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CANADIAN CONTRACT RECORD

A Weekly Journal of Engineering, Public Works, Tenders, Advance Information and Municipal Progress

"TENDERS" AND "FOR SALE" ADVERTISEMENTS PAGE 3

TENDERS AND FOR SALE DEPARTMENT

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City Hall, Toronto, Dec. 16th, 1907.

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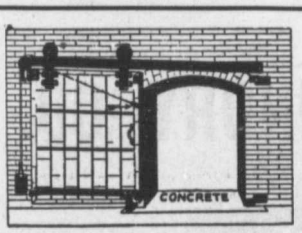

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County Clerk,
Prescott and Russell,
L'Orignal,
Ont.

L'Orignal, December 16th, 1907.

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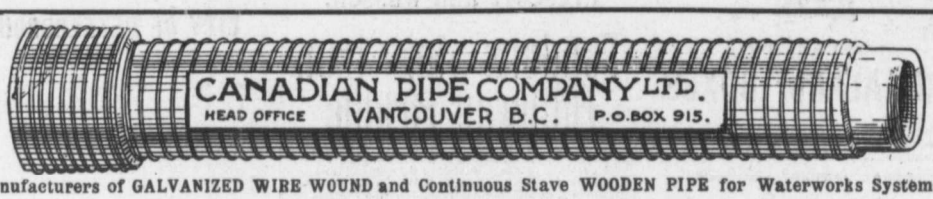

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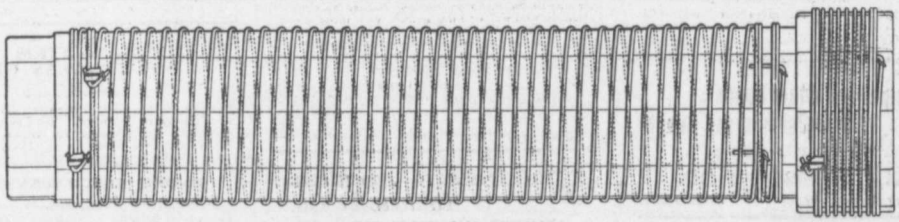

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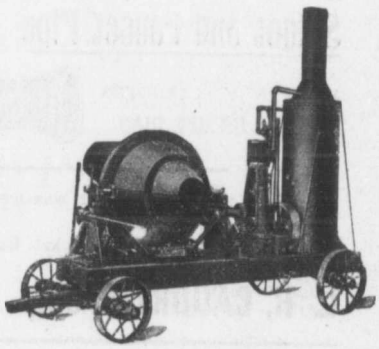

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STRIKE PREVENTION IN CANADA.

President Eliot of Harvard has recently called attention to Canada's "Industrial Disputes Investigation Act," which has been in operation for the past nine months, and which is conceded by President Eliot to have at least eight points of advantage over any labor legislation existing in the United States This Canadian law has already caused the amicable settlement of a number of troublesome and long-drawn-out disputes, and it appears that its provision for complete publicity is not the smallest factor in this result. The purpose of the Act "is not arbitration, but conciliation, investigation and publicity," and by these methods it aims to aid in the prevention and settlement of strikes and lockouts in mines and industries connected with public utilities. Its provisions secure a public inquiry into any industrial dispute concerning mines or public utilities, provided either one of the two parties to the dispute asks for such an investigation. According to President Eliot, the most striking feature of the Canadian Act is this:

"Whenever a dispute arises between an employer and any of his employes, and the parties thereto are unable to adjust it, either of the parties to the dispute may make application to the Minister (of Labor) for the appointment of a board of conciliation and investigation, to which board the dispute shall be referred under the provisions of this Act, if applicable. The Minister must, within fifteen days from the date at which an application is received, establish such a board, if satisfied that the provisions of the Act apply. Every board consists of three members, who are appointed by the Minister; but of these three members one must be appointed on the recommendation of the employer, one on the recommendation of the employes, and the third on the recommendation of the first two members. If either of the parties fails to nominate its representative within five days, the Minister must appoint a fit person to represent that party in the board; if the two members fail to select a third member, the Minister must appoint a fit person to be the third member of the board, and this third member is chairman of the board . . . The Department of Labor is authorized to provide any board of conciliation and investigation with a secretary, stenographer, and other necessary clerical assistance, in order to secure complete publicity for the inquiry.

"In making application for the appointment of a board, the party which desires the inquiry must set forth the parties to the dispute, the nature and cause of the dispute, including any claims or demands made by either party upon the other, an estimate of the number of persons likely to be affected, and the efforts made by the parties themselves to adjust the dispute. The application must be accompanied by a declaration that, failing the adjustment of the dispute under the Act, to the best of the knowledge and belief of the declarant, a lockout or strike will ensue. The party making application for the appointment of a board must transmit by sure means to the other party to the dispute a copy of the application and of the accompanying statement and declaration."

"The penalties imposed by this Act are as follows: Any employer who declares or causes a lockout contrary to the provisions of the Act is liable to a fine of not less than $100 nor more than $1,000 a day while such lockout exists; any employee who goes on strike contrary to the provisions of this Act is liable to a fine of not less than $10 nor more than $50 a day while such employe is on strike; and any person who incites, encourages, or aids an unlawful lockout or strike is liable to a fine of not less than $50 nor more than $1,000."

Although, as President Eliot concedes, Canada has an advantage over the United States in that the regulation of industries and all strifes which arise in industries, falls inevitably to the national administration and not to the provincial, nevertheless, the principles of this Act, he says, could be made to apply in the several States which constitute the United States. He summarizes as follows the advantages of our Canadian law over any legislation of the kind at present existing in the United States:

"(1) There is no arbitration in it, compulsory or other.

"(2) It prevents sudden blows aimed by capital at labor or by labor at capital.

"(3) It prevents the sudden cessation of industries which have to do with such necessaries of modern life as fuel, the means of transportation and communication, the lighting of towns and cities, and water and power supplies.

"(4) It makes it necessary for the aggressor in an industrial dispute to have a well-considered case which will bear thorough publicity.

"(5) It informs the public, which ultimately bears, in higher prices, the burden of all industrial warfare, about the causes and issues of every industrial dispute.

"(6) At the same time it leaves unimpaired the right of any group of men to combine for mutual advantage, and to lock out or strike after full public inquiry.

"(7) It tends to prevent or restrict machinations on the part of both employers and employes, because both know that publicity must come at last.

"(8) It gives opportunity, through the intervention of an impartial public authority, for reasoning, conciliation, the removal of misunderstandings, and an amicable settlement."

THE COMMERCIAL SITUATION

THE FINANCIAL SITUATION.

Reports from the east, and for that matter reports from the west, indicate that the financial situation is clearing up rapidly. There is much more confidence generally than there was a week or two ago. The trend of affairs at present indicates that after the first of the year the banks will begin to let out their money at the former normal pace. The atmosphere is becoming brighter.

One bank in the east informed their customers a few days ago that after the beginning of January they would give all the money the said patrons required. This is good news, and we are glad to pass it along. All who are interested in the welfare of the country should pass the good news along. Dear knows there has been enough pessimism at large already, although now we would take a notion to cheer up. This pessimism has been more in imagination anyway. According as things brighten up, the business men are commencing to realize how unfounded the "blue ruin" cry has been.

It is the duty of the banks to renew confidence, and they should lose no time in doing so. Their annual reports have been very satisfactory; in fact more favorable than the people generally looked for. Their policy of loan curtailing has been shown by their larger reserves, when many were under the impression that they would be much smaller. Every bank manager should now advise his branch managers that money will now be much easier, and thus start the proverbial "ball" rolling. Let the man in legitimate business have what funds he requires! Let him turn the wheels again! Business is gong to be good, and every line made in this country is going to be in good demand. It is much better for the business of the country to keep the money from the stock market gamblers, and let it go into channels that will bring profit and benefit to this country as a whole.

BANKING AND BUSINESS.

(Toronto Globe)

With the passing of the season of panic across the line, and with it the danger of a run on any Canadian bank, the policy of extreme conservatism that has hampered Canadian trade and industry is no longer justified. The banks have felt impelled to reduce advances and strengthen reserves at a time when money was most urgently needed. This policy has been defended on the grounds of financial danger and the duty of bankers to their shareholders. But so far as it has been promoted by rivalry and needless timidity, the duty of bankers to the general public should be a determining consideration. According to the November statement, the specie and Dominion notes held by the chartered banks aggregated $76,837,549, as compared with only $70,801,047 held in the same month a year ago. A year ago the total liabilities were $778,717,996, as compared with only $756,055,551 in November, 1907. While the total liabilities have been reduced by twenty-two millions during the year, the holdings of specie and Dominion notes have been increased by about six millions. Of course the banks have abundance of other assets to meet their liabilities, but the species and Dominion notes are held against sudden demands.

In times of prosperity the banks lend freely and let their reserves run low, thus encouraging every line of enterprise. When the stringency comes they can sustain their earnings by reduced loans at higher rates. This permits the strengthening of reserves against the danger of a panicky demand, and is in every way satisfactory from a banking standpoint. From the standpoint of the business community there are causes of complaint. Accommodation becomes most restricted when it is most in demand. The enterprises encouraged by free advances during times of prosperity are closed up by the refusal of advances. The public find abundance of money when it is least in demand, and an aggravated stringency when the demand is most urgent. Instead of exerting a regulating influence, the tendency of the banking policy is to help a plethora and accentuate a stringency. The reserves now being accumulated are no longer justified by any reasonable fear of a panic. They serve to tie up funds required in commerce and industry. Such extreme caution is all the less justified on account of the policy of the Finance Minister in affording relief and protection. Some banks have made a serious effort to meet the needs of their customers by ignoring possible criticism of their diminished reserves. This should be appreciated by the public, and followed as an example by the leading Canadian bankers. As the time of danger is past, the banks can give greater attention to the needs of the public and less to the strengthening of their own defences.

GIVE BETTER INDUCEMENTS.

Many of the banks of this country are receiving 7 per cent. interest on their loans. This is considerably more than they pay to depositors, and why should they not pay one per cent. more or so on deposits as an inducement to the people to bank their surplus cash? They complain that the people are hoarding, and small wonder it is, when people have become so acquainted with stories of money doubled, money trebled, etc., in the great real estate activity we have had. What inducement is 3 per cent. or 3 1-2 per cent. on deposits, especially when it is generally known that the banks will not let money out at less than about 7 per cent.?

A reasonable profit is sufficient. The more deposits a bank receives the greater is its scope for operation, and if a little more encouragement to depositors will increase the amount of money in the banks, will it not work to the advantage of the banks? Will it not also work to the benefit of the country in general?—The Commercial.

Strength of Foundations

No branch of engineering requires greater skill than the design and construction of foundations. The principles are simple, the first being that the supporting layers shall be at right angles, or nearly so, to the line of pressure, and the second that the courses are the foundation footings and the material on which the footings rest is the foundation bed. The function of a foundation is to support safely the loads brought upon it by its own weight and that of the superstructure. Safety does not require that no settling shall occur, but, if present, it is of the greatest importance that it shall be uniform. Unequal settling is a serious matter, causing excessive strains throughout the structure, producing cracks and other defects and may result in the collapse of the building. As in practice it is usually difficult to obtain uniform settling it is better when-

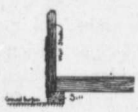


Fig 1 The primitive foundation consisting of a wooden sill on the ground, with studs and floor beams resting on top

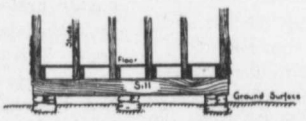


Fig. 2. The transition from the primitive to the dwelling house foundation

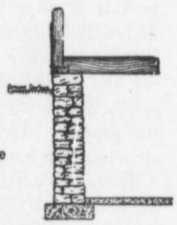


Fig 3 Typical dwelling house foundation A wall of rubble masonry

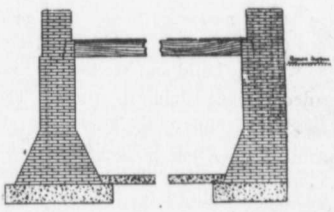


Fig 4 The two types of spread footings —a development of the dwelling house foundation—suitable for buildings up to seven or eight stories

it rests. Even a poor soil can carry a large structure if the footings are of sufficient width. It is necessary to correct the popular idea that quicksand is some lurking monster that swallows up the unwary. The engineer's definition of quicksand is any loose friable material saturated with water. There are different kinds of quicksand just as there are different kinds of wood, varying from nearly as treacherous as the popular idea of it, to a material that may be safely built upon. The lower end of Manhattan Island is a quicksand extending from the surface to a maximum depth of eighty feet below Broadway. It will bear three tons per square foot and the foundations of many build-

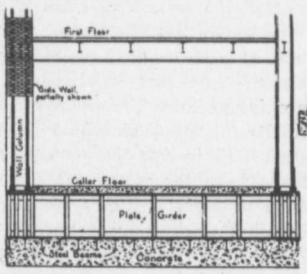


Fig. 5. The steel grillage foundation, designed for a high office building resting on quick sand.

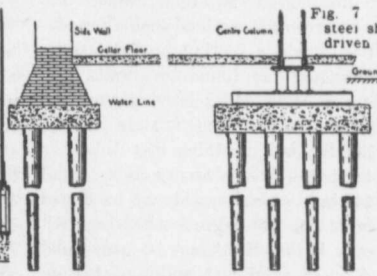


Fig. 6. The familiar wooden pile foundation, with combination of spread footing and steel grillage.

Fig. 7 Sectional View of steel shell of concrete pile driven to hard ground

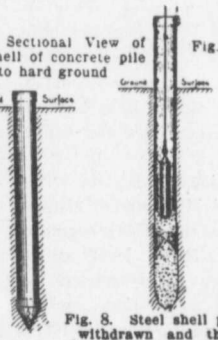


Fig. 8. Steel shell partially withdrawn and the concrete being rammed.

Fig. 9 The finished pile

problem, according to the "Architectural Record."

A foundation in its broadest sense is defined as "the basis or groundwork of anything." It is therefore both concrete and abstract and is universal. In this article it will be considered as that part of a building from the bottom of the excavation up to the ground surface. Its lower ever practicable to make the foundation unyielding. The materials entering into it should be as nearly indestructible as possible. Wood continually wet, brick, concrete, masonry and steel protected from moisture are all used with good results.

The load which a footing will carry depends directly upon its area and the nature of the material on which the footings rest upon it. Filled-in ground is one of the poorest materials on which to build, as for years after it has been deposited it will continue to settle and obviously any structure it carries must settle with it.

Safe Loads on Soils.

Ordinary ground will bear safely from two to four tons per square foot, dry clay from four to six tons per

square foot, good gravel from six to ten tons and bed rock from fifty to two hundred tons per square foot. Sand if confined will stand very large pressures, and similarly water, the most unsuitable of all, if it could be restrained, would be capable of resisting an enormous pressure. Certainly no force man has produced is sufficient to injure its structure. It is hardly necessary to say that good bed rock is the best available material on which to build and has been so considered since biblical times. The Egyptians apparently gave little attention to their foundations. The compact soil, dry climate and absence of frost simplified the problem. They usually built their temple walls on a footing of stone or sometimes of sun-dried bricks, the bottom courses being five or six feet below the ground surface. While this construction answered in the main, it is probable that the ruin of some of the great temples was caused by the failure of their foundations, due to the infiltration of the Nile overflow.

The Greeks gave the matter more attention, excavating to a considerable depth and building the footings of fine cut stone carefully laid dry. The Romans excelled all others of their time in their foundations. They excavated usually to rock and built spread footings of cut stone laid in cement. They used concrete, extensively and were skilful in subaqueous construction, using piles and cofferdams.

The foundations of modern structures may be divided into two classes: (1) Those where the work is begun on ground above water level, as for buildings; (2) those started on ground below water level, as for bridge piers and lighthouses. This classification is somewhat arbitrary, as the methods used are often the same in both. The conduct of the work, however, is so different as to seem to justify the division. It is the purpose of this article to consider only those of the first class.

The most primitive form of foundation consists merely of a wooden sill, a piece of timber say six by eight inches in section, laid directly on the ground with the studs, the floor beams resting on top. As the load that such a foundation will carry is limited by the comparatively small area of ground on which it rests, and as it readily rots, it should be used only for unimportant or temporary structures.

An improvement on this method is to raise the sill off the ground by putting it on occasional stones, thus materially increasing the life of the sill. A further improvement is to rest the sill on a continuous course of stones increasing the bearing area on the ground. This is the usual construction for barns.

The next step in the development of the foundation which has been built oftener than any other is that of the ordinary dwelling house. It is merely a wall, usually of rubble masonry, brick or concrete. It is generally started somewhat below the cellar floor and extends above the ground level. For ordinary frame houses the thickness required for the cellar walls usually gives sufficient bearing on the ground; but it is better to start them on a wider footing course. It will be clearly seen that this is a direct development of the shed and barn foundation, the improvement being the solid masonry wall started below the frost line.

For large buildings where the weight would overload such a foundation a wider footing is obtained by offsetting the foundation walls, giving a much wider bearing on the ground and proportionately increasing the weight which may be safely carried. This is known as a spread footing, which should not be sloped more than 30 degrees with the vertical. If the offsets may be made equal on both sides any width of footing may be obtained by going deep enough, the only limit being the volume of masonry required. The economical limit of the spread footing when resting on ordinary ground is reached when a building exceeds five to seven storeys. If owing to adjoining buildings the wall may be offset only on one side, the effective limit of offset is reached when the footing course is about one and one-half times the width of the wall at the nearest tier of beams above, for if it is more than this it will distribute little or no pressure under the toe.

The use of steel in building construction has developed a modification of the spread footing by using one or more layers of steel girders or bears, those of each layer being set on and at right angles to those of the layer below, making what is known as a grillage. The steel should be thoroughly protected from moisture and each layer should be embedded in concrete. This type of construction has been used to a considerable extent in New York and very largely in Chicago.

THE SAND BLAST IN BRIDGE PAINTING.

An authority states that in the use of the sand blast for cleaning metal work experience has proven an air pressure of 80 pounds per square inch is ample and efficient, removing all objectionable substance from the steel. Comparative tests with different air pressure using the same size of nozzle were made with the following results: At 60 pounds pressure the rate of cleaning was 10 square feet in 7 minutes, or nearly 1 1-2 square feet per minute; at 80 pounds pressure it was 10 square feet in 3 1-4 minutes, or 3 square feet per minute, and at 100 pounds pressure it was 3 1-3 square feet per minute. These tests have shown that the 80 pound pressure gave the most economical working pressure. To secure the best results this pressure should be constant, and, in case the air supply is taken from the main that supplies other injectors, it is good practice to install a small receiver about 18 inches by 36 inches in the air main. This receiver has a tendency to give a steady pressure and to catch any condensation from the air. The condenсation can easily be drawn from the receiver.

An advantage of sand blasting is that it secures strong adhesion of the paint on account of the thoroughness of the cleaning, especially upon metal surfaces that have been pitted by rust. Re-entrant angles and difficult corners that cannot be reached by hand are also readily cleaned by this method.

Reinforced Concrete Chimneys

The first reinforced concrete chimney was built in 1898 by the Ransome & Smith Company for the Pacific Coast Borax Company, Bayonne, N.J. Since that time about 400 stacks have been completed, and these are distributed through nearly every State of the Union and Canada. These stacks range in height above ground from 50 to 35 1-2 feet with inside diameters ranging from 4 to 18 feet, the majority of them being 150 to 200 feet high and 5 to 66 feet in inside diameter. Although the large majority of these chimneys have given satisfaction to their owners up to the present time, the failure of a few and serious cracks in several others have caused a number of inquiries to be made as to the reliability of reinforced concrete for chimney construction.

As a consequence of such questions, your Association has delegated the writer to investigate the causes of the faulty structures, and the condition of the chimneys now in service, with a view to reporting whether reinforced concrete may be safely recommended for chimney construction. With this in view the writer has visited and carefully examined a number of concrete chimneys; has investigated the causes for the defects in these structures; and has consulted with representatives of some of the companies which make a specialty of this type of construction. Through inquiries made by your Association and by personal correspondence direct reports have been received upon nearly 150 chimneys. The results of this special investigation taken also in connection with two or three professional cases, in one of which opportunity for examination of the material in a chimney which was taken down, provide data for this report.

General Conclusions.—It is possible to present quite definite conclusions and recommendations with reference to this class of construction. The general conclusions which follow are considered in detail in the complete report, and reasons are given for their adoption.

(1) Reinforced concrete is a suitable material for chimney construction.

(2) Reinforced chimneys must be designed and built upon the same principle and by the same methods which have proved essential in other types of reinforced concrete construction.

(3) The defects and failures which have occurred in chimneys thus far built have been due to poor workmanship or faulty design or the use of the wrong concrete mixtures, or to all three.

(4) The methods of construction at present being followed are defective in many cases and liable to lead to subsequent failures, and they should be radically modified.

Investigation of Chimneys. — As already intimated, several reinforced concrete chimneys have fallen while being constructed, or at some later period, and the cracks developed in a number of others have raised serious questions as to their safety. On the other hand, in general, chimneys built of reinforced concrete have given perfect satisfaction, this being attested by the fact that in many cases the owners have repeated their orders for such stacks, one corporation, for example having built fourteen of them at its plants in various parts of the country.

The question, then, which confronts us is whether the faulty structures reported are due to qualities inherent in reinforced concrete; or whether they are due to defects in design and methods of construction which may be amended in the future; or whether they may be considered simply as accidental failures to which all engineering structures are occasionally liable. In other words, shall we condemn the building of chimneys of reinforced concrete, or may we disregard the comparatively few and actual failures as accidental, or shall we approve of building concrete chimneys, at the same time insisting that, to be sure of permanence, the methods of design and construction must be, in some cases, radically changed?

My investigations and examinations of chimneys have led me very decidedly to the third alternative. In other words, the writer is convinced that reinforced concrete chimneys can be built which are entirely safe and practically indestructible, while recognizing that many have been erected with an utter disregard of the fundamental principles which have proved essential in all other classes of reinforced concrete construction.

In the first place, as we consider the problem, two principles must be recognized which may be termed axioms in engineering science. Failures do not necessarily throw doubt upon any class of construction unless the causes for failure are incapable of remedy. On the other hand, the fact that a structure or many structures have not failed is no proof that they are properly designed and built, since they may not have met with the most serious conditions or may be already stressed to a point so near breaking as to be liable to future deterioration from heat and frost and continued vibration.

To review the subject, therefore, the examination must be especially directed to the causes of the occasional failures and defects reported, with the object of determining, if possible, whether the conditions which have produced the troubles may be corrected in the future to prevent recurrence.

Eight cases have been reported in which chimneys have either blown over or have been taken down because they were defective, and ten or twelve others have been heard from in which cracks have developed which cause serious apprehension. In nearly every case of failure the chimney has been rebuilt by the construction company.

One of the failures most widely known is that which occurred at Peoria, Ill., in 1906. The chimney had been completed about three weeks when it gave way at the offset or projection, the upper part crumbling as it came down and the concrete breaking into small chunks. The T-shaped steel stripped clean from the concrete. The cause is stated to be a poor batch of concrete at the offset, although the manner of failure would indicate that

From Investigation made for the Association of American Portland Cement Manufacturers, by Sanford E. Ompso .

the concrete in the upper portion also was not of the best quality.

Another case is cited in which the chimney stood for nearly two years, and then blew over in a windstorm of about 45 miles per hour. Here, as in the other case, the concrete stripped from the steel, and the fall was attributed to poor adhesion between the concrete and steel.

A stack built in very cold weather in Canada blew over when the concrete, which evidently froze without setting, thawed out.

A case occurred in 1905 where the upper 30 feet broke and slid off while it was being topped off, the accident being charged to the fact that the mortar had not properly set.

This year a chimney in the West, after about two years' service, developed such cracks that it was considered dangerous, and was taken down and replaced.

Another stack was torn down, before the boilers were fired, because of defects in the workmanship.

The most recent failure occurred this last summer in Wisconsin, where a chimney blew over, only two weeks after its completion, during a severe tornado which damaged many other structures. The blame is laid upon the unusual severity of the storm and the freshness of the concrete.

Considering the chimneys which are now in commission, we find that in general they are subject to more or less checking or cracking. This need not necessarily condemn the structure, since the reinforcement may be sufficient to hold together safely the blocks formed by the cracks, and yet it would seem that with the opportunity we have of introducing steel wherever needed all cracking ought to be averted, especially as there is always danger that the cracks may increase from wind vibration, heat and frost.

Our reports indicate in most cases that the cracks are not considered dangerous by the owners of the stacks. In several instances, however, long vertical cracks have appeared, and in others horizontal cracks have been found in the lower portion which have given serious concern. One chimney, straight when built, has since leaned about 3 to 4 inches from the vertical, beginning at a point about two-thirds up from the base. Another informant reports soft spots in his chimney.

About 400 reinforced concrete chimneys have been built in this country, and direct reports have been received by your Association and by the writer from nearly half of them. The failures cited amount to about 2 per cent. of the total number with at least 2 to 3 per cent. more of doubtful safety; it is probable that most of the seriously defective cases have been brought to light, since special care has been expended in running down doubtful ones. Of the others, even where personal examination has revealed somewhat serious cracks, the general verdict of the users is "satisfactory" and "good."

Reinforced concrete chimneys offer special structural difficulty because of the height to which they are carried, and the accompanying difficulty of obtaining the very best of workmanship. For this reason we might expect a somewhat higher percentage of error than in ordinary reinforced concrete construction. Even taking this into consideration, however, 4 per cent. appears to be a somewhat alarming proportion of defective construction. But the vital question is whether even these few cases may be passed over as isolated cases of defective construction, or whether they afford an arraignment of other chimneys now standing; and whether they predicate a similar percentage of defective construction in the future.

An examination by the writer of a chimney which was being taken down, if the structure is representative of others, throws considerable doubt upon their durability. On the other hand, it affords means for pointing out definitely the errors which must be guarded against in the future. This chimney showed soft spots in three of the sections, where the concrete could be readily loosened clear into the steel. The concrete was porous throughout, and scarcely bonded between the 6 inch layers. Samples cut from good portions of the concrete, which was a mortar of one part of cement to three parts of sand, gave an ultimate strength of about 1,200 pounds per square inch, or about one-half the strength of a good 1:3 mortar laid with a sufficient quantity of water. A month after this inspection the chimney was taken down, the 6 inch layers being readily loosened from each other and cut into pieces by a pneumatic chisel, and the concrete was found to vary materially in hardness. Of special importance was the fact that the mortar in the angles of the T-bars was weak and porous, showing scarcely any adhesion to the steel. Further investigation showed that the concrete, or mortar, used in the construction was of such extremely dry consistency that even where well rammed, the moisture did not cover all parts of the surface of a layer nor did it produce a proper bond with the steel.

From such evidence it is impossible to avoid the conclusion that other chimneys built by similar methods, with so dry a mixture as to give a weak, porous concrete and to provide insufficient adhesion to the steel, are likely to cause trouble in the future.

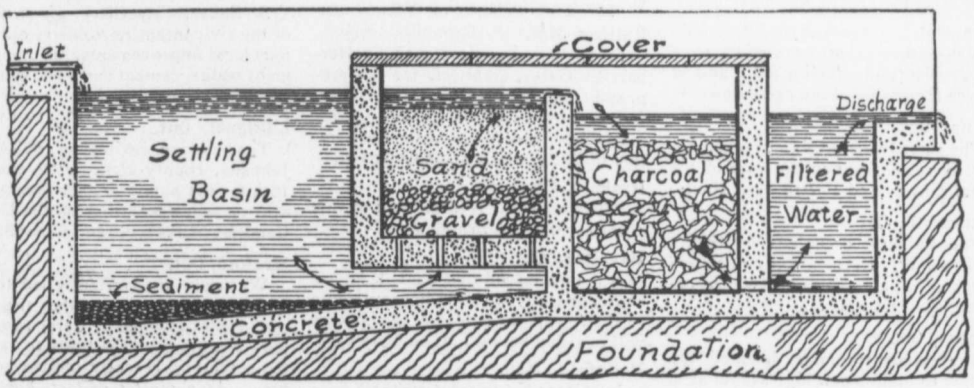
This appears to be a severe arraignment of concrete chimney construction. And yet, to be fair, it must not be overlooked for a moment that every one of the points brought out, the low strength of the concrete, the dry mix, the porosity, the lack of adhesion to steel, the lack of bend, and the soft spots, indicate construction which would not be tolerated in any other case of reinforced concrete work. It has been proved beyond a doubt, and reiterated in print and verbally, that reinforced concrete must be mixed wet in order to have it adhere to the steel and protect the latter from corrosion; that a factor of safety of four is certainly a minimum in compression; and that a concrete structure must be essentially monolithic. It should be clearly understood, also, that in the chimney just referred to all of the essential elements were disregarded.

The defects noted are not inherent in chimney construction. In other wards, from a practical standpoint, it is necessary to follow in chimney construction the methods which have proved necessary for success in other structures made from reinforced con-

(Continued on Page 22.)

How to Make a Water Filter

It is a well-known fact that the proper way to purify water is by distilling or boiling; but this is too expensive and a large percentage of our pure water sold has been only filtered. We illustrate a sectional view of a simple, but one of the best filters made, which should not be smaller than two feet deep, one foot wide and six feet long, which will have a capacity of two to ten gallons per minute, depending upon the amount of impurities the water contains, but the size that gives the best satisfaction is four feet deep and twelve feet long, the width depending upon the capacity desired which with ordinary water is about five gallons per minute for every foot width of the filter.



This filter as shown is built in the ground with the water inlet one foot higher than the discharge, and therefore is a gravity filter of the slow sand type, being the system most adopted by our larger cities where filtering water is a necessity as a safeguard to health.

This filter is made of concrete, walls and bottom six inches thick and the interior sides waterproofed to avoid waste of water. The settling basin should be deeper than any other section, to allow the sand or soil to settle and remain undisturbed in its bottom, which must be removed when filled up to the inlet openings into the gravel and sand section, these openings being one inch in diameter and about four inches apart. The filtering section should contain one foot of gravel, crushed stone or clean slag in the bottom, which is covered with about eighteen inches of coarse, clean, sharp sand which must not reach the overflow level at the top.

The charcoal section being for purifying the water with air, should be filled with porous materials, charcoal being the best, but may often be improved by mixing with clean pumice stone, slag or rough pieces of broken plaster of paris, as the natural needs of the water may require, the last section being a conductor for the water from the one inch holes at the bottom of the partition to the discharge level.

These filters may be covered or left open, however, the filtering sections should be covered as shown, and the less refuse the water contains the greater capacity and the longer a filter has been in use the more refuse lodges among the gravel, sand and charcoal, which must be cleaned at intervals, but it must be remembered that any coarse sand filter produces the purest water only after sufficient refuse has been retained by the sand to noticeably reduce its capacity, but the better way is to reduce the capacity of a newly cleaned filter by placing a light layer of fine sand on the coarse sand.

A filter of this type has been in use the past summer filtering muddy and oily water for supplying clean water for steam purposes, the oil being removed twice a day by skimming the surface of settling basin, the filtered waste also being used for drinking and cooking, but is not altogether free from the oil taste.

Another filter made of size given above produces clear, sparkling water from river water containing the refuse of coal mines and tanneries, which is considered remarkable, as the sand, gravel and charcoal are changed only four times per year and the filter is in use night and day continuously.—American Carpenter and Builder.

CLEANING BRICKWORK.

It is a common practice when brickwork gets dirty, after a few years' exposure to the sotty atmosphere of towns, to brighten it up by applying color washes and re-pointing. This is pernicious, for not only does it never produce the desired effect of new brickwork, but it looks what it is—"painty"—and after a year or so its appearance is worse than ever. Sometimes yellow stocks, or white Suffolks and Burnham bricks, are actually transformed into red bricks. painting, too, is ludicrous; the joints are filled up flush, the color wash applied over all, and the pointing lined in according to the fancy of the workman, often somewhat out of the horizontal and with imperfect perpends, and finally with the most varied conception of bonding. The suburban villa is bad enough without this sham brickwork. If it must be cleaned up, why not spend a little more time and trouble in rubbing down the surface and showing the honest substance of the real brick?

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

CONTRACTS OPEN.

Barrie, Ont.

In return for the concession of a fixed assessment of $35,000 for 25 years on all their property here, the Grand Trunk Railway have agreed with the town to spend no less than $150 000 for shops and other purposes before December 1909.

A by-law to loan $10,000 to the Aerial Ladder Company has been carried. Another to spend $10,000 on cement works was defeated.

Bath, Ont.

A by-law to grant exemption to a saw, grist and planing mill and a cheese factory has been carried.

Berlin, Ont.

The ratepayers have approved a by-law to raise $30,000 to extend the street railway and electric light plants.

Chatsworth, Ont.

The building occupied by G. W. Collins and J. Herbert was completely wrecked in an explosion which occured here last week.

Dundas, Ont.

The ratepayers have defeated the by-law to build a new high school at a cost of $25,000.

Exeter, Ont.

The evaparator by-law was defeated by the ratepayers in the recent elections.

Florenceville, N.B.

Representative lumber dealers of this locality met together last week for the purpose of discussing the erection of a new flooring mill. The project was unanimously endorsed and it was decided to proceed forthwith with the organization of a company.

Fort Frances, Ont.

An American capitalist has been here for a week looking at various sites with a view to establishing a large brewery.

Fort William, Ont.

This town will raise $50,000 towards constructing a municipal street railway system. Debentures will also be issued to provide for bridges over the McKellar, Mission and Kaministiquia rivers. Fifteen acres will be purchased on which to erect a plant at a cost of $20,000, and authority is asked from the Legislature to raise $410,000.

Guelph, Ont.

The ratepayers have decided by a large majority to have the waterworks remodeled at a cost of $125,000.

Goderich, Ont.

The by-law to guarantee $150,000 of the bonds of the Ontario and West Shore Electric Railway has been passed. A measure has also been carried here in favor of the Doty Engine Works for a loan of $35,000.

Halifax, N.S.

Plans have been prepared by Herbert E. Gates, architect, for the proposed Children's Hospital in this city, for the new Technical College and for alteratious and additions to the premises of rhe Eastern Trust Company.

Haskett, Man.

A new elevator is to be built at this point by McCabe Brothers.

Havelock, Ont.

It is understood that the C.P.R. are contemplating extensive improvements to their property here. A new station will possibly be built at an early date.

Holinfield Man.

It is intended to erect a church here this spring.

Ingersoll, Ont.

The ratepayers have defeated the by-law to acquire the plant of the Ingersoll Electric Power & Light Company for the distribution of Niagara power.

Killaloe, Ont.

M. B. Grace, township clerk, has for sale $3,500 thirty-year 5 per cent Renfrew county debentures.

Kincardine, Ont.

The by-law to grant $8,500 for improvements to the central school has been passed.

Kingston, Ont.

The road improvement by-law, voting$12,000 for the purpose, has been approved by the ratepayers.

Listowel, Ont.

The ratepayers have approved a by-law to grant certain exemptions to the Listowel foundry.

London, Ont.

The .Egerton street Baptists have outgrown their present building and have purchased a site for a new edifice on the Hamilton road. Work will be put in hand as soon as the present debt is paid off.

The firehall and hospital measures were passed and the Komoka water by-law defeated in the recent elections.

A bylaw has been passed by the city council to issue $75,000 debentures for the purchase of grounds and buildings for the isolation hospital on Ottawa avenue and Waterloo street.

S. Baker, City Clerk, gives notice of the civic intention to carry out various local improvements, including cement walks, cement curbs and gutters, and tile sewers.

L'Orignal, Ont.

Tenders are invited by E. Abbot Johnson, county clerk, up to January 16th for the purchase of $15,000, 5 per cent 15-year debentures of the United Counties of Prescott and Russell.

Meaford, Ont.

We were inadvertently led to believe a short time ago that the Seaman-Kent Company were awaiting inducements from the town to rebuild their factory recently destroyed by fire. As a matter of fact, however, the new factory is in quite an advanced stage of construction and will be ready for operation by February 1st.

The ratepayers have carried two by-laws, one to grant the Seaman-Kent Company a bonus of $10,000 and the other to build a $25,000 town hall.

Montreal, Que.

Superintendent Ferns, of the Fire Alarm Telegraph Department, is preparing specifications for the establishment of a new system in the Berthelet street fire station. Contracts will be awarded this month so as to complete the work during the present year. The cost of the entire new system, not including outside connections, will be $53,000. Conduits, manholes, cables and labor, including 65 miles of wire, to connect all wires and circuits to the new headquarters, will be required a at cost of an additional $10,000.

The Central Light, Heat and Power Company are preparing to extend their operations with a view of making con-

nections with their new up-town plant which they will install in the near future. The Company have nearly completed the installation of an extra 400 horsepower boiler, with the idea of extending their steam and hot water system of heating stores, warehouses, and office buildings within a quarter-mile radius from their plant, on the corner of Notre Dame and St. Peter streets.

Owing to the slow progress made in the construction of the conduit the Water Committee have decided to visit the works and ascertain the exact position of affairs. It was suggested at the last meeting that the city should take over the work for fear the conduit should not be built in time.

Lieutenant-Colonel Burland is authority for the statement that the construction of new armories for the 1st Prince of Wales Fusiliers will be entered upon shortly. A site on Esplanade avenue has already been chosen. The cost of the building will be in the neighborhood of $100,000.

Neelin, Man.

W.M. Easton, Secretary-Treasurer, is taking tenders for $3,000 twenty year, 5½ per cent, Huntly school district debentures.

Niagara Falls, Ont.

The following by-laws have been passed: additional school accommodation, $23,000; waterworks, $15,800; garbage collection, $5,800.

Ottawa, Ont.

J. D. McLean, Secretary, Department of Indian Affairs, wants tenders up to January 9th for 10,000 railway ties of cedar, tamarack and hemlock, which will be taken out during the present winter by the Indians of Garden River Band. Mr. McLean also wants tenders up to the same date for approximately 1,000,000 feet B. M. of maple, beech, elm, basswood, hemlock and cedar to be taken out by the Indians of Cape Croker Reserve, Saugeen.

Owen Sound, Ont.

By-laws to grant $1,200 to a shoe company and $15,000 to the granite company have been passed.

Port Arthur, Ont.

The city council have authorized the purchase of a 250 horsepower motor generator at a cost of $8,000 to provide additional power for the street railway.

Regina, Sask.

Tenders will be received up to January 20th for the work of installing a new heating system in the Government House. Forms of tender can be had from F. J. Robinson, Department of Public Works, this city.

Sarnia, Ont.

A by-law has been passed for raising $6,000 to extend the water works.

St. John, N.B.

Word has been received from Hon. William Pugsley, Minister of Public Works, to the effect that the Government have decided to build the wharf petitioned for by the city. The estimated cost of the projected work is from $250,000 to $300,000. It is expected that tenders will shortly be called for.

Plans are being prepared for the enlargement of the Simeon Jones Company's brewery.

Tillsonburg, Ont.

The electors have carried by-laws to grant aid to the Borden Condensed Milk Company and the pork packing company.

Toronto, Ont.

Tenders will be received up to January 14th by Emerson Coatsworth, Chairman, Board of Control, from all trades in the erection of a public bath house on Stephanie place. Plans may be seen at office of City Architect.

Charles F. Wagner, architect, is taking tenders for the construction of two brick stores at East Toronto.

J. B. Millar, Superintendent, Don Valley Brick Works, wants tenders up to January 15th for operating various branches of manufactures. Particulars on application.

Tenders have just closed on the construction of a large house to be built at Bedford Park. Any further particulars may be obtained at residence of Mr. Dack, Bedford Park, and at 836 Dovercourt road.

J. J. Kenney has purchased fifty feet of land on College street, west of the Excelsior skating rink, where he will erect stores and dwellings.

Tenders are invited by E. Coatsworth, Chairman, Board of Control, up to January 14th for the delivery of about 4,000 ties for Ashbridge's Bay Siding. Specifications at office of City Engineer.

Recent building permits include: H. M. Deeth, 3 attached 2-storey brick dwellings, Dufferin street, $6,000; J. Proctor, pair 2-storey semi-detached brick stores and dwellings, Hallam street and Dovercourt road, $5,000; H. Williamson, 2-storey brick veneered front and roughcast dwellings, Shanley street, $2,000; J. H. Smith, 2-storey brick factory, Queen street, $10,000; J. Thornley, 2-storey brick store and dwelling, Dundas street, $3,000; Samuel Benjamin Company, 5-storey brick warehouse, corner King street and Spadina avenue, $55,000; Gendron Manufacturing Company, alterations to factory, Duchess street, $12,000.

Vancouver, B.C.

The Pigeon Company have decided upon the erection of a large addition to their premises.

Work commences next month upon the construction of a 250-foot addition to the piers of the Union Steamship Company.

Hooper & Watkins, architects, have taken out a permit for a brick office building to be erected at the corner of Hastings and Abbott streets for the Song Mong Lim Company.

It is expected that the contract will shortly be let for the construction of the new $70,000 masonic temple to be erected at the corner of Georgia and Seymour streets. The excavation work is already in hand.

Recent building permits include: M. A. Barnett, frame tenement house, Hawks avenue, $3,800; H. Edwards, frame cottage, Homer street $1,000; M. A. Bradley, frame cottage, Homer street, $1,000; T. A. Allan, frame store, Richards street, $2,000; H. E. Campbell, frame cottage, Homer street, $1,000; R. Evans, frame cottage, Second avenue, $1,000; H. I. Brown, frame cottage, Beattie street, $1,100; W. T. Sproule, Burrard street, alterations, $1,200; National Construction Company, office building, Hastings street, $100,000; C. Stapleton, frame dwelling, Eleventh avenue, $1,700; Eric Killberg, frame dwelling, Keefer street, $2,000.

Vermilion, Alta.

Dr. Winters has discovered a large seam of good coal near this town and expects to start running operations shortly.

The school board are preparing to build a new school building to be completed by September next.

Victoria, B.C.

The British Columbia Agricultural Association are taking steps towards the speedy reconstruction of their buildings recently destroyed by fire.

Application will be made at the next session of the legislature for the incorporation of the Chilliwack Manufacturing Company, capitalized at $15,000 to carry on a timber and sawmill business.

Waskada, Man.

The fire committee, composed of J. Sankey and G. R. McLean, have decided to procure a chemical fire engine.

Waterloo, Ont.

The ratepayers have voted to extend the sewer farm, install a sanitary system in the schools and enlarge the gas plant.

Welland, Ont.

The ratepayers carried the following

by-laws: good roads, water works commission, sidewalks, frontage and bag company sewer.

Winnipeg, Man.

The management of the Winnipeg theatre have just taken out a permit for extensive improvements to their building which will probably be put in hand next spring.

It is reported that the large vacant lot at the corner of Heaton street has been purchased by a Toronto firm who will erect a large biscuit and confectionery factory thereon this season.

The Public School Board of Winnipeg are offering $200,000 in debentures for sale. This amount will be expended upon new school buildings.

The Sanitarium Committee will shortly meet and decide upon plans for the buildings of the institution which are to be erected this year.

Wolfville, N.S.

The Arcadia University have completed their canvass for $100,000 and will thus receive the Rockefeller grant of $100,000 and $30,000 from Andrew Carnegie for the new Science building.

Woodstock, Ont.

Rev. J. G. Taylor is maintaining an active campaign in order to raise funds for the erection of the proposed Industrial School for the colored. On his recent trip to Montreal he obtained a sum of $1,100 towards the project. An option on a building site in this city has already been offered.

CONTRACTS AWARDED.

Claresholm, Alta.

H. L. Wannamaker has the contract for the new residence being erected for the manager of the Canadian Bank of Commerce at Granum.

Kincardine, Ont.

The successful tenderer for the building of the new post office was Wm. Nicholson, of Wingham, Ont., at $18,000.

Lion's Head, Ont.

The Department of Public Works have awarded the contract for the extension of the wharf to Kastner & Porter, of Wiarton, Ont,, at $9,000.

Southampton, Ont.

Kastner & Porter, of Wiarton, Ont., have been awarded the contract for the extension of the wharf at $41,000.

Toronto, Ont.

Contractor George Henry will erect the addition to the Toronto General Post Office; estimated cost $20,000.

Victoria, B.C.

The contract for the new school house at Lynn Valley has been let to F. P. Rogers at $1,525.

FIRES.

Convent establishment of the Sisters of Charity, Rimouski, Que; loss, $100,000.

Building of the Dufferin Hotel, Carberry, Man.; loss $15,000.

Farm buildings of John Empey, Brandon, Man.; loss $4,000.

Residence of E. E. Fraser, Loch Lomond, N. S.; loss $2,000.

Store of S. M. Fleet, Ingersoll, Ont.; loss not ascertained.

Property of J. Smedley, the Methodist parsonage, Foster block and other buildings at Richard's Landing, Ont.; heavy loss.

Building of Peterborough curling rink, Peterborough, Ont.; loss $7,000.

Dry goods and grocery store of Arsene Lamy, Montreal, Que.; building loss $25,000.

Factory of Lockerby & McComb, manufacturers of tarred felt, roofing paper and roofers' supplies, Montreal, Que.; loss $50,000.

BUSINESS NOTES.

A report to the effect that the Wilcox Manufacturing Company are making an arrangement with their creditors has been discredited. The plant will probably be offered for sale at an early date.

F. Saunders & Son, builders and contractors, Toronto, Ont., are reported to have dissolved.

The Rural Telephone Company, Limited, Lansdowne, Ont., have obtained a charter; also the Ekfrid Caradoc Telephone Company, Melbourne, Ont.

Amongst the latest companies to secure charters are the Alpha Kappa Kappa House Company, Limited, Toronto, Ont., incorporated to erect buildings for the Kappa Kappa fraternity and capitalized at $15,000, and the Capital Construction Company, Limited, Ottawa, Ont., a new contracting firm, capitalized at $95,000.

Dancy Bros. Company, builders and contractors, Toronto, Ont., have dissolved, and H. N. Dancy and A. H. Dancy have formed a new partnership to carry on a general contracting business. Their temporary offices are at 340 Palmerston Boulevard, Toronto. R. C. Dancy will conduct a separate business, with office at 171 Spadina road, Toronto.

Miller & Burroughes, plumbers and steamfitters, Toronto, announce that they have dissolved partnership and request that all outstanding accounts be sent in at once to B. J. Miller, 351 Spadina avenue, who will hereafter carry on the business.

J. P. Heatherington, lumber dealer, Codys, N. B., is reported to have assigned.

NEW COMPANIES.

Glenwood Comission Company, Limited, Brandon, Man., incorporated to carry on a milling, elevator and lumber business, capital $200,000. Incorporators, R. and J. P. Smith, of Glenwood, Man.; J. H. Ingram and J. B. Noble, of Brandon Man., and others.

Imperial Theatre of Winnipeg, Limited, Winnipeg, Man., incorporated, capital $100,000. Incorporators, T. B. Campbell, John Haffner and W. Mannahan, all of Winnipeg; D. B. Flagg, of Buffalo, N.Y., and W. J. Gilman, of New York City.

Argyle Buildings, Limited, Winnipeg., Man., incorporated, capital $95-000. Incorporators, D. R. Woods, J. J. Quinn, E. Pigot, James E. Robertson and K. Metcalfe, all of Winnipeg.

Van-Bergh Electrical and Manufacturing Company, Limited, Winnipeg, Man., incorporated, capital $250,-000. Incorporators, H. J. MacDonald, K.C., H. Polson, Ashmore Kennedy, W. McMillan, H. R. Hollinshead, James Dodson, E. E. Yates and W. D. Pettigrew, all of Winnipeg.

Winnipeg Saturday Post, Limited, Man., incorporated, capital $20,000. Incorporators, K. Magee, A. Pearson, W. Kennedy and W. J. Sanderson, all of Winnipeg.

Jenking Brass Manufacturing Company, Limited, Montreal, Que., incorporated, capital $350,000. Incorporators, A. L. Bonin, Alexander Mason, Wentworth Young, H. L. Jenking and J. A. Lampard, all of Montreal.

Capital Construction Company, Limited, Ottawa, Ont., incorporated, capital $95,000. Incorporators, W. M. Cornell and J. K. Phillips, of Massena, N. Y., and W. C. Perkins, J. G. Gibson and H. H. Williams, all of Ottawa.

St. Lawrence Lumber and Mining Company, Limited, Cornwall, Ont., incorporated, capital $50,000. Incorporators, W. R. Hitchcock, Cornwall, Ont.; H, B. Chase, L. A Chittenden, H. A. Reed and George W. Minkler, all of Massena, New York, and others.

Dart Union Company, Limited, Toronto, Ont., incorporated as manufacturers in brass and iron, capital $40,-000. Incorporators. E. M. Dart, J. B. Goff, J. M. Goff, G. B. Champlin and G. S. Champlin, all of Providence, N.Y., and others.

Alpha Kappa Kappa House Company, Limited, Toronto, Ont., incorporated, capital $15,000. Incorporators, R. j. Dwyer, J. T. Fotheringham and F. W. Manning, all of Toronto, and others.

International Fence Company, Limited, London, Ont., incorporated to

mauufacture iron fencing and gates, capital $300,000. Incorporators, F. W. MacLaren, C. B. Hillier, E. Meredith and J. M. Ellis, all of London, Ont.

BUILDING NEWS.

The Evans Rotary Engine Company of Canada, Limited, have sold the Seaman Kent Company, Meaford, a 300-16 candle power electric plant to light their new factory. The unit consists of an Evans rotary enginedirect connected to C. G. E. direct current compound wound generator. The floor space of the complete unit is 54 inches x 38 inches and the height, 40 inches.

Building permits issued at Calgary, Alta., during 1907 totalled $2,094,265, which is almost a record for the western city. This figure does not include a large number of new suburban properties.

The mammoth cold storage plant which is to be erected at Prince Rupert, B.C., will cost $250,000.

In 1907 the fire losses of Toronto amounted to more than $1,000,000. The damage sustained in the big conflagrations of 1895 and 1904 alone eclipses this loss in the history of the city.

That street improvement is an important coosideration at Vancouver, B.C., is evidenced by the annual report just issued by City Engineer Clement. The item of three-plank walk heads the list in extent of work, 15.58 miles of this class of improvement having been done. Macadamizing stands next, 13.57 miles having been thus improved during the year. The other items of the report are as follows: wood block pavement, 1.29 miles; asphalt pavement, .80 mile; stone block pavement, .13 mile; streets cleared and rough graded, 4.77 miles; streets graded, 4.42 miles, cement walks, 8.41 miles; cement curbing, 3.24 miles; sewers, 6.86 miles; basement drains, 1.53 miles; storm sewers, .37 mile. This is a good showing considering the restrictions in this class of construction caused at the commencement of the season by the changes in the by-laws.

The new Y.M.C.A. building at St. John, N. B., is rapidly nearing completion. It is ready for the interior work, plumbing and decoration. In addition to the home comforts usually provided by the organization in its buildings, a swimming pool has been installed, and a bowling alley with two runs is a feature. It is estimated that the building when complete will cost $52,000. It stands on the site of the historic old Chipman house and opposite the public library. The architect was G. E. Fairweather.

At the annual reception recently given by the president and officers of the Montreal Builders' Exchange in the Mechanics' Building at Montreal, J. H. Lauer, the secretary, gave a review of the season in the building trades, referring to the general prosperity. It was stated and agreed to by those present that when the temporary financial stringency has passed away, the present year will be as busy and prosperous as the one just passed.

According to the statement of the Railway Gazette the number of freight cars built in the United States and Canada during the past year was 284,188, or 44,000 more than in the preceding year and 100 per cent more than were built in 1900. Of passenger cars there were turned out 5,457, as compared with 3,167 in the preceding year, and double the number constructed in any one year previous to 1906.

The civic building department at Montreal report a total of $8,403,129 for the year just closed.

The building permits issued at Regina, Sask., during 1907 totalled $1,177,980.

The building record of Brandon, Man., for the past year speaks well for the enterprise of this city. Although this figure is a little smaller than that of last year, account must be taken of the short building season and the financial stringency, which put a damper to a certain extent on building and caused the postponement of the erection of a number of edifices to this year. The grand total for 1907 is $715,290.

Perhaps no better tribute to the progressive nature and consequent prosperity of the west has been afforded of late than the splendid building record of Edmonton, Alta., for the past twelve months. In 1907 Edmonton constructed some $2,263,000 worth of new buildings. The most conspicuous feature in this building activity was the large number of dwelling houses which sprang up in all parts of the city and which shows the healthy expansion of the west. The class of dwellings that have been going up within the past two years shows a very decided improvement over those of the earlier days of the new city, and several scores of houses that would do credit to any eastern city have been built during the past twelvemonth. The influx of population has made it a difficult matter to provide adequate housing accommodation, and it is therefore one of the best evidences of increasing permanency when the largest bulk of a year's building permits have been for private residences of a creditable type. In business and public buildings the most important item is that of the new Post Office and Customs building, work on which was begun in midsummer, and is now well advanced, it having been possible, through the mildness of the weather, to continue outside work until two weeks ago. The Government is giving Edmonton a quarter-million dollar bullding in the heart of the city, with the assurance that it will be one of the finest public buildings west of the Lakes. The new Parliament Buildings are to be commenced as soon as weather conditions will permit, and work will be continued probably until late in 1911, it being the hope of the Government to have the buildings completed within three years. The plans for the new two-million dollar Capitol have been finally selected and an announcement has just been made of the character and style of the proposed structure. The Alberta Government has, with wisdom, acted somewhat leisurely in the matter of selecting its plans for the Capitol, and the result is that a building will now be provided which will serve its purposes for all time and be a lasting credit to the province.

That the mineral resources of Gloucester County, N. B., which the Drummond Mining Company, of Londonderry, N. S., are about to develop on such a large scale, are no modern discovery is evidenced by an article that appeared in the "Miramichi Gleaner" of June 2nd, 1838, which announced the arrival of a mining expert named Stevens, together with a special party from Great Britain.

Application will be made by the Bow River Collieries, Limited, at the coming session of the Legislature for a charter to construct a railroad from the mine, which is 55 miles north of Lethbridge, Alta., on the Big Bow river, to the main line of the Canadian Pacific Railway, a distance of 15 miles. As soon as the charter is secured construction will be commenced.

Brantford's building permits for 1907 total $509,945 against $408,625 in 1906, an increase of nearly twenty-five per cent.

THE POWER BY-LAWS.

Following the precedent of Toronto and the overwhelming majority given to the power by-law in that city on New Year's Day the ratepayers of all the municipalities where by-laws have been submitted have come out strongly in favour of cheap power. At London, Hamilton, St. Thomas, Guelph and Brantford, the largest majorities were recorded, but hardly less decisive in proportion were the victories gained at Woodstock, Galt, Waterloo and New Hamburg. The results have exceeded the expectations of the most optimistic.

REINFORCED CONCRETE CHIMNEYS.

(Continued from Page 16)

crete. As a proof of this we may simply point to the indisputable fact that concrete chimneys have been built satisfactorily with a proper factor of safety and with a wet mix which insures a positive bond to the steel, and with a dense concrete which protects the steel from corrosion and permits bonding the various parts of the structure.

Since reinforced concrete is everywhere being constructed on these principles, and is proving durable and satisfactory, and is being used under all conceivable conditions, we have ample cause for security in reinforced concrete chimneys provided they are properly designed and constructed.

Effect of Heat.—In the above discussion the effect upon the chimney of the interior heat from the boilers is not directly referred to. Just what part this has played in the faults which we have noted is uncertain. Undoubtedly the interior heat adds to the stress in the concrete, and thereby increases the tendency to crack, especially at points near the top of the inner lining. This simply indicates, however, that the quantity and arrangement of the steel reinforcement should be adapted to resist this extra stress.

When reinforced concrete was first introduced it was questioned whether, with changes in temperature, the concrete and the steel would not expand and contract unequally, so as to make them separate from each other. If this were the case, it would be especially detrimental to a structure like a chimney where the range in temperature is greater than usual. It has been proved conclusively, however, that concrete and steel have substantially the same co-efficient of expansion. For this reason there can be no separation due to change in temperature.

The interior heat affects the shell in another way, because concrete is a poor conductor. The interior surface for a depth of an inch or two becomes very much hotter than the exterior surface, and so tends to expand and crack the colder outside surface. This effect is most marked upon a thick wall, the action being similar to that of a thick glass bottle which breaks more readily when hot water is poured into it than does one of thin glass. The stress or pull on the outside surface must be met by increasing the amount of circular steel and placing it near this outside surface.

The effect of heat upon the concrete material itself is also a point which must be considered in chimney design. In the earliest chimneys built the concrete lining extended the full height, while in later ones it has been generally carried up to only about one-third the height. Usually the lining has been reinforced concrete, although in some cases firebrick has been used. A few chimneys have been built with no lining at all.

While much remains to be learned with reference to the effect of heat upon concrete, it is known to be a most excellent fire-resisting material, although it has been found that a temperature as high as 1500 degrees F. continued for only two or three hours, will draw out the water of crystallization so as to take out the strength for a depth of 1-2 to 1 inch. Lower temperatures affect the material less, and tests at the Watertown Arsenal indicate that a good cement mortar will not be appreciably injured at 600 to 700 degrees F. Tests of actual chimney temperature are extremely meagre, but from records available we may say that the temperature in an ordinary chimney seldom exceeds 700 degrees F. at the base, while 400 to 500 degrees is more usual. It is a fact not universally known among engineers that the temperature in a chimney remains quite high, even in its upper portion. For example, in the test of one chimney the temperature at three-quarters of the height above the base ranged only 10 to 20 per cent. lower than at the flue. This makes it evident that if the lining extends only one-third of the way from the bottom, the design of the concrete shell above it should be adapted to resist considerable heat, while greater safety may be insured by extending the lining far above the lower third.

Your Association has received no reports of injured linings. Many have never examined the interiors of their chimneys, but several have reported that the lining was in good condition. One correspondent states that after three months' use the interior surface of the chimney is "smooth, without cracks," and that " the soot does not adhere to the surface but falls to the bottom or is carried out by the draft." Since the fire-resisting quality of concrete increases very greatly with age, it is fair to assume that if the interior surface is sound at the end of the first two or three months it will not disintegrate after that time. In this connection Mr. E. L. Ransome reports a recent examination of the inner shell of a chimney built nearly ten years ago of a true concrete of cement, sand and broken stone, in which he found the concrete in the hottest part of the chimney opposite the flue perfectly sound and exceptionally hard.

Concrete, then, may be considered as satisfactory for a lining or an inner shell in ordinary cases, although when exceptionally high temperatures are expected, say above 750 degrees F., it is on the side of safety to employ firebrick.

Summary.—In closing, a recapitulation of the most essential requirements for reinforced concrete chimney design and construction may be made:

(1) Design the foundations according to the best engineering practice.

(2) Compute the dimensions and reinforcement in the chimney with conservative units of stress, providing a factor of safety in the concrete of not less than 4 or 5.

(3) Provide enough vertical steel to take all of the pull without exceeding 14,000 pounds, or at most, 16,000 pounds per square inch.

(4) Provide enough horizontal or circular steel to take the vertical shear (unless it does not exceed 50 pounds per square inch in the concrete) and to resist the tendency to expansion due to the interior heat.

(5) Distribute the horizontal steel by numerous small rods in preference to larger rods spaced farther apart.

(6) Specially reinforce sections where the thickness of the wall of the chimney is changed or which are

liable to marked changes of temperature.

(7) Select first-class materials and thoroughly test them before and during the progress of the work.

(8) Mix the concrete thoroughly and provide enough water to produce a quaking concrete.

(9) Bond the layers of the concrete together.

(10) Accurately place the steel.

(11) Place the concrete around the steel carefully, ramming it so thoroughly that it will slush against the steel and adhere at every point.

(12) Keep the forms rigid.

The fulfilment of these requirements will increase the cost of the structure, but if the recommendations are followed, there should be no difficulty in erecting concrete chimneys which will give thorough satisfaction and last forever.

Nearly a thousand miles of new railroads were laid in Canada during 1907.

MEGGERS AND BRIDGE MEGGERS

From Evershed & Vignoles, Limited, Chiswick, London, W., we have received a booklet describing that firm's patent meggers and bridge-meggers for testing insulation at or above working pressure. The bridge-megger is particularly adapted for the measurement of low resistance. The publication contains numerous diagrams describing the apparatus, together with information as to prices and instructions for using.

EASTERN CONCERNS HAVE A CHILL.

The demand for power and motive equipment in Vancouver is a good criterion of the trend of the times. Power in use makes work for a multiplicity of hands. Power drives wheels and wheels turn machines while skilled men are required to operate them. Skilled salesmen and clerks have to do with the disposal and shipment of the products. Railways must move these and men must operate the trains. Power is the root of much commercial activity, and there is no more promising indication of the continued industrial activity of British Columbia than the present exceedingly active demand for both power and equipment right here in Vancouver. Local equipment houses were never so busy as at the present time, and December has witnessed one of the largest month's sales they have ever enjoyed. One house has a single order requiring $38,000 worth of transformers alone. Telegragh orders for carloads of equipment are constantly being sent forward to rush the big shipments needed for immediate delivery.

This condition obtaining simultaneously with the completion of the British Columbia Electric Railway Company's new 10,000 horse-power unit at Lake Buntzen is a very promising augur for not only a continuation of our present and past prosperity, but a greater industrial activity than ever, for the immediate future.

In discussing this situation a prominent business man says that manufacturers and other British Columbia business men seem to be preparing to seize the opportunities which Easterners who have contracted a chill in their pedal extremities are leaving open to them. The fact is that many Eastern manufacturers have underestimated the situation in the West and in the belief that matters are much worse than they are have relaxed their efforts in this market.

This is shown by reports constantly coming in to the effect that Eastern wholesale houses are withdrawing their travelers. One big house has taken off all its travelers and is sending instead a weekly list to its customers. Western wholesale houses and manufacturers are apparently getting ready to capture the trade the Easterners are neglecting and Vancouver people are taking the lead in the movement.—Saturday Sunset.

ALLOWING FOR SNOW LOADS ON ROOFS.

Where a heavy fall of snow is followed by thawing and freezing successively and then more snow, and so on in repeated cycles, a coherent laminar mass of snow and ice is formed on roofs, which is of remarkable density. Several such "snow" accumulations proved to have a weight of 36 to 38 pounds per cubic foot. In these cases the thickness of the accumulated snow on the roof was 24 inches to 32 inches, thus producing a load of 70 pounds to 100 pounds per square foot. This is three or four times as much as is commonly assumed in calculations.—The Engineer (London).

EFFLORESCENCE ON CONCRETE.

Efflorescence is the term applied to the whitish or yellowish accumulations which often appear on concrete surfaces. "Whitewash" is another name given to these blotches. Efflorescence is due to certain salts leaching out of the concrete and accumulating into thin layers where the water evaporates on the surface. These salts are most probably sulphates of calcium and magnesium, both of which are contained in many cements and both of which are slightly soluble in water. Efflorescence is very erratic in its appearance. Some concretes never exhibit it; in some it may not appear for several years and in others it shows soon after construction and may appear in great quantities. The most effective way to prevent efflorescence would naturally be to use cements entirely free from sulphates, chlorides or whatever other soluble salts are the cause of the phenomenon, but the likelihood of engineers resorting to the trouble of such selection except in instances is not great, even if they know what cements to select, so that other means must be sought.

The most common place for efflorescence to appear in walls is at the horizontal junction of two days' work or where a coping is placed after the main body of the wall has been completed. The reason of this seems to be that the salt solutions seep down through the concrete until they strike the nearly impervious film of cement that forms on the top surface of the old concrete before the new is added and then they follow along this impervious film to the face of the wall. It has been suggested that this cause might be remedied by ending the day's work by a layer whose top has a slight slope down toward the rear of the wall or perhaps by placing all the concrete in similarly sloping layers. Mr. C. H. Cartlidge is authority for the statement that this leaching at joints can be largely done away with by the simple process of washing the top surface of concrete which has been allowed to set over night by scrubbing it with wire brushes in conjunction with thorough flushing with a hose.

But efflorescence frequently appears on the faces of walls built without construction joints and in which a wet concrete is puddled in and not tamped in layers, and here other means are obviously essential. Waterproofing the surface of the wall should be effective so long as the waterproofing lasts; indeed, one of the claims made for some of these waterproofing compounds is that efflorescence is prevented. Failing in any or all of these methods of preventing efflorescence, the engineer must resort to remedial measures. The saline coating must be scraped or chipped or, better, washed away with acids.

Efflorescence was removed from a concrete bridge at Washington, D.C., by using hydrochloric (muriatic) acid and common scrubbing brushes; 30 gallons of acid and 36 scrubbing brushes were used to clean 250 square yards of concrete. The acid was diluted with 4 or 5 parts water to 1 of acid; and water constantly played with a hose on the concrete while being cleaned to prevent penetration of the acid. One house front cleaner and five laborers were employed and the total cost was $150, or 60 cents per square yard. This high cost was due to the difficulty of cleaning the balustrades. It is thought that the cost of cleaning the spandrels and the wing walls did not exceed 20 cents per square yard. The cleaning was perfectly satisfactory. An experiment was made with wire brushes without acid, but the cost was $2.40 per square yard. The flour removed by the wire brushes was found by analysis to be silicate of lime. Acetic acid was tried in place of muriatic, but required more scrubbing.—Engineering-Contracting.

JAR-ABSORBING PLATE TO LESSEN NOISE.

Though many plans to lessen the jar of machinery have been tried, annoyance from steam hammers, etc., continues. A new French remedy is to place under the machine a 2 inch elastic plate consisting of two sheets of steel with an intervening layer of coach springs surrounded by felt.

CONCRETE PIERS FLOATED INTO POSITION.

A concrete block, weighing from seven to fourteen tons, for which it is claimed that it will float in water for a sufficient length of time to tow it to any place desired before it is lowered into position, is a new feature in connection with government breakwater and harbor work, that is at present in its experimental stages in Milwaukee, says "The Improvement Bulletin."

A "trial trip" of one of these blocks being floated to position, was made in Milwaukee harbor recently, under the personal direction of Major W. V. Judson, chief government engineer there and designer of the new style block.

The new block is a reinforced concrete caisson, or box. It may be built to almost any size, to meet the requirements of any particular work. The proposed standard size, however, will weigh about fourteen tons. In the experimental work now being carried on in Milwaukee, the blocks used are half that weight.

They consist of walls of concrete, enclosing a large hollow space. This is made watertight, so that the block floats and can be taken direct to a point over the position in the pier for which it is designed. It is then uncorked, like a barrel, and the water is allowed to rush in, sinking it to position. The hollow space is then filled in with sand and gravel, and when the space is thus filled the block is sealed up.

In floating out to the pier at the breakwater the first of two of these blocks was allowed to remain in the water for twenty-four hours, in order to determine its floating qualities and how long it might be possible to keep a block afloat if necessary before the water caused it to sink. As a rule, a few hours are sufficient time for handling one of these blocks from its starting place to the point where it is desired to lower it.

Inquiry is said to have already been made as to the possibility of securing the application of the patent for construction work in the east and south. It is said that the government alone is authorized to use them, as they are fully protected by letters patent.

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Hemlock, 1 x 4 to 8 inch	19.00 20.00
2 x 4 to 8 inch, 12 to 16 feet	22.00 23.00
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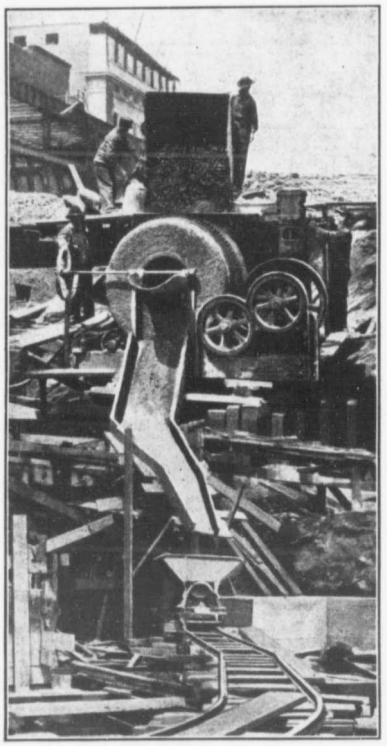

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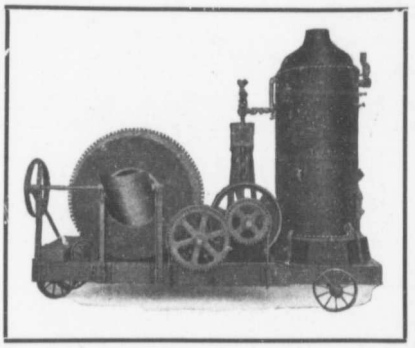

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