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MISSING

CANADIAN ARCHITECT AND BUILDER.

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—THE—

CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

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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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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

Ancient Babylon. THE excavations on the site of ancient Babylon, carried on recently under the direction of Professor Hilprecht, of the University of Pennsylvania, have disclosed the city wall, the foundations of which were 16 feet below the level of the desert; it was 17 feet high and 45 feet wide. In its construction were used bricks 20 inches square. A keystone arch was discovered which is believed to date back 5,000 years B. C., and tablets bearing cuneiform inscriptions, which are declared to have been written at least seven thousand years prior to the Christian era.

A Novel Idea. THE T square club, of Philadelphia, has hit upon a novel method of assisting the public to distinguish the good from the bad in architecture. The members of the club have been invited to compete for a medal for the "re-designing" of some of the most objectionable buildings in Philadelphia. Each competitor will be furnished with a photograph of the building and the approximate requirements for which it was intended. It is proposed that the designs submitted in this competition shall be published as an object lesson to the profession and the public.

The Fire Risk in Toronto. UNTIL such time at least as the City Council see fit to further improve the means of overcoming fire in Toronto, the Underwriters' Association will charge a special insurance rate on buildings in excess of four stories. They claim that the city water pressure cannot be effectively employed on buildings of more than four stories, and that the present equipment of steam fire engines would require to be at least doubled before buildings of greater height could be regarded as equally good risks with those of four stories and under. Not only are additional fire engines needed, but means of furnishing them with the necessary supply of water should likewise be provided. At present there is but a single water main supplying the Rosehill reservoir, and in case of accident, a large section of the city would be left without fire protection. A duplicate main, such as is to be found in every large city, has long been an absolute necessity, but there is no indication that it will be provided except as the result of some great catastrophe. The existing main, which is 24 inches in diameter, is at present fed from a 10-inch main on Front street, by which senseless arrangement its efficiency is greatly reduced. The City Engineer is fully alive to the absurdity of this arrangement, and on his recommendation a by-law was submitted to the ratepayers recently to authorize the construction of a 24-inch main on Front street, which by-law the citizens in their wisdom voted down. The attitude of the Underwriters' Association will have a damaging effect upon the rental value of high buildings, and prove to be a strong discouragement to the erection of such buildings in the future. The latter effect is not to be deplored, at least by those who desire to see an improvement in the character of our street architecture. Present owners of high buildings, however, who find themselves called on to pay one thousand to fifteen hundred dollars per year in additional insurance, on account of a fifth or sixth story, have good reason to complain at their lot.

Novel Method of Dredging. THE Collins Bay Rafting Co., who were recently awarded the contract for dredging a channel in which to lay the new steel intake pipe at Toronto Island, have gone about the work in a peculiar manner. Instead of excavating with a dredge, the sand is displaced to the required depth by water propelled under high pressure from the rapidly revolving screw of a steam tug. The tug is backed up to the scene of operations, and the screw set in rapid motion. Each operation of this kind bores a channel several yards in length in the sand. By this peculiar method, it is said, the work is being accomplished in as satisfactory a manner as by dredging, while the saving in time is so great that the contractors bid fair to make a handsome profit. It is expected that after the pipe shall have been laid in the channel the natural action of the water will replace the sand as a covering upon it.

Our Students' Department. THE Students' Department which has been a feature of the ARCHITECT AND BUILDER during the present year, would be more interesting and helpful if the students themselves would contribute to it. If we have not specifically invited such contributions, it was because we supposed the students would take it for granted that their assistance in this direction would be welcomed. There are many subjects affecting their success in the profession, in which students should feel an interest. There is information to be gained by the asking of questions and the exchange of opinions on these subjects. We trust the rising generation of architects will assist in making our "Students' Department" a medium for the dissemination of valuable information on the lines indicated.

Canadian Furniture. As a tangible illustration of the progress which the arts and crafts are making in this country, the Exhibition held in Toronto under the auspices of the Canadian Furniture Manufacturers' Association, recently, was one of considerable interest. While in point of design and workmanship there was much to be condemned, there was no lack of evidence that in both these directions great advancement has taken place during the last decade. The work of the leading manufacturers is marked by greater simplicity and refinement in design than was formerly the case. Mahogany appears to be the favorite wood at the present time, with oak and birch as its strongest competitors. Only two or three pieces of walnut were to be seen, the growing scarcity of this wood having advanced the price to the point where its extensive use is no longer possible. It is to be regretted that except on the opening day when a few visitors were admitted by invitation, admittance to the exhibition was restricted to persons in the trade.

New York Municipal Building Competition. A TERMINATION has been reached in the architectural competition for a municipal building for the city of New York. Some years ago architects were invited to submit designs for a building to be erected in City Hall Park, the central portion of the city, and the competition was one of the most promising ever arranged. After designs had been submitted objection to the site was taken by interested persons, with the result that an Act was finally passed forbidding the use of the park for the purpose. After a lapse of three years, during which time efforts were made to have the matter amicably settled, the plans were adjudged last January and the prizes announced, but no provision was made for the payment of the awards. Then followed an action in the courts to recover the awards, and on August 21st the Supreme Court gave four judgments for $2,000 each against the city in favor of the four architects whose designs were considered among the best. Two other awards have already been allowed by the city, one of $7,000 to Mr. J. R. Thomas for the first prize, and one of $2,000 to Rankin & Kellogg. It is a matter of regret that this competition, which promised to result in the erection of a satisfactory building, should have had such an unsatisfactory ending.

CONDITIONS IN THE HEATING TRADE.

A REPRESENTATIVE of the CANADIAN ARCHITECT AND BUILDER recently interviewed several of the largest manufacturers of heating apparatus, with the view of ascertaining the conditions at present prevailing in the trade. Some of the results of his enquiry are worthy of record.

During the season of 1895 an average trade was secured both in radiators and furnaces. To some manufacturers the season was more profitable than to others, owing to the fact that from the month of May forward prices of materials in the United States market advanced considerably, quotations being withdrawn several times, and manufacturers who had not secured supplies early in the season were compelled to pay the advanced rates. In pig iron and galvanized iron an advance in prices was made of about 50 per cent.

Upon the opening of the spring season this year, many manufacturers, anticipating a similar advance, placed large orders for supplies, but up to the present time no notable change in quotations has taken place, prices on the contrary ruling very low. United States supply houses are said to be particularly anxious to secure Canadian business, and are actually forcing their stock upon the market.

Although the heating season has only fairly well commenced, present indications point to considerable activity. Up to the present time the manufacturers of apparatus report sales fully equal to those of last year, with much better prospects for future business. There has been an increased demand for small furnaces. This is accounted for by the fact that furnaces are gradually replacing stoves for heating dwellings and small stores. In the city of Toronto, where the number of new buildings erected has been very limited, the trade has been confined largely to stores and dwellings which were being refitted for renting purposes. On country account a fair trade has been done in wood furnaces, this being a branch of the trade which promises to further develop as the advantages of furnaces become more generally known.

The sales of radiators, notwithstanding the general depression, have exceeded those of last year, and the manufacturers point to this fact as indicative of improved conditions. Ontario trade has been up to the average; Manitoba and British Columbia has shown a slight falling off. In the province of Quebec, outside the cities of Quebec and Montreal, the trade in heating apparatus has been fair, being confined largely to wood furnaces. An improved demand for furnaces is reported from the maritime provinces, where coal is largely used for fuel.

Several of the manufacturers have used iron from the Hamilton Smelting Works, and report it to be of fair quality. Complaint is heard that those who contemplate putting in heating apparatus refrain from placing their orders until the season is well advanced, with the result that manufacturers cannot give the work the attention it would receive were the orders placed at an earlier date. The interests of both the owner of the building and the manufacturer would be served by giving this matter some attention.

ILLUSTRATIONS.

DESIGN FOR HOUSE AT ELORA, ONT.—DICK & WICKSON, ARCHITECTS, TORONTO.

ILLUSTRATIONS OF RESULTS OF TESTS OF STRUCTURAL METAL WORK.

DESIGN FOR PUBLIC LAVATORY, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

This lavatory is now being erected for the corporation of the city of Toronto, at the intersection of Adelaide and Toronto street. As the drawings show, the lavatory is entirely below the street level and will contain four urinals, three closets and wash basin. It is the intention to have the lavatory in charge of a man, and to charge the fee of one cent for the use of the basin, towels and soap—the other accommodation being free. The building will be entirely of stone and brick,—the walls and ceiling of room and staircase being faced with white glazed brick; the floors, partitions, etc., of white marble; the staircase of iron, the only wood in the entire work being the doors. Ventilation will be by means of an electric exhaust fan, and lighting by incandescent lamps. The heating will also be by electricity. The cost will be about $3,000.

PERSONAL.

Mr. Richard P. Sharpe, formerly Hon. Secretary of the British Columbia Institute of Architects, is about to take up his residence in England.

A portrait by Fraser of the late Norman B. Dick, architect, has been presented to the Royal Canadian Yacht Club, Toronto, by a few of the members who were among his most intimate friends.

Several Halifax architects, including Mr. J. C. Dumaresq and Mr. Busch, jr., visited Toronto during the Industrial Exhibition. They report that a fair amount of building is being done in the maritime provinces this season.

Mr. Henry Langley, architect, Toronto, who was so unfortunate as to break his leg by falling into an opening in the floor of a new building in Rosedale in the early part of the year, is again able to attend to his professional duties.

Prof. John Galbraith, principal of the School of Practical Science, Toronto, was appointed vice-president of the Mechanical and Engineering Section of the Association for the Advancement of Science at the recent convention in Buffalo.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONUMENT NATIONAL LECTURES.

A FIRST attempt was made last year by the Society National to give free public lectures. The results have been so favorable that this year the Society has resolved to continue and complete the courses. The Quebec Government have recognized the importance of these lectures by voting an annual grant of $2,500 for their support. The free public lectures on the Arts and Sciences will be resumed this year in the Monument National, St. Lawrence Main street. The lectures will be as follows:—1. "Applied Mechanics," by M. Alex. Bonniu, Ecole Centrale of Paris, Officer of Academy; 2. "Mines and Metallurgy," by F. V. Roy, Ecole Centrale of Paris; 3. "Agriculture and Colonization," by M. J. X. Perreault; 4. "Architecture and Building," by M. Jos. Venne, architect; 5. "Political Economy," by the Hon. Jos. Royal; 6. "Universal History," by M. L. O. David; 7. "Commerce" by M. Stamilas Cote, editor of the Moniteur du Commerce. The dates of the lectures have not yet been definitely arranged. The classes as mentioned are entirely free of charge.

MASTER PLUMBERS' ASSOCIATION.

At a recent meeting of the Master Plumbers' Association of Montreal, a letter was received from the Toronto Foundry Co., thanking the Association for the manner in which they entertained the company's representatives while attending the convention of the National Association of Master Plumbers for the Dominion of Canada, recently held in this city, expressing their best wishes for the success of the organization, and enclosing the sum of $25 to assist in defraying the expenses incurred by the Association in connection with the convention.

DEPARTMENT OF ARCHITECTURE—M'GILL UNIVERSITY.

The recently endowed Chair of Architecture at McGill University, Montreal, has been filled by the appointment as Professor of Mr. S. H. Capper, M. A., A. R. I. B. A., late of Edinburgh University. Mr. Capper graduated as Master of Arts from the latter university in 1880, and was awarded the Pitt-Club Scholarship in Classics. He subsequently resided for five years in Spain, and studied closely the architecture of that country. He entered the Ecole des Beaux Arts in 1884, and studied architecture with M. J. L. Pascal, member of the French Institute of Architects. Having continued his studies in France and Italy until 1887, he began the practice of his profession in Edinburgh, in which city he designed and supervised the erection of such important buildings as Whitewich Orphanage, Glasgow; University Hall Buildings, Edinburgh; new laboratories for the Royal College of Physicians, Edinburgh; model workmen's dwellings, Blainhoyle, Perthshire, etc. He was appointed extension lecturer and examiner in Archaeology and Art for the M.A. degree in the University of Edinburgh. Mr. Capper has presented to the authorities of McGill University testimonials of the highest character as to his qualifications as instructor in architecture, and there is consequently every reason to hope that under his direction the new department of architecture will make satisfactory development.

For several weeks past the appearance of the streets of Montreal has been marred and traffic to some extent impeded by excavations for subterraneous wires. This work could have been done before the construction of the new pavements. Curiously enough, on the eve of the completion of the work, the City Council has decided to protest against the breaking up of the streets. An hydraulic company also proposes to make similar excavations. The City Council had the means several weeks ago of stopping the works but they have not done so. As it is, several lawsuits are in prospect.

The death occurred at Amherst, N. S., on the 8th inst., of Mr. H. G. C. Ketchum, C. E. Deceased was born at Fredericton, N. B., 57 years ago, and was educated at King's University. His first work was as a draughtsman on the old European North American Railway between St. John and Shediac, now part of the I. C. R. Subsequently he was connected with the construction of San Paulo incline in Brazil, a railroad running from the coast to the table lands in the interior. He was engineer of the International Contract Company, and afterwards built that portion of the I. C. R. between Painsec and Missiquash river. Latterly he has been engaged on the Chignecto Ship railway, and in this connection has become known as one of the best engineers of Canada.

MAXIMUM LOADS.

THE city of Buffalo has recently adopted a new ordinance governing the erection of buildings, embodied in which are the following stipulations regarding the maximum loads to be applied to soil, brick, concrete, iron, steel and wood :—

Section 143. Soil, masonry or other material shall not be loaded more per square foot surface than is shown in the following table, to wit :—

Solid natural earth or dry clay not to exceed 3½ tons per square foot.

Concrete in foundation not to exceed 4 tons per square foot.

Dimension stone in foundations not to exceed 6 tons per square foot.

Dimension stone with the beds dressed to uniform surface not exceeding a 1-inch joint and laid in cement mortar not to exceed 7 tons per square foot.

Rubblestone-work laid in cement mortar not to exceed 5 tons per square foot.

Common brick laid in lime mortar not to exceed 3 tons per square foot.

Common brick laid in cement mortar not to exceed 5 tons per square foot.

Hard-burned brick laid in lime mortar not to exceed 6 tons per square foot.

Hard-burned brick laid in cement mortar, not to exceed 9 tons per square foot.

Pressed brick laid in cement mortar, not to exceed 9 tons per square foot.

Pressed brick laid in Portland cement mortar, not to exceed 12 tons per square foot.

Section 144. If brickwork laid in cement mortar is "push-placed," walls may be loaded 20 per cent. in excess of the loads given above.

Section 145. The loads permitted for isolated brick piers whose heights are greater than six times their least dimensions, shall be 20 per cent. less than those given above.

Section 146. Cast-iron subjected to crushing strain only, as in bearing-plates, may be loaded to the extent of 15,000 lbs. per square inch.

Compression strain on cast-iron shall not exceed 13,000 lbs. per square inch.

Tensile strain on cast-iron shall not exceed 3,000 lbs. per square inch.

Cast-iron used for pillars shall be proportioned in accordance with the following formula :—

For round cast-iron columns :—

$$S = 14{,}000\, A \div \left(1 + \frac{L^2}{600\, D^2}\right).$$

S equals load in pounds.

L equals length of column in inches.

D equals diameter of column in inches.

A equals sectional area of column in square inches.

For rectangular cast-iron columns :—

$$S = 14{,}000\, A \div \left(1 + \frac{L^2}{850\, D^2}\right).$$

S equals safe loads in pounds.

L equals same as above.

A equals same as above.

D equals the side of square column or the least horizontal dimension of other columns.

Section 147. The minimum thickness of metal in cast-iron columns shall not be less than three-fourths of an inch, and no cast-iron column shall exceed in height thirty times its least horizontal dimension without having lateral support.

Section 148. All cast-iron columns shall have their ends turned true and at right angles to their axis, and the ends shall be parallel with each other.

Section 149. Cast-iron columns shall be thoroughly tested and inspected before being placed in position, and they shall be drilled with one-fourth test holes, not less than two in length, one on the upper and one on the lower surface of the columns as cast.

Section 150. All girders, beams, corbels, brackets and trusses, if made of steel, shall be so proportioned that the maximum fibre stress will not exceed 16,000 lbs. per square inch, or that if made of iron the maximum fibre stress will not exceed 12,000 lbs. per sq. inch.

Section 151. Plate-girders shall be designed and constructed of strength at least equal to those developed by the following formulæ :—

For plate-girders :—

Flange area equals maximum bending moment in foot-pounds divided by CD.

D equals distance between centres of gravity of flanges in feet.

C equals 13,500 for steel, 10,000 for iron.

Web area equals maximum shear divided by C.

C equals 10,000 for steel, 8,000 for iron.

Section 152. Maximum strain per square inch of rivet area (single shear) shall not exceed :—

	Steel lbs.	Iron lbs.
For shop-driven rivets	9,000	7,500
For field-driven rivets	8,000	6,000
Maximum shearing strain, in webs	7,000	6,000
Direct bearing	15,000	15,000

Section 153. The maximum loads allowed upon rivetted columns shall not exceed those determined by the following formulæ :—

For rivetted or other form of wrought-iron columns more than 90r in length,

$$S = 10{,}600 - 30\frac{L}{R}$$

S equals safe load pounds per square inch.

L equals length of column in inches.

r equals least radius of gyration of column in inches.

For rivetted or other forms of wrought-iron columns less than 90r in length :—

S equals 8,000.

S equals safe load in pounds per square inch.

For rivetted or other steel columns more than 90r in length :—

$$S = 17{,}100 - 57\frac{L}{R}.$$

S equals safe load in pounds per square inch.

L equals length of column in inches.

r equals least radius of gyration of column in inches.

For rivetted and other steel columns less than 90r in length :—

S equals 12,000.

S equals safe load in pounds per square inch.

Section 154. No wrought-iron or rolled-steel columns shall have an unsupported length of more than 40 times its least lateral dimension or diameter, nor shall its metal be less than one-fourth of an inch in thickness.

Section 155. With regard to connections of all structural iron-work upon buildings erected in the city of Buffalo, such work shall hereafter be in conformity with the practice of the Carnegie, Trenton, Phœnix, Pencoyd, or other first-class rolling-mills, as published in their standard books and sheets, and approved by the Superintendent of Buildings.

Section 156. Where wooden pillars are used the maximum loads to which they are to be subjected shall not exceed those determined by the following formula, S representing the maximum loads as intended to be fixed by this ordinance.

Section 157. For wooden pillars where the length is not more than twelve times the least thickness,

$$S = \frac{AC}{4}$$

S equals safe load.

A equals sectional area of the post in square inches.

C equals 4,000 for long-leaf yellow pine ; 3,200 for oak or Norway pine ; 2,800 for white pine or hemlock.

Section 158. For wooden pillars where the length is more than twelve times the least thickness.

$$S = X - Y\frac{L}{B}$$

S equals safe load in pounds per square inch.

L equals length of post in inches.

B equals breadth of least side of rectangular post or diameter of round post.

X equals 1,000 and Y equals 10, for yellow pine.

X equals 750 and Y equals 7·5, for oak and Norway pine.

X equals 625 and Y equals 6, for white pine and hemlock.

For oak or Norway pine posts, 75 per cent. of the loads in the above tables may be used.

For white pine or hemlock posts, 62½ per cent. of the loads in the above tables may be used.

Section 159. The ultimate load to which timber used for girders may be subjected shall not exceed those determined by the following formula, to wit :—

$$S = \frac{2CBD^2}{L}$$

S equals safe load in pounds.

B equals breadth of beam in inches.

D equals depth of beam in inches.

L equals length of beam in feet.

C equals 200 for long-leaf yellow pine, 150 for oak, 120 for white or Norway pine and hemlock.

Section 160. The contents given in all the foregoing formulæ

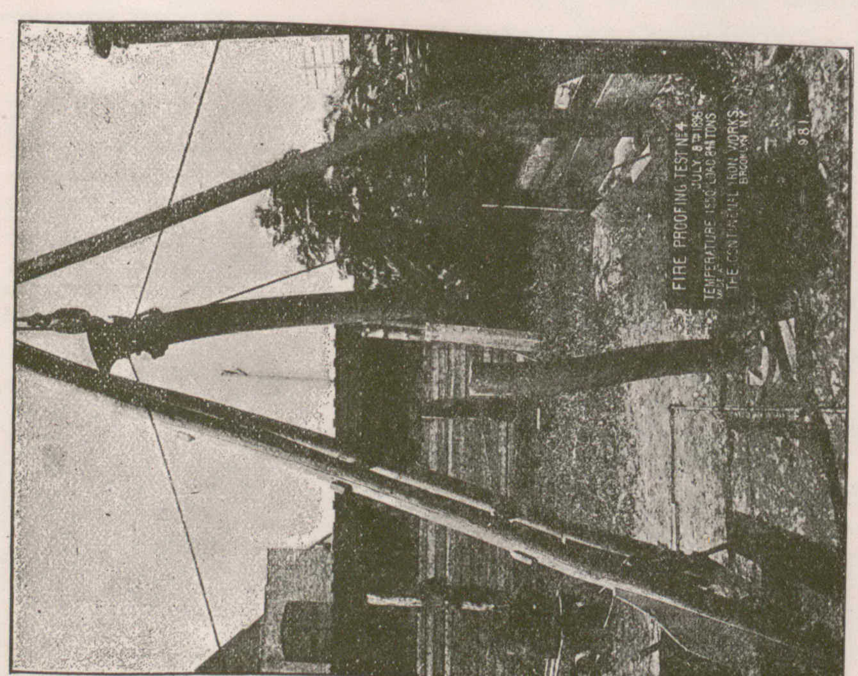


Fig. 11.

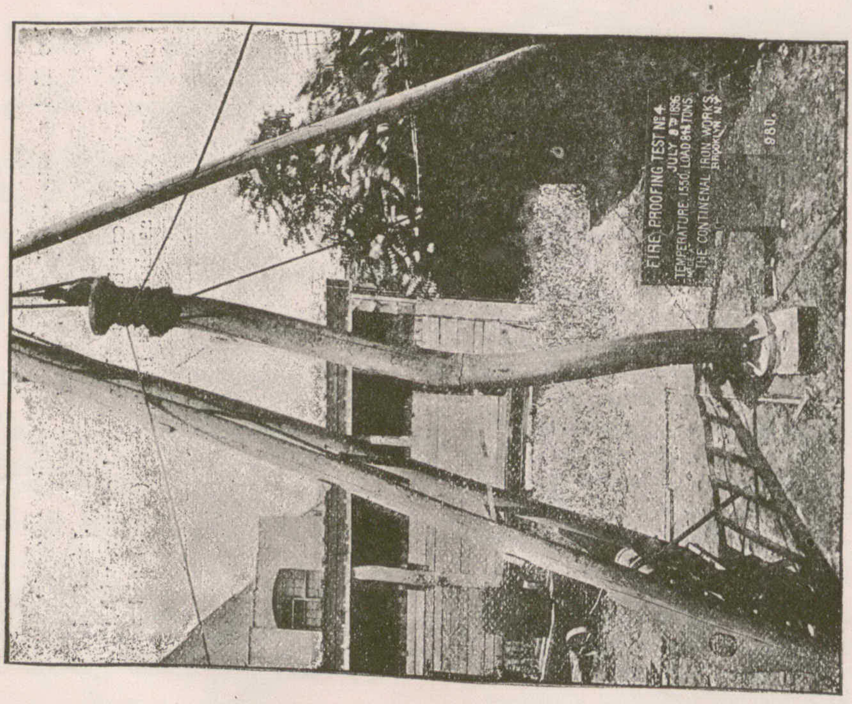


Fig. 12.

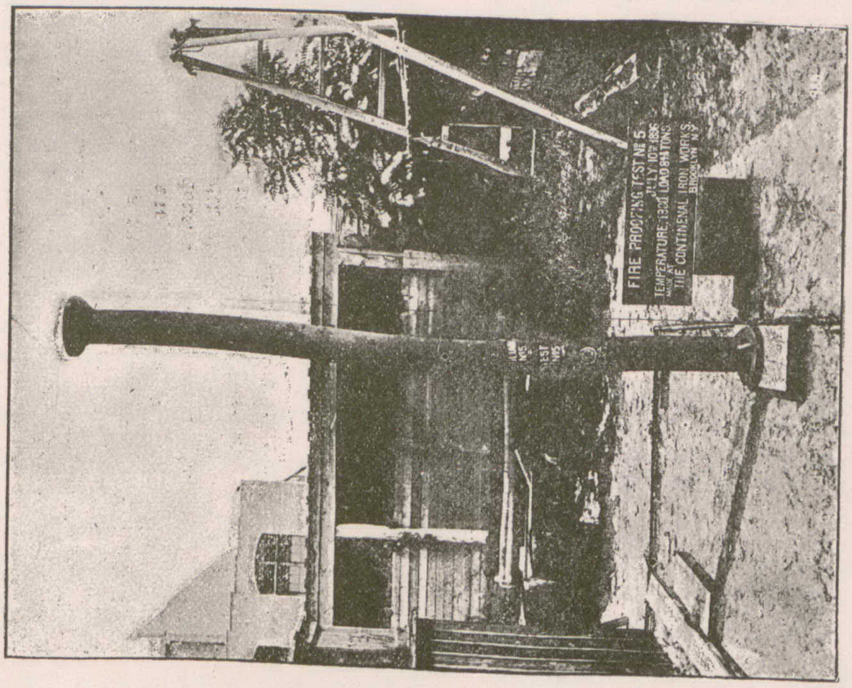
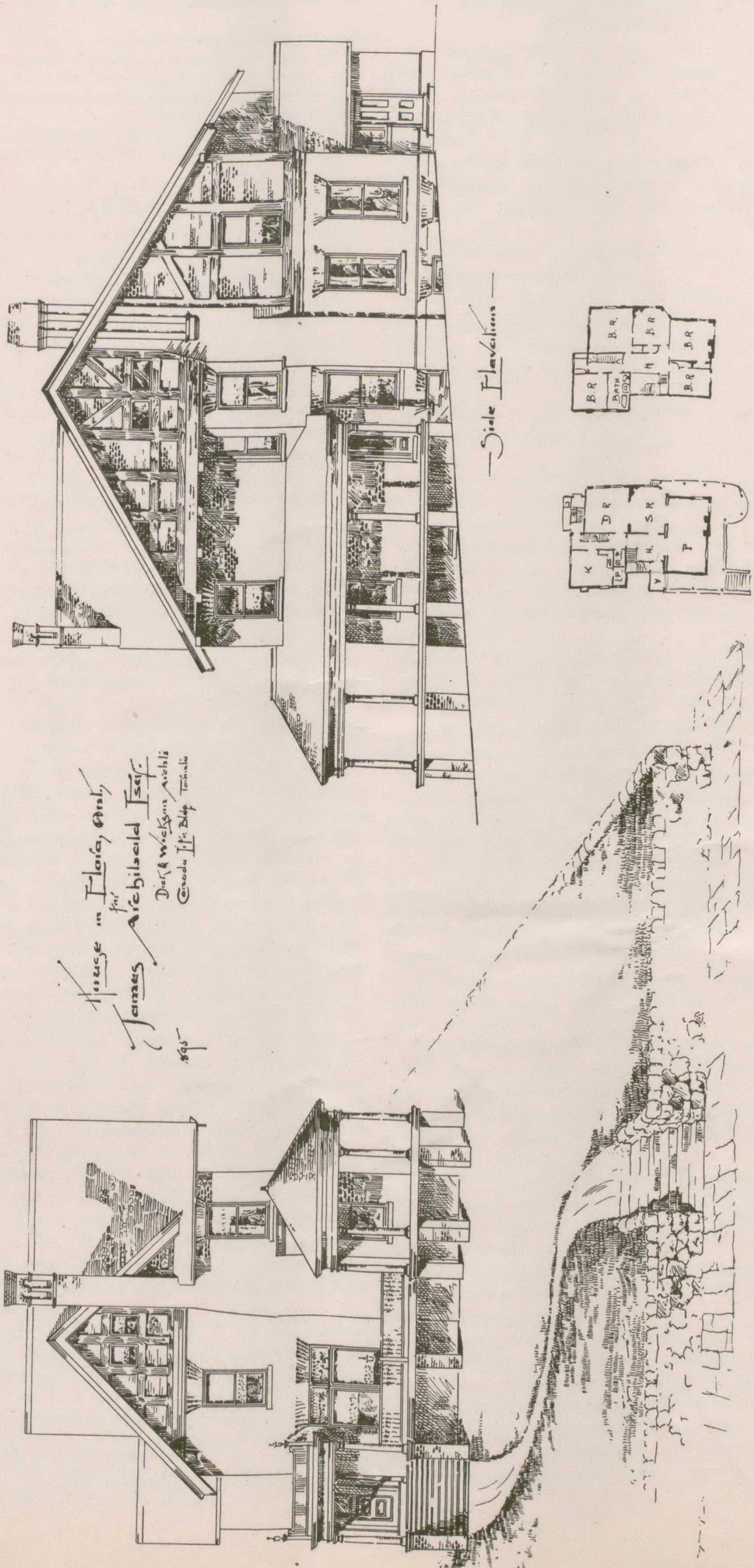


Fig. 13.

RESULTS OF FIREPROOFING TESTS OF STRUCTURAL METAL.

(For Description see Reading Pages.)


House in Elora, Ont, for James Archibald Esq.
Dick & Wickson Archts Canada Life Bldg Toronto
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are based upon the use of material and workmanship of the best of their respective kinds.

Section 161. All formulæ herein given for determining the load permitted upon girders of any kind are for girders supported at both ends and uniformly loaded over their entire length. The formulæ for column loads are for columns concentrically loaded.

Section 162. The calculations for the allowances which must be made for other methods of loading shall be based upon the above formulæ and constants and the rules of the best engineering practice.

TORONTO WATER-WORKS SYSTEM.

THERE is now in course of construction in connection with the proposed improvements to the Toronto waterworks system a six-foot steel conduit from the island out to the intake pipe in Lake Ontario, to replace the wooden conduit now in use. This work is a portion of the plan advocated by Mr. E. K. Keating, city engineer, and approved of by Mr. James Mansergh, the English engineer engaged to report on the most feasible scheme for improving the water supply. The contract was let in June last to the Collin's Bay Rafting Company for the pipelaying and to the John Perkins Company, of Toronto, for the tanks, gates and connections.

The shore crib on the island will be extended to the south to allow for a new connection with the steel main. When the steel pipe is ready the intake pipe will be swung into line with it by means of a flexible joint, and a telescopic joint used to connect the two. The crib is a steel tank, 11 feet square and 16 feet deep, made of steel plates five-eights inches thick. The connecting tank is 8 feet wide, 9 feet long and 15 feet deep. Diagonal sliding wooden gates are used to cut off either conduit as desired.

The steel used in the tanks has an ultimate strength of from 56,000 to 66,000 pounds per square inch, an elongation of 20 per cent in 8 inches, and reduces 35 per cent. in sectional area at breaking point, in specimens of one square inch or over, lengthwise or crosswise of plates. The trenches will be filled in solidly up to the level of the bottom of the tanks, and from this level up concrete walls 12 inches thick will be built around the tanks. The conduit is laid in lengths of about 45 feet, made of eight or nine rings of about 5 ft. each in length. The rings are cylindrical, each alternate ring being enough larger in diameter to slide over and be rivetted to the smaller sections. Most of the pipe is one-half inch in diameter, 500 feet being five-eighths of an inch. For jointing the lengths together 40 ¼-inch bolts are used. The steel for the conduit has an ultimate strength of 55,000 pounds per square inch, and is given two coats of the usual black coating before being laid in the trench. By means of steam pumps and a pair of movable heads a pressure of 35 pounds to the square inch is maintained on the inside of the pipe, and any leaks found are re-calked before laying. The conduit line is 2,350 feet in length, 680 feet being on the island and 1,670 feet in the lake. Every 45 feet length is supported on two caps about 11 feet from the ends. A pair of stay piles is driven at the end of each length to hold the pipe in line.

Three oval manholes 2 × 3 feet in section will be placed along the conduit; a stop-gate tank will also be placed on the line of the pipe just inside the shore line.

MODERN ARCHITECTURE.

Mr. Sububs—(who has ordered drawings for a new cottage)—Ah, what is that room adjoining the parlor?

Architect—That's for your bicycles.

Mr. Sububs—And that room adjoining the kitchen?

Architect—That's for the cook's bicycle.

TO AVOID FIRES FROM ELECTRICAL APPLIANCES.

The National Board of Fire Underwriters of the United States has promulgated a series of rules referring to electrical appliances for light and power. It publishes the following cautions for the information of the public.

1. Have your wiring done by responsible parties, and make contract subject to the underwriter's rules. Cheap work and dangerous work usually go hand in hand.

2. Switch bases and cut-off blocks should be non combustible (porcelain or glass).

3. Incandescent lamps get hot; therefore all inflammable material should be kept away from them. Many fires have been caused by inflammable goods being placed in contact with incandescent lamp globes and sockets.

4. The use of flexible cord should be restricted to straight pendant drops, and should not be used in show windows.

5. Wires should be supported on glass or porcelain, and never on wooden cleats; or else they should run in approved conduits.

6. Wires should not approach each other nearer than eight inches in arc, and two and one-half inches in incandescent lighting.

7. Wires should not come into contact with metal pipes.

8. Metal staples to fasten wires should not be used.

9. Wires should not come into contact with other substances than their designed insulating supports.

10. All joints and splices should be thoroughly soldered and carefully wrapped with tape.

11. Wires should be always protected with tubes of glass or porcelain where passing through wall, partitions, timbers, etc. Soft rubber tubes are especially dangerous.

12. All combination fixtures, such as gas fixtures with electric lamps and wires attached, should have approved insulating joints. The use of soft rubber or any material in such joints that will shrink or crack by variation of temperature is dangerous.

13. Electric gas lighting and electric lights on the same fixture always increase the hazard of fire, and should be avoided.

14. An electric arc light gives off sparks and embers. All arc lamps in vicinity of inflammable material should have wire nets surrounding the globe, and such spark-arresters reaching from globe to body of lamp as will prevent the escape of sparks, melted copper, and particals of carbon.

15. Arc light wires should never be concealed.

16. Current from street railway wires should never be used for lighting or power in any building, as it is extremely dangerous.

17. When possible, the current should be shut off by a switch where the wires enter the building, when the light and power are not in use.

18. Remember that "resistance boxes," "regulators," "rheostats," "reducers," and all such things, are sources of heat and should be treated like stoves. Any resistance introduced in an electric circuit, transforms electric energy into heat. Electric heaters are constructed on this principle. Do not use wooden cases made for these stoves nor mount them on wood work.

STUDENTS' DEPARTMENT.

MOULDINGS.

By examining antique mouldings, it will be found that in all the profiles the cyma and the cavetto are always used as finishings, and never applied when strength is required ; that the ovolo and talon are always employed as supporters to the essential members of the composition, such as the modillions, dentels and corona ; that the chief use of the torus and astragal is to fortify the tops and bottoms of columns, and sometimes of pedestals, when they are frequently cut in the form of ropes ; and that the scotia is employed only to separate the members of bases, for which purpose the fillet is also used, not only in bases but in all kind of profiles. An assemblage of essential parts and mouldings is termed a profile, and on the choice, disposition and proportion of these depends the beauty or deformity of the profile. The most perfect are such as are composed of few mouldings, varied both in form and size, fitly applied with regard to their uses, and so displayed that the straight and curved ones follow each other alternately. On every profile there should be a prominent member, to which all the others ought to be subservient, and seem either made to support, or to shelter it from the injury of weather, as in a cornice when the corona is principal, the cyma or cavetto cover it, and the modillions, dentels, ovolo and talon support it. When ornaments are employed to adorn the mouldings, some of them should be left plain in order to form a proper repose, for when all are enriched the figure of the profile is lost. In a cornice the corona should not be ornamented, nor the modillion band ; neither should the different facias of architraves, the plinths of columns, fillets, nor scarce any square number be carved, for they are, generally speaking, either principal in the composition or used as boundaries to other parts, in either of which cases their figures should be distinct and unembarrassed. The dentel band should remain uncut when the ovolo and talon immediately above and below it are enriched ; for, when the dentels are marked, particularly if they be small, the three members are confounded together, and, being covered with ornament, are much too rich for the rest of the composition—a fault carefully to be avoided, as the just and equal distribution of enrichments is on all occasions to be attended to. For, in effect, the articles of sculpture in architecture are like diamonds in a lady's dress, with which it would be absurd to cover her face and other parts that are in themselves beautiful. When mouldings of the same form and size are employed in one profile, they should be enriched with the same kind of ornaments. It must be observed that all the ornaments of mouldings are to be regularly disposed, and answering perpendicularly above each other ; the middles of the modillions, dentels, oves and other ornaments all in a line, for nothing is more confused and unseemly than to distribute them without any kind of order. The larger parts are to regulate the smaller ; all the ornaments in the entablaure are to be governed by the modillions or mutules, and these are to be dependent on intervals of the columns, and so disposed that one of them may correspond with the axis of each column. It is further to be observed that the ornaments must partake of the character of the order which they enrich, and those used in the Doric and Ionic orders must be of a simpler kind and grosser make than those employed in the Composite and Corinthian.—The Architect.

NOTES ON WINDOWS.

In planning a window, says a writer in A. A. Notes, one has to consider the room to be lighted, the quality of the light admitted and the quantity, under what external conditions the window has to serve, and what internal.

The height and depth of the room are material points to be considered ; the nature of the finishings, whether they are absorbent of light—such as oak panelling—or whether the walls will act as reflectors.

In town, one wants windows to give light as their main duty ; there is not much prospect to be seen, and the valuable part of the window for that purpose is the upper sash.

Consequently, the sill of the window may be placed high up, and the head should certainly be as near under the ceiling as the cornice and architrave will allow.

If, then, there is any sense in dividing one sash into smaller panes than another, it is the lower sash which should be divided. In the country you have to deal with a greater amount of light and of a more penetrating quality. Consequently, there is not the same need for having the head of the window so near the ceiling, nor is the question of airing the room so pressing.

Also, in most cases, one may treat the window as a picture, where—as in a painted picture—you do not want to have much sky, yet since sky is a source of ever-varying interest and beauty, one should be able to see that part of the picture with as much ease as the foreground.

As a rule too much light is provided, as shown by the inmates, who have to drape and swathe and extinguish about 60 per cent. of the light before they can feel comfortable. Windows form the cold part of the room, and thus also form the draughts ; the less area, therefore, the better. Where a window is undivided by sash-bars it might be 10 per cent. smaller than the divided one.

The external conditions are sunshine and rain, wind and—in manufacturing towns—corrosive acids in the air. One's first care, therefore, is to make the setting of the window in the brickwork weatherproof. Most of the drawings are very faulty in this respect. Under the usual conditions in which windows are placed, the woodwork is sure to shrink somewhat, and provision should be made anticipating this. As much as possible avoid using projecting sills, and in towns using stone ones. On the sills collect dust, smuts, and general dirtinesses ; the wind does not blow them away, it only blows them into corners. The rain comes and the water fouled by this collection pours over either end of the sill, and stains incurably the masonry in long incurable smears. The usual drip sunk on the under side of the stone sill is quite useless, for the wind blows the drops to the wall side of the hollow and then on to the wall itself.

The window has got to admit light in a pleasant form ; consequently, the spacing of lights is of great importance. The window, being part of the room, must be of the same scale as the room. Apart from the discomfort of a window looking as if it were open, when in reality it is closed—the great void of a window without sash bars is out of scale with the rest of the room. Each room has its own module, as all order has, and the size of the window panes should conform to it, either as implied or as expressed in the size of the panels to the door or the panelling. In my opinion plate glass should be used for sitting-room windows—indeed, everywhere if it can be sanctioned. It is both heavy and costly. But windows with plate glass can be made smaller than those of sheet, because plate glass transmits more light. As a counterpoise to its cost, one may urge that it gives you greater quiet and warmth and the blessedness of being able to see through it without distortion. The drawback to sash bars is that they add to the labor of cleaning. On the other hand, they lighten the weight of the sash and save it from being such a dangerously ponderous affair.

The window, after the hours of daylight are over, has to serve as an architectural feature. As a rule, it is generally blotted out by curtains, because no provision has been made for their being hung. It is idle to ignore curtains and blinds. They are perfectly necessary parts of a window, and the architect should recognize this on his plan. The mass of curtain falling from ceiling to floor is grievously out of scale with the rest of the room, and, moreover, cuts through and breaks up all continuity of lines on that side of the room. Such large curtains have to be made of stout stuff to hang in proper folds. They are costly to buy, heavy to mount, and generally difficult and disobedient to handle. Moreover, they are storehouses of dirt. I see no occasion to suffer this wrong and expense. It is brought about mainly by the wall under the window being made no thicker than the window-frame. The space so gained is dearly bought. The wall under the window is generally damp and always cold. If you carry the wall through the same thickness, you have the window-board of a convenient height and width to lay a book on or a bowl of flowers, and, moreover, yon have constructed a proper place to terminate your curtains. Hang your curtains inside the architrave of the window, the silk ones close against the sash, the stuff ones at a proper distance away. These curtains are not long enough to be so heavy as to drag in skimpy folds ; they do not require large poles or travelling laths, and the possibilities of your gear getting out of order—there is not so much area to buy or hold dust ; and at night, as well as by day, the decoration of your room is undisturbed and unbroken. With your curtains inside the window opening, you can inlay your architrave and cornice and get the pleasure of its effect, without having to peer behind the curtains in order to discover it.

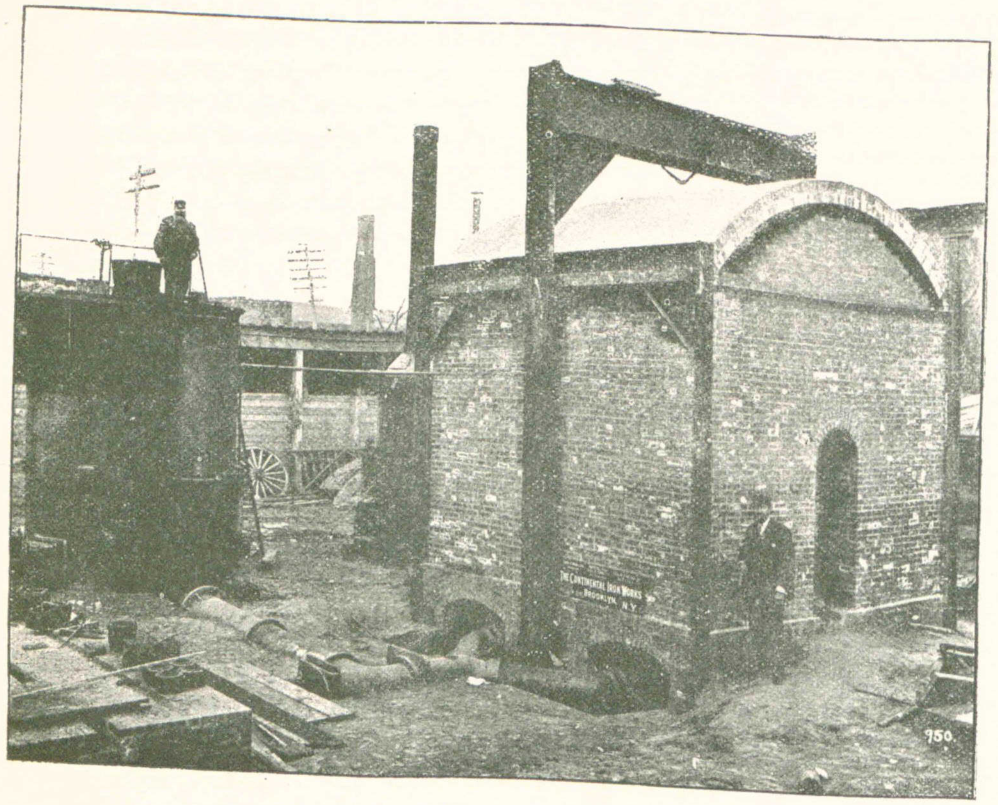


Fig. 3.

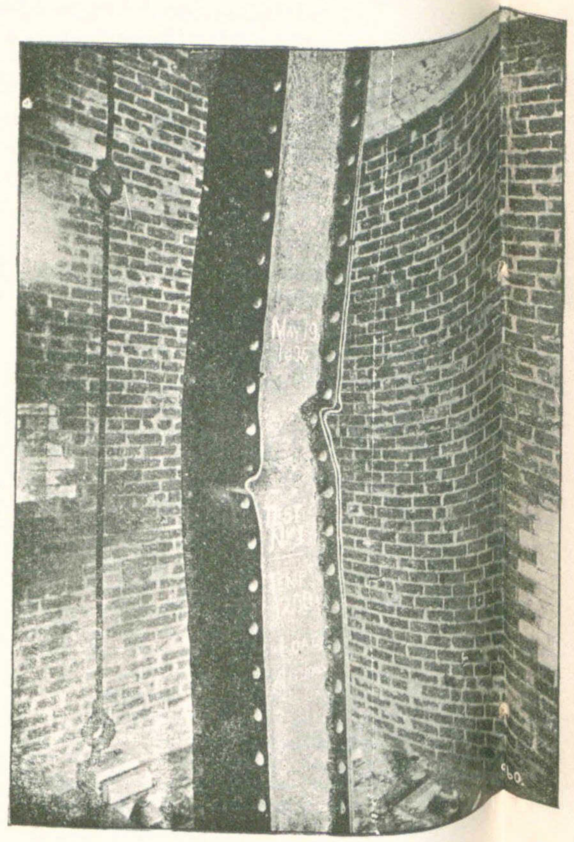


Fig. 4.

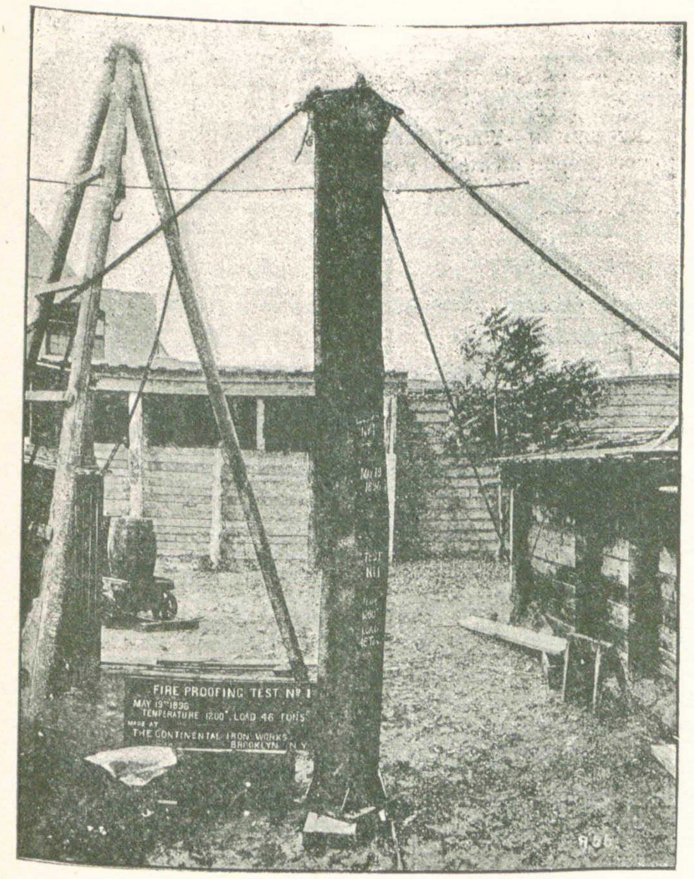


Fig. 5

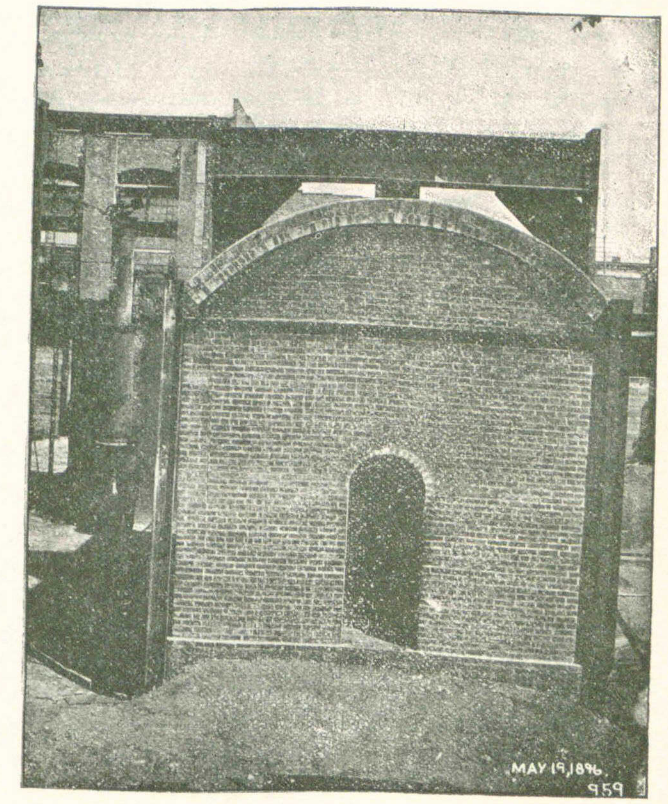


Fig. 6.

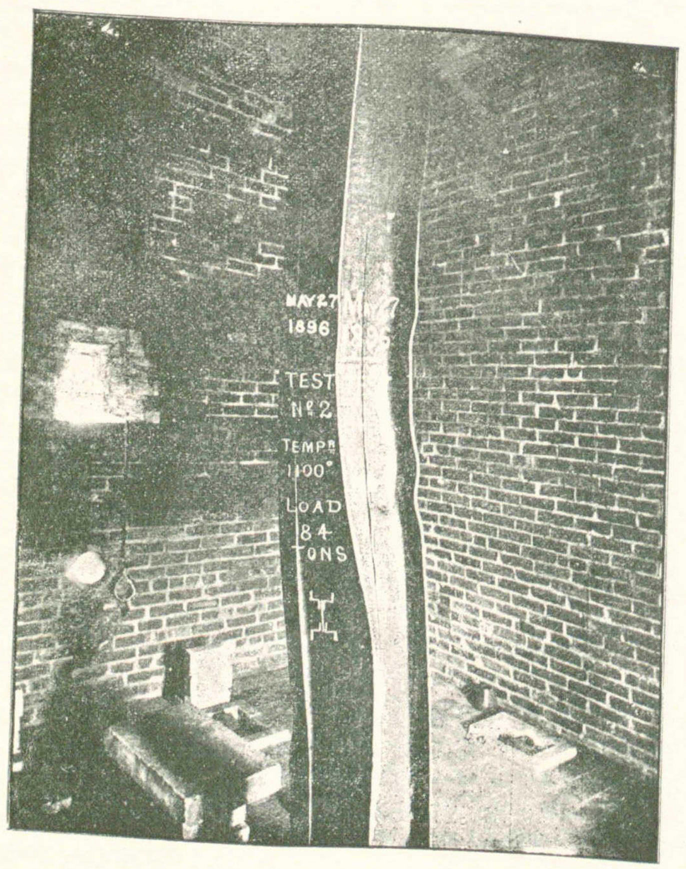


Fig. 7.

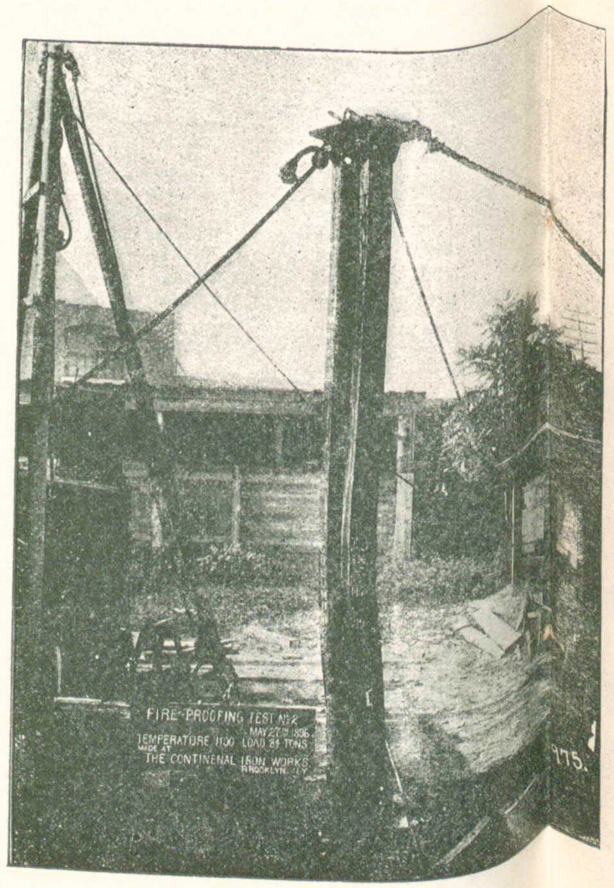


Fig. 8.

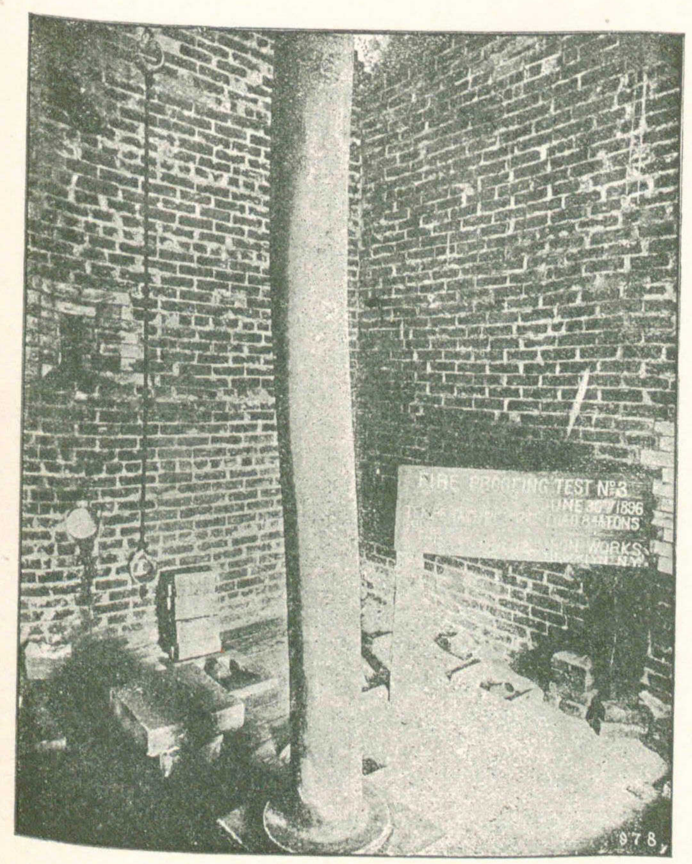


Fig. 9.

Fig. 10.

RESULTS OF FIREPROOFING TESTS OF STRUCTURAL METAL.

(For Description see Reading Pages).

BY THE WAY.

All beholders of the trades procession in Toronto on Labor Day must have been impressed with the air of comfort which marked the appearance of the working-men and their families. The bricklayers turned out in large numbers, and made a most creditable appearance, in spite of the fact that in Toronto during the present season there have been very few bricks to lay.

× × × ×

In many lines within the past few years the services of men have been replaced by those of the fair sex. Hitherto this new form of competition has been an unknown quantity in the building trades. We learn, however, that this state of things is not likely to continue, a firm of cement dealers having recently engaged a lady as travelling sales agent. It is said that she fluently sets forth the advantages of the material and that her efforts have met with considerable success.

× × × ×

"I witnessed a peculiar thing in New York once," said an insurance man to me the other day. "A number of the monetary institutions, occupying high buildings, became alarmed for the safety of their valuable documents, etc., in the event of the occurrence of a large fire in their locality. They talked the matter over and resolved to erect a fire-proof one story building, for use as deposit vaults. The building was erected accordingly and crowned with an iron roof. Some time afterward an extensive fire broke out in a building near by. As a result the buildings on all sides of the fire-proof structure, took fire. The heat became so intense that the iron roof of the fire-proof building curled upwards on every side, and was lifted to such an extent that the walls gave way and the whole structure collapsed. Of course," said the author of the story, "the circumstances were very exceptional, and such as might not occur again in a hundred years."

× × × ×

A contractor from a Western Ontario town advises me that contracts are being taken in his locality below the actual cost of materials and labor. "It is impossible," said he, "in the face of the extreme competition, to pay your workmen and have anything left for yourself at the figures at which contracts are taken. I recently tendered on a small building so low as to reduce my profits to a minimum, but an examination of the tenders submitted revealed the fact that my estimate had been underbidden by a considerable sum." I asked my informant how he accounted for this, and he remarked that too many contractors rely upon making large profits on extras, with the result that they tender on the actual work as specified at almost any figure in order to secure the contract. Frequently this practise, which is altogether too prevalent, results in the successful tenderer losing heavily on the contract. It has also a tendency to encourage inferior workmanship in an effort to make ends meet, and should be severely discouraged by owners and architects of buildings as well as by all reputable contractors.

× × × ×

The agent for a large number of estates in Toronto informed me the other day that whereas a year or two ago he had about 80 vacant houses on his hands, at the present time he has but eight. Furthermore, he had gone to considerable pains to ascertain where his tenants had come from, thus to learn whether one section of the city was being populated at the expense of another. His investigations disclosed the fact that the majority of the occupants of his houses had come from outside places to reside in Toronto. This indicates a steady growth in population, which, if continued, must shortly fill up the desirable vacant houses at present available, and stimulate the erection of new ones. There are a large number of empty houses in the city which will probably remain empty, as they deserve to do, until they fall to pieces, which is likely to be at no distant date. These belong to the class put up by speculative builders in the "boom" days. They were literally "thrown together," and from the very first were unfit for occupation. Such of them as found tenants proved death-traps to their occupants because of the cold-blooded disregard of consequences to human life displayed by the so-called "plumbers" of that period.

× × × ×

A Halifax architect with whom I had a conversation recently informs me that it is no longer possible to obtain in Nova Scotia clear native pine for interior finish, the supply having become exhausted. Such pine as is now obtainable must be puttied and painted to make a presentable appearance. Such clear pine as is used is brought from Ontario, but owing to the distance it has to be carried, very little is imported. White wood, imported from the neighboring States, is chiefly employed as a substitute, but of course is not equal in quality. Most of the more pretentious buildings are now constructed of brick, and those of low cost of wood. The latter are shingled on the sides as well as the roof. The climate will not admit of the use of clapboards. The moisture from the foggy atmosphere, followed by the heat of the sun's rays, causes the clapboards to warp and split. The method was tried of boring out the centre of the log and sawing the boards diagonally to the center, but even boards cut in this manner succumbed to the influence of the weather. Cedar shingles for roofing and siding are imported from Bangor, Maine, at a cost of from five to six dollars per thousand. The shingles are held in place by heavily galvanized nails, and when properly put on are said to have a life of about twenty-five years. It is not possible in this climate to use galvanized sheet iron for exterior cornices and ornamentation in the manner so common in Ontario. Stone, copper, and such like durable material, must be employed. While the cost of building is thus necessarily increased, there is less incentive to the dishonest use of materials.

Every intelligent business man must recognize the fact that advertising is not a matter to be let out to the lowest bidder. It might be so if all papers were of equal value as advertising mediums. But with this value in different publications ranging from nothing to the highest figure, it is contrary to the first principles of business to take the one that will do the advertising at the cheapest rates. It would be about as sensible to put in office men who might bid the lowest for the place. Fancy a great railway corporation, a bank, or an insurance company selecting its president and other officers by competitive bids, without regard to their qualifications, or the manager of an extensive mercantile business or a lawyer in a suit involving millions of dollars being selected because he is the lowest bidder! The purpose in all such cases is to secure the best services for the price paid.

FIREPROOFING TESTS.

Room 104, 22 William St.,
New York, N. Y., July 27, 1896.

BULLETIN NO. 2.

To the Tariff Association of New York; to the Architectural League of New York, and to the American Society of Mechanical Engineers:—

Gentlemen,—Your Joint Committee takes pleasure in submitting to you a report of work done to date. As you will remember, we, the undersigned, were appointed a joint committee to investigate and test methods of fireproofing structural metal in buildings and to obtain data for standard specifications.

Your Committee, after having effected its own organization, determined to add to its numbers by the creation of an Advisory Board. This step was taken for the purpose of more widely increasing the interest taken in the experiments, and also to prevent, as far as possible, the impression that the work was of a sectional or local character. The names of the gentlemen who accepted invitations to serve on this Advisory Board, are as follows:

Edward Atkinson, President Boston Manufacturers' Mutual Fire Insurance Co.; Osborne Howes, Secretary Boston Board of Fire Underwriters; Charles A. Hexamer, Secretary Philadelphia Fire Underwriters' Ass'n; H. H. Glidden, Manager Chicago Fire Underwriters' Ass'n; W. Martin Aiken, Supervising Architect United States Treasury Dep't, Representative Illinois Chapter, American Institute of Architects; Stevenson Constable, Superintendent of Buildings, New York, Geo. B. Post, New York Chapter, American Institute of Architects; F. H. Kindl, Structural Engineer Carnegie Steel Co.; John R. Freeman, Chief Inspector Dep't. F. M. I. Cos.; Henry Morton, President Stevens Institute of Technology; C. J. H. Woodbury, Member American Society Civil Engineers; H. B. Dwight, Dwight Survey and Protection Bureau, New York; F. C. Moore, Delegate New York Board of Fire Underwriters to Board of Examination of Department of Buildings; Wm. A. Wahl, Secretary Franklin Institute, Philadelphia; John T. Williams.

The Committee also wishes to take this opportunity of publicly thanking the parties mentioned below, for their offers of assistance, namely:

The Continental Iron Works, for permission to use part of their yard and for numerous courtesies which have been extended to the Committee from time to time; the Carnegie Steel Company, Limited, for their offer to furnish all the structural steel that your Committee may need; Messrs. J. B. & J. M. Cornell, for their offer to furnish the cast-iron columns for which your committee may ask; Messrs. Sinclair & Babson, for their donation of seventy-five barrels of Alsen's cement; the Lorillard Brick Works Company, through Mr. Henry M. Keasbey, for 54,000 common bricks; Mr. Henry A. Maurer, for his donation of 14,000 fire-bricks and fourteen barrels of fire-clay.

During the winter just past, your committee erected a testing plant as shown in the accompanying illustrations. The gas producer in the background is 9 feet in diameter, by 12 feet in height, and is equipped with a hopper valve on top. Gas is generated by means of steam from the boiler as shown, and carried into the furnace through pipes, as clearly indicated in the view (Fig. o). The foundations shown on the left is ready for the erection upon it, of a furnace for testing beams and floors. Its dimensions are, length 27 feet, width 12 feet, but it can be arranged to take larger beams if so desired. The furnace shown on the right is for testing columns and is 14 feet square, outside measurement.

The arched roof is made of fire-brick and is independent of the side walls, being supported by outside corner posts. The walls are of common brick, but can easily be changed so that the experiments can be made on other materials. One side wall and the end wall with the door are 12½ inches in thickness; the rear wall is 8½ inches and the fourth wall is 4 inches inside, 2 inches air-space and 8½ inches outside, making a total thickness of 14½ inches.

The floor is covered with fire brick, with openings left for the branch gas pipes and air-spaces to support the combustion. These branch gas pipes are 4 inches in diameter, capped with tuyeres reduced to 2 inches. In order to increase the temperature when desired, a barrel of naptha is connected by means of a small pipe and blown into the gas pipe at the "Y" branch, by means of a steam-jet.

The column is placed in compression by means of an hydraulic ram underneath, resting on three twenty-four inch I-beams, the same as those across the top of the furnace shown in the view. In order to keep the entire length of the column within the furnace, filler-blocks of cast-iron are placed between the ends of the column and these I-beams. The hydraulic ram is 12 inches in diameter, and the water-pressure can be carried to 2,500 pounds per square inch.

The temperature is measured by means of a Uehling & Steinbart pyrometer. As this pyrometer is in commercial use and has been thoroughly tested and described in various scientific journals, it is not necessary to enter here into a detailed description.

The money to carry out this work has been advanced by various parties, and, together with the Committee's disbursements, is shown in the accompanying treasurer's report.

TREASURER'S REPORT.

Committee on Fireproofing Tests, July 22, 1896:

SUBSCRIPTIONS RECEIVED.

Boston Board of Fire Underwriters	$400.00	
Boston Manufacturerts' Mutual Fire Ins. Co.	200.00	
E. H. Kendall	25.00	
Carrere & Hastings	50.00	
R. Magnicke	50.00	
McKim, Mead & White	100.00	
Sooysmith & Co.	100.00	
R. H. Robertson	50.00	
Geo. B. Post	100.00	
J. G. Howard	5.00	
The Tariff Association	500.00	
Bruce Price	100.00	
Lamb & Rich	25.00	
Clinton & Russell	100.00	
American Sugar Refining Co.	100.00	
Philadelphia Fire Underwriters' Association	400.00	
Continental Insurance Co.	50.00	$2,355.00

SUBSCRIPTIONS RECEIVABLE.

The Tariff Association	500.00		
Boston Manufacturers' Mutual Fire Ins. Co.	200.00	700.00	
		$3,055.00	
Cash on hand		18.62	
Deficit		29.68	$3,103.30

EXPENDITURES.

R. A. Bigelow, printing, etc.....$	4.25	
Electro Light Engraving Co.....	15.00	
Continental Iron Works, furnace, etc.........................	1,813.12	
W. H. Sturgis, sand............	19.50	
John T. Woodruff, broken stone.	68.00	
William C. Siegert, stationery...	11.00	
Berton & Nichell, setting fire-brick lining................	99.63	
Thomas F. Rowland, jr., for mason's wages paid..............	275.88	
Uehling, Steinbart & Co., two months' rent of pyrometer.....	30.00	$2,336.38

LIABILITIES.

The Continental Iron Works, labor, etc., on furnace and at tests.........................	766.92	$3,103.30

Respectfully submitted,
G. L. HEINS, Treasurer.

Your Committee decided that it would be best to make the tests according to the following programme:

1st. That a series of tests be made on steel and on cast-iron columns, without any fire protection whatever.

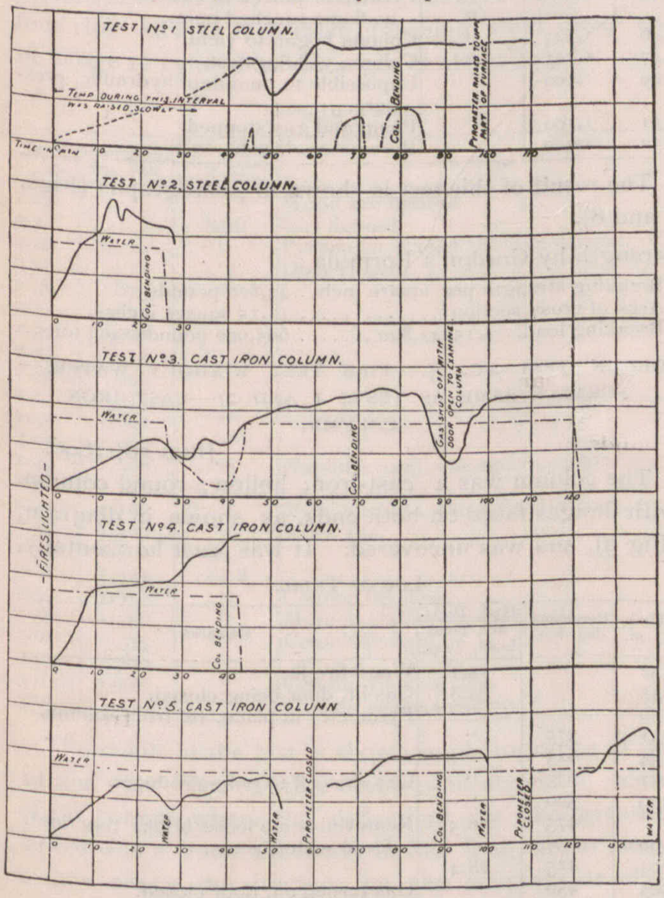


FIG. 1.

These tests then to be taken as a basis of comparison with those that were to follow.

2nd. That a series of tests be made with similar steel and cast-iron columns, protected with different materials and in different manner.

3rd. That a series of tests be made on unprotected beams and girders.

4th. That a series of tests be made on protected beams and girders.

It has also been proposed that each series be divided for test both with and without water.

Your Committee has communicated with many manufacturers of fireproofing materials and has been informed that these manufacturers will submit their materials for purposes of tests.

RESULTS.

The result of this series of tests is shown in the accompanying diagram (Fig. 1), where the solid line represents the temperature and the dotted line the load on the column.

Test No. 1 was made on a steel column, when the temperature was raised rapidly.

Test No. 3 was made on a cast iron column under similar conditions. Both columns began to fail as soon as they showed "red."

Test No. 2 was made on a steel column, when the

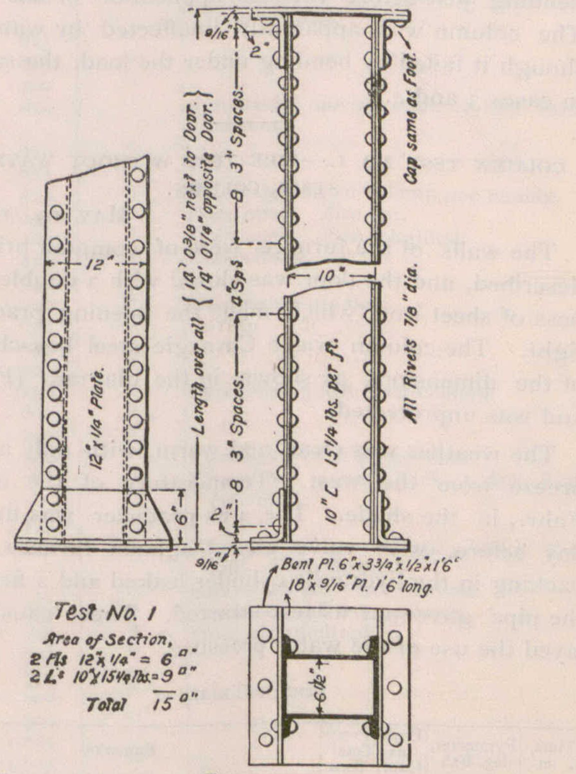


FIG. 2.

temperature was raised more slowly than in the other tests just described.

Test No. 4 was made on a cast-iron column, under similar conditions. Both these columns failed when

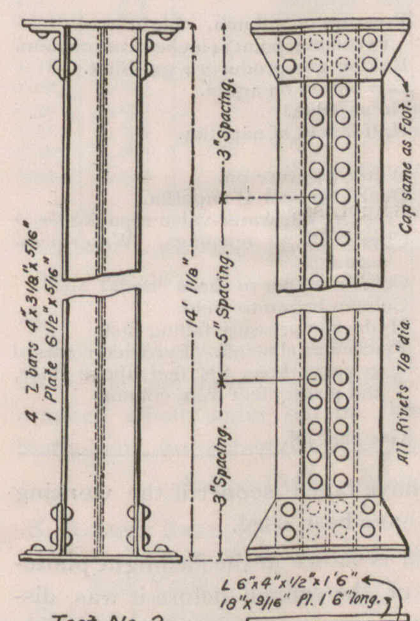


FIG. 6.

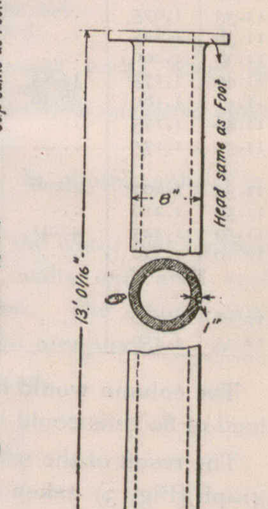


FIG. 9.

they began to show "red," although the time was longer than in tests Nos. 1 and 3.

Test No. 5 was made on a cast iron column, a jet of water being thrown upon it through a ¾-inch nozzle. The column was first heated to 675° and then quenched with water without injury. The heat was then slowly raised again to 775° and the column again quenched with water. The heat was then raised slowly to a temperature of 1,075°, and the column, which showed a "dull redness," was again quenched with water. The heat was then raised again to 1,300° and the column, which now showed a "bright red," was again quenched with water. The column was beginning to yield by bending just before the last application of the water. The column was apparently unaffected by water, although it failed by bending under the load, the same as in cases 3 and 4.

COLUMN TEST NO 1.—FIRE TEST WITHOUT WATER.—STEEL COLUMN.

MAY 19, 1896.

The walls of the furnace were of common brick, as described, and the door was closed with a double thickness of sheet iron, which made the opening practically tight. The column was a Carnegie steel box-channel, of the dimensions as shown in the diagram (Fig. 2), and was unprotected.

The weather was clear and warm, with only a slight breeze from the west. Temperature of the air 80° Fahr., in the shade. The gas producer was fired the day before, with valve closed against furnace. The packing in the hydraulic cylinder leaked and a fitting of the pipe gave out as test started. These causes delayed the use of the water pressure.

LOG OF TRIAL.

Time, h. m.	Pyrometer, deg. Fah.	Hyd. Pressure, Total Load, Tons.	Remarks.
10.35	....	....	Wood fire lit.
10.45	....	....	Gas turned into furnace.
11.02	....	....	Furnace door closed.
11.03	....	....	Naphtha valve slightly open.
11.13	....	....	Pyrometer put in furnace through lower hole, 2½ feet above the furnace floor, with point 12 inches from column.
11.19	1,025	....	
11.20	1,050	....	Pressure on column. Light load. Pyrometer point 24 inches from column.
11.25	600	....	Raking gas-producer; gas shut.
11.28	....	....	Gas turned on again.
11.33	1,025	....	No naphtha.
11.36	1,225	....	Half-faucet of naphtha.
11.38	1,200	....	
11.40	1,175	14.13	Water-pressure on.
11.41	1,180	28.26	Quarter-faucet of naphtha.
11.46	1,175	....	Pressure off, water-valve repacked.
11.50	1,175	....	Closed all air openings. Water-pressure on.
11.55	1,200	48.06	Column began to show "red."
11.56	1,210	....	Column began to yield.
11.59	1,225	42.41	Hydraulic pressure falling fast.
12.10	1,230	....	Pyrometer shut off. Pyrometer raised to upper hole, 8½ feet above floor, and point 3 feet from column.
12.16	1,230	....	
12.25	1,250	....	Gas shut off.

The column would have failed sooner if the working load of 80 tons could have been used.

The result of the test is shown in the flashlight photograph (Fig. 3) taken of the column before it was disturbed. After the column was removed from the furnace the photograph (Fig. 4) was taken. The brick walls cracked, as is shown in photograph (Fig. 5), the greatest damage taking place where one wall was bonded into the next and the cracks at these places extended through the bricks. Along the horizontal joints the walls cracked most on the bond courses. All the walls were hot, the eight-inch wall being too hot to hold the hand in contact with it.

Strength by Gordon's Formula :

Breaking strength per square inch. . 45,630 pounds.
Area of cross section.............. 15 square inches.
Breaking load, 15x45,630.......... 684,450 pounds, 342 tons.
Actual greatest load, cold, 141.4 tons, with no change of form.

COLUMN TEST NO. 2.—FIRE TEST WITHOUT WATER.—FURNACE TEST SAME AS TEST NO. 1.—STEEL COLUMN.

The column was a Carnegie steel Z-bar, as shown in the diagram (Fig 6), and was uncovered. The weather was clear and warm, with a moderate breeze from the northwest. Temperature of air, 80° in the shade.

LOG OF TRIAL.

Time, h. m.	Pyrometer, deg. Fah.	Hyd. Pressure, Total Load, Tons	Remarks.
2.23	80	....	Pyrometer point, 3 feet from column.
2.24	200	84.8	Wood fire lit.
2.30	650	"	Gas turned on.
2.33	.....	"	Door closed. Full cock of naphtha.
2.35	1,000	"	One-quarter cock of naphtha.
2.36	1,300	"	
2.37	1,350	"	
2.38	1,375	"	Naphtha closed.
2.39	1,300	"	
2.40	1,125	"	One-eighth cock of naphtha.
2.40½	1,300	"	
2.41	1,325	"	
2.42	1,250	"	
2.43	1,200	"	
2.44	1,175	"	Naphtha cock closed to "dropping."
2.45	.....	.... "	Pyrometer moved to 2 feet from column as flame touched poin..
2.46	1,125	"	Column began to yield.
2.47	1,125	"	Column yielding fast.
2.49	1,100		Impossible to maintain hydraulic pressure.
2.51	1,100		Pump and gas stopped.
2.52	900		Pyrometer closed.

The result of this test is shown in photographs (Figs. 7 and 8).

Strength by Gordon's Formula :

Breaking strength per square inch. . 42,820 pounds.
Area of cross section.............. 14.15 square inches.
Breaking load, 14.15x42,820....... 605,900 pounds, 303 tons.

COLUMN TEST NO. 3.—FIRE TEST WITHOUT WATER.—FURNACE SAME AS TESTS 1 AND 2.—CAST IRON COLUMN.

JUNE 30, 1896.

The column was a cast-iron, hollow, round column, with flanges faced on both ends, as shown in diagram, (Fig 9), and was uncovered. It was cast horizontally,

LOG OF TRIAL.

Time, h. m.	Pyrometer, deg. Fah.	Hyd. Pressure, Total Load, Tons.	Remarks.
2.32		14.1	Wood fire lit.
2.45		84.8	Gas lit, door being closed.
2.50		"	Pyrometer in place, 18" from column.
2.51	575	"	
2.54	625	"	
2.57	625	"	Gas shut off to poke producer.
2.59	500	"	
3.00	475	56.5	Removed some loose bricks that interfered with tuyeres.
3.04	425	28.2	
3.05	450		Gas turned on, door closed.
3.06	650	15.5	
3.08	667		Air-openings closed.
3.12	600	11.3	Door down to arrange bricks.
3.13	650		Door closed.
3.13½	750		Naphtha valve opened one-half.
3.14	750		
3.15	812	42.4	
3.17	900	84.8	
3.21	950	"	
3.23	1,000	"	
3.25	1,025	"	
3.28	1,050	"	
3.30	1,025	"	
3.32	1,025	"	
3.36	1,100	"	
3.37	1,125	"	
3.40	1,137	"	Slight redness reported by some.
3.43	1,175	"	Column reported bent slightly.
3.44	1,200	"	
3.47	1,250	"	
3.50	1,225	"	
3.52	1,175	"	
3.55	1,200	"	Gas shut off. Door down. Column decidedly red and bent.
4.04	387	"	Gas on and door closed.
4.08	925	"	No naphtha.
4.09	925	"	Naphtha turned on one-half cock.
4.10	1,000	"	
4.15	1,112	"	
4.32	1,125	"	Gas shut off. Stopped pumping.

with a dry sand core, by the Cornell Iron Works, New York.

The weather was clear and warm, with a slight breeze from south-west. Temperature of air, 75° Fahr.

Strength by Gordon's Formula was as follows :

Breaking strength .... 902,000 pounds.
Safe load 1-5 × 902,000 .... 180,400 pounds, 90.2 tons.

The result of Test No. 3 is shown in photographs (Figs. 10 and 11).

COLUMN TEST NO. 4.—FIRE TEST WITHOUT WATER.—FURNACE SAME AS TESTS NO. 1, 2 AND 3.—CAST-IRON COLUMN.

July 6, 1896.

The column was a cast-iron, hollow, round column, with flanges faced on both ends, and was uncovered. It was cast horizontally with a dry sand core, by the Cornell Iron Works, New York. The column was the same as illustrated in diagram (Fig. 9), with the following exceptions : Length, over-all, 13 feet 0¼ inch ; thickness of flanges, 1⅝ inches ; flanges reinforced by four ribs, each ⅞ inch thick, reaching from outer end of flange to cylinder at an angle of about 45°.

LOG OF TRIAL.

Time, h. m.	Pyrometer, deg. Fah.	Hyd. Pressure, Total Load, Tons.	Remarks.
2.22	....	....	Wood fire lighted.
2.25	....	84.8	Gas lighted.
2.28	....	"	Pyrometer placed 18″ from column.
2.29	....	"	Door closed.
2.30	675	"	
2.31	875	"	
2.33	900	"	
2.35	912	"	
2.40	950	"	
2.43	975	"	
2.44	1,000	"	
2.45	1,000	"	
2.49	1,000	"	Naphtha used, one-fourth cock.
2.51	1,125	"	
2.52	1,100	"	More naphtha, three-eighths cock.
2.53	1,200	"	More gas.
2.54	1,300	96.1	
2.54	1,325	84.8	
2.57	1,350	"	Column bending.
2.59	1,350	"	More naphtha, one-half cock.
3.01	1,375	"	Color reported.
3.03	1,500	"	
3.03½	1,525	"	Column yielding fast.
3.05	1,550	"	Column broke suddenly.

The result of the test is shown in photographs (Figs. 12 and 13). The fracture occurred at about the centre of the column where the deflection was the greatest. There was a crack about five inches long about seven inches above the fracture on the convex side of the column, showing that the column first pulled apart on the outside of the bend. No water was thrown on this column during the test.

COLUMN TEST NO. 5.—FIRE TEST WITH WATER.—FURNACE SAME AS TESTS NO. 1, 2, 3 AND 4.—CAST-IRON COLUMN.

July 10, 1896.

The column was a cast-iron, hollow, round column, with flanges faced on both ends, and was uncovered. It was cast horizontally with a dry sand core by the Cornell Iron Works, New York. The column was the same as illustrated in photograph (Fig. 9), with the following exceptions : Flanges were 1⅝ inches thick, and were reinforced with four ribs as in Test No. 4. There was a slight defect in this casting, there being a porous portion a few inches long on one side about 3 feet 6 inches from the lower end.

The weather was partly cloudy and sultry. There was a strong wind from the south-west. Temperature of the atmosphere was 80° Fahr.

Water was thrown upon the column through about 50 feet of 2½-inch rubber hose and a ¾-inch nozzle. The pressure at the hydrant was fifty pounds.

LOG OF TRIAL.

Time, h. m.	Pyrometer, deg. Fah.	Hyd. Pressure, Total Load, Tons	Remarks.
2.16	....	84.8	Wood fire lighted.
2.28	....	"	Gas lighted.
2.29	600	"	Door closed. Pyrometer in place 18″ from column.
2.31	625	"	
2.32	675	"	
2.33	700	"	
2.36	675	"	Pyrometer moved back 5 feet from column.
2.40	625	"	
2.41	675	"	
2.42	525	"	Water thrown on column one minute.
2.43	450	"	Door open. Fire out.
2.44	400	"	Door open. Fire relighted.
2.46	425	"	Door closed.
2.47	540	"	
2.49	1,000	"	Heat rising too fast.
2.51	650	"	
2.52	675	"	
2.55	700	"	
2.58	750	"	Pyrometer 3 feet from column.
2.59	800	"	
3.01	740	"	
3.02	750	"	Pyrometer 18″ from column.
3.05	785	"	Pyrometer moved back 5 feet from column.
3.06	775	"	
3.09	400	"	Water on column one-half minute. Fire out. Door down.
3.16	....	....	Gas relighted. Door closed.
3.19	675	"	Pyrometer 18″ from column.
3.22	700	"	More air admitted.
3.24	725	"	
3.27	775	"	
3.28	800	"	
3.30	900	"	
3.35	1,025	"	
3.40	1,025	"	
3.41	1,050	"	
3.50	1,050	"	Column red.
3.55	1,075	"	Water on column one-half minute. Fire out. Door down. More water on column as it was still red.
4.13	....	"	Gas relighted.
4.17	750	"	Pyrometer 18″ from column.
4.21	787	"	Naphtha one-half cock.
4.23	900	"	
4.24	1,025	"	
4.27	1,150	"	
4.29	1,200	"	
4.30	1,250	"	Column getting red.
4.31	1,275	"	Column bending.
4.32	1,280	"	
4.34	1,300	"	Pyrometer moved back. Water on column one minute.
4.35	....	"	Door down and water on column again two minutes.

The result of this test is shown in photograph, (Fig. 14).

The column was very red when the water was thrown on it the last time. The brick walls and arch roof cracked when water fell on them. The column was badly bent, but otherwise appeared uninjured.

Respectfully submitted,

S. ALBERT REED,
For the Tariff Association of New York.
GEORGE L. HEINS,
For the Architectural League of New York.
H. deB. PARSONS,
THOMAS F. ROWLAND, JR.,
For the American Society of Mechanical Engineers.

} The Committee on Fireproofing Tests.

The Dominion Bridge Company, of Montreal, are erecting a building at Hochelaga 400 × 80 feet in size.

Mr. Charles Berger, the contractor for the Montreal court-house, has finally secured a settlement of his claims against the Quebec government. Mr. Berger has claimed $180,000 as balance due him on his contract. The claim was submitted to arbitrators, and the amount awarded was $116,954.

THE BUILDER

[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.]

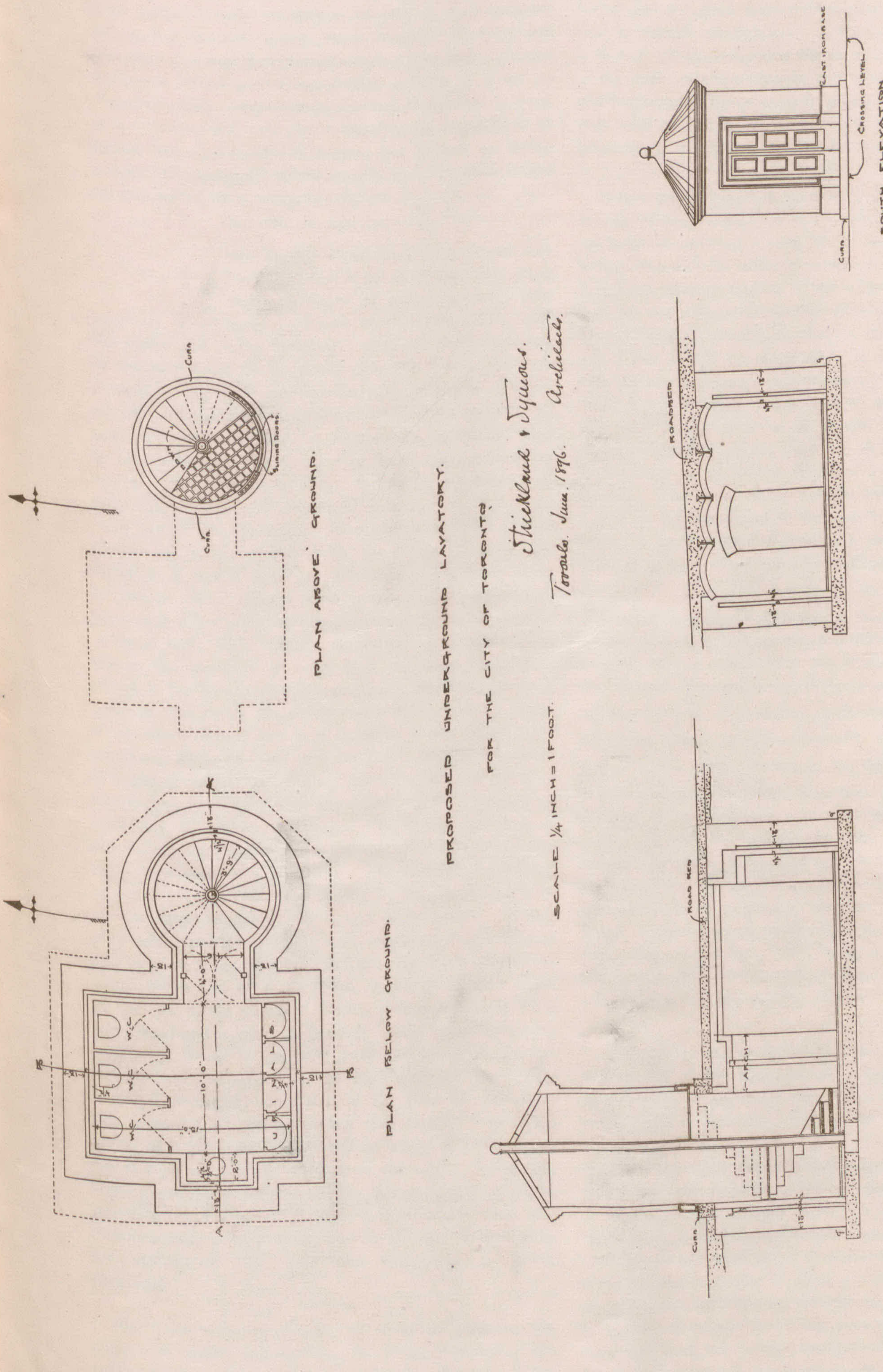
Plastering and Decorating.

PLASTERERS often make a mistake when repairing badly cracked ceilings or walls by using plain lime putty, or mortar containing but a small percentage of plaster of Paris. Instead of using so much lime, in either stopping up cracks or patching, it would be much better if he would use plaster of Paris, with a little whiting added and mixed with glue water. This would allow him ample time to make a good job of work, and there would be no danger of the new work breaking away from the old. If there is color to be laid on the patched plastering, it may be taken for granted that there will be several shades of the same color if the ceilings or walls are old and dirty, or if they have been kalsomined or whitewashed, they must first be made clean by scraping and sandpapering. After this is done thoroughly, the whole should receive a light coat of white shellac; the walls should then stand a day or two, after which the colors or decorations may be applied. It must be remembered that the shellac must be applied to the new patching and stopping, as well as to the old work, otherwise the coloring will change and look faded and flat where the new mortar has been applied, and each crack will show a faded line. The cost of plaster of Paris, whiting and glue, is not more than double that of "fine stuff," and it is worked easier, and the results are much more satisfactory, so that in the end it pays better to use the superior materials.

While on the subject of plastered walls and ceilings, it may not be amiss to offer some suggestions to our rural readers as to the colors that may be employed in the decoration of same. Of course these suggestions are intended only for plain country or suburban residences, such as are occupied by well-to-do farmers, merchants, physicians, lawyers, etc., etc., the decoration of which the ordinary painter will be able to execute satisfactorily. In treating a sitting room, make the body of the ceiling a warm gray, then about two feet from the wall run a twelve-inch band painted in pale turquoise blue, and edged by two inch stripes of rich orange yellow. The stripes and band may be edged or separated by narrow pencillings of black. Do not make a square field with this band work, but continue the band and stripes from wall to wall, letting them cross each other at right angles. Where the room is large, it will be as well to paint in the centre piece harmonizing with the general design, having the bands crossing each other the same as the outer band. The centre piece may be square but set in the ceiling diagonally, or it may be diamond shaped. If the room is large, say 16 x 30 feet, a good effect may be obtained by running an extra band design across each end of the room at about ten feet from the end walls and omitting the centre pieces. These extra bands should be treated the same as the ones on the ends of the room.

In treating the walls, excellent effects are obtained by making them a light sage green. Run a band of pale olive around the room about thirty inches wide, having narrow bands of terra cotta color on upper and lower edges, with dividing lines of venetian red. This band should be up from the base about two feet, which would make the upper edge of it about four feet six inches from the top of the base; this will leave a strip of sage green between base and band, and between band and ceiling. Of course the width of band and its height from base may be changed to suit conditions. The above proportions are suited to a room where the ceiling is ten feet high. The woodwork should be painted in light cheerful colors: perhaps a medium green, with grooves and chambers picked in with black and touched up here and there with bright vermillion, would suit most tastes. At any rate these colors properly proportioned would have a very pleasing effect when taken in with the walls and ceiling. Of course the colors for walls and ceiling may be varied to any extent without varying the design. Buff for the walls, with pale blue band and dark brown stripes give a good effect, while the ceiling may be done in cream, with robin-egg blue band and Indian red edgings separated by dark blue lines, with the woodwork finished in maroon and a light shade of Indian red.

The library may be finished in the same design, though it should be in darker colors and subdued in tone. A clear gray-blue should be used on the ceiling, with a band of Pompeiian red, edged with medium green and striped with vermillion. Color the walls with a deep buff, with a chocolate band edged with dull Indian red, in similar design to sitting room. The wood-work may be ebonized and picked in with bronze and buff, but care must be taken not to overdo the picking in. If it is desired to separate ceilings and walls, it may be done by running an edged band just below and touching the ceiling. All the painting, whether on woodwork or walls, should be in egg-shell finish made by a composition of two-thirds raw oil to one of turpentine, and the ground-work should be well prepared by being well and smoothly sandpapered. All holes or indentations in the woodwork should be well stopped with hard drying putty, and the whole should be fair and even on the face. Other rooms in the house may be finished in like design, adopting colors to suit the taste. Where there is a hall, there may be some deviation from the design, and a frieze may be added, or stencil designs may be run all round just under the ceiling. A little more


PROPOSED UNDERGROUND LAVATORY.
FOR THE CITY OF TORONTO.
Strickland & Symons. Architects.
Toronto. June. 1896.
SCALE 1/4 INCH = 1 FOOT.
PLAN BELOW GROUND.
PLAN ABOVE GROUND.
SECTION A-A.
SECTION B-B.
SOUTH ELEVATION
CROSSING LEVEL
CURB
ROADBED

elaboration may be employed in the vestibule, both on the walls and on the ceiling. In decorating such rooms as we have mentioned, regard should be had to the character of their furnishings, so that there may be an agreeable harmony all round. It is not necessary to have colors simply variations of one or two primary colors, but opposite colors when intelligently employed give very rich and pleasing effects, but the inexperienced decorator will have to experiment a little in order to discover which combinations produce the better results. It is not intended that the foregoing be considered as suited for a pretentious house, but rather as being adapted for buildings where simplicity and quietness are sought rather than æsthetic effects.

Stairs. No matter what kind of a house may be erected, if it be more than one story high, a flight of stairs of some sort becomes a necessity to admit of communication with the upper part of the building. Generally the character of the house and the purposes to which it is to be put, determines the style and character of the stairs. Where possible a long continuous flight should be avoided, as nothing is more tiresome to people past middle age than to lift themselves up a story or more over stiff, steep stairs. Platforms or landings should be introduced at intervals, so that any one flight may not contain more than ten or twelve steps. The width of stairs should always be in accordance with the importance of the building in which they are placed, varying from three to twelve feet. Where two persons are expected to pass each other conveniently the least width admissible is three feet, and, though sometimes conditions arise where the designer is compelled to make them less, where it can by any possible device be made to admit of making the stairs three feet wide it should be done. From three to four feet is a suitable width for a good dwelling, while five feet will be found ample for stairs in buildings occupied by many families, and from eight to twelve feet is sufficient for the width of stairs in halls of assembly or public buildings. To avoid tripping or stumbling, care should be exercised in the planning of a stair to secure an even grade. To this end the nosing or outer edge of each step should be exactly in line with all the other nosings. In stairs that have a circular plan and containing flyers and winders, precaution in this regard is especially required. In such stairs the steps, flyers and windows alike, should be of one width on the line along which a person would naturally walk when having his hand on the rail. The tread-line, consequently, would be parallel with the handrail, and is usually taken at a distance of from eighteen to twenty inches from the centre of it. In the plan of the stairs this tread-line should be drawn and divided into equal parts, each part being the tread or width of a flyer from the face of one riser to the face of the next. When the tread is complete and the nosing added it will be from one-and-a-half inches to two inches wider than the distance from riser to riser, but in making calculations for stairs on the run this difference is never reckoned.

The term "rise and run" is used to indicate the space the stairs will occupy, the "rise" meaning the height from the top of the lower floor to the top of the second floor. The "run" means the distance from the front riser to the face of the last or top riser, from which a plumb line is dropped to the floor, from which point to face of first riser is the "run." In other words, it is simply the distance the treads would make if laid edge to edge—without nosings—and measured altogether. Let us suppose we have fifteen treads, each being eleven inches wide,—this would make a run of 13 feet 9 inches, as follows: $15 \times 11 = 165 \div 12'' = 13$ feet 9 inches. Sometimes this distance is called the "going" of the stair, but this term is only used in this country by old country workmen, and is nearly obsolete, and when it is used it just as often means the width of a single tread as it does the "run" of the stairs.

It is a general maxim that the greater the breadth of a step the less should be the height of the riser. Experience shows that a step of 12 inches wide and 5½ inches rise may be taken as a standard, and if from this it is attempted to adduce a rule of proportion, substituting, for the sake of the whole numbers, the dimensions in half-inches, namely, 24 and 11, then, in order to find any other width corresponding in inverse proportion: say, as 24:11::12:22 — 24:11::19:13.8 — 24:11::20:13.2. Thus it will be seen that a step of six inches in width will require the riser to be eleven inches; a step 9½ inches wide will require the riser to be nearly 7 inches, and a step of 10 inches requires a riser of about 6⅝ inches. The same thing is thus otherwise expressed: Let T be the tread and R the riser of any step which is found to have proper proportions, then to find the proportion of any other tread t and riser r,

$$\frac{R \times T}{r} = t, \text{ or } \frac{T \times R}{t} = r.$$

Take, for example, a step with a tread of 12 inches, and a riser of 5½ inches as the standard, then to find the breadth of the tread when the given riser is 8 inches, and substituting these values for t and r in the formula, we have $\frac{12 \times 5\frac{1}{2}}{8} = 8\frac{1}{4}$ inches as the breadth of the tread. Suppose, again, the given breadth to be 13 inches, we have $\frac{12 \times 5\frac{1}{2}}{13} = 5\ 1/13$ inches as the height of riser. This process of inverse proportion may be graphically performed quite easily by any workman able to build a stair. It will be noticed that the standard measurements are 12 in. tread and 5½ in. rise, making in all 17½ inches. To get a well proportioned stair, keep the measurement of tread and riser to this figure. If the tread is nine inches, make the rise 8½ in.; if 8 ins., make the rise 9½ ins. Whatever a riser or tread may be, make the corresponding riser or tread make up whatever is lacking of 17½ inches.

Straight stairs are the most common and the most useful, and if not long are the easiest stairs to travel over. By a straight stair we mean a single flight without a break or a turn. A platform or landing stair is one that has resting places in its length. Platforms or landings may be located at any point in the run of the stair, and the continued flight may run in the same direction as the bottom flight, or it may turn to the right or to the left as conditions require. A dog-legged stair is one in which some of the steps are built around a newel post in order to turn a corner. They are an inconvenient stair and are chiefly used as a back stair. Circular and elliptic stairs are very fine in appearance; they are built on circular orelliptical plans and require the highest kind of workmanship to properly construct. There are some other kinds of stairs to which we may refer in future issues.

BUILDING METHODS IN TORONTO.

MR. WM. SCOTT, builder, of Galt, Ont., writes to the ARCHITECT AND BUILDER as follows: "I spent three hours in your city recently and visited some of your departmental stores. In Mr. John Eaton's I saw what I considered a very poor piece of building construction for a building of such height. In connection with an addition which was being erected in rear of the main building, the beams were built of 2 inch plank, and bolted. The lower bolts were about one and a half inches from lower edge and upper bolts about same distance from upper edge, where the most strength is required. The beams rested on oak caps on top of oak turned posts—the next row of posts resting on top of beams—the same method being employed on each story.

I am safe in saying that in one year the roof will be down at least three-quarters of an inch for each story in height, due to shrinkage and posts crushing in caps —which, with proper construction, should not occur.

I was also in Robert Simpson's new building, and from what I saw of it, as a fire-proof building, is a great improvement on its predecessor, burned in 1895, and is a credit alike to the architect who designed and superintended its construction and to the city of Toronto.

I was astonished to see a lumber yard on top of the new city and county building, which, it is said, will cost $2,000,000. A splendid place for a fire which could not possibly be got at."

IRON VS. WOOD WALL TIES.

A SUBSCRIBER at Ridgetown, Ont., writes: "(1). Would you kindly give me your opinion on the relative utility and durability of pine lath and ⅛" and 1" hoop iron as a tie for hollow brick walls—say for a school house, the ceilings being 14' high, the wall from foundation to second story joist being 8" outside, then 4" hollow and 4" brick wall; the second story wall being two 4" walls with 4" hollow. The total height of brick wall is 30' from foundation to plate. (2). Is there any legislation providing for the inspection of buildings that are considered unsafe?"

ANSWER.—(1) Pine lath ties connecting an 8" brick wall with an inner 4" brick wall answer the purpose fairly well, but are not nearly so good as hoop iron or round wire ties. The objections to lath ties are:—1st. The ends will swell from damp absorbed from mortar and then shrink when dry and become loose. 2nd. They are apt to be attacked by dry rot and become useless. 3rd. In case of fire the walls will be rendered too weak to support new walls and roof, as fire will destroy the ties. 4th. More wood ties are required to hold the walls together than iron ones, and this in itself is an objection to their use. Iron ties (either hoop iron or wire bent at the ends) better serve the purpose for the following reasons:—1st. They do not shrink. 2nd. Being of less dimensions they bed better in the mortar and thus get a better grip of the walls. 3rd. If properly prepared they will last as long as the brickwork. 4th. In case of fire they will not burn, thereby preventing the walls from falling. They are handier to employ and cost but little. These ties, when made of iron, should be cut off the right length, made hot, and while in that condition plunged into a bath of common coal tar. This will cover them with a black japan and will prevent them from rusting. (2) The only legislation relating to the inspection of buildings is that passed by some of the larger municipalities, such as Toronto, Montreal, etc. The matter is in the hands of the municipalities.

A NOVEL PLAN OF BUILDING.

A GERMAN inventor has built a house of hollow tubes, whose advantages are, he says, a constant temperature and incidentally strength, comfort and beauty. He first put up a frame of water tubing, allowing continuous circulation to a stream of water. Around this frame he put up his house in the ordinary way. The peculiarity is that all floors and ceilings are crossed and recrossed by the water pipes. The water, having passed through horizontal tubes under the floors and ceilings, passes through the vertical tubes until all have been gone through. In the summer, fresh, cool water circulates under pressure through the network of tubes, cools off the walls, and, after having run its course, flows considerably warmer than when it entered. In its course it has absorbed much heat, which it carries away. During the long and severe winter the water entering through the basement is first heated to nearly 100 degrees and then forced through the ceiling. Of course much of the heat is left all over the house, and at the outlet the temperature of the water is about 40 degrees. The speed of the circulation of water can be regulated so as to allow fixing a certain temperature, equal throughout the building.—Stone.

FINISHING HARDWOOD.

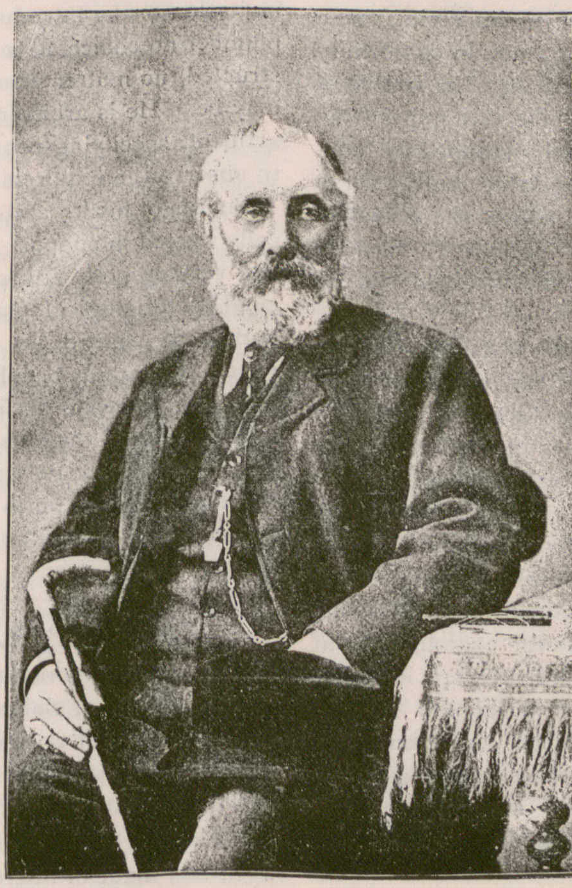
SOME carpenters have experienced difficulty in properly cleaning and repairing hardwood for finishing, as considerable care and skill are required to give the wood a proper surface and leave it ready for treating with varnish or other finish. In working it, after the material has come from the machine, it should be carefully gone over with a fine set smoothing plane, which should be worked with the grain, as otherwise holes would be worked out, causing a great deal of trouble to "smooth up again." Use an iron plane, and scrape the surface with a properly shaped and sharpened scraper, which will cut to a shaving. Work carefully with the grain and take out all holes and rough spots, especially near the joints. When scraping across joints bend the scraper with the hands and avoid tearing up the grain on either side of the joint. Do not use sand-paper before every imperfection of finish has been removed, but when all cross-grain spots, plane marks and other imperfections have disappeared rub the surface over with a sandpaper, being careful to follow the direction of the grain. Use a cork rubber, or, what is still better, a piece of solid India rubber, around which wrap the sandpaper. Be careful at joints not to use the sand-paper on the cross joints when the grain of one piece abuts the grain of another at right angles, for no good finish can be shown when hardwood is rubbed across the grain with sand-paper.

A correspondent of the Painters' Magazine asks: "How is the new tin roof of a steeple best treated in order to give it a green color of oxidized copper? How is the color prepared?" We take it for granted that the roof is covered with sheet zinc, in which case you had best prepare a mixture of 1 part of cupric chloride, 1 part of nitrate of copper and one part of sal-ammoniac in 62 parts of water mixed with 1 part of crude hydro-chloric acid. The zinc plate is to be covered with this liquid, which will impart to the same a deep black color. The latter will change into a dark whitish gray after it is dry (in twelve to twenty four hours). Any coating of oil paint will stick to this firmly and lastingly. Take black and ochre for bronze green paint, and after this is dry, glaze the light patina over it. This you can prepare from suitable green with white, but the most lasting would be Bremen green and white lead. The former, as is well known, only becomes green the second day; first it is blue. This is the best way of imitating patina with oil paint.

THE LATE JOHN RITCHIE.

THE death of Mr. John Ritchie, which took place at his residence in Toronto on Sunday, the 13th inst., removed one of the oldest citizens and a prominent business man of that city. For a month past he had been under medical attendance, his death finally resulting from heart failure.

The late Mr. Ritchie was born in Aberdeen, Scotland, in the year 1820, and was therefore 76 years of age. He resided with his parents until 12 years of age, after which he was obliged to earn his own livelihood. At the age of 18 years he was apprenticed to the plumbing trade with the firm of John Blackee & Son, Aberdeen, and served an apprenticeship of seven years, remaining with the firm for three years longer. He was then employed in another shop until September, 1854, when he resolved upon coming to America. Arriving at New York he secured work with Philbin & Quinn, receiving $10 per week until the following March, when, being considered one of the best workmen in the city, his wages were advanced, and he remained with the firm until 1857, when he decided to visit Toronto. On reaching this city he established a business on his own account on King street East, and by careful attention and first-class workmanship, he succeeded in building up a large trade.



THE LATE JOHN RITCHIE.

The first contract executed by deceased was given him by one of the best known architects of the city at that time, and included hot and cold water throughout, closets, basins, baths, pantry and kitchen sinks. Although his price was much in advance of that for which other plumbers offered to do the work, it is said that when the contract was finished the owner of the building was perfectly satisfied, and from this time forward a considerable transformation took place in the plumbing of Toronto buildings.

A short time afterwards he added to his business the manufacture of brass work and general plumbers' and steamfitters' supplies, and admitted to partnership his eldest son, the business being carried on under the firm name of John Ritchie & Son. In 1876, at the Centennial Exhibition in Philadelphia, they were awarded first prizes on cocks, valves and lubricators; also in Australia the same year, together with first prizes at Toronto, Hamilton and other places. A few years later the firm dissolved partnership, the late Mr. Ritchie continuing until the year 1895, when he converted his business into a stock company known as The John Ritchie Plumbing & Heating Co., Ltd., of which he was at the head. He was recognized as the father of the plumbing trade in Toronto, and always took an active interest in the advancement of the trade with which he was indentified.

Deceased was at one time a prominent figure in municipal affairs, having represented St. Thomas ward as alderman for four consecutive years. He was an active member and past master of St. John's Lodge No. 75, A. F. and A. M., and a past principal of Toronto Arch Chapter, St. Andrew's and St. John's. Among his intimate friends Mr. Ritchie was familiarly known as "Heather Jock," on account of the vigorous and dramatic manner in which he always rendered that song at Hallowe'en dinners ot the Caledonian Society, of which he was a member.

In religion he was a Presbyterian, having been continuously a member of Knox church since his arrival in Toronto. He leaves a widow and four sons.

USEFUL HINTS.

SOLDERING GLASS.—Recent investigations by Margot have established the fact that an alloy, composed of 95 parts of tin and five of zinc, melts at 200 degrees centigrade, becomes firmly adherent to glass, and is unalterable and exhibits an attractive metallic lustre, says the Engineering and Mining Journal. An alloy, consisting of 90 parts tin and 10 of aluminum, melts at 390 centigrade, becomes strongly soldered to glass, and is possessed of a very stable brilliancy. With these two alloys it is possible, it is claimed, to solder glass as easily as it is to solder two pieces of metal, and this operation may be done by soldering the pieces of glass, when heated in a furnace, by rubbing their surface with a rod of the solder, the alloy as it flows being evenly distributed with a tampoon of paper or a strip of aluminum, or an ordinary soldering iron can be used for melting the solder.

A mortar that has the property of setting or getting hard under water is called hydraulic. Portland cement is an hydraulic cement. This property is due to the presence of clay in the lime.

Apropos of the question of hot air furnaces and their proper insulation against fire and the dangers resulting from loss of life engendered thereby, it has been found from experience and from observation, here and abroad, that the proper fire protection is arrived at only when the hot air flues are lined with tin and encased with hollow tile or hard burned brick, set well away from all woodwork.

The highest building in the world, not counting the Eiffel Tower and the Washington Monument, is the Cologne Cathedral. The height from the pavement to the top of the copula is 511 feet. It is 511 feet long and 231 feet wide. It was begun August 15th in the year 1248, and was pronounced finished August 14, 1880, over six hundred years after the corner stone was laid.

THE VENTILATION OF TRAPS.

Mr. W. J. Freamey, Plumbing Inspector for the city of Minneapolis, Minn., in his annual report says :—"In addition to the regular inspection and routine work of this department, I have made a somewhat limited examination of the practical effect and desirability of the present system of so-called trap ventilators. My investigations confirm the opinion I have held for some time, that the crown and back-venting of traps, as now practised, is worse than useless, and its attendant heavy expense to builders is very often the cause of curtailing a large amount of necessary plumbing work. The most serious objection, however, to this pernicious custom is the sense of false security given to the owner or tenant of a house provided with so-called modern plumbing.

I made examinations in twenty-three houses, the plumbing work in which was done in the very best and most workmanlike manner, all of them having been constructed within the last seven years, in conformity with the ordinance governing plumbing. In twelve of the houses examined I found all of the vent pipes from traps under kitchen sinks completely stopped by congealed grease and particles of vegetable matter for a space from three inches to a foot above the crown of the traps they were supposed to "ventilate." In most cases a strong wire was required to dislodged the obstruction.

Of the other eleven kitchen sink traps examined I found one only that was perfectly clear, and all the rest of the trap vents in this house were found in the same ideal condition, including the water closet vent. The housekeeper informed me that it was the custom to put a pail of boiling hot water, with a can of concentrated lye dissolved in it, through every fixture in the house at least once a week ; also that the plumber having charge of the work had positive instructions to inspect the work, and remove all trap screws for examination at least once a month, so as to be sure all were in order. These very necessary precautions accounted for the model sanitary condition of this house. In seven of the houses I found a soft, slimy substance adhering to the interior surface of the vent pipes for two or three inches above the crown of the traps. While the stoppage was not complete, there was every indication that an entire obstruction would soon result. The remaining three examined were partially stopped up, but in the case of these the vent was placed below the crown of the trap and so fashioned that the lower line followed the descent of the waste pipe. I also found, where couplings were used at the foot of wrought iron vent pipes, that the dislodged particles of rust form an accumulation sufficient in most cases to stop the opening in the bend. Wrought iron pipes without a lining of some non-corrosive substance should not be used for the purpose of back venting. The traps used in a majority of the cases examined were the usual form of "S" and "P" traps, with the regulation seal usually found in such traps. The result from stoppages, as indicated, will at once be apparent to any one who has given the matter the slightest attention. In this latitude, where for weeks at a time the ends of soil and vent pipes—usually extending two feet above the roof—are completely sealed with accumulations of hoar frost, rendering them totally useless for the purpose of vents or for the escape of gases generated in the sewers, the matter assumes a very serious phase, requiring intelligent and immediate action.

With the vent pipes over the crowns of traps inoperative, and in addition the ends of soil pipes frozen solid, the inquiry may well be made, how is it impossible to avoid contagious diseases becoming epidemic?

This condition of things has been known to the plumber who makes any pretence of keeping up with the requirements of his business for several years. When the difficulty of obstruction caused by grease, as cited in cases of kitchen and pantry sink traps, was found to be of such a serious nature, the matter was brought to the attention of the proper authorities, and it was then that the expedient of the trap screws was resorted to as a cure for the evil. I think it is fair to assume that not one householder in fifty knows of the existence of the contrivance, and if they do, they don't bother about its use or what it was intended for.

The plumbing ordinance as at present in force is an invitation to the introduction of disease, and leaves the plumber no choice as to how the work should be constructed, no matter what his knowledge or experience may be. He is arbitrarily compelled by legislative enactment, specifying penalties for infractions, to continue to observe the requirements of an obsolete ordinance.

Boards of health and physicians are, I believe, practically agreed in support of the germ and bacilli theories, and very properly advocate the establishment of municipal bacteriological plants, with competent bacteriologists in charge, to determine the exact family to which the various bacilli are related.

I have no hesitation in saying, if there be any truth in the accepted theories, there is no surer way for the insidious germ to gain admission to our residences than through the waste pipes as at present constructed. "An ounce of prevention," etc., might be applicable in this connection.

THE PREPARATION OF MORTAR.

Some very interesting suggestions relative to the proper method of slaking lime, preserving it in good condition thereafter, and preparing from it strong adhesive mortar, are given by Edward Wolff, an American authority. Among other things, he says :—

"The slaking operation should be done in a watertight box made of boards, and so much water should be mixed in that the contents will never get dry, and a sheet of water will remain on top to prevent access of air. If the box will not hold the entire quantity of lime required, the contents may be emptied into a cavity made in the ground close to the pan, and this process may be repeated. This should be done at least two weeks before sand is added, or before the mortar is prepared for use. Slaked lime prepared and kept as stated has been found free of carbonic acid after many years, air and gas not havingbeen able to find access. Instead of following the procedure in slaking lime recommended above, we see in this country a faulty process adopted, which consists in loosely mixing the sand with the slaking lime immediately after water has been added and forming a dry heap on the surface of the ground, which is left lying there several weeks to give time for complete slaking before the sand is worked in evenly and the mortar considered ready for use. This heap arrangement is perfectly adapted to circulating air through a material which should be guarded against contact with air. The sun heats the surface of it, makes the air escape after it has given up its share of carbonic acid gas, while at the base of the heap and at the shady side a fresh supply enters to fill up the vacuum after it has circulated through the heap and has been robbed of its share of carbonic acid gas. That this procedure really happens in such a heap we can easily see when we place a lump of freshly-slaked lime in a wine glass, and in another glass place a small quantity of material taken from a heap such as described, and which has been prepared a few days before. Fill both glasses nearly up with water, and add a few drops of muriatic or sulphuric acid to each. In the first glass nothing can be observed, while in the second glass we will see in the shape of small bubbles the carbonic acid escape, which has been absorbed by the lime from the atmospheric air circulating in the heap." It is reasoned that as the hardening of mortar after mason work results from slow absorption of carbonic acid from the air, if this be allowed to take place to any great extent before the mortar is used, a granular and non-adhesive condition of the mortar results, and a strong wall cannot be made with it.

TESTS OF NAILS.

Recently some very complete investigations have been made in the laboratory of Sibley College, Cornell University, to determine, first, the relative merits of cut and wire nails—a question involving the due consideration of the surface of the two types, as well as the proper shape, point, etc. ; secondly, the best relation between the thickness of the board nailed and the length of the nail ; thirdly, the relative holding power in different kinds of wood ; and, fourthly, the approximate stress nails may be expected to stand both in direct tension and when subjected to shearing stress, the relative force required for driving in and drawing out, etc.

Any absolute statement as to the holding power of nails would be of little or no practical value since a slight alteration in the governing conditions would very materially affect the result. Only comparative results are therefore given, but these are of interest, more especially as they suggest a possibility of effecting a marked improvement in the cut nail.

It is to be noted that when a pointed wire nail is driven into a piece ot timber, it forces the fibres of the wood apart, the elasticity of the fibres keeping them tightly pressed against the sides of the nail. On the other hand, when a square or cut nail, not pointed, enters the wood, the edges on the end sheer off, and there is little or no wedging across the grain. As the nail penetrates, the two sides which are perpendicular to the grain are wedged and press back these fibres still more, and when the nails are being withdrawn these fibres act as barbs and resist its removal.

To show that the greater part of the holding power of these nails was due to this action, a nail was driven in these two holes so that only the ends of the fibre came in contact with its surface. Then by comparing the pull necessary to withdraw this nail with one driven in the ordinary way, it was possible to estimate the value of this effect. In one experiment the nail driven between holes required a withdrawal pull of 590lb., while an exactly similar nail driven in the solid wood required 635lb. to remove it, or only a gain of 45lb., or less than eight per cent more. Evidently, therefore, by pointing an ordinary cut nail, its holding power should be very materially increased, since its grip would then be due to a combination ot both the cut and wire nail effects.

Comparing the value of cut to wire nails, as regards their resistance to a straight pull, it was found that for 4in. nails the advantage was on the side of the cut nail in the proportion of five to four ; for 2½in. nails the advantage was much greater, the ratio being as nine to five.

As nails are more often subjected to shearing strain, several experiments were made to decide the relative value of the two types of nails under this condition. Two pieces of wood were nailed flat together and placed in a testing machine in such a manner as to cause one piece of wood to slide over the surface of the other, thus subjecting the nails to a direct shearing stress. As may be readily supposed, the nature of the timber used materially affected the results. When Georgia pine was used the wire nail had a superiority of about six per cent. With white pine, hemlock, and oak, however, the wire nail showed an inferiority of twenty-two per cent., eleven per cent., and five per cent., respectively. These comparisons were made on the basis of equal areas of nail, and compared by the fairer standard weight, the average of the cut nail is still greater.

To determine the effect of the surface ot the nail on its holding power, tests were made of plain, barbed, and "blued" wire nails. The barbed nail was found to offer a somewhat greater resistance to withdrawal than the plain, smooth nail ; but the "blued" nail was much superior to either. Further, it was found that in cut nails, barbs which are sharp and angular diminish the holding power, and that the resistance to driving and withdrawing vary in about the same ratio, generally at about six to five.

The experiments showed very clearly that the shape of the driving end of the nail is important. The holding power of a pointed wire nail was found in one case to be 122 per cent. greater than an otherwise similar but blunt nail. Even slightly bevelling the edges was found to increase the holding power about eighty per cent.

So far as the effect of time on the holding power could be tested it was found that the grip diminishes as the nail stands, though after being wet the rusting of the nail causes it to hold better. Roughly, it was found that the nail holds about one and a half times as much when driven in the side of timber as when driven in the end.

Summing up the results of the experiments, they may be said to show that (1) cut nails are superior to wire nails in all positions ; (2) the main advantage of the wire nail is due to it possessing a sharp point ; (3) if cut nails were pointed, they would be thirty per cent. more efficient in direct tension ; (4) wire nails without points have but one-half their ordinary holding power ; (5) the surface of the nail should be slightly rough, but not barbed—barbed decreases the efficiency of cut nails about thirty-two per cent. : (6) nails should be wedge-shaped in both directions when there are no especial dangers of splitting ; (7) the length of nails to be used in tension should be about three times the thickness of the thinnest piece nailed ; when used in shear about twice this thickness is sufficient ; (8) the relative holding power in different woods is as follows : White pine, one ; yellow pine, 1 5 ; white oak, three ; chestnut, 1 6 ; beech, 3 2 ; sycamore, two ; elm, two ; and laurel, 2 8 ; (9) nails usually hold about fifty per cent. more when driven perpendicular to the grain than when driven along it ; (10) nails are always strongest when driven perpendicular to the surface ot the timber ; 11 when subjected to shock, nails will hold less than one-twelfth the load they will stand when weight is applied gradually.

TESTS OF CONCRETE.*

By A. Fairlie Bruce, M.I.C.E.

In the following paper the author proposes to describe a series of experiments carried out by him during a period of upwards of two years on portland cement and concrete on the Blane Valley section of the Glasgow corporation waterworks, with a few of the general deductions to be drawn from them.

The cement used is specified to be sufficiently finely ground to leave a residue of not more than ten per cent. on a sieve of 5,776 meshes per square inch, and capable of resisting a tensile strain of 350 lb. per square inch at seven days.

The method of testing is as follows: Samples are taken from a number of bags in each consignment and mixed together. A 1-10th bushel measure is filled through a filler and weighed. Then 5lb. are sifted (a) through a sieve of 2,500 meshes, (b) through one of 5,776 meshes; and (c) through a sieve of 14,400 meshes per square inch, the residue left on each sieve being weighed. Two sets of ten briquettes each are then made of neat cement, about 3.2 lb. being required for each set, mixed with eighteen to twenty per cent. of water. The amount of water actually taken up by the cement in setting is about the former figure. If the cement is quick setting, only enough to fill two or three moulds is mixed at a time, wet blotting paper being placed below each mould. When the briquettes have completely set the moulds are removed, and they are left on a sheet of glass under a wet cloth till they have hardened sufficiently to be placed in water. This is usually done about twenty-four hours after they are made. Briquettes of one of cement to two and one to three of sand are usually made from each lot of cement in the same way.

In order to detect the existence of free lime, if any, cakes are made 3 in. to 4 in. diameter, and ½ in. thick at the centre, with thin edges, one being kept in water and one in air, and watched, the former for hair cracks, the latter for colour. Glass test tubes are also occasionally filled with cement; they at once indicate any tendency to expand by breaking.

The following are the mean results obtained by testing about 9,000 tons of cement. :—

Residue on Sieve Meshes per square inch.			Tensile strength pound per square inch.			Time of Setting (minutes).	Weight per 1-10th bushel-lb.
2,500 per cent.	5,776 per cent.	14,400 per cent.	Neat at seven days	2 to 1 at four weeks	3 to 1 at four weeks		
2.1	8.1	20 5	476†	297	190	378	10.2

There has been a marked improvement in the quality of the cement since the commencement of the works, the average residues for the last 3,000 tons supplied being 2 4 7 7, and 18.1 per cent., and neat tensile strain 531 lb. The improvement in fineness of grinding is particularly important, as it represents an actual gain of five and a half per cent. on that at first supplied, the residue even on the first sieve being absolutely devoid of cementitious properties.

The tests for fineness, tensile strength and for the presence of free lime, are the only ones to which the author is inclined to attach much importance as deciding the quality of the cement. Those with sand are chiefly useful as the means of settling the relative merits of the sand it is proposed to use. The question of weight appears to have little or no bearing on the value of cement.

We come now to the tests carried out to ascertain the modulus of rupture for concrete bars and those on the resistance to thrust of arch ribs. The study of the strength of concrete has never received the attention it deserves, having been somewhat eclipsed by that of cement. It therefore appeared to the author that a systematic series of tests, having this object in view, would be both interesting and useful to the members of his profession.

Every effort has been made to extend these tests, numbering 400 in all, to as great a variety of materials as possible, including those known to be of inferior quality; but they have chiefly aimed at obtaining, by multiplying the experiments, what may be regarded as reliable mean results of the growth of strength in those classes of concrete in common use on public works.

The ages at which the tests were made vary from one week to a year; but attention has been mostly directed to the earlier stages, as in actual practice (save in such large works as reservoir dams, whose construction extends over a lengthened period) concrete is subjected to its full working strain at a very early date.

The proportions used vary from five to one to twelve to one, the superior limit adopted for any material being: (a) That the quantity of cement used must be sufficient to fill all the voids in the sand, and (b) that the resulting mortar must completely fill all those in the stones. In sand the voids vary from thirty-three to thirty-four per cent.; three-to-one mortar will, therefore, fulfil the first condition. In gravel they are the same as in sand, so that nine parts, when it is employed will satisfy the second condition. In broken sand the voids equal forty-nine to fifty per cent., making seven parts in the former and six in the latter to one of mortar; the largest number that can be employed if a perfectly solid concrete is to be produced.

It is perhaps as well to recall that the practice is too common, in comparing the relative strengths of concrete, to speak of them as so much to one of cement, without stating, not only the number of parts of sand and stone, but the kind of stone used, thus giving a very indefinite idea of the real strength of the concrete. Thus, if it is said that a concrete is eight to one, if unscreened ballast is used the product will contain exactly one-eighth of its bulk of cement, the mortar being anything from one to two and a half to one to four. If concrete made of five of whinstone and three of sand be meant the cement will be as one to 5.8, or with sandstone in place of whinstone one to 6.2; results seriously affecting the quantity of cement needed.

Before deciding on the proportions of concrete it is designed to use for any work all the circumstances of the case should be carefully considered and the voids in the stone to be used accurately measured. For foundations or backing it is perfectly safe to go to the extreme limits allowed by the voids in your materials, but where the concrete has exposed facework it is necessary to allow for an excess of mortar in the mixture, otherwise either the backing or skin must suffer. To guard against careless mixing, the mortar in exposed surfaces, especially where the action of frost has to be feared, should not, as a rule, be weaker than two and a half to one. Again, if there be any danger of the concrete being robbed of any of its cement before it has set by

* A paper read before the Civil and Mechanical Engineers Society.

† The increase of strength at fourteen days was 16.3 per cent.

the action of water, full allowance must be made for this.

The test-bars used in these experiments were made in moulds 30 in. long by 4 in. square; they were usually left in them, covered with wet bags, for about five days, when they were transferred to tubs and kept under water till the day before that fixed for breaking them. The bars were first weighed wet and then dry, the difference being the measure of their porosity, which, with whinstone, amounted to nearly one-half per cent., and for sandstone concrete to one per cent., proving the concrete to be practically water tight.

RUSSIAN HOUSES.

THE town architecture of Russian houses, both in its effect and arrangement, resembles the architecture of Italian and French houses, except that the roofs are covered with sheet iron painted with vivid colours, mostly green and red. The windows are double. The village houses are all log-houses (mostly of rounded logs), and very similar to the Swiss log-house, with the exception that the staircase is for the most part in the interior of the house; the roof is high pitched, and covered with sawed boards projecting 6 ft. from the walls, while the Swiss roofs are flat and generally covered with wooden shingles. The chimney of the Russian house is of brick. On the less frequented roads the village houses are of much ruder construction; the rafters project above the ridge, and form by their closeness the entire covering; the projections above the ridge are sometimes cut off, and the ridge piece is introduced, on which is rudely carved the representation of the head of some animal. The Russian village generally consists of one street, presenting on each side a range of bold projecting gables. The houses are of two storeys; some of the better village houses have a third storey in the roof, and a colonnade with a balcony on the ground floor, and occasionally a second balcony from the attic; these balconies are always in the gable front. In the village there is a side entrance, with a pent-house roof over it, leading into the court where the sheds for the cattle are placed. The Russian stoves are well adapted for economizing heat. The flue is carried up and down, so as to fill a space of about 4ft. square, and to the height of about 10ft.; it is then carried off. These stoves stand in the corner of the room, so that they can warm four rooms. The flues are built of hollow porous brick, which of course contains the heat. The external surface is of white glazed and ornamental tiles. The fuel is usually birch, and when the flame is entirely spent a damper is placed on the flue, and the heated air thus enclosed diffuses itself through the rooms. The stove requires to be heated at most for an hour in the morning and another at night to maintain a high temperature (fifty degrees Fahr., for instance) during the twenty-four hours.

PUBLICATIONS.

Building Construction and Superintendence, by F. E. Kidder, C.E., Ph. D., architect, author of The Architects' and Builders' Pocket Book. Part I.—Masons' Work. Two hundred and fifty illustrations, 409 pp.; one large octavo vol., cloth; price, $4. New York: William T. Comstock.

It is somwhat remarkable that no complete work descriptive of modern building construction as practiced in this country has as yet been accessible to the would-be architect. To meet this want was the object of the well-known author of the work before us, and from a study of its contents we believe that his efforts will be highly appreciated by a large class of young men, and also by those whose duty it is to instruct them in this branch of the architectural profession.

LEGAL DECISIONS.

LYONS v. Wilkins, (1896) 1 Ch. 811, shows, says the Canada Law Journal, that although the operations of trades unions have been to some extent legalized, there is still a limit beyond which they may not lawfully go. The facts of the case were that a strike had been ordered by the defendants, the secretary and a member of the executive committee of a trades union for the purpose of securing an increase of wages. For the purpose of making the strike effective the plaintiff's works were picketed, that is, certain persons were posted in the neighborhood of the plaintiff's premises, who were furnished with cards requesting those to whom they were delivered to refrain from working for the plaintiffs. The pickets accosted persons on entering and leaving the plaintiffs' premises and endeavored to persuade them not to work for the plaintiffs. The executive committee also endeavored to get one Schoenthal, who was a manufacturer of goods for the plaintiffs, to cease to do work for them, and on failing to do so, they ordered a strike of his workmen. And another man named Scott, who made goods for the plaintiffs, was also threatened with a strike if he did not cease to work for the plaintiffs. The action was brought for an injunction to restrain the defendants from procuring or conspiring to procure persons to break contracts with the plaintiffs, and from inducing or conspiring to induce persons not to enter into contracts with the plaintiffs. On a motion for an interlocutory injunction, North, J., granted the application and restrained the defendants from maliciously inducing or conspiring to induce persons not to enter into the employment of the plaintiffs. On appeal the Court of Appeal (Lindley, Kay and Smith, L.JJ.), though dismissing the appeal, varied the terms of the injunction so as to make it more strictly conform to the words of the Conspiracy and Protection of Property Act, 1875 (38 & 39 Vict., c. 85), (see Cr. Code, sec. 523 (f)), and restrained the defendants, etc., "from watching or besetting the plaintiffs' works for the purpose of persuading or otherwise preventing persons from working for them, or for any purpose except merely to obtain or communicate information," and also "from preventing Schoenthal or other persons from working for the plaintiffs by withdrawing his or their workmen from their employment respectively." The action of the defendants as regards Schoenthal, between whom and his workmen no dispute existed, being held to be wholly illegal and unwarranted.

PERSONAL.

Mr. John Burns, plumber and gasfitter, of Montreal, returned a couple of weeks ago from a trip to Manitoba.

Albert W. Sanderson, the well-known contractor, of Fredericton, N. B., has resolved to remove to the Antipodes.

Mr. W. W. Doane, City Engineer of Halifax, was among the visitors to the recent Toronto Industrial Exhibition.

On the 10th of September Mr. E. J. Murphy, contractor, of Montreal, was married at Peterboro to Miss Minnie Hurley, of that town.

News has been received of the death by drowning in Lake Wadgumbang, Conn., of Benoni Irwin, a well-known painter, formerly of Toronto.

Mr. G. B. Clements, contractor, of Toronto, while engaged in the construction of a residence on Spadina road, fell from a ladder and received a dislocation of his left shoulder.

Mr. Adam Kaufman, of Berlin, Ont., was awarded first prize for architectural drawing at the recent Industrial Exhibition in Toronto. Mr. Kaufman is about to take the course in architecture at Cornell University.

WATER PROOFING BRICK.

EXPERIMENTS made to ascertain the length of time that brick and sandstone are rendered water-proof, or protected, by oiling, show some valuable results. The oils used were linseed oil, boiled linseed, and the crude mineral oil known as "blue oil," and the exposure was on a roof fairly exposed to the sun and weather, the bricks being good, sound, machine-made. It is stated that the amount of oil and water taken up by the sandstone was very much less than that absorbed by the bricks, although the area of the sandstone cubes was much the greater. Equal amounts of the raw and boiled oils were absorbed; the blue oil, however, was taken up in much greater quantity by both bricks and sandstone, but by the end of twelve months the whole of the thirteen and one-half ounces of blue oil had apparently evaporated, and the bricks had returned to their original state, but those treated with raw and boiled oils were unchanged. Finally, it was seen that the sandstone cubes treated with raw and boiled oils returned to their original weights, but not appearing to have lost the good effects of the oils, being practically impervious.

PAGES

MISSING