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MISSING

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—THE—

CANADIAN ARCHITECT AND BUILDER,

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ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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Illinois Architects' License Bill.

A BILL providing for the examination and licensing of architects and regulating the practice of architecture has passed the Legislature of the State of Illinois. The bill, which will doubtless have special interest for Canadian architects, in view of the efforts put forth in this direction by the Ontario Association of Architects, will be found printed on another page of this number.

American Institute of Architects.

THE thirty-first annual meeting of the American Institute of Architects has been called to meet in Detroit, Mich., on the 29th and 30th inst. and Oct. 1st. Among the papers to be presented will be one by Mr. Cass. Gilbert, F.I.A., of St. Paul, Minn., on "Architectural Education and its Bearing on Membership in the Institute;" by Mr. Cliptson Sturgis, F.I.A., Boston, Mass., on "Church Architecture," and Mr. H. Rutgers Marshall, F.A.I.A., of New York, on "Architectural Truth." The committee to which was referred amendments to the constitution and by-laws will report numerous radical changes.

Public Bathing Facilities.

APROPOS of our remarks in a recent issue on the necessity for the erection and maintenance of public bath houses in cities like Toronto and Montreal, it is learned that in upwards of fifty European cities the plan has been adopted of providing bathing facilities in public school buildings. In Berlin and other principal German cities, all new common school buildings are fitted up in this manner. The idea is one which might with advantage be adopted in connection with the public schools in the poorer districts in our Canadian cities. Bathing facilities in connection with the public schools would not do away with the necessity for one or more public bath houses, but would be to the latter a valuable auxiliary in improving and maintaining the public health.

Builders and Building Inspectors.

THE National Association of Builders and the National Association of Building Inspectors of the United States, which are distinct organizations, are meeting simultaneously in annual convention in Detroit, Mich., at the present time. The subjects which will come up for discussion by the Building Inspectors are: Uniformity of Safe Loads for Building Floors; Adoption of a System of Uniform Definitions in Building Laws; Uniformity of Tests of Steel Construction and Best Methods of Safeguarding the Same Against Fire; Safe Means of

Ingress and Egress ; Elevator Inspection ; Boiler Inspection ; Ventilation ; Sanitation ; Plumbing Inspection ; Gas Fixtures Inspection ; Appointment of Building Inspectors ; Best Methods of Enforcing Building Laws ; Electric Wiring in Buildings, etc., etc. The Toronto City Council have appointed Mr. Coatsworth, City Commissioner, a delegate to this convention. We would like to indulge the hope that as the result of his visit the Council may be induced to revise the city building by-laws, substituting for the many glaring anomalies at present existing therein some of the carefully considered recommendations contained in the draft by-law prepared and submitted a year or two ago by the Ontario Association of Architects.

Cost of Operating Elevators.

THE cost of operating elevators by steam, water and electricity has properly become the subject of careful investigation, in view of the extensive and growing use of these appliances. It is stated that in New York, the home of so many sky-scrapers, a larger number of persons are carried vertically in elevators than are transported horizontally by the various forms of traction. Experience with electric elevators in the United States is said to have shown the cost of carrying a useful load of 1,500 pounds to a height of 100 feet, inclusive of return to starting point, to be one cent. In Berlin and Vienna the cost is reported to be considerably below the figure mentioned. In the former city the cost of lifting by electricity a load of 850 pounds to a height of 80 feet, inclusive of descent, was only one-fifth of a cent.

National Art Commission.

A BILL has been prepared by the Board of Managers of the Public Art League of the United States for presentation to Congress, which provides for the appointment of a National Art Commission. It is proposed that the Commission shall be charged with the duty of passing upon the merits of all works of art which may hereafter be purchased or constructed by the government. The bill provides that the commission shall be composed of the presidents of the American Institute of Architects, the National Sculpture Society, the National Academy of Design, and two other citizens of the United States, to be appointed for a term of six years, and from time to time, as vacancies occur, by the President of the United States. This is an extension of the idea advocated for several years past by the Ontario and Quebec Associations of Architects that there should exist in each of these provinces a qualified commission to whom should be submitted designs for public monuments, parks, squares and other improvements of an artistic character. We are pleased to note the growth of sentiment in this direction, and trust that it may shortly take practical form in Canada as well as the United States.

Speculative Building.

THE business depression which settled down upon Toronto five or six years ago, due in large measure to the collapse of the real estate boom, was severely felt by speculative builders. In consequence of the drop in prices of real estate, in which most of them were more or less interested, their equities were wiped out, and they were stripped of their possessions. Under these circumstances, many of them removed from the city, and some from the country, in the hope of being able, amid more favorable surroundings, to start life over again and repair their shattered fortunes. Persons who had suffered by their operations were not loth to witness their departure, and the more legitimate class of builders comforted themselves with the reflection that when better times should return they would be free from the competition of the speculative builders. Recent observation, however, goes to show that some of the speculative builders of the boom days have managed to live through the dull times, and with the return of improved conditions are ready for business again. Owing to the great decline in land prices, these men are able to operate in even the best residential localities, the attractiveness of which they are likely to seriously impair, unless the building regulations are amended so as to compel the erection of a class of buildings suited to these localities.

Development of Trades Unionism.

THE Building Trades Unions of Chicago are considering the best method of labelling buildings which have been entirely constructed by organized labor. The suggestion that a metal flag be adopted which should also serve as a weather vane, has met with favor. The idea is to provide a means by which the members of trades unions may distinguish and keep away from houses erected by "scab" labor. The ultimate end in view will no doubt be to boycott every occupant of a building which does not fly the union badge. The narrow-minded tyranny of some of the labor organizations is fast reaching the point where it will overstep the bounds of public tolerance and bring about its own defeat. Our readers will not be slow to recognize the ridiculousness of measures such as the one we are considering, but the originators are apparently oblivious to the fact that they are making themselves the laughing-stock of sensible minds. In Great Britain the unions are not less tyrannical. The bricklayers refuse to allow any but the sons of bricklayers to be apprenticed. The President of the National Association of Master Builders, in referring recently to the arrogant demands of the unions, expressed the belief that they would have to fight once for all as to whether capital should rule labor or labor rule capital. Recognizing as we do the interdependence of capital and labor, we would like to see these two forces working in harmony for the advancement of the best interests of the race, but it seems futile to hope that this desirable condition can come about so long as the labor organizations submit themselves to the leadership of unreasoning demagogues.

Competitive Designs for Government Buildings.

CANADIAN architects in common with those of the United States will be pleased to learn that the Tarusey Bill, passed by Congress in 1893, which provides for obtaining designs for government buildings by competition among the leading architects of the country, is to be put in operation at once. We publish elsewhere in this number the regulations which have been framed to govern these competitions. The first buildings to be erected on the competitive plan will be in Camden, N.J., and Norfolk, Va. There is little doubt that as the result of bringing to bear upon the designing of public buildings the best architectural talent of the country, there will come a marked improvement in the public architecture of the United States. The Dominion Government might, with advantage to the architectural profession in Canada and still greater advantage to the country, follow the example of the United States in

throwing open to competition in the future the designing of public buildings. Such a step would give a much needed stimulus to Canadian architects, and the competition thus engendered would result in the erection of buildings in which both excellence and diversity of the design would be displayed. In view of the fact that a successor has not yet been appointed to the position made vacant by the recent retirement of Mr. Thos. Fuller, late Chief Architect of the Public Works Department, the present would seem to be an opportune time for the Government to consider and deal with this matter. It might be advisable for the Architectural Associations of Ontario and Quebec to memorialize the Government on the subject at this juncture.

Mexican Federal Palace Competition.

We have before us details of the requirements of the proposed Federal Palace for which an international competition for designs has been instituted. The printing of these details would occupy too large a portion of our space and is therefore not attempted. Should any Canadian architect feel a disposition to take a hand in the competition, he can by calling at this office see a copy of these requirements. The edifice will be constructed in the centre of an elliptical area, surrounding which will be structures of similar architectural composition. The principal conditions are that solidity and the rational employment of materials shall not be sacrificed to decorative fancies. The total cost must not exceed $1,500,000, without counting the foundations to the level of the street. The designs must be sent, accompanied by an explanatory specification and description written in Spanish, French and English, and estimate of cost, to the Ministry of Communications and Public Works, either directly or through the diplomatic or consular representatives of Mexico, on or before the 30th of November, 1897. The designs will be submitted to a jury composed of seven architects or civil engineers appointed, one by the Chamber of Deputies, one by the Senate, one by the Ministry of Communications and Public Works, and four by the candidates by means of a written ballot, from among ten experts proposed by the Ministry of Public Works. They must not be participants in the competition and will be chosen by the absolute majority of ballots. For this purpose the candidates must send with their drawings and specification a list containing the four names of the persons whom they choose as members of the jury. Before the award is made the official journal of the Government will publish the result of the ballot held for the formation of the jury, over which the Minister of Public Works or his representative will preside. There is here an opportunity for Canadian architects to distinguish themselves, and also for Canadian manufacturers of supplies to get a share of the orders for materials required in the fitting up of these important buildings.

BY THE WAY.

Another example of the low level to which architectural competitions in Canada have been reduced is now before us in a competition instituted by the St. Thomas Board of Education for plans for a twenty-room school building. The estimated cost of the building was $30,000, and the prizes offered were $50, $35 and $25 respectively. Seventeen architects are said to have submitted plans in this competition. The first prize has been awarded to E. T. Macdonald, of St. Thomas, the second prize to Neil Darrach, of St. Thomas, and the third prize to Mr. Ogilvie, of Toronto. I regret that I am not in a position to publish the names of all the competitors.

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A joint committee, appointed by the Royal Institute of British Architects and the College of Organists, to determine the most suitable position for church organs, recommends that as a rule the organ be placed at the west end of the church and the choir in two divisions at the sides of the nave.

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Senator Thurston, chairman of the special committee of the Senate upon International Expositions, has recommended that the appropriation of half a million dollars be made to cover the cost of an exhibit at the Paris Exhibition of 1900; also that provision be made for the expenses of five commissioners. Has the Government of the Dominion of Canada yet given any thought to this matter? Canada should have adequate representation at this Exhibition, which promises to eclipse all of its predecessors.

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A well known Toronto plumber related to me a bit of his experience the other day which seems to indicate that the conditions at present prevailing in the trade are by no means favorable to the making of profits. In view of the dull times, he determined to figure more closely than usual on a certain contract—in fact, his purpose was to make no allowance for profit, but simply to cover the cost of doing the work, and rest satisfied with keeping his workmen employed. After completing and sending in his tender, calculated on this basis, he was startled by the discovery that he had failed to take into account the cost of three boilers required by the specification. He hurried away to the company who had invited him to tender, and began to explain to them his mistake, when they interrupted him to remark in the coolest possible manner that the error was of no consequence, as they had received bids which were very much below the one he had submitted. Notwithstanding the unsatisfactory condition of the trade indicated by this incident, there are plumbing firms—some of them not old-established either—which appear to be doing a prosperous business.

BUILD WELL.

High on the granite wall the builders, toiling,
Heaved up the massive blocks and slabs to place,
With swart and streaming brows and straining sinews,
Under the summer's blaze.

And higher yet, amid the chills of autumn,
Tier upon tier and arch on arch arose;
And still crept upward, coldly, wearily,
'Mid winter's sifting snows.

From stage to stage up springs the master builder,
Instructing, cheering, chiding here and there;
Scanning with scrutiny severe and rigid,
Each lusty laborer's share.

Anon his voice to those most distant shouting,
Through the hoarse trumpet makes his orders swell;
Or utters words like these to rouse and hearten:
"Build well, my men, build well!"

"The ropes are strong, and new and sound the pulleys;
The derrick's beams are equal to the strain;
Unerring are the level, line and plummet;
Let nought be done in vain!

"Build that these walls to coming generations
Your skill, your strength, your faithfulness shall tell,
That all may say, as storms and centuries test them,
The men of old built well!"

THE NATIONAL ELECTRICAL CODE.

THE National Board of Fire Underwriters of the United States have finally adopted a code governing the installation and construction of electrical apparatus. The rules of most interest to architects are as follows:

CLASS D.—FITTINGS, MATERIALS AND DETAILS OF CONSTRUCTION.

All Systems and Voltages.

40. WIRE INSULATION—

a. Rubber Covered—The insulating covering must be solid, at least three-sixty-fourths of an inch in thickness and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at seventy degrees Fahrenheit and three days' submersion in lime water, and after three minutes' electrification with 550 volts. (See page 44.)

b. Weatherproof—The insulating covering must not support combustion, must resist abrasion, must be at least one-sixteenth of an inch in thickness, and thoroughly impregnated with a moisture repellent.

c. Flexible Cord—Must be made of two stranded conductors, each having a carrying capacity equivalent to not less than a No. 16 B. & S. wire, and each covered by an approved insulation, and protected by a slow-burning, tough-braid outer covering.

1. Insulation for pendants under this rule must be moisture and flame proof.

2. Insulation used for cords used for all other purposes, including portable lamps and motors, must be solid, at least one-thirty-second of an inch in thickness, and must show an insulation resistance between conductors, and between either conductor and the ground, of at least one megohm per mile after one week's submersion in water at seventy degrees Farenheit, and after three minutes' electrification, with 550 volts.

3. The flexible conductors for portable heating apparatus, such as irons, etc., must have an insulation that will not be injured by heat, such as asbestos, which must be protected from mechanical injury by an outer, substantial, braided covering, and so arranged that mechanical strain will not be borne by electrical connection.

d. Fixture Wire—Must have a solid insulation, with a slow-burning, tough, outer covering, the whole to be at least one-thirty-second of an inch in thickness, and show an insulation resistence between conductors, and between either conductor and the ground, of at least one megohm per mile, after one week's submersion in water at seventy degrees Fahrenheit, and after three minutes' electrification, with 550 volts.

e. Conduit Wire—Must comply with the following specifications:

1. For insulated metal conduits single wires and twin conductors must comply with section (a) of this rule.

Concentric wire must have a braided covering between the outer conductor and the insulation of the inner conductor, and, in addition, must comply with section (a) of this rule.

2. For non-insulated metal conduits single wires and twin conductors must comply with section (a) of this rule, and, in addition, have a second outer fibrous covering, at least one-thirty-second of an inch in thickness, and sufficiently tenacious to withstand the abrasion of being hauled through the metal conduit.

Concentric conductors must have a braided covering between the outer conductor and the insulation of the inner conductor, and comply with section (a) of this rule, and, in addition, must have a second fibrous outer covering at least one-thirty-second of an inch in thickness, and sufficiently tenacious to withstand the abrasion of being hauled through the metal conduit.

41. INTERIOR CONDUITS—(For wiring rules, see Nos. 24 and 25.)

a. Each length of conduit, whether insulated or uninsulated, must have the maker's name or initials stamped in the metal, or attached thereto in a satisfactory manner, so that the inspectors can readily see the same.

Insulated Metal Conduits:

b. The metal covering, or pipe, must be at least equal in thickness, or of equal strength to resist penetration by nails, etc., as the ordinary commercial form of gas pipe of same size.

c. Must not be seriously affected externally by burning out a wire inside the tube when the iron pipe is connected to one side of the circuit.

d. Must have the insulating lining firmly secured to the pipe.

e. The insulating lining must not crack or break when a length of the conduit is uniformly bent at temperature of 212 degrees Fahrenheit to an angle of ninety degrees, with a curve having a radius of fifteen inches, for pipes of one inch and less, and fifteen times the diameter of pipe for larger pipes.

f. The insulating lining must not soften injuriously at a temperature below 212 degrees Fahrenheit, and must leave water in which it has been boiled practically neutral.

g. The insulating lining must be at least one-thirty-second of an inch in thickness, and the materials of which it is composed must be of such a nature as will not have a deteriorating effect on the insulation of the conductor, and be sufficiently tough and tenacious to withstand the abrasion test of drawing in and out of same long lengths of conductors.

h. The insulating lining must not be mechanically weak after three days' submersion in water, and, when removed from the pipe entire, must not absorb more than ten per cent. of its weight of water during 100 hours of submersion.

i. All elbows must be made for the purpose, and not bent from lengths of pipe. The radius of the curve in the inner edge of any elbow not to be less than three and one-half inches. Must have not more than the equivalent of four quarter bends from outlet to outlet, the bends at the outlets not being counted.

Uninsulated Metal Conduits:

j. Plain iron or steel pipes of equal thickness, or of equal strength, to resist penetration of nails, etc., as the ordinary commercial form of gas pipes of the same size, may be used as conduits, provided their interior surfaces are smooth and free from burs; pipe to be galvanized, or the interior surfaces coated or enamelled to prevent oxidization with some substance which will not soften so as to become sticky and prevent wire from being withdrawn from the pipe.

k. All elbows must be made for the purpose, and not bent from lengths of pipe. The radius of the curve of the inner edge of any elbow, not to be less than three and one-half inches. Must have not more than the equivalent of four quarter bends from outlet to outlet, the bends at the outlets not being counted.

42. WOODEN MOULDINGS—(For wiring rules, see No. 24.)

a. Must have, both outside and inside, at least two coats of waterproof paint, or be impregnated with a moisture repellent.

b. Must be made of two pieces, a backing and a capping so constructed as to thoroughly incase the wire, and provide a one-half inch tongue between the conductors, and a solid backing, which, under grooves, shall not be less than three-eighths of an inch in thickness, and must afford suitable protection from abrasion.

It is recommended that only hardwood moulding be used.

48 SWITCHES—(See Nos. 17 and 22.)

a. Must be mounted on non-combustible, non-absorptive, insulating bases, such as slate or porcelain.

b. Must have carrying capacity sufficient to prevent undue heating.

c. Must, when used for service switches, indicate, on inspection, whether the current be "on" or "off."

d. Must be plainly marked where it will always be visible, with the name of the maker and the current and voltage for which the switch is designed.

e. Must, for constant potential systems, operate successfully at fifty per cent. overload in amperes, with twenty-five per cent. excess voltage under the most severe conditions they are liable to meet with in practice.

f. Must, for constant potential systems, have a firm and secure contact; must make and break readily, and not stop when motion has once been imparted by the handle.

g. Must, for constant current systems, close the main circuit and disconnect the branch wires when turned "off"; must be so constructed that they shall be automatic in action, not stopping between points when started, and must prevent an arc between the points under all circumstances. They must indicate, upon inspection, whether the current be "on" or "off".

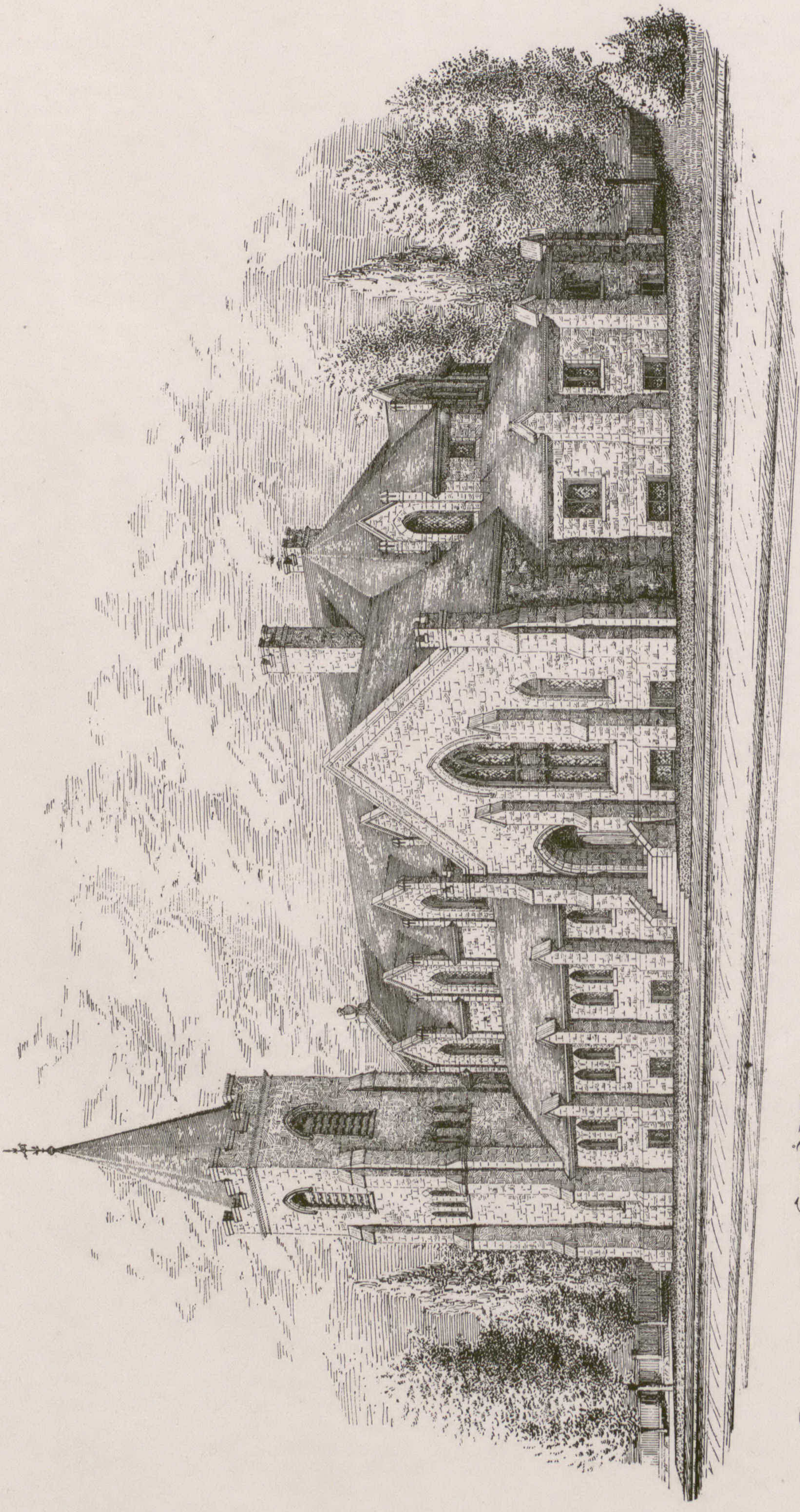
44. CUT-OUTS AND CIRCUIT BREAKERS—(For installation rules, see Nos. 17 and 21.)

a. Must be supported on bases of non-combustible, non-absorptive insulating material.

b. Cut-outs must be provided with covers, when not arranged in approved cabinets, so as to obviate any danger of the melted fuse metal coming in contact with any substance which might be ignited thereby.

c. Cut-outs must operate successfully, under the most severe conditions they are liable to meet with in practice, on short circuits with fuses rated at 50 per cent. above and with a voltage 25 per cent. above the current and voltage for which they are designed.

d. Circuit-breakers must operate successfully, under the most severe conditions they are liable to meet with in practice, on short



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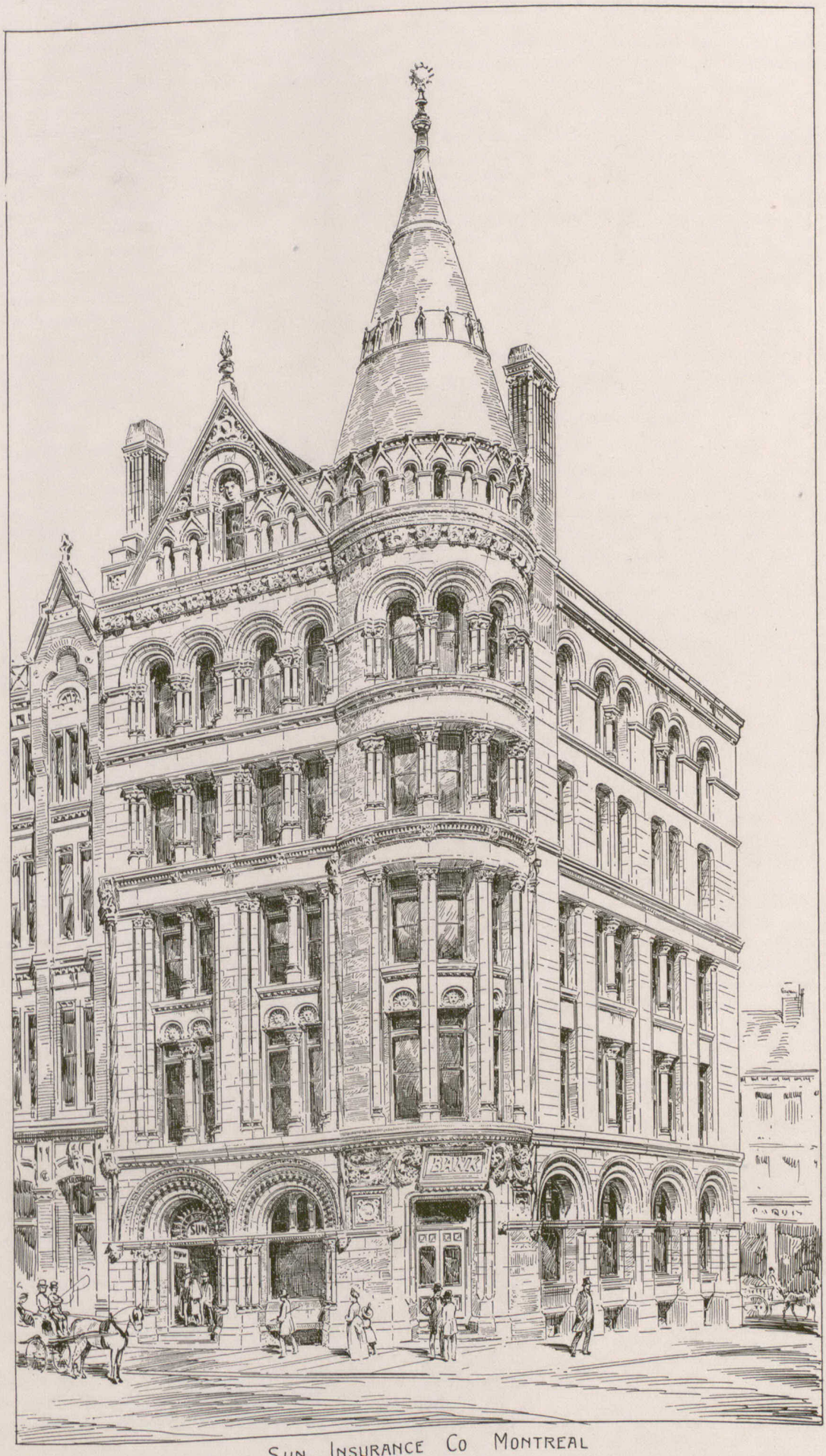

SUN INSURANCE CO MONTREAL

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circuits when set at 50 per cent. above the current, and with a voltage 25 per cent. above that for which they are designed.

e. Must be plainly marked where it will always be visible, with the name of the maker, and current and voltage for which the device is designed.

45. Fuses—(For instalation rules, see Nos. 17 and 21.)

a. Must have contact surfaces or tips of harder metal having perfect electrical connection with the fusible part of the strip.

b. Must be stamped with about eighty per cent. of the maximum current they can carry indefinitely, thus allowing about 25 per cent. overload before fuse melts.

With naked open fuses, of ordinary shapes and not over 500 amperes capacity, the maximum current which will melt them in about five minutes may be safely taken as the melting point, as the fuse practically reaches its maximum temperature in this time. With larger fuses a longer time is necessary.

Inclosed fuses where the fuse is often in contact with substances having good conductivity to heat, and often of considerable volume, require a much longer time to reach a maximum temperature on account of the surrounding material which heats up slowly. This data is given to facilitate testing.

c. Fuse terminals must be stamped with the maker's name, initials, or some known trade mark.

46. Cut-out Cabinets—

a. Must be so constructed, and cut-outs so arranged, as to obviate any danger of the melted fuse metal coming in contact with any substance which might be ignited thereby.

A suitable box can be made of marble, slate or wood, strongly put together, the door to close against a rabbet so as to be perfectly dust tight, and it should be hung on strong hinges and held closed by a strong hook or catch. If the box is wood the inside should be lined with sheets of asbestos board about one-sixteenth of an inch in thickness, neatly put on and firmly secured in place by shellac and tacks. The wires should enter through holes bushed with porcelain bushings; the bushings tightly fitting the holes in the box, and the wires tightly fitting the bushings (using tape to build up the wire, if necessary) so as to keep out the dust.

47. Sockets—(See No. 27.)

a. No portion of the lamp socket, or lamp base, exposed to contact with outside objects, must be allowed to come in electrical contact with either conductor.

b. Must, when provided with keys, comply with the requirements for switches. (See No. 43.)

48. Hanger-boards—

a. Hanger-boards must be so constructed that all wires and current carrying devices thereon shall be exposed to view and thoroughly insulated by being mounted on a non-combustible, non-absorptive insulating substance. All switches attached to the same must be so constructed that they shall be automatic in their action, cutting off both poles to the lamp, not stopping between points when started and preventing an arc between points under all circumstances.

49. Arc Lamps—(For installation rules, see No. 19.)

a. Must be provided with reliable stops to prevent carbons from falling out in case the clamps become loose.

b. Must be carefully insulated from the circuit in all their exposed parts.

c. Must, for constant current systems, be provided with an approved hand switch, also an automatic switch that will shunt the current around the carbons, should they fail to feed properly.

The hand switch to be approved, if placed anywhere except on the lamp itself, must comply with requirements for switches on hanger-boards, as laid down in Rule 48.

50. Spark Arresters—(See No. 19c.)

a. Spark arresters must so close the upper orifice of the globe that it will be impossible for any sparks thrown off by the carbons to escape.

51. Insulating Joints—(See No. 26a.)

a. Must be entirely made of material that will resist the action of illuminating gases, and will not give way or soften under the heat of an ordinary gas flame or leak under a moderate pressure. They shall be so arranged that a deposit of moisture will not destroy the insulating effect, and shall have an insulating resistance of at least 250,000 ohms between the gas-pipe attachments, and be sufficiently strong to resist the strain they will be liable to be subjected to in being installed.

b. Insulating joints having soft rubber in their construction will not be approved.

52. Resistance Boxes and Equalizers—(For installation rules, see No. 4.)

a. Must be equipped with metal, or with other non-combustible frames.

The word "frames" in this section relates to the entire case and surroundings of the rheostat, and not alone to the upholding supports.

53. Reactive Coils and Condensers—

a. Reactive coils must be made of non-combustible material, mounted on non-combustible bases and treated, in general, like sources of heat.

b. Condensers must be treated like apparatus operating with equivalent voltages and currents. They must have non-combustible cases and supports, and must be isolated from all combustible materials and, in general, treated like sources of heat.

54. Transformers—(For installation rules, see Nos. 11 and 33.)

a. Must not be placed in any but metallic or other non-combustible cases.

55. Lightning Arresters—(For installation rules, see No. 5.)

a. Must be mounted on non-combustible bases, and must be so constructed as not to maintain an arc after the discharge has passed, and must have no moving parts.

Class E.—Miscellaneous.

56. Insulation Resistance—

The wiring in any building must test free from grounds, i.e., the complete installation must have an insulation between conductors and between all conductors and the ground (not including attachments, sockets, receptacles, etc.) of not less than the following:

Up to	5	amperes	4,000,000
"	10	"	2,000,000
"	25	"	800,000
"	50	"	400,000
"	100	"	200,000
"	200	"	100,000
"	400	"	50,000
"	800	"	25,000
"	1,600	" and over	12,500

All cut-outs and safety devices in place in the above.

Where lamp sockets, receptacles and electroliers, etc., are connected, one-half of the above will be required.

57. Protection Against Foreign Currents—

a. Where telephone, telegraph or other wires, connected with outside circuits, are bunched together within any building, or where inside wires are laid in conduits or ducts with electric light or power wires, the covering of such wires must be fire-resisting, or else the wires must be enclosed in an air-tight tube or duct.

b. All aerial conductors and underground conductors, which are directly connected to aerial wires, connecting with telephone, telegraph, district messenger, burglar-alarm, watch-clock, electric-time and other similar instruments, must be provided near the point of entrance to the building with some approved protective device which will operate to shunt the instruments in case of a dangerous rise of potential, and will open the circuit and arrest any abnormal current flow. Any conductor normally forming an innocuous circuit may become a source of fire hazard if crossed with another conductor charged with a relatively high pressure.

Protectors must have a non-combustible insulating base, and the cover to be provided with a lock similar to the lock now placed on telephone apparatus or some equally secure fastening, and to be installed under the following requirements:

1. The protector to be located at the point where the wires enter the building, either immediately inside or outside of the same. If outside, the protector to be enclosed in a metallic, waterproof case.

2. If the protector is placed inside of building, the wires of the circuit from the support outside to the binding posts of the protector to be of such insulation as is approved for service wires of electric light and power (see No. 40a) and the holes through the outer wall to be protected by bushing the same as required for electric light and power service wires.

3. The wire from the point of entrance to the protector to be run in accordance with rules for high potential wires, i.e., free of contact with building and supported on non-combustible insulators.

4. The ground wire shall be insulated, not smaller than No. 16 B. & S. gauge copper wire. This ground wire shall be kept at least three inches from all conductors, and shall never be secured by uninsulated, double-pointed tacks, and must be run in as straight a line as possible to the ground connection.

5. The ground wire shall be attached to a water pipe, if pos-

sible, otherwise may be attached to a gas pipe. The ground wire shall be carried to, and attached to, the pipe outside of the first joint or coupling inside the foundation walls, and the connection shall be made by soldering, if possible. In the absence of other good ground, the ground shall be made by means of a metallic plate or a bunch of wires buried in a permanently moist earth.

58. ELECTRIC GAS LIGHTING—

Where electric gas lighting is to be used on the same fixture with the electric light:

a. No part of the gas piping or fixture shall be in electric connection with the gas lighting circuit.

b. The wires used with the fixtures must have a non-inflammable insulation, or, where concealed between the pipe and shell of the fixture, the insulation must be such as required for fixture wiring for the electric light.

c. The whole installation must be free from "grounds."

d. The two installations must test perfectly free from connection with each other.

59. SOLDERING FLUID—

a. The following formula for soldering fluid is suggested:

Saturated solution of zinc chloride	5 parts.
Alcohol	4 parts.
Glycerine	1 part.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

SOME SUGGESTIONS TO THE O. A. A.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Is it not about time that the committee appointed by the Ontario Association of Architects some years ago to look after the æsthetic, archæological, historical, architectural and monumentally-decorative detail of this provincial capital, commenced to agitate in favor of something?

The building industry has been enjoying a recess for a spell, and no doubt the worthy architects composing this distinguished committee have been enabled to participate in the vacation along with the rest of us; surely, therefore, they might have racked their wits and put them to some use in discovering data in this convention-visited city for their commemorative genius. If they are not hopelessly asleep I would like to suggest a few thoughts not unworthy the consideration of a respectable committee charged with the serious business of placing the Queen City on a proper art basis.

First, the reclaiming from the vandal Time, the lethargy of the Dominion Government, a squatter or two, and other evil influences, that half a dozen acres or so within the southern purlieus of the city, known as the "Old Fort."

The Old Fort has a history well worth preserving, and is not unworthy of a better fate than it receives. The Old Fort has been the scene of at least one sanguinary engagement, disastrous for both participating parties, but chiefly the invaders, when on the memorable 25th of April, in the year 1812, some weeks previous, perhaps, to the birth of the majority of the members of the committee aforesaid, the redoubtable General Pike invading the province attacked the Fort and was blown into oblivion, and various other directions, by the timely explosion of the powder magazine, the innocent result of a well planned accident on the part of one of our reckless regulars on sentry duty who happened carelessly to ignite the end of a fuse communicating with the interior of the magazine, just as the intepid Yankee was making his headlong way eastward across the Garrison Common towards the Fort. Peace to his ashes.

The curious old block houses of the Old Fort are in a good state of preservation, requiring but little to keep them so and attractive. They might be fitted up as a historical and military museum.

The embrasures and fortifications generally, such as they are, would be all the more presentable and picturesque by being restored; also the grand old guns would look more comfortable on less shaky carriages. Pyramids of cannon balls alongside would also add to the effect, besides being quietly suggestive to a certain class of visitors that we keep well awake.

The sidewalks of the Fort would be more in keeping if they were of a more permanent character than of pine, say of brick, and the roadway, instead of rambling all over the sward, be kept within bounds, a 20-foot gravel carriage drive with 6-inch stone kerbing on each side, the drive to make a detour and loop around the old guard house.

Why not look after the roadway also leading from the Old to the New Fort, plant a line of trees on each side and make a proper connection with the old military burying ground? In short, invoke the aid of the City Council to petition the Dominion Government to make a regular and systematic attempt at creditable maintenance of the Old Fort and all the great space beyond to the New Fort—including the making of a boulevard and drive 200 feet wide or so along the water-front from the Queen's Wharf to the ramparts of the New Fort, with proper approaches at either end and at the foot of Strachan avenue continued across the common. All of which I submit are eminently proper suggestions for the consideration of a wide-awake committee.

The Garrison Commons and Old Fort could be made wonderfully attractive without in any one feature destroying the utility of either for the purposes intended by the government, and the City Council could well afford to adopt a liberal policy in this direction. With the exhibition park and the New Fort at one end and the Old Fort at the other with all its historic reminiscences, together with the interesting little military cemetery, the place could be made quite as attractive and picturesque as the celebrated Hoe at Plymouth.

I would suggest that the Old Fort be dignified with a Gate (capital G) at the eastern entrance—nothing so costly, of course, or ambitious as the St. Louis or Kent Gates at Quebec—and yet something of a monumental character, built between the earth works, having an arched carriage entrance and a side entrance for pedestrians, built substantially of stone, with neat turrets and battlements, having a fortified appearance—something like a Gate, you know.

A tablet could be placed somewhere in the entrance, or over the central arch, recording the catastrophe of the sudden elevation of the Invincible Pike together with his staff of 200 aerial navigators; also the statement in prose or poetry of the fact that the British red coats and a company of English Hussars have from time to time made things lively within the precincts of the old stockade, recording the time of their occupation, together with the name of the companies. So much for the Old Fort.

2nd. What is to prevent the committee, if not too tired doing nothing, taking an active interest in the City Hall Square scheme, and the Governor Simcoe monument, about the necessity of either of which a whole volume might be written.

3rd. Why should Castle Frank be forgotten? Must this old historical land-mark be allowed to go uncared for and unsung—no glittering marble or eternal bronze or big round boulder to mark the identical site? Alas! alas! The very roadway to the place is eloquent with a hundred interesting reminiscences.

4th. Shame on the city—not one effort has been made by public or private enterprise to record the Victorian Jubilee, save the ludicrous burlesque at the recent Exhibition, when $20,000 was literally given to the winds, when half the amount would have perpetuated to generations that we are not altogether a city living on a reputation for loyalty only without the deed. Surely the committee on art and things, if still in existence, might take the representatives from other eminent bodies into its confidence and devise some means, however desperate, to save the city's historical records from dry rot and mildew and blight. Wake up, committee! Wake up! and show yourselves.

HUBUR G. PAULL.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE annual meeting of the Province of Quebec Association of Architects will be held in the City Hall, Quebec, on Thursday, September 30th, and Friday, October 1st. Members having any suggestions to make should forward the same to the secretary at as early a date as possible. The members are especially requested to prepare themselves to take an active interest in the meeting, and to bring forward questions for discussion. The programme is now being prepared. The transactions of the council for the year ending September 30th, 1897, will be printed and distributed to the members, in accordance with the resolution passed at the last meeting. This, it is hoped, will result in a more general discussion.

In October next the association enters upon the eighth year of its existence. Since its foundation it has been most useful and effective. The future will in a large degree depend upon the efforts put forth by the members of the association.

AMATEUR SKETCH CLUB.

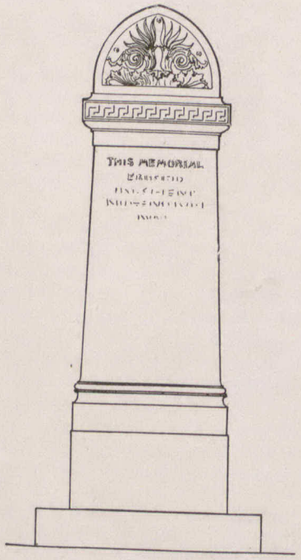
An architectural sketch club has at last been formed in Montreal. Every person having an interest in architecture is eligible for membership. During past years such a step has many times been suggested, but the support offered did not seem sufficient to warrant any action. The organization will be known as the "Amateur Sketch Club," the object being to promote architectural sketching and study.

The club is now making arrangements and will shortly inaugurate a series of sketching tours. Draughtsmen and younger members are cordially invited to become members.

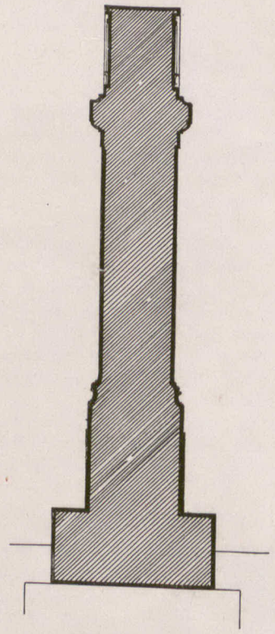
Until further notice correspondence should be addressed to the Amateur Sketch Club, Room 4, New York Life Building, Montreal.

A MEMORIAL FOR MOVNT ROYAL CEMETERY

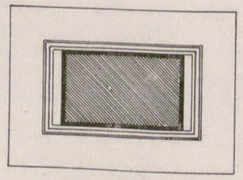
BOND AND SMITH - ARCHITECTS
TEMPLE BVILDING - MONTREAL.



ELEVATION



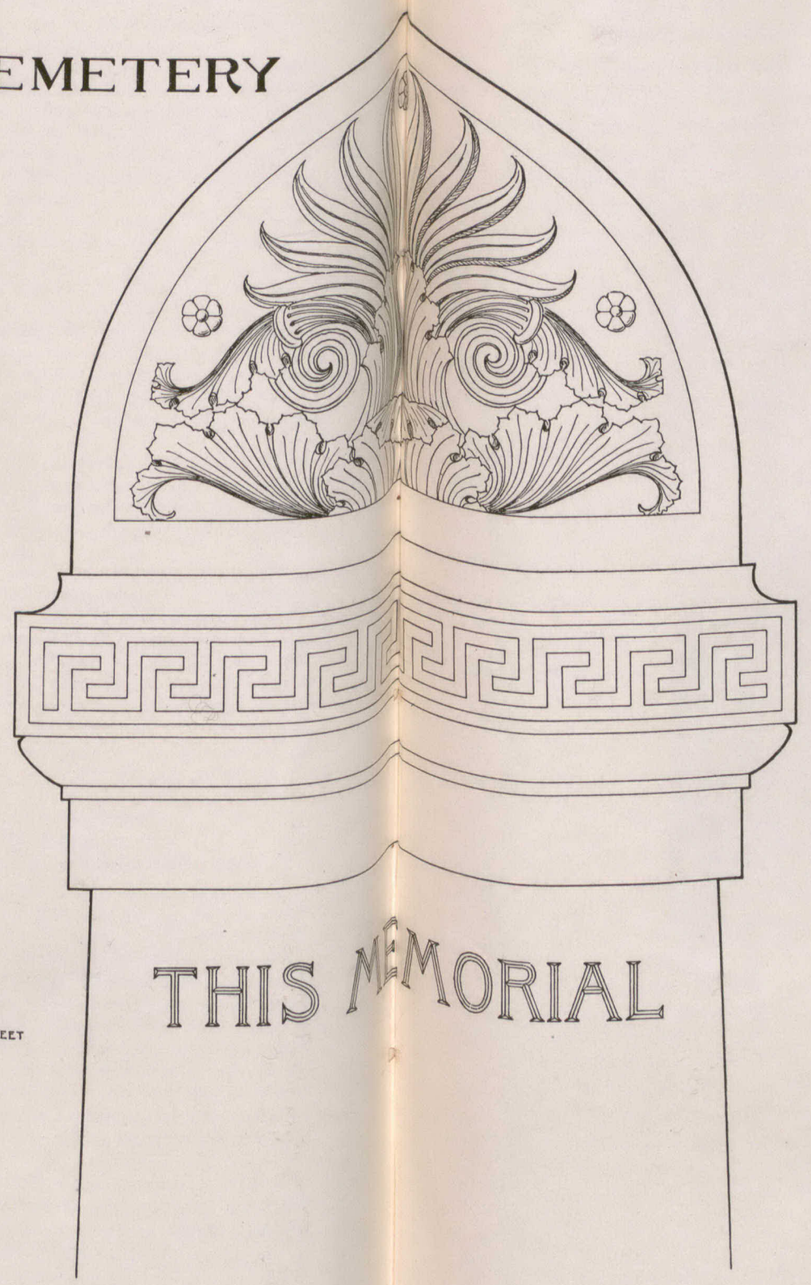
SECTION



PLAN

SCALE: 1 2 3 FEET

MATERIAL: WHITE MARBLE



SCALE OF DETAIL 3 6 9 12 INCHES

ILLUSTRATIONS.

ST. NICHOLAS' CHURCH, RODMERSHAM, KENT.

CHURCH OF THE COVENANT, TORONTO.—GORDON & HELLIWELL, ARCHITECTS.

MEMORIAL FOR MOUNT ROYAL CEMETERY, MONTREAL.—BOND & SMITH, ARCHITECTS.

SUN LIFE INSURANCE BUILDING, MONTREAL.—JAMES & JAMES—J. WILSON GRAY, ASSOCIATED ARCHITECTS.

NEW BUILDING OF THE BELL TELEPHONE COMPANY, MONTREAL.—DAVID MAXWELL, ARCHITECT.

THIS company's new building, at the corner of Notre Dame and St. John streets, Montreal, contains the head office, eastern and local department offices, electrical engineering department, main exchange, distributing room, power room, and various other departments, including the Montreal agency. The Merchants Bank of Halifax occupies a large portion of the ground floor ; the Royal Victoria Insurance Company and the Northern Electric & Manufacturing Co., Limited, have offices on the first floor, and the first and third floors are laid out principally for offices to be rented. A corridor ten by one hundred and thirty feet (10′ x 130′) long runs from Notre Dame street to Hospital street, with a large vestibule at each entrance. Off this corridor are the entrances to the elevators, stairways, Montreal agency, long distance booths and the banking room.

The vault in the bank was built by Messrs. J. & J. Taylor, Toronto, and is one of the most expensive and strongest safety deposit vaults ever built in Canada. The door of the vault, including the bolt work, is over a foot thick, made of chrome steel, according to the most modern practice in safe construction, and the walls, floor and ceiling are all of strength and thickness proportionate to the door. In connection with the vault are examining boxes for depositors and a book vault. There is also a directors' room, lunch and coat rooms, and a lavatory.

BELL TELEPHONE COMPANY.—HEAD OFFICE AND MAIN EXCHANGE, MONTREAL.

A NINETEENTH CENTURY SACRED ART.

By J. W. L. FORSTER.

THE bare suggestion of it comes to us with a touch of novelty. Has anyone dared to say there is such a thing? Many have said there is not. Are there indeed signs of the times we have not discerned? As with mining prospectors there is sometimes a question whether a trace of silver may, instead of indicating a vein of that precious metal, only make more emphatic the test-proofs that the vein is lead ; so may the presence here and there of a sacred picture prove the art of to-day to be only very secular indeed. Indications are, however, clear enough to give zest to inquiry, and to assure us that the few minutes so given will not be without interest.

I do not intend to speak of Christian art in its general application, as that refers to an era distinct from the Pagan era which preceded it, but only of that province in the choice of subject that has received by consent the name Sacred Art. As to a definition of this term opinions are not unanimous ; a brief review therefore of the conditions which affect it may perhaps make clearer the character of art falling within the limits called sacred.

In studying these conditions we have to note that Christianity, which had in earlier centuries dismantled Pagan temples, and in a spasm of prurience broken and puiverized their statues, instituted the monastery, into whose sanctuary men retired who wished to be holy. A large part of their leisure was there given to ornamental work, with the invention from time to time of new features, to supersede the old. Penmanship was followed by wood-carving, then by pottery, glass-work, illuminating, stone-carving, higher architecture, painting. Cathedrals arose and convents increased in number ; for the Christian church grew rich amongst people whose souls she guarded and whose enterprises she blessed. And as the patronage of the church was bestowed, as it is the rightful privilege of wealth to bestow it, upon merit and skill, skill naturally sought the cloister and soon made its home there. In such environment the themes of the religious writings, particularly those in the ancient Scriptures—ever picturesque and grand—stirred the pulses of the artists to achieve, in drawings and color, representations of those hallowed scenes. Outside the cloister men were of two classes—nobles and slaves. To be noble was to fight and win, and then fight to defend the winnings; to be a slave was to toil and moil for life and master, and fight whenever summoned in the master's cause. There was little chance for culture ; "little reck on soft virtues for soldiers, art was for the men with petticoats." Such conditions could not well produce other than a monastic art.

It may here be noted that the political combinations and struggles, into which, alas! the Christian church was too often

dragged, culminated in the great conflict whose arena was transferred from Germany to Northern Italy. When Ghibellines and Guelfs had exhausted every resource of men and money, and every princely family was somewhat hard-pressed, many of the petty chieftains of the north, who had become mercenary to either faction, settled down with their freebooting retainers, or squatted we ought to say, upon the soil of Tuscany. And, as already men had begun to know their value as fighters, their personal value in a political equation was likely to be considered. Quite naturally then, the advent of sturdy Northmen, who gloried in their personal freedom, transmitted a sort of contagion of unrest to the more patient vassals on the Tuscan plains. Thence to the cities spread an awakening towards a sense of man's individuality, or his value to himself as well as to the state. This was the daybreak of a new era. When the aurora of this new age darted above the horizon in Italy, the artists, instead of servilely painting conventual designs at the command of their superiors, began also to think for themselves, with the result that there soon appeared the master-pieces of Cimibue, Di Grandi, Da Vinci, Raffæl, Angelo.

With the releasing of the grip of Italian feudalism upon the bodies and minds of its minions, both art and letters responded to the impulse of expansion. But the nobles were poor and the church was rich; consequently, she that had nursed a feeble art in the cell of her convents through the dark ages, became its patron when it afterwards grew strong in the free air of a renaissance. The artists, who were not monks, remained worshippers at the shrines of the church, and so between the patron and the worshipper was evolved the sacred art that is the standard by which art, both sacred and secular, has ever since been measured.

In looking for the causes of its decline we see the further tribulations which befell the Christian church. History has already made us familiar with the frequent and unfortunate alliances into which it was led by knights-bishop and knights-errant during the stormy centuries that succeeded the scarcely less stormy Crusades. Years they were, darkened with a moral effeminacy that reached its climax of folly ultimately in a widespread sale of indulgences which shocked the conscience of the world, and in a general moral paralysis that did not greatly revive even under the galvanism of the Reformation. During later years the successors of Raffæl (a noble line of painters, including Dominichino, Fra Angelico and many, many such), reproduced from the cloister reflections mostly of his great master-pieces. What moral decrepitude began political revolutions completed, and to-day the shattered remnants of the ecclesiastical strongholds of mediæval Europe serve but to show where temporal sovereignty of the church, together with the studio of the cloister, once existed. But while these destructive forces were at work there was a constructive element plainly visible also. Independent tribes became welded into nations; feudal states gradually grew into kingdoms and turbulent chaos was metamorphosed into a cosmos somewhat resembling peace. Rulers received their crowns from Episcopal hands, but eventually wearied of the constant interferences of ecclesiastics, with the inevitable result that kingly patronage was given in the course of time to Painters-Royal. Commissions for historic pictures lured the pencils of the artists away from biblical designs; the popularity of the monastery as a picture mart declined; Sacred Art grew feeble, and still is mourned as dead.

Through this review of early conditions affecting Sacred Art, we are aware of its limits and are better prepared for a definition of the term. Sacred Art, as generally understood, treats of Bible themes, embracing the worship of God, the observances and sacred acts of the prophets, of the disciples of Christ and the priests of the temple, together with historic incidents in the life of Christ. Around these may be grouped events in the lives of devout members of the Christian church, who have been in later years canonized by its councils. Here the classification ends. Much of the latter material might properly be termed religious art, treating as it does the ceremonials and religious rites of the Christian church, and the signification of "sacred" be limited to apostolic themes. But there is no evidence that such distinction has ever been made by the church that has given us both theme and picture, nor by any writer on the subject. We must therefore accept this definition as canonic; and in doing so it will be seen the barriers set up are strong, nor do they confine us within a very narrow sphere.

The effort to limit Sacred Art to its old barriers is manifestly as great as to confine the City of London within the radius of the music of Bow Bells, or within the confines of the old wall. While a vast population hives around her it draws life from her heart and is known by her name, so within the province of Sacred Art and around its heart there would seem rightfully to cluster all those themes that live upon the story and teaching of the Book of Books.

It will be wise now in the interest of our theme to look for a few moments at the nineteenth century itself and note its influence upon art. Its tendencies ought to be considered, the national movements and local influences as well, and the men who stand at the gateways of its history. This age is characterized by a scrutiny of every material and condition that effects a truth even if that truth have in it man's temporal well-being or eternal salvation. Three centuries ago, owing to prevalent illiteracy, faith was narrower even if it was necessarily stronger, in the intercourse of trade amongst the people, or in regard to the teachings of the only educated class of that day. It was providential, as I understand the term, that the magic lever of knowledge was held in the hands of a community whose raison d'etre was their belief in a God of holiness and a Christ Redeemer of the souls of men. Their teachings saved the race from moral extinction, and it stamped the record of the people's simple faith upon the missiles and panels and canvases that shame the impious banter of half-enlightened scoffers to-day. But this century permits men to probe deeper into the mystery of God and to perceive profounder meaning in the teachings of Jesus, and more all-touching signficance in His life.

That the art of to-day feels the influence of this scrutiny is certain. Many of the pictures within the sacred circle express a devoutness less formal and more unconscious; possess less stage manner and more altruism; exhibit less of the adornment and precision of the conventicle and more of the pathos of the soul that has learned for itself the meaning of vicarious suffering right down in the throbbing populations of the world.

It is here where a notable difference will be observed distinguishing the religious art of this period from that of the medieval epoch. In the matter of reverence it appears to me the spirit of the present day is not wholly divined. If the art of the years yield any verdict on this question it is in confirmation of the excellence of the latter manner. Reverence, as represented of old seemed impregnated with more than a trace of despair and gloom, now it is awed by the omnipotence of mercy, and dares to hope.

A thought or two now in regard to national influences. It is true the great mass of the population of France, and in some measure Germany, under the magic of Voltarian ridicule drifted from moral moorings, unrestrained by any conviction of accountability. Accepting only the enlightenment of reason they were carried on by an easy current into the naturalism, which, under every change of literary creed, existed as the dominant cult during the first half of this century. About the middle of the century another revolution, more enlightened than the former, brought back the estranged heart of the populace to a moral sense if not to religious subserviency. For it seems to have been immediately after this that science began to speak for morality as a necessity. It is true it did not contribute to faith in God, but rather to aetheism, but at the same time the christian sentiment that claims a good code of morals as its great bulwark made some advance.

In England the religious movements that once more redeemed the people and saved the nation, as is asserted by the eminent encyclopedist, Dr. Cunningham Geikie, have given little in the way of direct art, except in illustrated publications which are voluminous and influential, but which I have not space to notice more fully in this paper, but they have left us a better social code so that the sentiment breathed into pictures partakes of more domestic and purer virtue than continental art as a whole, or than is to be discovered in the art of any former period. An opinion prevails that the wholesome spirit of British home life has, through most of this century, by the instrumentality of literature and art, exerted some influence upon the schools of Western Europe. For certain it is that the last half of this century, in spite of its scientific agnosticism and ruthless demolition of creeds, has manifested a spirit not at all hostile to art of a religious character. National influences have not been unfavorable to the growth of sacred art.

It may be in place here to express an opinion, namely, that though France has given evidence of artistic power unrivalled by any nation, and Britain, with her self-contained, insular religious devotion has a mental soil well prepared for it, it remains for Germany to produce the master types of recent sacred art. Sir Noel Paton's sermons in color are impressive, but they do not impress like Christ healing a sick child by Gabriel Max. Edwin Long's "Diana or Christ" in his greatest work, but it is not equal

to Hoffman's "Christ in the Temple". Uhde's homely peasant groups tell their sacred story with a naivete that is touching. So with Skredswig, the Norwegian and Karl Bloch, the Dane. Delug preached the gospel of sympathy, of love and sorrow in his very impressive picture called "Holy Women". Munkacsy's "Christ before Pilate", though painted by a German, was painted in French atmosphere, and is more realistic than mystic in character. But "The Raising of Jairus" Daughter by Max truly leaves nothing to be desired in recent Sacred Art.

The characteristics of race are a factor that should find a place in this discussion. There is, however, only time to say that subjects in sacred art as treated by painters of the Latin race partake to a great degree of the romantic or traditional history of the Christian church, while the Teuton artists seem attracted more to the significant life and work of Christ himself. These race characteristics will likely prove an important factor because of the recent art movements, which have been more active in the zone dominated by the Teuton.

But space is too limited to allow further reference to comparative qualities amongst schools, and the painters who have told with sincerity and dignity the story that is not yet half told. There is but time to refer to quantity. In doing this, even if we leave out of reckoning the wider view of its province and confine ourselves to the most limited classification laid down earlier in this paper, a review of the catalogues of the Royal Academy for the ten years past reveals at least seven sacred pictures each year, the Salons of France ten, Munich ten, Berlin ten, and so on. Spain, Italy, Russia, Netherlands, each brings its quota of recruits to the ranks of sacred art; so that the annual muster numbers at the lowest computation one hundred and fifty.

If for the sake of a severer and more careful selection we place the number at one hundred, the decade has added one thousand purely sacred pictures of highest merit to our gallery.

In conclusion let me add a fact that it will be well to note, that in the former era of Sacred Art, personal recompense by means of commissions given by a wealthy paternal institution helped greatly to inspire the artists then to paint religious subjects, while in these times such pictures are, without challenge, mainly the work of an unsuggested impulse.

If such be the fact, the claim that there is an influential Nineteenth Century Sacred Art appears to be well sustained; and it may be that there is in this fact a prophecy that shall realize a bright fulfilment in the twentieth century so near at hand.

ILLLINOIS ARCHITECTS' LICENSE BILL.

SECTION 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly, That within thirty days after the passage of this act the Governor of this State shall, by the advice and consent of the Senate, appoint a State Board of Examiners of Architects, to be composed of five members, one of whom shall be a member of the faculty of the Illinois State University, and the other four shall be architects residing in the State of Illinois, who have been engaged in the practice of architecture at least ten years. Two of the said practicing architects appointed as examiners shall be designated to hold office for two years from the date of the passage of this act, and the other two, together with the member of the faculty aforesaid, shall hold office for four years from the passage of this act; and thereafter, upon the expiration of the term of office of the person so appointed, the Governor of the State shall appoint a successor to each person whose term of office shall expire, to hold office for four years, and said person so appointed shall have the above specified qualifications. In case appointment of a successor is not made before the expiration of the term of any member, such member shall hold office until a successor is appointed and duly qualified. Any vacancy occurring in the membership of the board shall be filled by the Governor of the State, for the unexpired term of such membership.

SECTION 2. The members of the State Board of Examiners of Architects shall, before entering upon the discharge of their duties, make and file with the Secretary of State the constitutional oath of office; they shall, as soon as organized, and annually thereafter, in the month of January, elect from their number a president and a secretary, who shall also be a treasurer. The treasurer shall file a bond for the penal sum of $5,000 with the Secretary of State, to be accepted by the Governor of State before entering upon his duties. The Board shall adopt rules and regulations to govern its proceedings, not inconsistent with this act, and a seal, and the secretary shall have the care and custody thereof, and shall keep a record of all the proceedings of the board, which shall be open at all times to public scrutiny. The secretary of the board shall receive a salary which shall be fixed by the board, and which shall not exceed the sum of fifteen hundred dollars ($1,500) per year; he shall also receive his travelling and other expenses incurred in the performance of his official duties. The other members of the board shall receive the sum of ten dollars ($10) for each day actually engaged in this service, and all legitimate and necessary expenses incurred in attending the meetings of said board; said expense shall be paid from the fees received by the board under the provisions of this act, and no part of the salary or other expenses of the board shall be paid out of the State treasury. All moneys received in excess of the said per diem allowance and other expenses above provided for, shall be held by the treasurer as a special fund for meeting the expenses of said board, and the cost of an annual report of the proceedings of the State Board of Examiners of Architects.

Provided, however, that when the money in the hands of the treasurer at the time of the annual report is rendered, exceeds twenty-five hundred dollars ($2,500), the amount of such excess shall be paid into the State treasury, to the credit of the State Board of Examiners of Architects.

SECTION 3. Three members of the board shall constitute a quorum. Special meetings of the board shall be called by the secretary upon the written request of any two members, by giving at least seven days' written notice of the meeting to each member, reckoning from the day on which the notices are postmarked, telegraphed or personally delivered. The board shall adopt rules and regulations for the examination of applicants for licenses to practice architecture, in accordance with the provisions of this act, and may amend, modify and repeal such rules and regulations from time to time. The board shall, immediately upon the election of each officer thereof, and upon the adoption, repeal or modification of its rules of government or its rules and regulations for examination of applicants for licenses, file with the Secretary of State, and publish in at least one architectural journal and one daily newspaper published in the State of Illinois, at least twice, the name and address of each officer, and a copy of such rules and regulations, or the amendment, repeal or modification thereof.

SECTION 4. Provision shall be made by the board hereby constituted for holding examinations at least twice in each year, of applicants for licenses to practice architecture, and any person over twenty-one years of age, upon payment of a fee of fifteen dollars ($15) to the secretary of the board, shall be entitled to an examination for determining his or her qualifications. All examinations shall be made directly by said board, or a committee of two members delegated by the board, and due notice of the time and place of the holding of such examinations shall be published, as in the case provided for the publication of the rules and regulations thereof. The examination shall have special reference to the construction of buildings, and a test of the knowledge of the candidate of the strength of materials, and of his or her ability to make practical application of such knowledge in the ordinary professional work of an architect, and in the duties of a supervisor of mechanical work on buildings, and should also seek to determine his or her knowledge of the laws of sanitation as applied to buildings. If the result of the examination of any applicant shall be satisfactory to a majority of the board, under its rules, the secretary shall, upon an order of the board, issue to the applicant a certificate to that effect, and upon payment to the secretary of the board by the candidate of a fee of twenty-five dollars ($25), he shall thereupon issue to the person therein named a license to practice architecture in the State, in accordance with the provisions of this act, which license shall contain the full name, birthplace and age of the applicant, and be signed by the president and secretary, and sealed with the seal of the board. If an applicant fails to pass said examination, his or her fee shall be returned.

All papers received by the Secretary in relation to applications for license shall be kept on file in his office, and a proper index and record shall be kept by him.

SECTION 5. Any person who shall, by affidavit, show to the satisfaction of the State Board of Examiners of Architects that he or she was engaged in the practice of the profession of architecture on the date of the passage of this act, shall be entitled to a license without an examination, provided such application shall be made within six months after the passage of this act. Such license, when granted, shall set forth the fact that the person to whom the same was issued was practicing architecture in this State at the time of the passage of this act, and is, therefore, entitled to a license to practice architecture, without an examination by the board of examiners, and the secretary of the board shall, upon the payment to him of a fee of twenty-five dollars ($25), issue to the person named in said affidavit a license to practice architecture in this State, in accordance with the provisions of this act. In the case of a co-partnership of architects, each member whose name appears must be licensed to practice architecture. No stock company or corporation shall be licensed to practice architecture, but the same may employ licensed architects. Each licensed architect shall have his or her license recorded in the office of the county clerk in each and every county in this State, in which the holder thereof shall practice, and he or she shall pay to the clerk the same fee that is charged for the recording of notarial commissions. A failure to have his or her license so recorded shall be deemed sufficient cause for revocation of such license.

SECTION 6. Each county clerk shall keep in a book, provided for the purpose, a complete list of all the licenses recorded by him under the provisions of this act, together with the date of the issuance of each license.

SECTION 7. Every licensed architect shall have a seal, the impression of which must contain the name of the architect, his or her place of business, and the words, "Licensed Architect," "State of Illinois," with which he shall stamp all drawings and specifications issued from his office, for use in this State.

SECTION 8. After six months from the passage of this act it shall be unlawful, and it shall be a misdeamor punishable by a

fine of not less than fifty dollars ($50), nor more than five hundred dollars ($500), for each and every week during which said offense shall continue, for any person to practice architecture without a license in this State, or to advertise, or put out any sign or card, or other device which might indicate to the public that he or she is entitled to practice as an architect.

SECTION 9. Any person who shall be engaged in the planning or supervision of the erection, enlargement or alteration of buildings for others, and to be constructed by other persons than himself, shall be regarded as an architect within the provisions of this act, and shall be held to comply with the same; but nothing contained in this act shall prevent the draftsmen, students, clerks of works or superintendents, and other employes of those lawfully practicing as architects, under license as herein provided for, from acting under the instruction, control or supervision of their employers, or shall prevent the employment of superintendents of buildings paid by the owners from acting, if under the control and direction of a licensed architect who has prepared the drawing and specifications for the building. The term building in this act shall be understood to be a structure, consisting of foundations, walls and roof, with or without the other parts; but nothing contained in this act shall be construed to prevent any person, mechanic or builder, from making plans and specifications for, or supervising the erection, enlargement or alteration of any building that is to be constructed by himself or employes; nor shall a civil engineer be considered as an architect unless he plans, designs or supervises the erection of buildings, in which case he shall be subject to all the provisions of this act, and be considered as an architect.

SECTION 10. Architects' licenses issued in accordance with the provisions of this act shall remain in full force until revoked for cause, as hereinafter provided. Any license so granted may be revoked by unanimous vote of the State Board of Examiners of Architects for gross incompetency, or recklessness in the construction of buildings, or for dishonest practices on the part of the holder thereof, but before any license shall be revoked such holder shall be entitled to at least twenty days' notice of the charge against him, and of the time and place of the meeting of the board for the hearing and determining of such charge. And on the cancellation of such license it shall be the duty of the secretary of the board to give notice of such cancellation to the county clerk of each county in the State in which the license has been recorded, whereupon the clerks of the counties shall mark the license recorded in his office cancelled. After the expiration of six months from the revocation of a license, the person whose license was revoked may have a new license issued to him by the secretary upon certificate of the Board of Examiners, issued by them upon satisfactory evidence of proper reasons for his reinstatement, and upon payment to the secretary of the fee of five dollars ($5).

For the purpose of carrying out the provisions of this act relating to the revocation of licenses, the board shall have the power of a court of record, sitting in the county in which their meeting shall be held, and the power to issue subpœnas and compel the attendance and testimony of witnesses. Witnesses shall be entitled to the same fees as witnesses in a court of record, to be paid in like manner. The accused shall be entitled to the subpœna of the board for his witnesses, and to be heard in person or by counsel in open public trial.

SECTION 11. Every licensed architect in this State who desires to continue the practice of his or her profession shall annually, during the time he or she shall continue in such practice, pay to the secretary of the board during the month of July a fee of five dollars ($5), and the secretary shall thereupon issue to such licensed architect a certificate of renewal of his or her license for a term of one year. Any licensed architect who shall fail to have his or her license renewed during the month of July in each and every year, shall have his or her license revoked at the discretion of the board. But the failure to renew said license shall not deprive him or her of the right to renewal upon payment of said fee.

SECTION 12. Within the first week of December, after the organization of the board, and annually thereafter, the secretary of the board shall file with the Auditor of the State a full report of the proceedings of the board, and a complete statement of the receipts and expenditures of the board, attested by the affidavits of the president and secretary, subject to the approval of the State Auditor.

At a recent meeting of the stockholders of the Central Bridge and Engineering Company, Limited, of Peterboro', Ont., the following board of directors was elected: Messrs. William Cluxton, John Carnegie, James Kendry, F. J. Rogers and R. A Morrow. Messrs. Carnegie and Kendry were subsequently appointed president and vice-president respectively.

The Toronto and Hamilton Sewer Pipe Company's works at Hamilton were recently damaged by fire to the extent of $15,000. The loss was well covered by insurance. As the company have another factory in another part of the city, their business suffered no interruption in consequence of the accident. The damage caused by the fire is being speedily repaired. Meanwhile manufacturing operations are going on as usual.

The construction of a large breakwater at Buffalo was recently stopped owing to the decision of the collector of customs at that port to impose a duty upon the stone, which was being imported for the work from quarries in Canada. Previous to entering into the contract with the government, the contractors consulted the Treasury Department and received the assurance that no duty would be incurred. After considerable delay and correspondence the secretary of the Treasury Department has instructed the collector of customs at Buffalo to admit the stone pending the final settlement as to the rate of duty and by whom to be paid.

MANUFACTURES AND MATERIALS

GLASS COLORING BY PENETRATION.

COLORED glasses are generally produced by fusing oxides with the glass; the whole mass is colored. Leon Lemal colors the surface by penetration, and obtains, according to "La Nature," colored patterns of striking novelty. A bit of silver salt is placed on the glass, and the glass heated up to 500 or 550° Centigrade; the excess of salt having been removed, the surface will appear of a more or less deep yellow. The depth to which the color penetrates depends upon the time, the shade upon the quantity of salt applied. In five minutes the top layer of glass, 0.17 millimetres in thickness, was colored; after an hour that thickness was doubled; in 18 hours a plate 1.6 millimetres ($\frac{1}{16}$in.) thick was colored throughout. The color appears in both reflected and transparent light, and the yellow is said to be distinguished by a fine greenish or bluish fluorescence. Other methallic salts can be used, gold, copper, iron; silver with a little copper gives a red. The process is exceedingly simple. To transfer a lace pattern upon glass, it suffices to dip the lace into very diluted solution of nitrate of silver and then into potassium sulphide. Photographic collodion negatives can be directly applied to the surface.

Messrs. Warden King & Son, of Montreal, manufacturers of the Daisy hot water boiler, have recently appointed the Toronto Radiator Manufacturing Co., Limited, of Toronto, as their Ontario selling agents.

The Ontario Sewer Pipe and Brick Manufacturing Company's property at Mimico, Ont., was recently purchased by Mr. S. M. Nease, of Pittsburg, Pa. It is understood to be the intention to form a new company to operate the works under the old name.

It is reported that a company is being formed at Orangeville to establish cement manufacturing works, a large deposit of marl having been discovered in that locality. The deposit is said to consists of about 350 acres, and satisfactory tests of the material are reported to have been made.

Gypsum is reported to have been found in the Lake St. Martin district. A test of a sample about 10 or 12 inches square and 3 inches thick showed it to be free from foreign substances. The end of the vein, where first discovered, is about 6 by 3 feet, and the vein has been traced for four miles.

Mr. Samuel Cabot, the well known manufacturer of shingle stains, of Boston, Mass., is sending out a very effective color-combination chart, showing sixteen separate and distinct combinations. The chart, which may be had for the asking, should be of assistance to architects in the selection of colors that will blend harmoniously.

The Ontario Radiator Company, Limited, of Toronto, are negotiating with the city authorities of St. Thomas with a view to the location of their works in that city. They desire that the city should give them $10,000 or $15,000, or that the citizens should subscribe this amount in stock. The company agree to employ from 30 to 100 hands.

Mr. E. E. Sheppard, Government Trade Commissioner to the South American Republics, states in his report recently presented to the Government, that a large amount of school furniture is purchased by the Mexican Government, and that Canada should get a share of the orders in this line. The report also states that Canadian steel clad baths have been successfully introduced into Mexico through the agency of a prominent local plumbing firm.

A deputation from the Toronto Trades and Labor Council recently waited upon the City Council and asked that in all contracts yet to be awarded on the new City Buildings preference should be given to local manufacturers. They suggested that a preference of 10 per cent. would be sufficient. While it may not be found expedient to restrict the giving of contracts to Toronto contractors, it is very desirable that as few of them as possible should go beyond the bounds of the Dominion.

A number of well known engineers and contractors assembled recently at the Canadian Locomotive and Engine Company's works at Kingston, Ont., to witness tests of steel pipes manufactured from flat steel sheets rolled cold by machinery without the aid of furnaces or heating agencies. The process is the invention of F. A. Williams, of Wolverhampton, England. Two plates are employed in the manufacture of each pipe. They are bound

together by means of two bars of steel rolled to a channel section. These bars are placed internally in the pipe and the edges of the ribbed plates set into the recesses in the channel bars. The pipe is then bound by two concavo-convex bars, which run the entire length of the pipe and fit into the channel between the nibbed edges of the plates. The pipe, when fitted together ready for rolling down, is shipped on a cast-iron mandrel on the rolling-down machine, which exerts great pressure upon the two wedges and flattens them in such a manner that they are securely locked in the channel bars, and bind the edges of the nibbed plates so effectively that the pipes, when tested, are found to be absolutely water-tight. At the test above referred to, the pipe was closed at the ends by caps and filled with water. A large pressure was then put on by a testing pump; the gauge is said to have registered 300 pounds without any sign of leakage or weakness.

PERSONAL.

Professor Butler, of King's College, Nova Scotia, has been appointed Professor of Civil Engineering at the Royal Military College, Kingston, Ont.

The announcement has recently been made in the daily press that Hon. Wm. Harty, Minister of Public Works for Ontario, is rapidly improving in health.

Messrs. Gordon & Helliwell, architects, have recently removed their offices from 26 King Street east, Toronto, to the third floor of the Confederation Life Building.

Mr. J. H. Tromanhauser, architect, while superintending the erection of a grain elevator at Kingston, Ont., had his foot severely crushed by a falling timber.

Mr. J. W. L. Forster, the well-known portrait painter, has recently returned to Toronto, after an absence of five months spent in Europe, principally in the Channel Islands.

Professor Sparkes, principal of the Government Art School at the South Kensington Museum, London, recently paid a visit to the Hamilton Art School, and delivered an address to the students.

Mr. E. Coatsworth, City Commissioner of Toronto, was deputed by the City Council to attend the convention of the National Association of Building Inspectors of the United States, which has just concluded its sessions in Detroit, Mich.

At a recent meeting of the Toronto Master Plumbers' Association, the resignation of Mr. Burroughes, the president, was accepted. Mr. J. B. Fitzsimmons was elected to the position. Mr. James Wilson was elected vice-president, and Mr. J. E. Nott second vice-president.

Messrs. H. Simpson and J. A. Ellis, architects, of Toronto, recently formed a partnership. It is now learned that Mr. F. T. Hodgson, of Collingwood, has also become a member of the firm, which will be known as Hodgson, Simpson & Ellis, with offices at Collingwood and Toronto.

Mr. Joseph Wright, president of the Canadian National Association of Master Plumbers, and Mr. F. H. Herbert, architect, of Toronto, were recent visitors to New York. Mr. Wright is said to have been in consultation with the officials of the National Association of the United States with a view to bringing about the affiliation of the Canadian Association with that organization.

At the Foresters' tent on the Industrial Exhibition Grounds, Toronto, on Sept. 6th, Mr. Geo. W. Gouinlock, architect of the new Temple Building, was presented with a gold Maltese cross, representative of the Chavelier Order. The medal bore the inscription, "Presented by the Supreme Court to Brother G. W. Gouinlock for distinguished services, September, 1897." The presentation was witnessed by a large company.

Let me ask, says Mr. Andrew Carnegie in a recent address, under what conditions does the employer of labor make profits and become prosperous? Only when labor is prosperous, is his reply, and in great demand; when wages are the highest, and when the demand for his products are the greatest. Then, and then only, is the employer prosperous. On the other hand, when labor is not fully employed, and can be obtained for the lowest wages; when there is little demand for his products, then the employer can never be prosperous. In most cases he must not only make profits, but he must see his capital impaired month after month; he cannot gain, he must lose. Before the employer can be prosperous, prosperity must exist throughout the land.

LEGAL.

It is an unwise course for a builder to act in defiance of local by-laws, says the Builder's Reporter. Courts of all kinds generally support the latter, and when a decision is given in favor of a builder the advantage is rarely worth the expense. A case has just been heard in Plymouth in which a builder announced that he intended to establish a test case, and an ambition of the kind is sure to be expensive. He was summoned for erecting small houses at the rear of other houses without leaving the 15 feet of open space between the houses and the boundary wall required by the local by-laws. His defence was that he had substantially complied with the by-laws, of which the object was to secure an open space of not less than 150 square feet. But the space was obtained by an increased width, although the length was diminished by about a foot. The defendant was fined £2 and costs in each of the five cases, but what is worse, the corporation can insist on the removal of the buildings or on the infliction of an additional penalty. So far the course of the law is not favorable to the contention of the contractor, and it is doubtful if the case be brought into a higher court whether a different decision would be obtained.

Last week, says the Builders' Reporter, a case which should serve as a warning to architects was tried at the Bristol assizes. It was another example of how little value is now attached to one's acting as well as judgment and experience dictate. The plaintiffs, Rogers & Co., Limited, who are brewers in Bristol, opened a branch on the Power Estate, in Newport, Mon. Mr. Watkins, the defendant, is an architect practising in the latter place, and he was asked to estimate the cost of a new building. It appears he returned the sum as between £600 and £700. The actual cost of the building was £1,163 17s. The plaintiffs brought their action to recover a sum equivalent to the difference between the two amounts, viz. £463 17s. The defendant said he worked out the cost at 5d. per cube foot, and it was £674. He found it ought to have been 7d., which would be about £900, and he wrote stating this. He wrote the letter at his house, and the letter produced was the original from which he wrote the letter to the plaintiffs. No mention was ever made to him as to the limit of the price. He admitted he made a mistake in the first estimate. Mr. Justice Day, who heard the case without a jury, said he was not satisfied that the defendant had informed the plaintiffs about the extent of the expenditure, and that was negligence. His lordship assessed the damages at £150. Mr. Watkins had claimed £56 commission on the amount expended, but the sum was reduced to £35. A verdict for £115, with costs, was, therefore, given for the plaintiffs. It will be observed that the defendant has been doubly punished. His commission was not determined by the amount of expenditure, and he has had to contribute a large sum towards that expenditure, as if he had bound himself that his estimate would not be exceeded. In fact, Mr. Watkins had stated that a larger amount would have to be met, but apparently the letter went wrong in the post.

OBITUARY.

We learn of the death at Chicago on August 3rd, of Mr. Thomas Watson, who in the past carried out important railroad contracts in Canada.

The death is reported at Los Angelos, California, of Mr. Edward Langley, at one time a member of the firm of Langley, Langley & Burke, architects, Toronto. Mr. Langley went to California with the object of benefitting his health.

Mr. George Pirie, a well known and highly respected contractor, died recently at Pembroke, Ont. Mr. Pirie was a member of the town council and board of education, and was held in high esteem for his reliability and enterprise as a contractor and citizen.

The death is announced at Hamilton, Ont., of Mr. F. J. Rastrick, architect and civil engineer. Deceased was born at West Bromwich, Staffordshire, and came to Canada in 1852, locating at Brantford, but removing to Hamilton the following year. He has designed many public and private buildings, and has also been employed by the Dominion Government as inspecting architect. For a number of years he served on the council of the Ontario Association of Architects.

When using wax and oil in shading colors, it is absolutely necessary that the color should become perfectly dry before applying the varnish. It is also equally necessary that the varnish be a good elastic oil varnish, devoid of resin gums.

STUDENTS' DEPARTMENT.

"Begin at the bottom and work to the top,"
Is splendid advice to be giving,
And yet it is not the best hint we can drop
To men who dig wells for a living.

REPRODUCTION OF PLANS AND DRAWINGS.

In Ombres et Lumiere the following process is described by A. Carteron:—A well-sized paper is selected and cut rather larger than the drawing to be copied. An ink is prepared by dissolving 8 to 10 grammes of gum arabic in 100 parts of water, and adding thereto a few drops of aniline blue or other suitable dye. The drawing is traced upon the paper with this ink and allowed to dry. The entire surface of the paper is then covered with printers' ink, by means of a roller or stiff brush, and well equalised. After a short interval the entire sheet of paper is immersed in water, and by means of a roller, or brush, passed delicately over the surface, the ink is disengaged from the tracing lines. This is facilitated by the solution of the gum. The lines are thus represented by bare white paper, and the tracing may be used as a negative. If a very opaque ground is wanted, the background of printers' ink may be intensified by brushing on bronze powder with a badger's-hair brush.

DURABILITY OF DRAWING PAPER.

A Cantor lecture by Mr. C. F. Cross shows that many modern varieties of the material that is called paper are almost fleeting. He describes a valuable set of actuaries' tables which after a year or two of office work was in such a condition that it had to be mounted with varnish, leaf by leaf, upon cloth, at a cost of £3 10s. Apparently the transactions of societies have the least chance of any printed matter of a survival, for the paper employed is selected on account of its showy appearance, which is merely superficial, and when it loses its lustre, what is printed on it vanishes. The Germans, who are giving attention to the subject, lately analysed ninety-seven standard publications from various countries. Only four were found to have less than 5 per cent. mineral stuff, and sixty-two were composed of inferior stuff and mechanical wood. It is known that drawing papers have become liable to attacks of micro-organisms. One of the causes is the employment of gelatine as a sizing agent. When the papers become moist, as happens when color is applied, bacterial life is stimulated and rapid growth follows. It is proposed as a remedy to add antiseptics to the size, but they bring disadvantages of another sort. It may be assumed that the deterioration of water-color drawings is as often produced by the use of paper containing unsafe materials as by inferior colors.

HOW INDIAN INK IS MADE.

An interesting account of the manufacture of the so-called Indian ink, extensively used by architects, and made in the Anhui province of China, is given by Mr. Fraser, United States consul at Wuhu, on the Yang-tsze, in his last trade report. It is more correctly called China ink—encre de Chine—and from Anhui it goes to every part of China and all over the world.

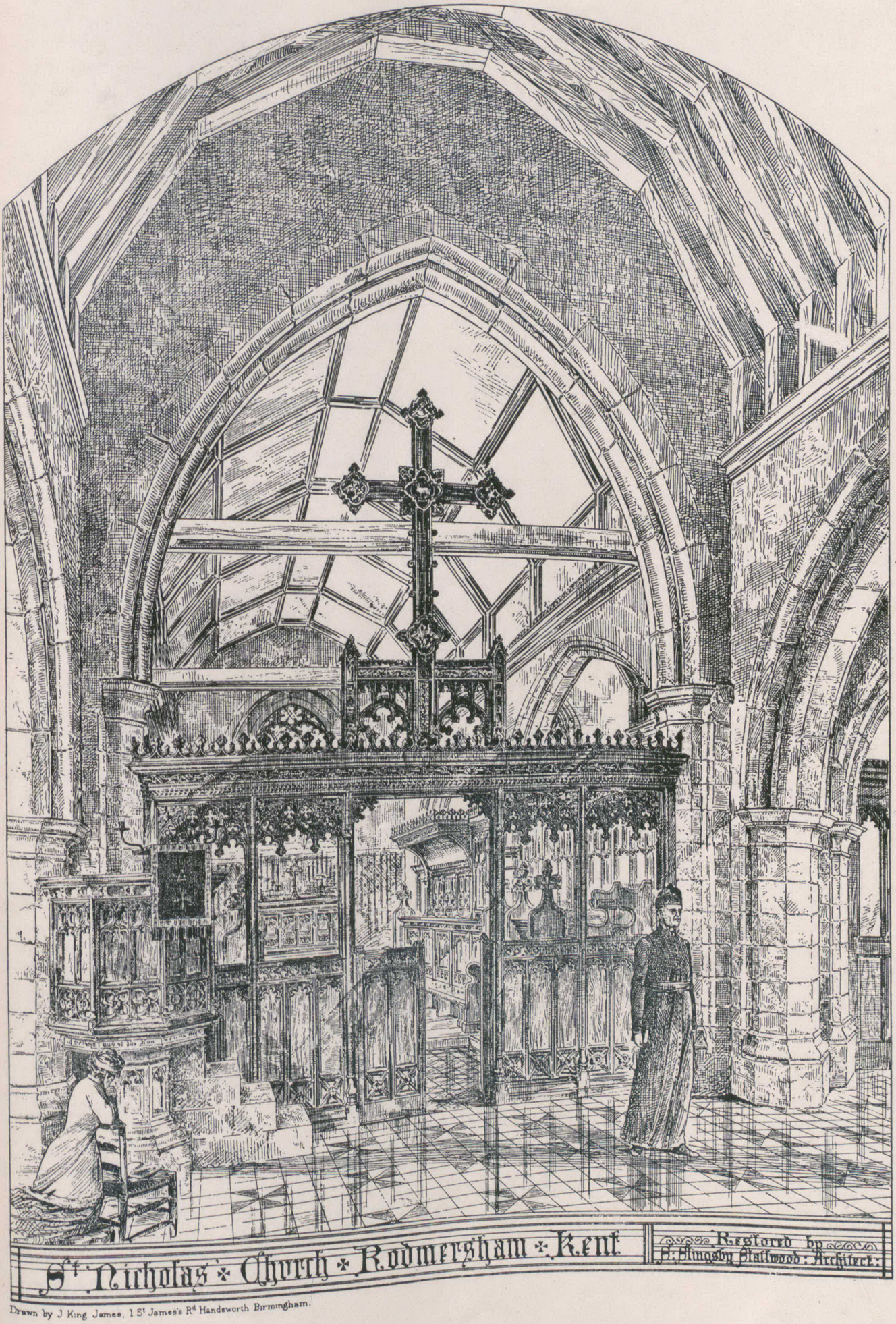
The materials with which this beautiful black ink is made are sesamum or colza oil, or the oil expressed from the poisonous seeds of a tree extensively cultivated in the Yang-tsze valley, and also well-known in Japan. To this varnish and pork are added. The lampblack made by the combustion of these substances is classed according to the materials and the grade of fineness, and also according to the time taken over the process of combustion. The paste made of this lampblack has some glue added, and is beaten on wooden anvils with steel hammers. Two good hammerers can prepare in a day eighty pieces, each weighing half a pound. A certain quantity of musk of the musk-deer, or of Baroos camphor, for scenting, and gold leaves, are added to give a metallic lustre.

The materials thus prepared are molded in molds of carved wood, dried, which takes about twenty days in fine weather, and adorned with Chinese characters in gilding. About thirty-two average-sized sticks of ink go to the pound. The price varies from 50 cents or less per pound to as much as $35, there being over a dozen different grades.

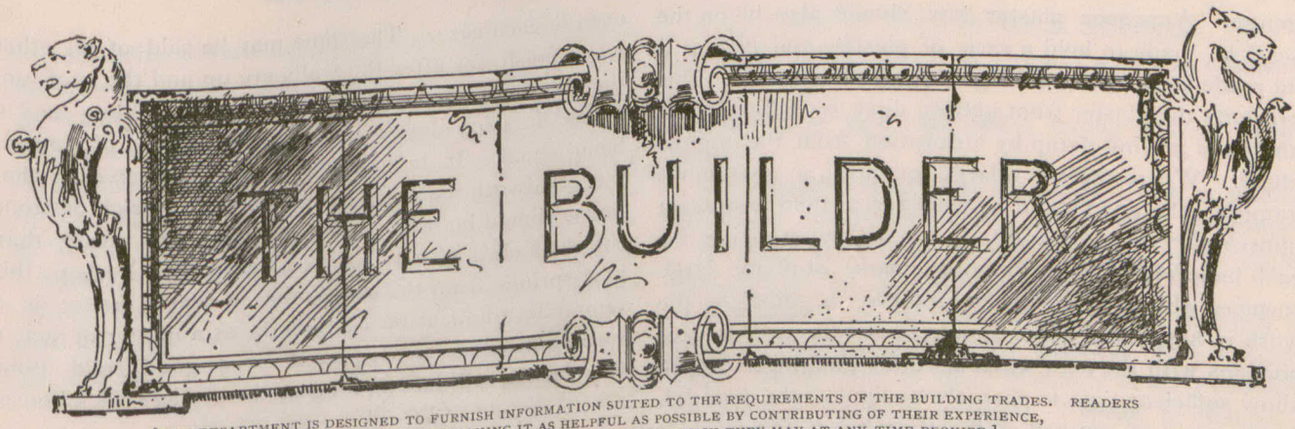
CURVED AND STRAIGHT LINES.

The great horizontal lines formed by regular layers of worked stone, as in the huge temples of Egypt, give an impression of solidity, of duration to eternity. Nothing, on the other hand, can be gayer than the pagodas of the Chinese, with their roofs curled up at the extremities—a graceful combination of curve and the oblique. This form is to be found also in the shape of their shoes and of their head-dresses, and, stranger still, in the features of their faces. Again, nothing can be more doleful than the immense roofs of the countries of snow and ice, whose sides descend nearly to the ground by two dull and rigid lines, forming an acute angle, and stretching out from the side walls as if to enclose and smother the houses which they protect. This mode of construction still prevails in northern climes. A century ago no other was employed in the villages. The houses, which were nothing but a ground floor, disappeared beneath the thick and heavy thatched roofs, the projection of which kept out the day, and gave them the appearance of being covered by an extinguisher. It is easily understood how the deliberate and clearly meant predominance of one or the other of these lines can determine, with great precision, what impression a work of art shall produce, while their skilful combination can soften or modify it to the taste of the artist. But there is as much danger in exaggeration in the one direction as in the other. If the too frequent representation of similar lines repels by its monotony, the abuse of contrasting lines ends in a neutralization of one impression by another, that is to say, in a total want of meaning.

The floating stone is one of the wonders of Corea that travellers have spoken much and often about. The stone is of great bulk and shaped like an irregular cube. To all appearance it is resting on the ground, and is perfectly free from support on any side. If two men, standing at opposite ends of it, hold each the opposite ends of a thread, they will be able to pass the thread under the stone without encountering any obstacle. The natives consider it one of the greatest wonders of their land, and have erected a temple in its honor, known as the Fon Shih Miao.



Drawn by J King James, 15t James's Rd Handsworth Birmingham.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

A New Work on Plastering.

A NEW work, of rather ambitious dimensions, on the art of plain and decorative plastering, has just been published in England by B. T. Batsford, 94 High Holborn, London. The book is the work of William Millar, plasterer and modeller, and is the greatest effort ever attempted in this direction. It contains over 600 pages of reading matter, each page being 8 × 11 inches, including margins, and fifty-two full-page plates. Over two hundred and thirty illustrations and explanatory diagrams are in the text, and the whole get-up is a monument of skill and industry such as the plasterer's art never before received. Every department of the art is discussed and explained from a thoroughly practical standpoint, and the rules laid down for doing all kinds of work are presented in the plainest and most unmistakable manner. The introductory chapter is interesting from an historical point of view, as it informs the reader of the methods employed by the ancients in applying plaster, and illustrates several designs in stucco found in Pompeii and in Rome, the work of artists of the first century; also designs in stucco executed in Egypt 1400 years before our era. It is with the practical part of the work, however, that we have to do here. In the matter of choosing plaster of paris for work, our author says: "The quality of plaster may be tested by simply squeezing it in the hand. If it coheres slightly, and keeps in position after the hand has been gently opened, it is good; but if it falls to pieces immediately it has been injured by damp." Of the strength of plaster he says: "The compressive resistance of properly baked plaster is about 120 lbs. to the square inch when gauged with neat water, and 160 lbs. when gauged with lime water, thus showing that lime water hardens and improves the affinity of plaster. The adherence of plaster to itself is greater than to stone or brick. The adhesion to iron is from 24 to 37 lbs. to the square inch." These are matters every worker in plaster should know.

Sawdust as a Substitute for Hair.

"SAWDUST has been used as a substitute for hair, also for sand, in mortar for plastering. It makes a cheap additional aggregate for coarse stuff. Sawdust mortar stands the effects of rough weather and frost when used for external plastering. The sawdust should be used dry and put through a coarse sieve to exclude large particles. I have used it with plaster for both run and cast work; it proved useful for breaks of heavy cornices, by rendering the work strong and light for handling. Some kinds (of sawdust) require washing, otherwise they are liable to stain the plaster. Several patents have been issued for the use of sawdust in place of hair and of sand. One of these is for the use of equal parts of plaster, a lime and sawdust; another is for the use of 4½ parts each of slaked lime and sawdust to 1 part of plaster, ¼ part of glue and 1-16 part of glycerine, with a small part of hair. Kahl's patent plaster consists of 35 per cent. of sawdust, 35 per cent. of sand, 10 per cent. of plaster, 10 per cent. of glue, and 10 per cent. of 'whiting.'" The author does not tell us of the lasting qualities of mortar in which sawdust enters so largely. Older writers warn us against employing sand or lime that contains vegetable matter of any kind, because of the rapid decay of the latter. Our opinion has always been that the preserving qualities of the lime will, in almost every case, do much towards preventing the decay of vegetable or animal matter, such as may be employed as aggregates or binders in mortar, as is evidenced in the preservation of hair in the mortar of very old buildings. Our advice is, however, never to use sawdust where good sand and hair can be obtained.

Gauged Work.

QUOTING again from the same authority, on the subject of gauged work, we are told that "All gauged work should be regulated in strength according to the purpose required. A brick or stone wall would not require so much plaster as a lath partition. Work not subject to friction or wear does not require so much plaster. If the work is required for immediate use, as with running screeds, or blocking out large mouldings, or fixing large castings, much plaster must be used. The amount of plaster required for scaffold work varies from ¼ to equal proportions for gauging coarse stuff or setting stuff, and from ⅓ to equal proportions for coarse stuff for heavy cornices, and ⅓ to equal proportions for putty and fixing ornament. The amount of plaster also depends upon the quality of the plaster, some of which are much stronger than others. Coarse plaster that is of a dark and sandy nature is generally weak, sets quickly, and becomes soft and useless. Fine plaster should be used for gauging putty when running cornices, also for fixing enrichments. All gauged work should be gauged with uniformity, each separate gauge having the same amount of water and plaster as required by the bulk of stuff being gauged. Unequal gauging causes hard and soft places in the work, and when more plaster is used in one gauge than another there is an extra expansion caused by the swelling of plaster, which makes the work more difficult to do when floating, setting, running mouldings, or mitring. A quart and a pint measure should always be kept on the scaffold for measuring the water used for the various gauges. The quantity of water will regulate the quantity of plaster for each

gauge. A proper plaster box should also be on the scaffold, made to hold a sack of plaster, and having a lid made in two halves hinged from the centre. This prevents the plaster from getting dirty by falling stuff, and from getting damp by absorption from the atmosphere. Where there is a large quantity, a continuous gauging, the box should be placed on a stand to prevent unnecessary exertion and loss of time by stooping for each handful. When gauging coarse stuff for large surfaces which require several gauges to complete the work in hand, size water should be used in proper proportions with the neat water used for gauging, so as to allow sufficient time to properly manipulate the material. In the event of gauged stuff setting before the work is laid and ruled off, it is difficult to make the surface strong and fair. This also allows the various gauges to be laid on or against the previous ones while they are in a soft state, thus forming stronger joints and better cohesion between the various gauges. The use of size water in gauged setting stuff and putty enables the work to be freely trowelled and finished. Gauged stuff should not be hand floated, as excessive working destroys the setting powers of the plaster." We stop here with these few quotations from the book, but it would not be doing justice to those of our readers who work in mortars and plasters if we dropped the work altogether. It contains so many good things that it is but right our readers should know more of it, and with this end in view, we will refer to it from time to time.

Average Cost of Buildings.

THERE has been much figuring and more guessing as to the cost of buildings per cubic foot. Architects and builders who have kept a strict account of the cost of their work and of the work of others, have varied so much in their figures that no sensible contractor would trust any of them. Frame buildings are put down all the way from 3½ cents per cubic foot to 30 cents per foot, depending, of course, on the character of the building, style of finish, and whether of hard or soft wood. For brick buildings, figures have been given from 7 cents to one dollar per cubic foot, and for some public buildings even more than that. In stone work where much carving has been done the cost in some instances has run up to $1.75 per cubic foot, but in plain stone buildings it has been as low as 12 cents per foot. There never was, nor will there ever be, a constant figure that can be used in all cases of wood buildings, or of brick or stone. There are so many conditions in building that a rule to estimate by cubing—correctly—can never be devised unless human intellect acquires power now not known. A quick method of cubing a building should be within the reach of every builder, which he may use in order to obtain an approximate estimate of a proposed building. Architects and builders are often asked the question: "How much would it cost to build a house so and so, with so many rooms and so and so?" and it frequently happens that on the answer to such a query the erection or not of the house depends. A rapid cubing of the proposed house would at once enable the questioned to answer with some degree of correctness; and while he can make his answer, it will be but just and fair to the questioner that he be informed that the answer given is only approximate. It should be borne in mind that frames for windows and doors cost about the same in wood, bricks or stone, the same style of finish and trimmings being used in each case. The same may be said of all other wood finish, for after the walls are up and the roof on, the difference between a stone or brick building and a frame one ends almost entirely, all things, of course, being equal. It is generally supposed, however, that the woodwork made for the interior of a brick or stone house should be more elaborate and more costly than the same class of work in a frame house. Perhaps this idea springs from the notion that a frame house is a temporary affair at best; though, as a matter of fact, a well built frame house, placed on a good solid stone foundation, will last as long as the average brick house.

How to Build a Chimney.

THERE are floating through building literature a thousand and one remedies for curing smoky chimneys, but very few methods suggested of "how to build a chimney that will not smoke." This of course is a pretty difficult task, particularly if the chimney is placed in a multi-gabled house, or near other buildings, trees, or hills. Yet fairly good results can be obtained by the scientific builder if he follows certain given rules. If a chimney is intended to carry smoke from an open fireplace it is a good plan to make the throat not less than four inches wide and sixteen inches long, which will give an area at that point of sixty-four inches—of course something will depend on the size of grate—then the flue should be abruptly enlarged so as to nearly double the area and so continue for a foot or more; then it may be tapered off gradually until the desired area is obtained. The inside of the chimney should be "parged" or plastered throughout its entire length and made as smooth as a trowel can make it, and the mortar used should be the very best so that it will harden with age. No flue should contain less area than sixty square inches. The best shape for a chimney flue is circular, or many sided, as giving less friction. Brick is the best material for the purpose, as it is a non-conductor. The higher above the roof a chimney rises the better. When expense is no object, eight-inch drain tile (glazed), built in the chimney, makes the best flue known, if properly jointed.

Hints on Estimating.

IN estimating it is always best to take the items in a certain order and to preserve that line of order throughout the whole estimate. It is impossible to exaggerate the good effects of a system which enables the contractor to know day by day how he stands. Every contractor has an interest in his competitors' knowing how to estimate correctly. It does not need many under-estimators to ruin the building business of a town. Carpenters are far too apt to imagine that all that is wanted to make a successful contractor is to be a good mechanic. This is a great mistake. The country contractor should be as good a business man as he is mechanic, and he should have a constant clear insight into his business. The business of contracting is not like that of a merchant, who is constantly selling the same articles in small quantities to the same customers at a steady profit. With a contractor each new contract is on a new basis, with a new customer, in one large amount, composed of various quantities and prices, and it is evident that it must require vastly more care and foresight to conduct his business successfully than one that is steadier. He is also entitled to a profit on the labor he employs and pays for. He should also estimate the risk of damage

to the building while in course of construction. Prudence and wise precaution are not a waste of time and trouble, and if not exercised when called for, the consequences will assuredly have to be borne in loss and anxiety. Every man on the works should do his work faithfully, for the biggest leaks in contracting are often caused by workmen who shirk and shirk the work before them. It is always best to employ good men who know their business and who will do their parts faithfully. A good man is always worth his wages, no matter how much that may be.

Charge for Making Estimates.

If there is one thing more than another that contractors should "sit on," it is the practice of making estimates for every "Tom, Dick and Harry" that fancies he is in a position to have a house built, and who expects to get a $3,000 house for eight or nine hundred dollars. The work of giving free estimates falls more on the carpenter than on any other tradesman, and there can be no valid reason adduced why he should give his time and knowledge to interested people free of cost. Advice from a lawyer or a doctor is always charged for, and justly, and the knowledge and experience of the estimator are just as valuable and require as much time and labor to acquire as does the special knowledge of the physician or lawyer. If every builder would post up in his shop or place of business a large sign with the following legend inscribed on it in large letters, and where it cannot fail of being seen by all who enter the works,

TAKE NOTICE
WE CHARGE FOR MAKING
ESTIMATES.

and if the spirit of the legend is adhered to strictly, it would be the means of a great saving of time to the contractor and would insure fair prices for work done. It is a common occurrence that proposals are advertised for extensive works "with right to reject any or all bids." There is generally no restriction as to the number of bidders, and no certainty that any bid will be accepted, in which latter case all have their trouble for their pay. This is a gross injustice on the face of it. Again, owners will solicit estimates from several builders just to learn whether it will be cheaper to build than to buy; in these cases is it not fair that the men who spend their time in preparing estimates should be paid for it? If it was generally understood that owners would be obliged to pay a percentage to each party whom they notified to give them figures, some would be content with the bids of two or three parties, either of which they would not be afraid to accept, having made their own choice as to who were the best or most responsible. As it now is, if a man has a house to build, he invites every jobber he can hear of to estimate and then makes use of an irresponsible figure to bring down the competent contractor's estimate to the same level. We do not blame the owner; the estimates cost him nothing, and he is gaining valuable information that is worth to him many a good dollar. So long as contractors are satisfied to give their estimates free of charge, so long will the owner take advantage of the generous opportunity.

The publishers of Heating and Ventilation, New York, in a card in our advertisement pages, offer to send free a specimen copy of their journal, the only one of its kind, to any address on application.

HOW TO HANDLE STONE.

On this subject Mr. J. B. Gordon writes as follows to Stone:

There is a right way and a wrong way to open a quarry.

One should first consider the dip and rise or pitch of the strata, natural bed or rift, natural dries or seams.

A careful examination should be made by an expert to determine the right side to open.

Then decide on the kind of machinery that will be most profitable to handle the material most economically. The over-head cable system is at least one-third more economical than derricks. I speak of quarries in general. Some places derricks would be preferred.

Nine cases out of ten quarries are situated alongside railroads, or near enough to them to run switch tracks into them.

First consideration is amount of stripping; next the quantity of unmarketable stone.

Erect two cables at right angles to each other. The one along the face and above the quarry will take all the useless refuse and deposit it once and for all time out of the way. The same cable takes the stone that has to wait shipment, such as bridge ashlar, rubble, etc., to another place until wanted. The second takes the marketable stone from the first and loads it on cars direct, or alongside the track. This is handling stone by a system.

Stone-cutters can be kept at work along and under both cables without confusion or danger.

The quarry can be kept clear and clean, and every man work to advantage.

The nature of the stone rules the kind of machinery required for quarrying and cutting it.

Employ a foreman who can command men, and make him solely responsible. A quarry owner should never be a quarry "boss." He should look after the selling of the stone, and he will have all he can attend to.

A competent "boss" will see that derricks, drills, hoists, channellers, etc., are securely placed in position; that every contrivance about them is in perfect order; that no "sway," "swash" or "buckle" is permitted to go without immediate remedy; he will observe that men work steadily and clean up as well as they can after themselves; he will insist that good men be paid a premium above the ruling wage-scale in common, thus insuring faithful service and strict obedience.

Now, a word or two to masonry contractors: In building large walls loss is often suffered because the work is intrusted to foremen who lay out the work, stretch the lines and hoist the stone, but who let the mason select the position for it, thus delaying the work of the derrick until mason decides the bed and where to place the stone. This takes much time, but as the work seems to be going on all right the loss of time is not noted. Now the foreman should lay out the work, see that everything is in ship-shape; select each stone for the place he has designated in the wall before moving it, mark the bed, and let the masons do the work. He has done the thinking.

The use of broken ashlar is increasing every day. It has been considered expensive to construct. It isn't, if it is made right. Usually on buildings where there is considerable of this work, you will likely find on the wall six men doing work that two competent masons ought to do. The stone is sent to the scaffold in all sizes, or as the masons call for it. In consequence they spend half their time measuring. Now, if the fitter or stone cutter were properly instructed as to the bond, he could send the stone to the wall, where, as I say, two men could do as much work as a half-dozen in the usual way. I have done it.

ARTIFICIAL STONE AND MARBLE COMPOUNDS FOR BUILDERS.

THE following formulæ, writes "W. C. S.," in the Building News, give the methods of preparing some of the best-known products used as artificial stones, concretes, etc., which are open for anyone to prepare :

ARTIFICIAL STONE COMPOUNDS FOR BUILDING.

No. 1.—Ingredients: 10 parts of hydraulic lime which has fallen to a powder, with water to form a paste ; 25 parts of gravel, 5 parts of coal ashes or wood ashes, water q.s. Preparation.—Thoroughly mix the mass, and add sufficient water to make the mass equal to 50 parts bulk, then pour the mass into moulds made of wooden boards and allow it to set.

No. 2.—Ingredients : 125 parts of hydraulic lime which has fallen to a powder, mix with sufficient water to form a paste ; then add 250 parts of ground oyster-shells and 150 parts of ground peat ashes, and sufficient water to make the whole equal to 500 parts in bulk. Then pour into mould until set, as in No. 1.

No. 3.—Ingredients : 100 parts ground quartz sand, 2 to 10 parts finely-ground plumbic oxide, water-glass (silicate of soda) q.s. Mix the solids together, and then moisten with the water-glass until thoroughly mixed, and firmly press into moulds. When set, the stone mass thus formed should be burned.

No. 4.—Ingredients : 1 part of cement (Portland), 3 parts of sand, dilute sulphuric acid (1 part acid to 50 parts water). Preparation : Mix the sand and cement into a dough with the acid fluid, and submit to a strong pressure. Then dry the stones in the air for two days, and afterwards steep them for 12 hours in water and acid (3 of acid and 100 of water), and finally dry them.

No. 5.—Ingredients : 2 parts of Portland cement, 1 part of sand, 1 part of cinders, solution of green copperas q.s. Preparation : Dissolve the green copperas in water until no more will dissolve. Separately mix the three solids together in the dry state, and then moisten them with the solution of copperas ; press the mass into moulds, and allow them to dry in a warm place for two weeks ; then take the blocks out of the moulds, steep them in water for 24 hours, and finally dry for four weeks.

No. 6.—Ingredients : 10 parts unslaked lime, 3 to 4 parts of water, 40 to 60 parts of dry sand, 2½ to 10 parts of hydraulic cement. Preparation : Mix the lime with the 3 or 4 parts of water, and then mix in the sand, and finally the cement. Afterwards grind the compound, and press into moulds.

No. 7.—Ingredients : One part of alum, 15 parts of water, 2 parts hydraulic lime, 10 parts sand, one part cement. Preparation : Dissolve the alum well, and then add the other ingredients, and work up to the required consistency ; press into moulds, and allow to remain for 24 hours. The blocks of stone thus prepared will not be fit for use for at least 14 days ; but to be thoroughly hard requires longer drying.

No. 8.—Ingredients : 30 parts of quartz sand, 1 part of oxide of lead (plumbic oxide), 10 parts of water-glass. Preparation : Mix the sand with the oxide, and then make a dough of the mass by adding the water-glass ; press into moulds, and then heat the blocks at a red heat for two hours.

No. 9.—Ingredients : 4 parts of coarse sand, 1 part of cement, gravel q.s., lime-water q.s., 2 parts of fine sand, 1 part of cement, 1 part of dry metallic coloring matter. Preparation : Mix the sand, cement and gravel with sufficient lime-water to form a paste ; press this into moulds, and cover the surface with a composition made up of the fine sand, cement and coloring matter. When the surface is nearly dry, brush it over with a solution of water-glass.

No. 10.—"Victoria" stone is made as follows : The refuse from the granite quarries is broken up into pieces of suitable size, and 4 parts of the fragments thus obtained are mixed with one of Portland cement, with the addition of sufficient water to bring the mass to the consistency of dough. The mass is run into moulds, in which it is allowed to remain for several days, or until it has set solid ; the blocks are then immersed in a solution of silicate of soda.

No. 11.—Ingredients : 400 parts of sand, 52 parts of limestone, 6 parts of burnt clay (brickdust), 13 to 25 parts of water-glass. Mix all together.

ARTIFICIAL MARBLE.

No. 1.—Ingredients : 8 parts marble-dust or white limestone, 2 parts zinc oxide, 1 part Portland cement, hot acqueous solution of water-glass q.s. Mix the three solid ingredients into a paste with the solution of water-glass (which should contain about 40 per cent. of the glass), and mould the paste under pressure while warm, and expose the moulded form for a week or ten days to warm, dry air before finishing.

No. 2.—Ingredients : 280 parts of granite or other stone, broken small ; 140 parts of limestone or chalk, 5 parts of burned calamine, 3 parts of calcined feldspar, 2 parts of calcium phosphate, 40 parts of water-glass. Mix all the ingredients together in a dry state before adding the water-glass, then press the paste into moulds, and dry the finished pieces at a temperature gradually rising to 125° Fahr.

No. 3.—Ingredients : Alum, water, plaster of Paris. Preparation : Dissolve alum in water (cold) until no more alum will dissolve, and then gradually stir in dry plaster of Paris until the mixture is of a suitable consistence, then spread out the plaster in slabs or form into blocks and bake it.

VARIEGATED MARBLE

is produced artificially by mixing dry Portland cement with dry pigment that will color the cement, and the mixture is made into a paste with the least possible quantity of water. Make a separate pasty compound of each color, and then place each separate compound one on top of the other, and press the compound from all sides, and beat it, so that the colors of the different parts impress themselves on each other without any uniformity; the result will be the production of veins penetrating the mass, which should then be sawn into plates or slabs, and these pressed in a mould for twelve days, during which time they should be kept moist as long as they are not entirely hardened. The polishing of each slab is proceeded with just like marble is polished.

IMITATION MARBLE

may also be produced from sandstone by impregnating the latter first with a solution of sulphate of alumina, and the next one of water-glass. The sandstone will thus acquire a marble-like appearance, and can be polished. The sandstone when thus prepared can be submitted to a very great heat, until it is almost vitrified. It is likewise unaffected by atmospheric influences.

CONCRETES

for floors and pavements can be prepared thus: Remove the soil to a depth of two feet, and then lay in the largest stone or rubble you can obtain to the depth of one foot, and on top of this shoot sufficient small stones—about the size of eggs—to fill up the interstices, and level the surface smooth. On top of this put a layer of coarse gravel six inches thick, and well douse the whole with water, and let it remain some days until it has well settled. The stuff so laid in will form a solid body or foundation for the concrete, which should be prepared as follows: Mix one barrel of good cement with 3 pounds of clean sharp sand; well mix together in the dry state, and then make the mixture into a paste by sprinkling sufficient water on it, well stirring the whole. To the compound thus mixed add two barrels of stone chips and two barrels of coarse gravel, but only as much as the paste will readily combine with. Mix all thoroughly, and then tip it on the bed or foundation, and level it off to its proper height. Proceed with the laying of this deposit as quickly as possible, and when the whole surface is covered, ram it down by the aid of a rammer, such as is used by paviors. Finish off the surface by laying on a thin layer of pure cement mortar to bring the surface to complete evenness. Do not let it dry too quickly, but wet it occasionally so that it shall have all the water it will absorb.

CONCRETE MARBLE.

No. 1.—Ingredients: Milk of lime (prepared by steeping lime in water, allowing it to settle, and pouring off the fluid, which is the "milk of lime" required), finely-powdered marble or limestone, or else chalk; a small quantity of coarsely-powdered limestone. Preparation: Mix the marble, limestone, or chalk with the milk of lime until it acquires the consistency of paste, and to give the whole more cohesion add the coarsely-powdered limestone. Lay the compound as quickly as possible, as it dries very quickly, and becomes hard.

No 2.—Five parts coarse sand, 12 parts pebbles, 3 parts lime.

No. 3.—Sixteen parts pebbles, 8 parts river sand, 2 parts lime. Mix with water to a suitable consistency.

SPECIAL MORTARS.

Hydraulic Mortar.—Burn some lime (CaO, calcic oxide), and then moisten the burnt lime with water and allow it to fall into a powdery condition by exposing it to the air; this powder will be calcic hydrate (C_2OH_2O—i.e., slaked lime). Separately prepare some kisselguhr (infusorial earth or fossil meal), by washing, drying, gently heating, and pounding up any lumps that may be formed; then mix this fossil meal with the calcic hydrate in equal weights, and mix the compound with water to form a suitable working consistence. For mortars that are not much exposed to water, mix 1 part of infusorial earth with two parts of calcic hydrate (by weight). Another good hydraulic mortar may be made by mixing 1 part of alum shale with two or three parts of the slaked lime. The mixture is moistened with water for use, and used as mortar. It dries very quickly, becomes hard and impermeable.

A mortar for damp places may be made by using a warm solution of green vitriol (sulphate of iron or ferrous sulphate, as it is also called), with which to slake the lime, and mixing the slaked lime with very fine quartz sand.

To make ordinary mortar harden under water, add a little manganese to it.

Turkish mortar, for use in building solidly-constructed edifices, is prepared by mixing with water to the desired consistency 1 part of powdered brick and 2 parts of sifted lime. Put this on in layers of 5 in. or 6 in. thick between the course of brick and stone.

RULES FOR MEASUREMENT.

Many states have different rules of measuring for various portions of buildings, and we give below a few rules which are in general practice throughout many of the states, says the National Builder:

STONE WORK.

Measure rubble work by the cubic foot or by the cord of one hundred cubic feet.

Measure the outside of walls for their length, exclusive of pilasters.

At re-entrant angles measure through the walls both ways.

The section of a pilaster shall be measured as the sum of its face and returns multiplied by twice its projection from the face of the wall.

Measure openings over four feet in width as though four feet were unbroken.

Measure openings of greater width than five feet as five feet narrower than their actual size and deduct the balance.

Independent piers shall be measured at their actual cubic contents, and paid for according to the character of the work.

Footing courses shall be measured by same rules as walls.

Ashlar work, range work, copings, etc., are to be measured superficially after measuring the walls as rubble. Openings shall be deducted with the exception of reveals.

BRICK WORK.

Masons' measure shall be reckoned at 7½ brick per foot super for each half brick of thickness of wall.

To get the lengths of walls measure the outside exclusive of pilaster.

At re-entrant angles measure the thickness of the wall one way, thus giving the actual material.

The section of a pilaster shall be measured as the sum of its face and returns multiplied by its projection from the wall.

Measure all openings of ten square feet or less as though they were unbroken.

Measure openings over four feet in width as though four feet narrower than their actual size, and deduct the balance.

Independent piers shall be measured at twice their actual contents, and paid for according to the character of the work.

Hollow walls: Allow the mason one-half the air space.

We also give the rules for measuring roofs of different materials:

SLATE AND TILE ROOFS.

Measure by the square of 100 feet.

Measure the slope at one foot longer than the actual length covered.

Measure only to the edge of slates on gable, and measure one foot more than is actually covered on each side of hips and valleys.

The horizontal measure of a conicle or other curved roof shall be made at its base.

Measure openings of ten square feet or less as though the roof were entire.

Measure larger openings as though two feet narrower each way than the actual openings and deduct all but this allowance.

Valleys, flashings, etc., to be measured at the actual surface of metal used.

METAL ROOFS.

Measure the actual surface of metal used, including flashings.

Measure all openings of ten square feet or less as though the roof were entire.

Measure all openings of more than ten square feet as though one foot narrower each way than the actual opening and deduct all but this allowance.

PITCH AND GRAVEL ROOFS.

Measure the actual surface covered.

Measure all openings of one "square" (100 square feet) or less as though the roof were entire, and all openings of more than one "square" as though one foot smaller each way than the actual size, and deduct the openings thus measured.

Deduct nothing for fire walls in the roof.

Allow the actual metal used in flashings.

ELECTRICITY IN BUILDING OPERATIONS.

FROM the Electrical World we learn that temporary electric lighting installations have proven to be an almost indispensable aid during the contruction of the modern many-storied buildings. With such artificial illumination, work is carried on throughout the entire 24 hours with many resulting economies. It is interesting to note that in almost every case when current can be obtained from the street electric supply service, or sometimes from adjacent isolated plants, both arc and incandescent lights, and in some cases electric motors, are temporarily used. As the building progresses temporary wiring is extended from floor to floor, and in some cases supplies quite a large number of lights.

A number of New York "sky scrapers" now in course of construction are wired for from 50 to 100 arc lamps and 200 to 300 incandescents. In one of these buildings a pipe cutter and a drill press are being operated by electric motors, and in another several electric tile polishing machines are in use. Other applications will readily suggest themselves. Originally the wiring is usually in fairly good condition, but as the work on the building progresses, constant overhauling and changing is necessary. One or more men are continually employed in watching the work and making the alterations in the location of the lights.

In the present temporary installations of this nature ordinary single and twin rubber insulated conductors are used, supported on porcelain insulators fastened to the iron or brick work. In some cases lead-armored conductors are used without insulators. It would seem advisable to adopt some special conductors and fittings for this work. There also seems to be an excellent field here for compact, portable electric generating plants, consisting of vertical boiler, high-speed engine, and direct-connected dynamo, mounted on a single bed-plate or separately. The use of such portable plants would cetainly be productive of particularly economical results. A compact gas engine and dynamo combination on the same lines might also be suggested if the necessary continuous running could be guaranteed.

Aside from the importance of proper illumination and power appliances, the necessity for frequent intercommunication between distant parts of these 15 to 25 storey buildings, would seem to warrant the installation of a temporary telephone system with stations perhaps upon each floor. The temporary installation of such systems is to be expected in future large buildings during construction.

THE TECHNICAL TRADE JOURNAL AS AN EDUCATOR.

THE value of a well-conducted trade journal to a man who is engaged in the industry represented by that publication cannot be over-rated, writes Mr. Thos. P. Pemberton in the Master Steam Fitter. Nearly all trade papers, as the term is understood, are more or less technical in character, giving information not only of the general condition of special industries, but also of the changes and improvements made by manufacturers in design, process and construction. When these can be presented to readers by means of outline drawings and finished engravings the usefulness of the trade paper is still further increased. The daily newspapers pay little attention to the multitudinous details which are of interest to manufacturers. They may announce new inventions, the erection of large works, peculiarities in mechanism and operation, or great scientific discoveries, and these, undoubtedly, interest general readers and satisfy the public mind in its eagarness to know, at least, something of all current developments and events. But when the manufacturer desires minute information regarding his own special industry, he has recourse to technical and trade journals, which give him information of what others are doing and how they are doing it. The industrial press, when it performs its functions properly, does precisely that which the daily press leaves undone. In saying this we do not forget the wonderful enterprise of some of our large American dailies in giving illustrated descriptions of many new inventions and discoveries, but these, however satisfactory for general readers, are incomplete for manufacturers who may be particularly interested in all the details of design, construction and operation.

But how is the technical trade paper an educator? Its mission and purpose are, in its successive issues, to cover the whole ground and to confine its information to the particular field in which it operates. It reports and explains many new processes, whether they be developed at home or abroad; it illustrates and describes important new machines and apparatus; it records the progress of invention and improvement in different branches of industrial art and applied science; it announces what is being made and sold; the organization of new firms; the award of contracts; the construction and operation of large plants; and gives special information on special subjects for manufacturers of specific articles. All this and much more is in the routine and absolute requirements of business education.

The advertising pages in such a journal are not a mere dreary and uninviting series of puffs and boastings. They are an illustrated catalogue and chronicle of the supplies which are required in particular branches of industry. They indicate the most advanced state of ingenuity; they present to the eye and the mind qualities and forms; they tempt the manufacturer and the consumer, as a matter of self interest, to examine them. Those who do not examine them exclude themselves from information for which, if they comprehended their own interests, they would be willing to pay handsomely.

Trade journalism in this country has acquired dignity and importance; and in this field, as in all others, popularity, success and rapid growth are the portion of journals which prove their possession of brains, enterprise and sincere devotion to the interests of which they are representatives. They are educating mediums for the advancement of civilization, the progress of commercial enterprise, manufacturing industry and mechanical ingenuity. They are the exponents of taste, design and utility, and an inestimable benefit to producers and consumers, to both employer and the employed.

IRON CANTILEVER ROOF.

THE cantilever principle has been successfully applied by Mr. C. Doucas in the designing of the roof of the machinery hall of the Geneva Exhibition. The cantilevers rest on columns 124 ft. 8 in. apart and 47 ft. 5 in. high; they are anchored down to standards 35 ft. 6 in. high at the side walls, which are 288 ft. 8½ in. apart. At the centre, between the free ends of the cantilevers, is a space of 25 ft. 3 in. spanned by a ventilator roof. The standards, being designed to resist the whole of the wind-pressure, have a base of 5 ft. 7 in., and are anchored on to blocks of concrete. The length of the building, 490 ft. 6 in., is divided into nine intermediate bays of 47 ft. 7 in., and two end bays of 31 ft. 2 in. The cantilever principals enclosing the end bays meet in an expansion-joint in the centre, the ventilator only extending over the inner nine bays. In this part there are ten latticed purlins. The intermediate rafters supported by the purlins are 15 ft. 10 in. apart and 3 ft. 3 in. deep, and carry intermediate H-bar purlins. There is no wind-bracing except in the two end bays.

The main bracing in the principals, purlins and intermediate rafters is arranged in single triangulation, and generally consists either of two angle bars riveted together, or of single angle bars, the length of these members varying from 4 ft. to 10 ft. Columns and standards are also made of single triangulation lattice-work. The lightness of the structure is remarkable.

Before carrying out the design, the committee of the Exhibition submitted it to the criticism of Professor Ritter, of Zurich, who approved of it, and recommended the following factors for the calculation of strength:—Snow load, 6·14 lb. per superficial foot; wind-pressure, 16·38 lb. per superficial foot; tension or compression on wrought iron, seven tons per square inch. The total weight of wrought iron is about 500 tons—i.e., 7·78 lb. per superficial foot, or 0·135 lb. per cubic foot inclosed. The iron structure, after having served its purpose, became the property of the contractors.

Mr. D. Stevens, of Chesley, Ont., is rapidly pushing to completion the new Public School building in that town, for which he was given the contract.

QUESTIONS AND ANSWERS.

A SUBSCRIBER at Galt writes: Could you let me know how to make a good red stain for brick. I want to color a building of white common brick. If you can give me a recipe that is known to have given good results, I shall feel obliged.

ANSWER.—Slake one-half bushel of lime in a tight barrel by pouring over it sufficient boiling water to cover it four or five inches deep, stirring it until slaked. Then fill the barrel two-thirds full of water and add a bushel of best Owen Sound Portland cement. To this add 3 lbs. sulphate of zinc, previously dissolved in water. Color with Indian red to suit. If this is too dark use Venetian red. A clean coal oil barrel will answer. If a pailful of clean fine sand is mixed with these materials and kept well afloat while using, the work will be much improved. Apply with a flat brush. Be careful not to splash stone or woodwork, for when dry it is next to impossible to remove. This mixture, when properly applied, renders the brickwork impervious to damp.

A new window frame carries a rod at one side on which the window is hung to swing outward as well as slide up and down.

In painting brickwork it is of great importance to see that the bricks are thoroughly dry, and they should, therefore, not be touched after a storm or heavy rain. The best time to paint this class of work is in a hot summer. These remarks apply equally to stonework.

PREPARING ZINC FOR PAINTING.—Dissolve in 64 parts of water 1 part each of chloride of copper, nitrate of copper and sal ammoniac; then add 1 part of commercial hydrochloric acid. Brush the zinc over with this mixture, which gives a deep black. Leave it to dry for twenty-four hours, when any oil color will firmly adhere to it, and withstand both heat and damp.

PAGES

MISSING