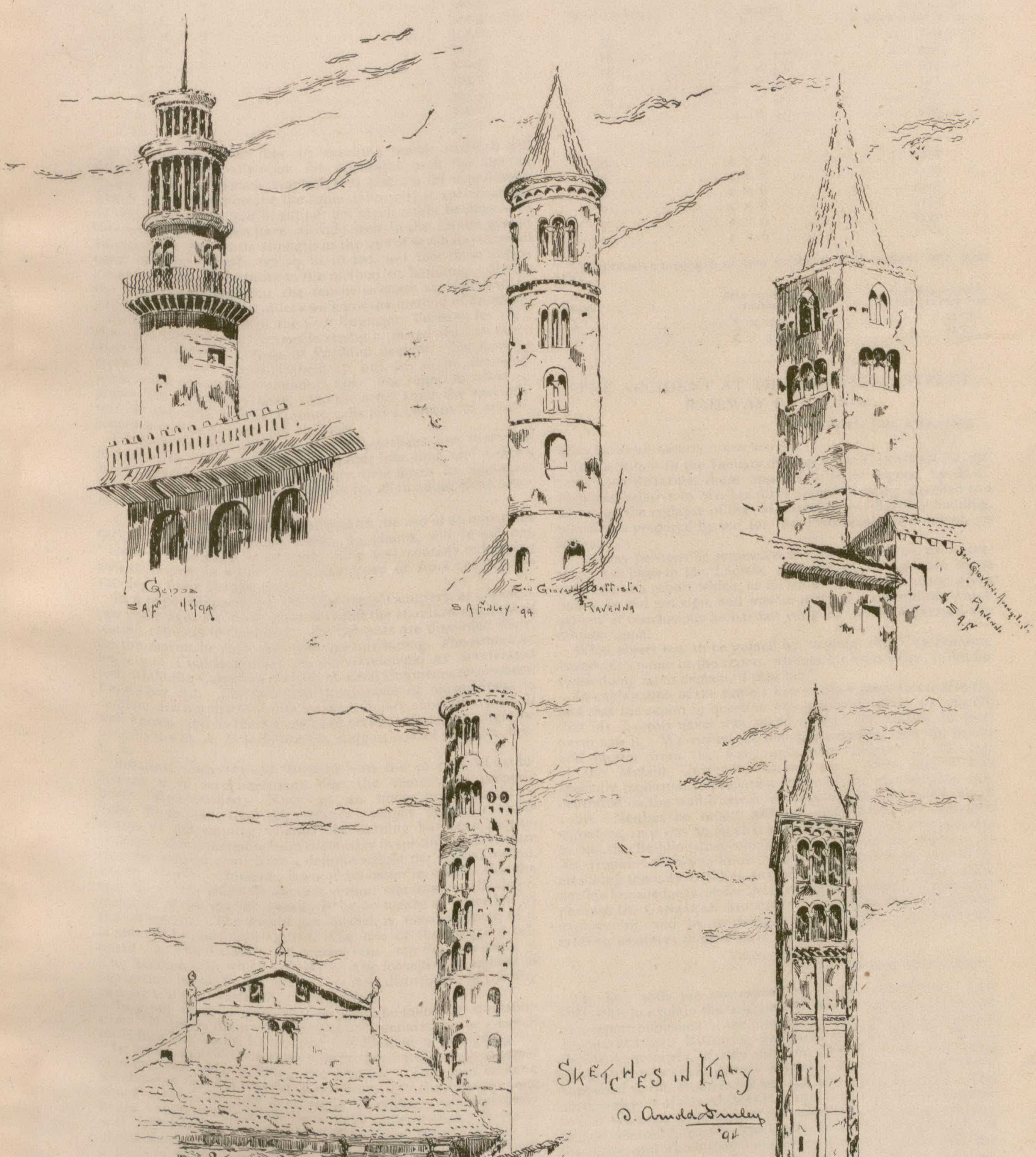
The following table gives the losses in per cent. due to the retempering of cement and is the average of a large number of tests :



The conclusion of the committee was that they consider the use of rubber cushioning tends to regulate the position of the fracture and the ultimate strength.

Similar tests by American engineers might be quoted, but this is not necessary. Mr. Jno. Gartland found from a large range of tests that where only 50 per cent. of the briquettes broke across the least cross section with the unprotected grip, 90% broke across the least section while using rubber cushioning with the grip designed by Mr. W. R. Cook, representative of Messrs. Riehle Bros. This is the form of grip used in the School of Science.

In this connection might be mentioned a series of tests in the school laboratory on the effect of cushioning. 50 briquettes were broken in sets of five, and in each case the cushioning was in-


Genoa
S.A.F. '94
San Giovanni Battista
Ravenna
S.A. Finley '94
S.A.F.
Sketches in Italy
S. Arnold Finley
'94
San Zeno
Verona.
S.A.F. '94
San Appolanaire Nuova.
6th Cy. Leaning Tower
Ravenna.

creased, with the result that the tensile strength increased, as given below:

	Pds. per sq. inch
1 set, average	328.8
2 " "	344.3
3 " "	344.3
4 " "	355.6
5 " "	363.
6 " "	369.5
7 " "	395.2
8 " "	393.3
9 " "	396.2
10 " "	405.7

It is apparent, then, that the resulting tensile strength will depend very materially upon the apparatus used, the method adopted and the person employed to perform the experiment. There cannot, therefore, be the same uniformity in specifications on this point as on that of sifting, but much might be done with this end in view. We have already seen in the results quoted variations in the tensile strength at the end of seven days (tested neat) of from 500 pds. per sq. in. to 200, and that these differences may be due entirely to the method of handling. Hence the mere statement that the tensile strength was found to be 345 pds. is meaningless unless we know the method of handling.

In the annual report of the City Engineer, Toronto, for 1893, there is a table giving the tensile strength (tested neat) on seven days of 23 different brands of Portland cement. The average strength of these brands is about 236 pds. per sq. in., the maximum being 350 and the minimum 140. The report for 1890 explains the method adopted. On the other hand, the specification for the drill hall at Toronto calls for a cement to stand a tensile strain of 450 pds. per sq. inch.

Of these two methods the second will, perhaps, give more uniform results, while the former requires less time, and where a large amount of testing is necessary, time forms an important factor. It would, however, be better for all to adopt some intermediate method.

3. SOUNDNESS.—Mr. Faija advocates the use of an apparatus called a "steamer," and which, he claims, will reveal any "blowey" tendency in cement. The test consists in keeping pats of cement in water at a temperature of from 110 degs. to 120 degs. Fahr. for two days.

In a paper prepared for the Engineers' Congress at Chicago, two years ago, Mr. Gary gave in detail the standard methods of testing cements in Germany. All hot tests are discarded there, for the reason, he says, that they are misleading. The American Society of Civil Engineers do not recommend an accelerated test, while the Canadian Society of Civil Engineers recommend Faija's hot test. The fact that many cases of unsoundness in cement are not discoverable by the ordinary short time tests, is well known, and as the hot tests are on the safe side, it might be well for the O. A. A. to follow the suggestions of the Can. Soc. C. E.

SPECIFIC GRAVITY OR WEIGHT.—In the process of manufacture, it is very important that the cement be properly burnt (semi-vitrified). Now, as an underburnt cement is light, it follows that the relative weight forms a ready means of determining whether the burning has been properly done. It has therefore been customary in specifications to state that the cement shall have a definite weight per striked bushel, 112 to 115 pds. However, it would be better to specify that the specific gravity shall be above a certain standard, as the determination of the specific gravity is by no means as uncertain as that of weight. The weight per bushel is unsatisfactory, as it is affected by the following:—1. The size of the measure adopted; 2. The distance the cement falls into the measure; 3. The freedom with which it falls; 4. The looseness or amount of separation between the grains; 5. Any disturbance in the way of a jar while the measure is being filled.

In proof of the above, we may give the following quotation from "Notes on Building Construction," prepared by the Council on Education, South Kensington:—"Method of Weighing"—"In order that the cement may be accurately weighed, great care must be taken in filling the measure. This may be done by allowing the dry cement to run down into the measure by a board or shoot, inclined at an angle of 45 degs., any superfluity being carefully struck off by a light straight-edge. A vessel with holes in it is sometimes used for filling instead of the inclined shoot. An accurate method is to fill the measure through a sieve of about 1-16th inch mesh, held a short distance above it, or the cement may be poured through a hopper placed about two feet above the measure. A drawing of the hopper is sometimes given in connection with the specifications." It is thus apparent that the weight per striked bushel is liable to vary aud must differ considerably with different persons and even with different determinations of the same person. The specific gravity, on the other hand, is a definite quantity not effected by voids and its determination liable to but a slight personal error of the observer.

It will be seen, then, how desirable it is that this property of cement, namely, its relative weight, should be determined from its specific gravity rather than from its weight per striked bushel.

The following is the result of a series of tests of Beams 4" × 6" made of Portland cement and kept under water for one year. The first set were gauged neat, while the second consisted of two parts of crushed granite, such as used in the manufacture of granolithic sidewalks, to one of Portland cement:

I.

Span in inches.	Section b × h	Modulus of Rupture in pds. per sq. in.
36	4" × 5.9"	526
18	4 × 5.9	426
18	4 × 5.9	594
9	4 × 5.9	542
9	4 × 5.9	561
9	4 × 5.9	518

II.

Span in inches.	Section b × h	Modulus of Rupture in pds. per sq. in.
36	4 × 6	1088
18	4 × 6	1107
18	4 × 6	1007
9	4 × 6	1125
9	4 × 6	1130
9	4 × 6	1111

Compressive strength of two cubes of neat cement one year old:

Height.	Area exposed to crushing.	Crushing strength in pds. per square in.
5"	5 × 4.9	3878
5"	5 × 4.8	3877

THE ACCIDENT AT THE MONTREAL STREET RAILWAY BUILDING.

MONTREAL, Jan. 23rd, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—In the January number of the CANADIAN ARCHITECT AND BUILDER, there appears a letter signed by E. C. Hopkins, relative to Mr. Lacroix's signature being attached to a report on the collapse of the Montreal Street Railway building, which was prepared by me for the Provincial Government, as follows:—

"It may perhaps be somewhat of a surprise to you, as it certainly has been to Mr. Lacroix and myself, to find his name attached to a report which, as he states in his letter to me, given below, he did not sign, and was no party to; and further, which arrives at conclusions he has not yet gone into or expressed any opinion upon.

What object was to be gained by tacking the City Building Inspector's name to the report, without his knowledge, is left for those doing so to explain, if possible."

In explanation of the same I beg to draw your attention to the fact that the report in question was prepared solely by myself, that Mr. Lacroix never was asked to sign the report—in fact, never saw it. We visited the building together, took the bricks and mortar from the wall, and were present at the test at the McGill University Laboratory. After that I was specially requested to prepare a report giving the weights concentrated on the wall where it was supposed to have failed, which I did. Neither the report nor the copy bears Mr. Lacroix's signature, so it was as much a surprise to me as to any one else to find the Building Inspector's name added to my report. As Mr. Hopkins wishes to know "what object was to be gained by attaching the City Building Inspector's name to the report without his knowledge is left for those doing so to explain if possible," perhaps the CANADIAN ARCHITECT AND BUILDER will give the explanation, and by so doing will prove that I at least had nothing whatever to do with it.

Yours truly,

W. McLEA WALBANK.

[It lies with the correspondent of the ARCHITECT AND BUILDER to explain the addition of Mr. P. Lacroix's signature to a report published in the December issue of the CANADIAN ARCHITECT AND BUILDER, and submitted by Mr. W. McLea Walbank, architect, of this city, on behalf of the Provincial Government in the coroner's enquete, of the accident which happened to the Montreal Street Railway Co.'s building. The correspondent of the ARCHITECT AND BUILDER having applied to Mr. Walbank for a copy of his report for publication, the last named referred him to his clerk, who gave him a rough draft of the report and which they together corrected to agree with the original. Mr. Lacroix having examined the collapsed building jointly with Mr. Walbank and the fact of him having also signed a letter sent to the Queen's Attorney and prepared by Mr. Walbank suggesting the proceedings that should be adopted for conducting the tests of the building material employed in that building, led the clerk to confuse the two documents, the letter of suggestions and the final report of Mr. Walbank, and so one was taken for the other, and the name of Mr. P. Lacroix, Building Inspector, added to the report without Mr. Walbank's knowledge, or without any bad faith or intention whatever on the part of either Mr. Walbank's clerk or the ARCHITEGT AND BUILDER's correspondent.]

ELECTRICITY FOR ARCHITECTS.*

By John Langton, Toronto.

The engineer or architect will find that, though the quantities dealt with in electrical work may be new to him, the ideas involved are largely the same as he is already familiar with in other branches of physical science. There is a common impression to the contrary, and this no doubt is partly due to the peculiar names of the practical electrical units: volt, ampere, &c.

These are merely arbitrary names, agreed upon by international convention, to shortly express compound units, and so avoid the repetition of cumbersome phrases. It is, for instance, as if it were agreed to call the ordinary British unit of fluid pressure a Newton, so that we might say shortly, but with perfect definiteness, 75 Newtons, instead of 75 pounds pressure per square inch above the atmosphere. Electrical units are in this manner named after eminent men of science. The Volt, after Volta, the discoverer of the galvanic battery; the Ohm, after Ohm, the discoverer of Ohm's law; the Ampere and Culomb, after the French physicists of the same names; the Farad, after Faraday, the Henry after Joseph Henry, and the Watt, the unit of power, appropriately named after James Watt.

In the common commercial uses for electricity for light and power, which the architect has ordinarily dealt with, the main ideas and phenomena present close analogies to the familiar facts of the pressure and the flow of water—so much so that the readiest way of getting a very fair general idea of commercial electricity is to consider the facts concerning it as being illustrated by the similar facts of hydraulics.

I will endeavor briefly to present this analogy, but I must ask you to remember that it is of course nothing but an analogy. I do not mean to imply that an electric current is in any sense a flow of a material fluid, merely that the results are very much as if it were a kind of fluid.

Referring to Table 1:—The 1st column gives the names of the electrical units which measure the four electrical quantities involved in ordinary light and power work. The 2nd column shows the letters by which they are symbolized in formulae. The 3rd column gives the electrical quantities which the units designate. The 4th column states the general ideas involved; and the last column the hydraulic quantities which are analogous to the electrical quantities in the 3rd column.

Table 1.

Name of Electrical Unit.	Symbol.	Electrical Quantity.	Idea.	Analogous Hydraulic Quantity.
Volt.	E	Dif. of Potential. Electromotive force (E. M. F.)	Pressure.	Head or pressure of water.
Ohm.	R	Resistance.	Wasteful Resistance.	Friction of pipes and channels.
Ampere.	C	Current.	Rate of Flow.	Flow per second.
Watt.	W	Power.	Rate of doing work.	Power.
			746 Watts=1 Horse Power.	

Ohm's Law.

Current=Pressure÷Resistance.

$$\text{or Amperes}=\frac{\text{Volts}}{\text{Ohms}}$$

$$\text{In Symbols, } C=\frac{E}{R}$$

$$\text{or, } R=\frac{E}{C}$$

$$\text{or, } E=CR$$

Electrical Power.—(Kilowatt=1000 Watts)

Watts=Volts×Amperes.

$$\text{In Symbols, } W=EC$$

$$\text{or, } W=C^2R$$

$$\text{or, } W=\frac{E^2}{R}$$

As the flow of water is due to difference of level or head, so is a current of electricity due to a difference of electric potential. And in both cases the amount of the flow through some path provided for it, is dependent—1st, on the head or pressure which causes it; and 2nd, on the frictional resistance which the provided path opposes to that flow, and in both cases the work expended in overcoming this resistance appears as heat. With the same resistance, the greater the pressure the greater the flow. With the same pressure, the greater the resistance the less the flow.

In electrical work, the relation between the pressure, the resistance and the current is a very simple one, and is expressed by Ohm's Law, which is that "The current is equal to the pressure divided by the resistance," or that the current is equal to the ratio of the pressure to the resistance. This is a definite numerical statement that the number of the amperes is equal to the number of the volts divided by the number of the ohms. For instance, 100 volts applied to the ends of a wire whose resistance is 50 ohms, will produce in the wire a current of 2 amperes. With 1000 volts and 500 ohms, the current would still be 2 amperes. And the same current of 2 amperes would be produced with 10 volts and 5 ohms.

Now as to the unit of power. In a fall of water, the weight of the water in pounds multiplied by the number of feet fall or head, is its energy—that is, its capacity for doing work—in foot pounds. And consequently, the rate at which this energy is developed, the rate of doing work, that is to say the *power* of the fall, is measured by the rate of flow multiplied by the head. In mechanical units 33,000 foot-pounds per minute is 1 horse power. Whether the flow is 33 pounds per minute under 1000 ft. head, or 1,000lbs. per minute under 33 ft. head, or 33,000 lbs. per minute under 1 foot head, the power in each case is the same, namely: 33,000 foot pounds per minute, or 1 horse power.

Similarly in electrical units, power is measured by the current multiplied by the E. M. F. The watts equal the volts multiplied by the amperes. 1000 volts and 10 amperes, 100 volts and 100 amperes, 10 volts and 1000 amperes, all give the same power, namely: 10,000 watts or 10 kilowatts.

Since it is the same thing that is measured in both cases,—power—there must be a definite numerical relation between the electrical and mechanical units, which is that 746 watts equals 1 horse power.

In buying electric power at a rate of, say, 4 cents per horse power hour, it is a very simple matter to calculate the cost of the current consumed. Power circuits supply current at a constant pressure. 250 volts is one usual pressure. If the current used is 3 amperes, the watts are 3×250=750 watts; practically 1 horse power, and costing 4 cents per hour. On a 125 volt circuit, a 6 ampere current would mean 1 horse power. So that for a general rule, multiply together the average amperes, the volts and the hours. Divide the product by 746 and the quotient will be the horse power hours consumed.

The resistance of an electrical conductor is analogous to the hydraulic friction in pipes; but whilst the mechanical friction in pipes varies according to the most complicated rules, the resistance of conductors is fortunately governed by very simple laws. It depends only on the material, the area of cross section and the length of the conductor. And fortunately again a cheap metal, copper, is one of the best conductors. It is second only to silver, which is better still, but only by a small percentage. The resistance of iron is between 6 and 7 times that of copper. Copper is therefore universally used for wiring, and we need only consider the effects of area and length, which are that the resistance of a wire varies directly as the length and inversely as the area.

Suppose the resistance of a wire 1 foot long and of a certain cross-sectional area is 1 ohm; if 2 feet long it would be 2 ohms; if 10 feet, 10 ohms. Another wire of 10 times the sectional area and 1 foot long would be 1-10 of an ohm, or if 10 feet long, 1 ohm. There are plenty of published tables of the resistance per foot of copper wires, and by the aid of this simple relation between resistance, area and length, they may be extended to any actual case. The question of resistance is of direct concern to architects in the wiring of buildings, but its bearing will perhaps be plainer after considering as briefly as possible the three systems of lighting in general use:

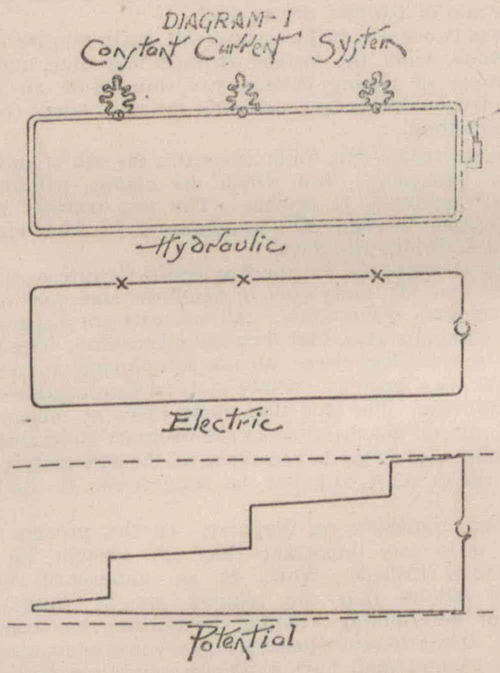
I. The constant current system, which is generally used for lighting by arc lamps.

II. The constant potential direct current system, used for incandescent lamps and for motors.

III. The alternating current system, used for incandescent lamps.

These can all be very well illustrated by analogous hydraulic systems, and for this purpose I have prepared diagrams 1, 2 and 3.

Take first diagram 1—the constant current system. Here the pump represents the dynamo, which maintains a steady flow circulating round the



main pipe. At intervals in the main pipe are stop cocks, and round each of them a by-pass consisting of a long pipe, which opposes a high frictional resistance to the flow, so that the pump must exert greater pressure to maintain the same steady flow. These by passes represent the lamps, in which the whole work done in forcing the current through them against their resistance, appears as heat, raising the temperature of the carbons to such a degree that they give out light. It is obvious that except for the constant resistance of the main pipe, a resistance which is made small, the work the pump must do increases directly with the number of the by-passes the flow must traverse; and, since the flow is constant, it follows that this increased work is due entirely to increased pressure.

Underneath the hydraulic diagram is that of the corresponding electric system, representing a dynamo and arc lamps. The amperes are the same no matter how many lamps are burning, but the dynamos must generate about 45 volts for each lamp burning.

Underneath this again, I have drawn a diagram of potentials, which shows graphically how the difference of potentials established by the action of the dynamo is consumed in different parts of the circuit. It is as if the dynamo were a pump raising water to a height, from which it flows down through the channels offered by the different parts of the circuit back to the pump, which again raises it to retrace the same course, maintaining a constant circulation.

Starting at the highest potential established by the dynamo, the potential gradient falls gently, owing to the slight consumption of volts required to overcome the small resistance of the main conductor. When it reaches the first lamp there is an abrupt fall, by the amount of the volts consumed in forcing the current through the high resistance of the lamp. Then follows a gentle grade to another abrupt fall at the next lamp; and so on to the last lamp, from which there is a last gentle grade back to the dynamo through the return wire.

When the same current passes through one lamp after another the lamps are said to be connected in series.

Turning to Diagram 2—the constant potential direct current system—the hydraulic diagram is an ordinary waterworks system, with the addition that all water used is discharged into a main return pipe which leads back to the pump, and from which the pump draws its supply.

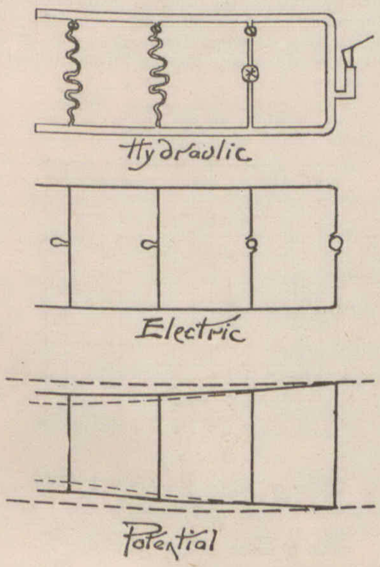
The function of the pump is to maintain a constant difference of pressure between the mains. Each cross pipe from main to main takes whatever flow its frictional resistance will allow the main pressure to produce. And it is obvious that as more cross paths are opened, the increased work the dynamo must do, is due to the increased flow; the pressure remains constant.

*Paper read at the fifth annual convention of the Ontario Association of Architects.

In the electric diagram underneath, the high friction cross tubes are replaced by incandescent lamps, and the water motors by electric motors.

The potential diagram shows that the pressure in the mains cannot be quite constant, since there must be some fall of potential in the main conductors, and the amount of this fall is less when there are fewer lamps burning, i.e., when the total current is less. The potential gradient is

DIAGRAM II
Constant Potential Direct Current



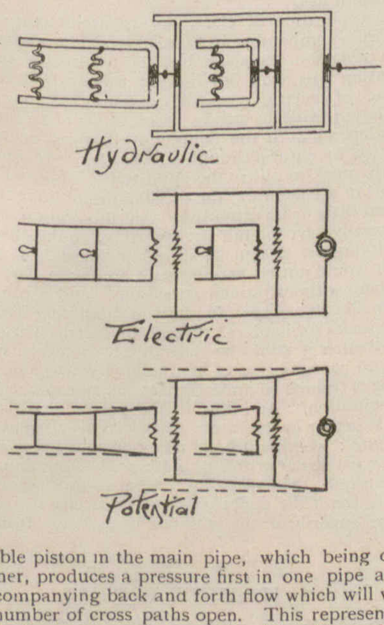
greatest near the dynamo where the conductor has to carry the total current, but the grade gets flatter and flatter as the current diminishes, by the amperes subtracted at each cross path. These potential gradients are repeated in the reverse order in the return wire.

The form of gradient drawn is that for a conductor of uniform size. But if the conductor is reduced at each cross path so that its area always bears the same proportion to the amperes carried, the potential gradient would be the same throughout, and a continuation of the first grade starting from the dynamo, as is indicated by dotted lines.

When lamps are connected side by side, so that each takes its own separate current, the lamps are said to be connected in parallel, or in multiple.

There remains the alternating current system shown by Diagram 3. The pump in Diagrams 1 and 2 produces a flow always in the same direction, representing a direct current of electricity. In Diagram 3 the pump is re-

DIAGRAM III
Alternating Current System



placed by a movable piston in the main pipe, which being oscillated from one side to the other, produces a pressure first in one pipe and then in the other, with an accompanying back and forth flow which will vary in amount according to the number of cross paths open. This represents the primary circuit, to which the lamps are *not* connected. The object of an alternating system is to save in the cost of main conductors by transmitting power with a small current at a very high pressure. But for convenient and safe use, this power must be transformed into a larger current at a lower pressure, in a secondary circuit to which the lamps are connected. It is the peculiarity of the alternating system, that this can be done with very little loss and without any moving mechanism. The actual means by which this is effected in the "transformers" or "converters," are beyond the scope of this paper, but a simple mechanical contrivance in the hydraulic system will give us analogous results. A sliding piston in the small primary cross pipe and another piston in the large secondary pipe are connected by a bar pivoted in the middle, so that the two pistons oscillate together and move equal distances. If the area of the secondary piston is, say 10 times that of the primary, a secondary pressure 1-10 that of the primary will balance the the contrivance, whilst a secondary flow of 10 times the primary is produced by any oscillation.

The electric diagram shows the alternator and primary circuit, feeding two separate secondary circuits through two transformers.

The potential diagram for both primary and secondaries is similar to diagram 2.

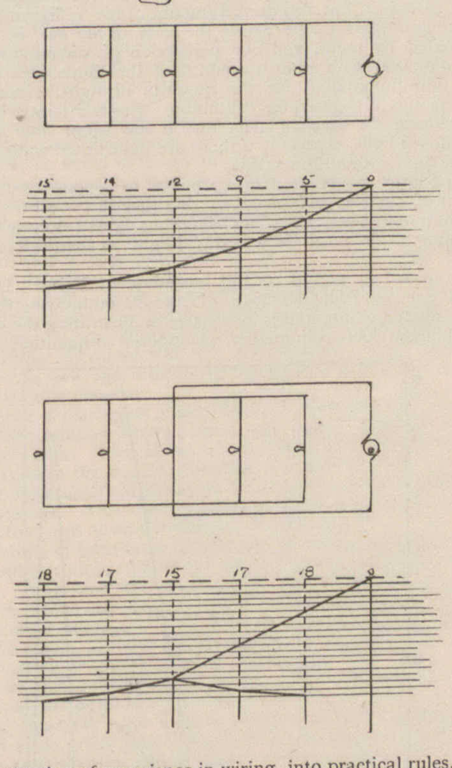
I may say parenthetically that the hydraulic analogy goes still further. The effects of the inertia of water represent excellently those of the electric quantity, self-induction, whilst, if the pipes are made elastic, the results would be very similar to those due to electric capacity. But as inductance and capacity are inappreciable in such work as an architect will ordinarily have to deal with, I have not considered them in this paper.

In wiring for incandescent lamps the object is to maintain as nearly as possible a constant difference of potential between the terminals of the lamps. But when, at different times, there are are at different points on the same line, different numbers of lamps burning, it is impossible that the volts at all points should be always the same. And the question is, what variation is permissible?

An incandescent lamp is simply a carbon wire of high resistance, which the current passing through it heats to incandescence. But the resistance of the carbon decreases as the temperature increases. Therefore a rise or fall in the volts causes more than a proportionate rise or fall in the amperes, and the consequent heat and temperature. Also, the light given out increases much more rapidly than the temperature. Roughly speaking a variation of 1% from the rated volts of the lamp, up or down causes a variation of 5% in the light. And it is informally agreed that 2% total variation in volts at any lamp constitutes good and satisfactory regulation. This variation is of course reckoned between the maximum and minimum load—not between full load and no load. If a group of lamps is fed by a wire direct from the constant volts of the source of supply, and the lamps in the group are always all turned on or off together, the drop of volts in the wire may be any amount, and yet because it will be always the same, there will be no variation in the volts when the lamps are burning.

But besides minimizing the variation in the volts at any one lamp, it is desirable that the lamps in the same building should all get about the same volts, so that the same class of lamp may be used interchangeably throughout the building. This is the object of the feeder system of indoor wiring, in which feeder wires carry the current to convenient points in the main wires to which the lamps are connected. Diagram 4 shows graphically the effect on the distribution of volts.

Diagram IV



The consolidation of experience in wiring, into practical rules, embodying safe practice as regards danger from fire, has been performed by the Fire Underwriters Associations. Their rules and regulations are published, and give in detail the minimum standard of safe wiring. The wiring must be at least as good as the rules prescribe, to avoid trouble with fire insurance. Among other things the rules prescribe the greatest amperes different sized wires may carry, and here is a point where they are not necessarily a sufficient standard to guide the architect. The Underwriter's aim is a single one, safety from fire; the architect has an additional aim, good and unvarying light; and our previous considerations concerning the resistance of wires, will show how these objects are not simultaneously attained.

The work spent in forcing a current through a wire generates heat in the wire, and the degree the temperature will rise to depends upon the relation between the rate at which the heat is generated and the rate at which it is got rid of. Now the rate at which heat is generated, is the rate at which work is spent in forcing the current through the resistance of the wire; i.e., it is the watts spent in the wire. And from Table 1, watts=(amperes)^2× ohms. But we have seen that a long thick wire and a short thin wire may have exactly the same ohms resistance. With the same current the heat generated is the same in both. How about the resulting temperature? In the long wire the heat generated is spread over a greater length. The heat generated per foot run is less, and, the long wire being thicker, it also presents greater surface per foot run for cooling by radiation, convection or conduction. Obviously the short thin wire gets much the hotter. The safe carrying capacity of wires, both exposed and cased, laid down in the Underwriters' rules, is really a statement of the heat generated per foot that the wires can get rid of without becoming dangerously warm. This is independent of the length of the wire. The heat generated per foot remains the same, but the longer the wire, the greater the total heat and the greater the total volts lost in forcing the same amperes through the resistance of the greater length. But the total drop in volts is what the architect must limit in order to get good and steady light. He must therefore be guided by the total resistance, and the ampere capacity of the Underwriters' rules is useful to him only as setting the inferior limit to which he may reduce the size of the wires.

With regard to the different classes of wiring—exposed wiring on cleats or knobs is best for factories, but for domestic work it is only suitable in stores or houses where hanging kerosene lamps, or exposed gas pipes stapled to the walls and ceilings, would be the alternatives. What is called concealed work, in which rubber covered wires are run between floor and ceiling, and brought out only where brackets or hanging fixtures are to be placed, is probably the most suitable for the ordinary run of dwellings. Where once in, there is little liability of its being disturbed. But in larger buildings, warehouses, stores and such like, where there are likely to be changes in partitioning off the space, and in the distribution of the lights, to suit different tenants, or the same tenant at different times, wires run in mouldings are by far the most convenient. They are not only most readily accessible for changes of wiring, but the wiring is much less liable to damage by workmen in other trades making repairs. The principal objection is the unsightliness of lines of mouldings straggling all over the ceiling to wherever a lamp is needed. But moulding work has frequently many advantages of convenience to recommend it. Architects, I believe, are always looking for a "motive" in design. Mouldings can be made of any section, and perhaps they might be used to panel off the ceiling in some decorative pattern, suitable to any probable distribution of lights, giving a wide choice of paths for wiring and points for outlets. But this touches the artistic side of architecture, which is beyond my province. The best class of wiring is interior conduit work, in which buildings are piped with strong non-metallic, waterproof and poorly combustible tubing, and wires subsequently drawn into. This is particularly suitable to such work as the best class of office buildings. And where it would be too expensive to carry throughout a building, it may sometimes be used for the main lines to centres of distribution

When incandescent electric lights were first introduced they were distributed on wall brackets and hanging fixtures in the same manner as gas jets, as if this were the natural arrangement of lights, instead of having originated in the necessity of keeping gas jets within reach for ease in lighting, and in keeping them away from walls and ceilings for fear of fire. This force of habit for some time prevented, and in a measure still prevents full advantage being taken of the possibilities offered by electric lights for getting better illumination with the same amount of light. For a desk light or a reading light we cannot do better than replace the shaded oil lamp or gas drop light by a shaded electric lamp, but for the general illumination of a room the incandescent light can, in general, do much better. The illumination we perceive depends not only on the amount of light reflected from an object, but also on the amount of the reflected light the eye takes in, and with lights a little above the level of the eye, we are always partially dazzled by them, and our perception of surrounding objects is indistinct compared with what it would be if the lights were out of sight. To get the best illumination for the quantity of light, a room should be lighted as a picture is lighted for exhibition. Electric lamps high up near the ceiling remove the dazzling effect and at the same time give a more generally diffused light, especially if there are light tinted walls and ceilings to reflect the light without much loss.

For lighting large rooms, arc lamps are used to a considerable extent on the continent of Europe, constructed so that they throw all their light on a white or light tinted ceiling, the room being thus lighted entirely by reflection from the ceiling. The result is a diffused light as shadowless as diffused daylight.

Now with regard to uses of arc and incandescent lights. Diagram V is copied from one by Prof. Nichols, of Cornell, embodying the results of experiments made by him, and is instructive in illustrating the difference of light from different sources in quality, as opposed to quantity.

This diagram represents the brightness of different parts of the spectra of the electric arc, clear daylight and clouded daylight, in comparison with the same colours in the spectrum of an incandescent lamp. The brightness of the latter is taken as the standard in all parts of the spectrum, and is represented in the diagram by the horizontal line at the height 1. The other spectra are reduced to the same brightness at the yellow line D, and their brightness in other regions of the spectrum is shown by curves.

Curve I represents daylight on a cloudless summer day.

Curve II represents daylight under a densely clouded sky.

Curve III shows the light from an electric arc.

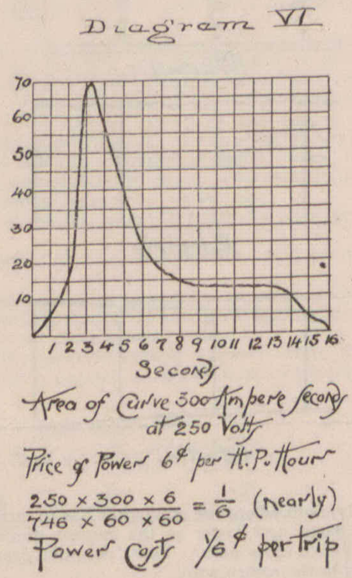
Curve IV is from the lime light.

The abrupt rise and almost immediate descent again of curve III indicates a narrow but very bright band of light in the violet end of the arc spectrum, which accounts for the value of the arc light in photography, and also explains the predominant bluish tinge of its light.

The curves show how far all artificial illuminants fall short of equalling the quality of clear daylight, which latter must always be our standard of perfect white light. Even the light of a very dull day is a better all round light than an arc light or lime light of equal general brightness.

Lights are usually rated by candle power, and this is gauged by the relative blackness of shadows thrown on a white ground. Candle power therefore merely measures the ability to distinguish between black and white. For this purpose the yellow rays are much the most effective; but the blue and violet rays are the most useful for showing the distinction between colors, that is, for bringing out the colors of natural objects. And this being so, the curves show that the incandescent lamp gives us the most of that kind of light wanted, for reading or writing, whilst the arc light gives a closer approach to the effect of daylight upon colors. In addition to positive utility, the feeling of suitability has a value. The incandescent lamp, with its warm yellowish red glow, gives a cheerful and cosy air to a small room, where an arc lamp would be simply garish. In a large hall or store, to which the idea of cosiness is inappropriate, the same light that makes a small room cheerful may give only an impression of dullness, whilst the arc light would give an agreeable effect of brilliancy. Of two large stores side by side, one lighted by arcs and the other by incandescents, the arc lit store has in general a more attractive air of being brilliantly lighted, although, measured by candle power, its actual illumination may be decidedly inferior.

Diagram VI is a curve of current consumed in one trip of an electric eleva-



tor. The time in seconds is measured horizontally, and the amperes vertically. This is a diagram from an actual elevator, running 250 feet per minute in a three-storey building. I have taken several such diagrams from different elevators and they all have the same general form as the one shown. I have chosen this one of an elevator having a short run, in order to better bring out the effect on the current consumption of frequent stops. The peak at the beginning of the curve shows the large current required to start the car and accelerate it to full speed, in comparison with the small current needed—from 7th to 14th, second in diagram—to keep the car in motion after speed has been attained. Nevertheless, even in this unfavorable case, the curve shows the very small cost of power per trip.

For the diagram given the cost is only ⅙ cents per full trip one way, at the rate charged in Toronto for very intermittent use of current, which is 50% higher than the regular Toronto meter rate for power supplied to an elevator in constant use.

Hitherto the application of electricity to architecture has owed little to architects. Trade competition has forced in electric power to take the place of power from other sources which had been already applied to elevators, pumps, ventilating fans, &c.; but beyond this little has been done. The convenience of electric power has certainly led to the extension of mechanical ventilation, with its steady displacement of a fixed volume of air per minute, independent of the degree of dryness or temperature which makes ventilation by natural draught so variable. In ventilation architects have been fairly quick to utilize the opportunity afforded them. But in the larger problems of architecture, the possibilities of applying electricity seem to have received little or no attention. An illustration of what I mean is what might conceivably, though not probably, be the effect of cheap electric power in modifying the design of dwelling houses. If it were desirable to use elevators it would not be very difficult to devise perfectly safe methods of operating them without trained attendance, and a constantly used elevator would have almost as great an effect in modifying house planning as the substitution of stairs for ladders. Supposing such a use of elevators were practicable; whether it would be desirable, whether it would really add to the comforts and conveniences of life, nobody can say so well as the architect, who alone is trained to appreciate at their proper value all points bearing on such a question. And that is the point I wish to bring out by the illustration. Whether in the future electricity is to play any part in modifying architecture; whether it be of any real assistance to the architect in dealing with the particular problems of his profession, depends principally on the architect himself. The electrical engineer must co-operate in devising working details, but if the applications of electricity to architecture are ever to be more than superficial, the initiative must come from within, not from without.

ILLUSTRATIONS.

SKETCHES IN ITALY—BY ARNOLD FINDLEY, MONTREAL.

COMPETITIVE DESIGN FOR A MASONIC TEMPLE, MONTREAL.—J. R. RHIND, ARCHITECT—AWARDED SECOND POSITION.

CHURCH OF ST. GREGORY, OSHAWA.—POST & HOLMES, ARCHITECTS, TORONTO.

DETAILS OF STORE FOR R. SIMPSON, TORONTO.—EDMUND BURKE, ARCHITECT.

TORONTO BUILDERS' EXCHANGE.

The following are the officers elect for 1895: Board of Directors—George Oakley, president; John Aldridge, 1st vice-president; Wm. Park, 2nd vice-president; David Williams, treasurer; Wm. Pears, Thos. Cannon, Jr., James Crang, Wm. Booth, Henry Martin, Fred'k. Wakefield, Henry Lucas, James Isaac.

THE WEATHERING OF BUILDING STONE.*

The slow decay of everything exposed to the weather has become a proverb, and from the earliest times men have moralized on the "gnawing tooth of time," as though time were some relentless monster devouring slowly man and all his products; but of late years geologists have begun to make some enquiries as to the monster, and to find out somewhat exactly what time's gnawing tooth really is. The question is one of great importance to the student of geology, for the weathering and wearing away of the solid rock and the building up of its materials in new places are among the most significant factors in the ceaseless round of change by which mountains and valleys and plains are carved and re-modelled on the earth's surface. To the geologist no structure is permanent, the "everlasting hills" do not last forever; in fact the destructive forces are most actively at work where the mountain lifts its head so boldly, as if to defy the elements.

The "tooth of time," when examined a little carefully, turns out, as so many bugbears do, to consist of very simple and innocent elements. Air, water, change of temperature; these three factors alone or in combination, with traces of a few common acids, are the effective forces in the weathering of the rocks of the geologist and of the stone of the architect. The effects produced by these agencies may be purely mechanical, or purely chemical, or more often a mixture of both.

In climates like our own, where the extremes of heat and cold may run from 100° in summer to 15° or 20° below zero in winter, the effect of mere change of temperature may be important in its disintegrating action on building stone. The rise of temperature, when sunshine falls upon the wall of a building, is imparted to the outer layers of particles of the blocks of building stone and expands them, granite having been found to expand .000004825 inch per foot for each degree Fahrenheit, marble .000005668, sandstone .000009532.

Since stone is a poor conductor of heat the surface will expand more rapidly than the interior, and there will be a tendency to form minute cracks and to chip off the surface of the stone. It is said that the south side of stone buildings, exposed to great changes by the coming and going of sunshine, begins to roughen and disintegrate sooner than the north side in New York and other American cities. The ill effects of change of temperature will, of course, be more apparent in the case of stone like granite, made up of minerals differing in their rate of expansion by heat. This is most strikingly shown in case of fire, when granite, though stronger and more compact than sandstone or limestone under ordinary circumstances, crumbles far more easily in the intense heat.

Another injurious effect of change of temperature is to be found in the loosening of the joints between the blocks of stone in a building. Supposing the stone to have been laid in summer, all the blocks will occupy less space in the cold of winter, and minute fissures will tend to form in the cement or between it and the stone. These fissures admit water and make the starting point for other changes.

Change of temperature alone is, however, not a rapid agent in disintegration. It is the presence of water that gives it efficiency as a destroyer in climates like ours in winter where freezing and thawing occur in rapid succession. When water freezes it expands with an almost irresistible force, which has been estimated at 138 tons per square foot at 2° below freezing, and is quite sufficient to rend the strongest rock. All the tiny fissures and crevices of a block of building stone exposed to rain or melting snow become filled with water, which may afterwards freeze, wedging off fragments. Another thaw followed by another frost pushes the parts still farther asunder until the stone splits and crumbles. Stone buildings of many kinds illustrate this action on the sides exposed to storms. It is very well seen on many New York brown stone houses, where the porous Connecticut sandstone has been sawn and set on its edge, and after a few years scales so as to be quite unsightly.

The action of frost depends very largely on the porosity of any stone exposed to its influence. A compact massive stone like granite or many limestones is little affected, while porous limestones, and especially sandstones, are very quickly injured in exposed positions. In this respect the capacity of a stone to absorb water is of great importance, and one may say with Sterry Hunt that, other things being equal, "the value of a stone for building purposes is inversely as its porosity or absorbing power." N. H. Winchell gives in a report of the Geological and Natural History of Michigan (Vol. 1, p. 197, etc.), a table showing that massive crystalline stones, like granites, syenites and gabbros, absorb very little water, generally much less than one per cent.; dolomites absorb a little more, and dolomitic limestones still more, up to 3 or 4 per cent. Limestones absorb rather less, while sandstones absorb very much more, the lowest amount in his table being three per cent., and the highest 12.69 per cent. Sterry Hunt found that Potsdam sandstones from Canada absorbed from 0.50 to 3.26 per cent., Medina sandstones from Canada 3.31 to 4.04 per cent., and subcarboniferous sandstone from Ohio 9.59 to 10.22 per cent. Silurian limestones and dolomites from Canada examined by him absorbed from 0.11 to 5.55, while Tertiary limestones from Caen, France, absorbed from 15 to 16.05 per cent. of moisture.

As a general rule a stone absorbing 10 per cent. of water crumbles rapidly in our winters, and should not be employed where carving or a fine finish of any kind is exposed to the weather.

Thus far the purely mechanical side of weathering has been discussed. Let us now turn to the chemical side. The air consists of about four parts of nitrogen and one of oxygen, with varying amounts of watery vapor, a little carbonic acid and traces of ammonia and other nitrogen compounds. In cities it may also carry soot and traces of some common chemical compounds, such as sulphur dioxide, sulphurous and sulphuric acids, hydrochloric acid, nitrous and nitric acids.

Rain water is more or less strongly charged with oxygen, carbonic acid and other substances found in the air. The nitrogen of the air is inert and the oxygen and other substances are active only in the presence of water, so that very dry air has little or no effect in weathering. In very dry climates like that of Egypt monuments of stone may be ground off by driving desert sand acting as a sand blast, but are scarcely affected in other respects after 4000 or 6000 years exposure to the weather. How differently a damp climate affects the same stone may be seen only too well in the Egyptian obelisks transported to London, Paris and New York. It is well known that in the last city the granite scaled so rapidly that the obelisk had to be coated with paraffine to preserve it at all.

The action of oxygen as a weathering agent is important in respect to a few minerals only. Certain sulphides, especially the brassy yellow mineral iron pyrites, are changed by oxygen in the presence of moisture into sulphates and finally into oxides. Granites, marbles and other crystalline rocks containing these minerals, may be weakened by their weathering out, and are stained an ugly brown by the hydrous oxide formed, so as to be quite disfigured. This change is less important in the sandstones, though even then the change of colors may be disagreeable. Many stones used in the Parliament Buildings at Ottawa illustrate this, the dark brown smear having sometimes run down on to the blocks below. Stones rich in magnetite, such as diabase, sometimes used as black granite, may be acted on in a different way. The mineral magnetite consists of the sesquioxide of iron combined with the monoxide. The latter portion may weather into hydrous sesquioxide, giving brown stains, and sometimes causing the rock to crumble. A similar effect, though less important, has been observed in some massive rocks containing large amounts of silicates rich in iron, hornblende or augite.

Water charged with carbonic acid is a very efficient weathering agent, and has some action on most minerals, except quartz. In the granite of the Thousand Islands large blocks of quartzite are sometimes found, and as a rule the quartzite projects sharply an inch or so above the granite, showing the amount of weathering and degradation since the time some thousands of years ago when all was planed smooth by glaciers.

In the case of granite and other massive crystalline rocks this weathering consists in the change of the felspar into clayey substances and of the mica and hornblende into impure clay, oxides of iron, etc. The quartz grains are loosened in this way and are washed off by rain action, leaving fresh surfaces exposed. Without the help of frost it is probable that this variety of weathering would go on very slowly. Granite monuments in our cemeteries seem but little affected even after standing a number of years, though they gradually lose their polish and grow rough.

Limestones are more easily attacked. If pure they are slowly dissolved, but keep a tolerably smooth surface. If impure, as they generally are, the particles of sand and clay are insoluble and form a crust on the surface. With this the soot of city atmospheres combines to change the original color into a dingy black. Limestones with large fossils soon become unsightly on dressed surfaces from the projection of the fossils. Marbles or crystalline limestones are very readily acted on. A study of marble tombstones in our cemeteries shows that even a few years exposure removes the polish, except on parts that are protected. Every marble slab which I have examined, bearing a date of twenty years or more ago, has completely lost its polish on all exposed parts, has turned grey in color and is so friable that one can easily rub off particles with the finger. It is quite evident that marble is entirely unsuited for outdoor use in the climate of Toronto.

Sandstones differ greatly among themselves in their liability to weather, hard quartzitic ones being almost unattacked, while porous, loose textured sandstones crumble sometimes very rapidly. These differences depend chiefly on the character and amount of the cement which holds the particles together. A clayey cement is the worst, since it readily absorbs moisture and is crumbled by the action of frost. Such sandstones are seductively easy to work, so that builders are tempted to use them for carvings, but often the storms of a single winter will round the edges and spoil the sharpness of such carvings, particularly on exposed corners of buildings.

A calcareous or lime cement, though better than clay, is comparatively easily dissolved by rain water charged with carbonic acid, and still more easily by water containing traces of sulphurous or sulphuric acid, such as may frequently be found in the air of cities. Carbonate of iron is another, though rarer cement, which is easily soluble. The red anhydrous oxide of iron resists solution very well; the brown hydrous is less resistant. The most permanent cement of all is a siliceous one, which is practically unaffected by rain charged with any ordinary solvent; but unluckily such sandstones are so hard to work and usually of such poor colors that builders rarely employ them.

A rather fine grained grey sandstone frequently used in our cemeteries, has turned darker grey, but resists weathering often admirably. Horizontal slabs fifty years old are not at all friable and still retain their inscriptions, though somewhat encrusted with dirt and lichens. A yellowish sandstone has not stood as well, and after thirty-five years in one instance has weathered so as to be quite illegible.

The presence of clay spots in sandstones is most injurious to the appearance, since they weather out and leave ugly holes, sometimes not standing even a single winter. The filling of the holes with powdered sandstone and shellac renders the stone presentable, but only for a short time. Still worse is the presence of clayey layers between the laminae either of sandstone or limestone. The clay rapidly weathers out, spoiling the dressed face of the stone and in time weakening the whole wall.

The hardening of certain limestones and sandstones after quarrying is an interesting effect of the action of the air, though not properly included under weathering. It appears to be due to the drying out of the quarry water with which the stone was soaked. As it drys out, all the substances which it held in solution, such as lime and silica, are deposited, hardening the surface of the block. If once this hardened skin is removed, however, no amount of wetting with pure water will renew it.

Thus far we have considered the action of the weather in decomposing and dissolving part or all of the constituents of a building stone, injuring its strength and durability; but there is another action of some importance to the architect as an artist, that is the slow change of color which most varieties of stone undergo after taking their place in a building. This may be called the mellowing touch of time as contrasted with his gnawing tooth, and from the artistic side an architect's work, like a rich wine, may ripen and improve with years.

Most of these color changes are the result of slow oxidation. Some dark grey or bluish limestones, like those of Kingston, contain bituminous matter from the multitude of fossil organisms that died to form these beds of rock. This color is slowly lost by oxidation and the surface of the stone gradually reaches the true color of the limestone, a pale grey, sometimes even suggesting marble. As a general rule such changes of color are due to oxidation of iron compounds from the monoxide, which is green or black as a rule, to the sesquioxide, which is yellow or brown or red. The general effect then is to change the color from cool greenish greys to warmer yellows or browns. An old marble statue, cold white in the beginning, becomes yellowed like old ivory with the lapse of time; but this change may be due partly to the action of dust and soot in cities. Many whitish or grey limestones yellow in a somewhat similar way. Grey or greenish sandstones generally take on a yellow or brown tone in time. In many cases this change of color is a distinct improvement, especially where stones of different colors which do not quite harmonize have been used together.

Of course in cities burning much soft coal, color is of no importance, since all colors are presently shrouded in an impartial pall of sooty grey or dingy black.

In towns burning mostly hard coal, like our own Toronto, with its usually clear skies and clean atmosphere, the color scheme and the changes which time will give rise to should be carefully considered, more so than they are at present.

In choosing a building stone which has not been thoroughly tested by use one may very easily make mistakes. The color, the texture, the power to resist crushing strain, as the stone comes from the quarry, may all be greatly modified by weathering. The amount of moisture which the stone will absorb, the chemical constitution and the mineral composition, as shown under the microscope, all afford data by which to judge of its lasting qualities; but perhaps the best test of all is to examine the neighborhood of the quarry and see what effect weathering has had upon loose blocks or exposed ledges of similar stone. In any case, architects in choosing stone for buildings intended to be of a lasting and monumental character, should take every means possible to determine the durability of the material they are working with.

*Paper by Prof. Coleman, School of Practical Science, Toronto, read at the fifth annual convention of the Ontario Association of Architects.

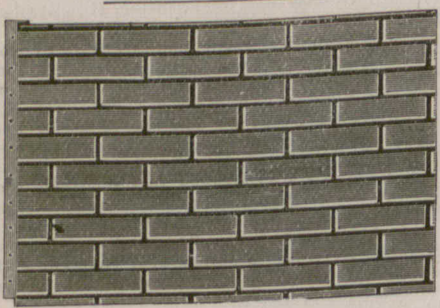
NO TEUTONIC ART.

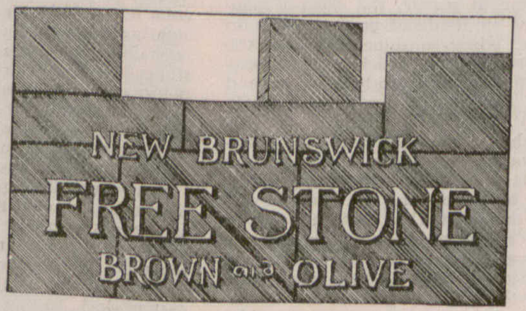
THE art we call Teutonic is really Byzantine. The tribes which were planted on the various frontiers of the empire, and were largely in its service, were all directly indebted to Byzantium for their art. Hence while we find the same art, with slight local differences, among the Goths of the Crimea, the Lombards in Italy, the Burgundians in Austria and Switzerland, the Alemani on the Rhine, the Merovingians in Gaul, the Angles and Saxons in Britain, the Visigoths in Spain, the Vandals in Africa, and the early Scandinavians in Denmark and Scandinavia. The cloissoné jewelry, the interlaced dragon patterns, etc., all of which have such a common likeness, have an equally common likeness with the work which we can trace to the Queen of Bosporus, and, as Lindenschmidt was never tired of preaching, there is no Teutonic art. The art of all the Teutonic tribes who founded the modern States of Europe was in reality the art of Byzantium, and this was so in later times also. The art of the Carlovingian Empire, and of the later Anglo-Saxons, was the art of the exarchate of Ravenna, just as the art of Southeastern Europe, as preserved in the churches of Kief, was the direct daughter of Constantinople.—Sir Henry Howarth, in The Antiquary.

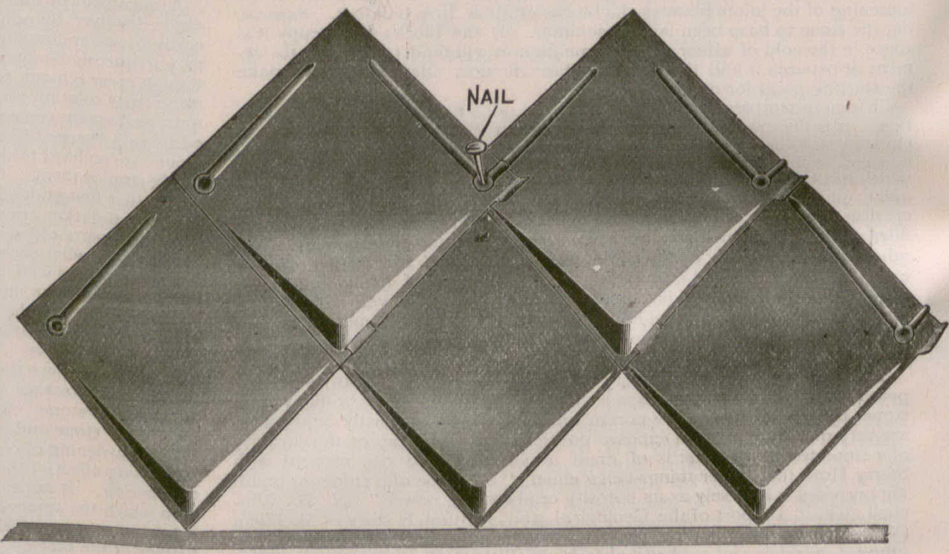
SO far from stencilled effects in wallpaper losing their popularity they are unquestionably gaining ground, and those who admire them most are those whose taste is best cultivated. The design of a wallpaper based on stencils is as artistic and effective as any, provided, of course, that proper care is taken in the selection of colours.

A writer on painting states that the ochre best suited for the purposes of the house-painter will show an analysis about as follows: Hydrated oxide of iron 45 per cent., Silica 35 per cent., Alumina 20 per cent.

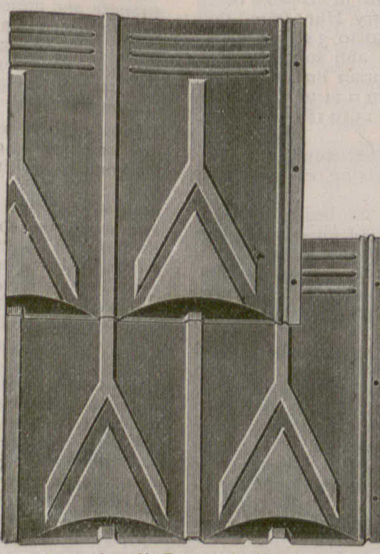
Yellow is the Chinese imperial color, not to be desecrated by common use. Imperial buildings are roofed with yellow tiles. The Pekin Gazette is issued in a yellow cover; the national flag has a yellow ground; and the Emperor's own robe is of yellow silk, embroideerd with a gold five-clawed dragon.







DIAMOND TILES



"Empire" Patent Shingles
Warranted Rust-Proof.

PAGES

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