Canadian Engineer

(Including THE CANADIAN CEMENT & CONCRETE REVIEW)

A WEEKLY JOURNAL

For CIVIL, MECHANICAL, ELECTRICAL and RAILROAD ENGINEERS and CONTRACTORS

MONTREAL OFFICE: 833 Board of Trade Building

HEAD OFFICE—TORONTO 62 Church str... ner Court.

WINNIPEG OFFICE: 404 Builders' Exchange

Vol. 20—No. 5 Toronto, Fe... 11 Single Copies 10 Cents

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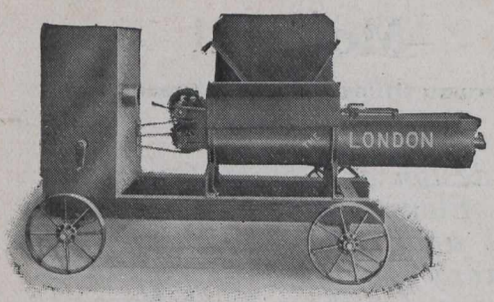

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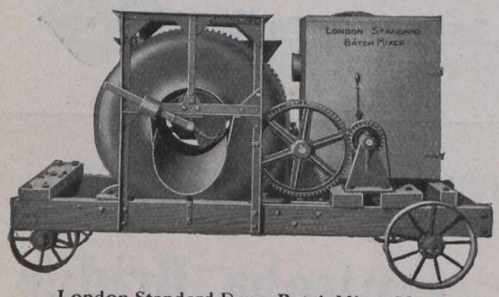

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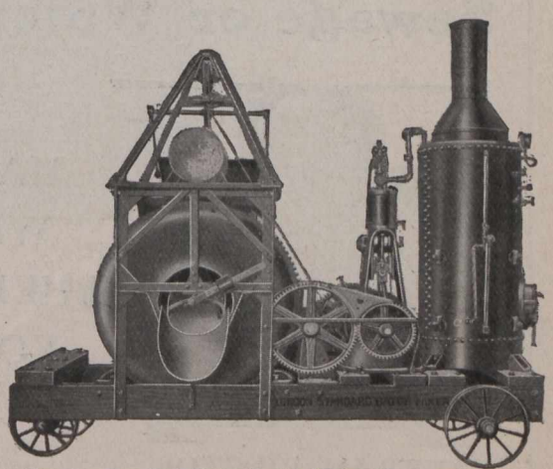

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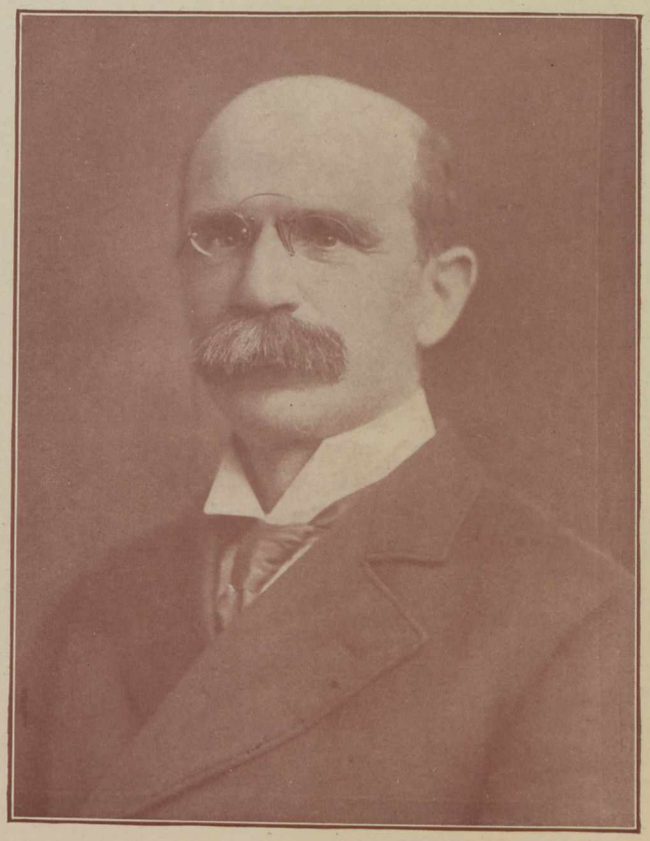

C. H. Rust.

PRESIDENT CANADIAN SOCIETY CIVIL ENGINEERS.
CITY ENGINEER, TORONTO, CANADA.

Volume 20. Toronto, February 2, 1911 Contents of this issue on page 253

THE CANADIAN ENGINEER

An Engineering Weekly.

THE NEWLY ELECTED PRESIDENT OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.

During his professional experience, Charles Henry Rust has held many honorary positions and has been elected as a member of numerous important organizations, but we fancy that his election as president of the Canadian Society of Civil Engineers for the year Nineteen Hundred and Eleven will be to him the most gratifying of them all.

This blue ribbon of honorable distinction has been worn by the most prominent and successful and likeable of Canadian engineers, and to be placed in the same list with a Gzowski, a Jennings, a Keffer, a Kennedy, a Mountain, a Galbraith, a Ruttan, and the other engineers who have been elected president of the national association which represents the engineers practising the various branches of the profession in Canada, is an honor recognized by every Canadian and appreciated by every recipient.

During the dozen years that Mr. Rust has been city engineer for the city of Toronto, he has had to solve the problems that face one who provides sanitary conveniences, transportation routes, and parks and pleasure grounds for a community that trebles its population in a decade and which still has growing pains.

Mr. Rust is come of English parentage, being born on Christmas Day, 1852, in Essex, England. The Brentwood Grammar School gave him his foundation in English and Mathematics, and it was here that his love to excel brought him his first reward in winning for him two scholarships. Perhaps, though, it was not so much his ambition as his love for mastery of each subject with which he comes in contact that encouraged him to become so intimately familiar with small details as to enable him to elucidate each question presented with graphic clearness that won for him the coveted mortar-board and yellow tassel. Be which it may, the faculty for carefulness and exactness and thoroughness which characterized his school days has not forsaken him in the years since, and it developed in his early training with the Great Western Railway, Paddington, and under the late Mr. Frank Shanly, C.E.

Over thirty-four years ago Mr. Rust entered the service of the city of Toronto in a junior position and quick promotion followed until in 1883 he was appointed assistant engineer in charge of sewers. From 1887 to 1891 he was principal assistant, and in 1892 was made acting chief engineer. Six years later he was appointed city engineer, which position he has filled with profit to the city of Toronto, with honor to the profession which he has chosen for his life work, and credit to himself as a man of affairs and a gentleman.

Although Mr. Rust has given close and intense attention to his duties as a city engineer, yet he has found time to take an active part in the affairs of the Canadian Society of Civil Engineers, being elected to the Council in 1887, and elected Vice-President in 1891.

Mr. Rust is also member of the American Society of Civil Engineers, The American Waterworks Association and the American Society of Municipal Improvements. Of this latter society he was in 1902-3 president, and he still maintains a very active interest in this organization, being Chairman of the Committee on Standard Specifications for Pavements.

In municipal engineering the position of city engineer of Toronto is one of the most important posts and it is fortunate that a position of such prominence is occupied by one possessing high professional qualifications and standing personal honor and the confidence of the community for whom he has to provide so many facilities.

ELEMENTS OF STRUCTURAL STEEL DESIGNING.

Detailing.

Wm. Snaith.*

(Continued from last issue, page 225.)

(This is the third of a series of articles by Mr. Snaith. —Ed. Canadian Engineer.)

Mechanical drawing is the nearest approach in modern times to a universal language. If notes in any particular language are omitted and the proper number of views and the requisite dimensions are given, a structure or machine designed in America could be built in Germany or Russia, the workmen who had to read the drawing being only required to understand the system of measurement in which the dimensions were expressed. We may expand the idea of comparison with a language and say that its grammar consists of conventional signs, conventional methods of representing sections of different materials, screw-threads, etc.; and the rhetoric of the subject can be looked on as consisting of "standards" of different kinds. This is not

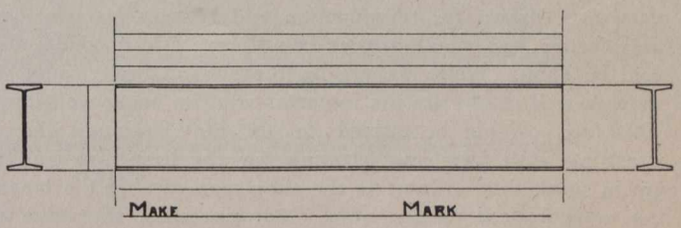

Fig. 1

to be considered as so much imagination, for the expression of ideas correctly in a drawing involves the following of practice and precedent to exactly the same extent as the expression of ideas by speech. While this line of reasoning emphasizes the importance of clear drawings, the subject of detailing must be regarded as of even greater importance from the standpoint of strength. Somewhere we have seen a statement that "a student can construct a stress-sheet but it takes an engineer to do the detailing," and we are disposed to appreciate the wisdom of the statement. It should not be supposed that the effects of secondary stresses must be thoroughly understood before scientific detailing can be accomplished. The designs of some of the simplest structures offer opportunities for the application of an extensive knowledge of strength of materials and methods of fabrication. The details of a bridge truss should be not only strong enough to properly connect the main members, but should also take into account the effect of vibration and the necessity for rigidity. The presence of sufficient material

*With Barber & Young, Structural Engineers, Toronto, Ont.

in the main members is of even less importance than the use of enough metal in the details.

Drawings.

We shall not here concern ourselves with the materials used in making drawings. In general, structural detailing is done on the unglazed size of tracing cloth and is inked in from preliminary pencil lines. Practice will give speed and much of a drawing can be done directly in ink after the draftsman has gained experience; but it will generally pay the beginner at first to complete the drawing in pencil before putting a single ink line on it. Failure to accept this advice will make it necessary to make use of the information that after the patient use of an ink eraser and probably a metal "erasing-shield," it is wise to rub the surface of the tracing cloth with a stick of soapstone or pumice stone, in order to prevent the ink from spreading.

If good work is expected from the shop the drawings must be good. The moral effect of a first-class drawing cannot be over-estimated, while a poor drawing, dimensioned

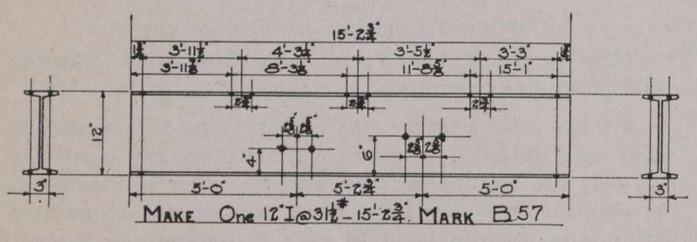

Fig. 2

inconveniently, although possibly correctly, or with irregular lettering, will not inspire confidence in its accuracy and will lead to inaccurate shopwork. The drawings in most of the technical works mentioned in the first article of this series may be used as good examples to follow, but it must be kept in mind that the size of lettering on such drawings, drawn for reproduction and reduced, is considerably larger than would appear in ordinary drawings intended for the shop. While we are on the subject of lettering we may as well emphasize the importance of its being well done. This fact will not be agreed to by the beginner who is wrestling with free-hand lettering for the first time and is apt to think that so long as the shop man can see his meaning, appearances matter little. To appreciate the value of such reasoning we can return to our analogy that drawing bears to language. One is not likely to value the opinion of the man who, in expressing it, "seen them things hisself," although his meaning may be perfectly clear.

Clear-cut lines, not overrunning points where they should end and heavy enough to give good results in blue printing should be used. Dimension lines should be fainter than the lines of the drawing itself. The usual arrangement of the views consists in drawing the top view or plan above the elevation and end views at that side of the elevation of which they represent the end; bottom views are very rarely drawn, sections taken near the bottom are drawn and placed below the elevation. Members are detailed in the position they occupy in the structure, horizontal members lengthwise, and vertical pieces crosswise; inclined members and vertical ones if necessary, are shown lengthwise on the sheet with the lower end to the left. The principal members cut in making a sectional drawing are blackened in or cross-hatched—the shaft of a column in a view of a column footing will stand out clearly as will the shapes that are used in a plate girder if the section cut both web and flanges.

The importance of dimensioning drawings has been hinted at, but there are few detailers whose work on this score is beyond criticism. There can be no absolute method of putting dimensions on a drawing that will be universally satisfactory until all practice is standardized. In the meantime the methods in use in the shop must be thoroughly understood by the drafting room, the draftsman must understand the possibilities and methods of the "layers-out" and inspectors. Standard spacings of rivets in I-beams, etc., are given in all the handbooks (e.g. Cambria, pp. 50 to 52) and should always be used. All dimensions should be given from well-defined lines or points in the member and seldom from lines outside of it. At times it is convenient to locate points from a center line. It should never be necessary for the man in the shop to perform any arithmetical work to obtain a dimension; he will frequently be found to be rusty on the subject, and as we know by unfortunate experience that mistakes in addition of fractions can be made in the office, we should be unreasonable in expecting infallibility in the shop. Field holes, which are always shown blackened in, should be located independently of shop rivets or it will be very difficult to check position after the rivet holes, from which they may be located, are covered by rivet heads. The same dimension may be repeated several times for the sake of clearness but this should be done with great care and as seldom as possible. It is inevitable that changes should be required and if dimensions are repeated indiscriminately there is every probability that some of them will be missed when an alteration is made. No extensive study of the Theory of Probability is required to see that if there is a right and a wrong dimension the chances are even that the wrong one will be used. In the mechanical work of writing in the dimensions the most satisfactory place is in a break in the dimension line, but frequently, for the sake of rapidity, the lines are unbroken and the dimension is written on top. The writing of a dimension at some distance from the place it should go

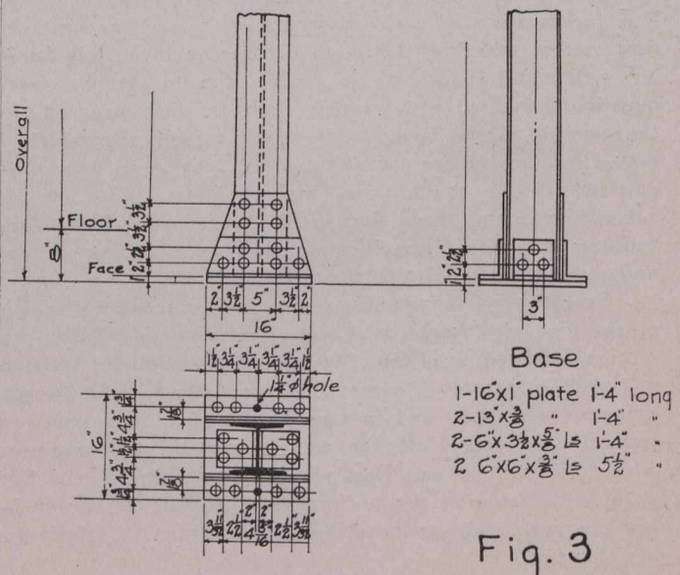

Fig. 3

and connecting it thereto with what is familiarly termed a "sea-serpent," is a makeshift and should be seen as seldom as its namesake. It is good practice to write dimensions over 9" in feet and inches—0'-10¾", 7'-3"; although sometimes all dimensions up to 24" are expressed in inches. Widths of plates are always given in inches and the length in feet, and the general way of specifying a plate is:—1 plate 16" x ¾" x 4'-6". The longer leg of an angle is written first and the thickness last:—1 L 5" x 3" x 5-16". Notes

should be reduced to a minimum and additional views should be made rather than covering the same space with lettering which may not be read at the right time. When notes are used they should not be telegraphic messages for the sake of making them short, but should say clearly all they are intended to say.

Office Practice.

There is no such thing as standardization of office practice and there seems no prospect of such a thing; the beginner or new man will consult his own happiness in finding out the peculiarities of the office as soon as he can and conforming to them as quickly as he finds them out.

From time to time suggestions are made looking to the adoption of standard sizes of working drawings, but there are apparently as many varieties as there ever were. In general the size of a drawing is the least important thing about it and while it is desirable that all the drawings in a set should be uniform in size, it is not imperative. "Blanket" drawings, as the monstrous sheets sometimes used are aptly termed, are indefensible and amount to a confession of incompetence on the part of the draftsman to turn out work of any degree of refinement. A good method to use in adopting a set of standard sizes is to make the external dimension of one size double one of the sides of the next smaller. The standard adopted by the writer is based on a sketch sheet 9" x 12." The next size is made by doubling the 9" dimension, obtaining 12" x 18", which, with the next size larger 18" x 24", will cut economically out of the 36" width of tracing cloth. For larger drawings and lay-outs the size would be 24" x 36." The further advantage of these sizes lies in the fact that the largest size can be exactly folded down to the size of the smallest.

Some method of indexing and filing drawings must be used in every office and the technical magazines constantly contain descriptions of systems which are perfectly satisfactory to the office in which they are devised. The writer has devised a card index system, based on the Dewey decimal system of indexing which has proved satisfactory, but there are so many points of divergence in drafting room practice that a description of it would probably be of small value. The opinion is sustained by experience that this is a matter that must be worked out by each office for itself. It is the part of wisdom for the new man in an office to treat its method of filing with respect, for it will not be changed for his benefit and, in general, sufficient thought has gone into its evolution to entitle it to reverence in the eyes of those responsible for its existence.

In almost every chapter written on drafting room practice it is insisted that careful records of all computations and sketches should be kept in note books and not made on scratch paper. There is no doubt of the need for such advice, but it would appear from observation that it is disregarded by all but the best draftsmen and engineers, probably because a beginner not unnaturally supposes his computations not worth preserving, and therefore never cultivates the habit. If loose-leaf notebooks are used and some abbreviated title written on each sheet to identify it, the material of improbable value can be discarded and notes of importance transferred from one book to another. We have pointed out that it is unfortunately common knowledge that mistakes will occur. It should be of real assistance in preventing the same mistake from happening twice if it can be traced to its source in notes thus preserved.

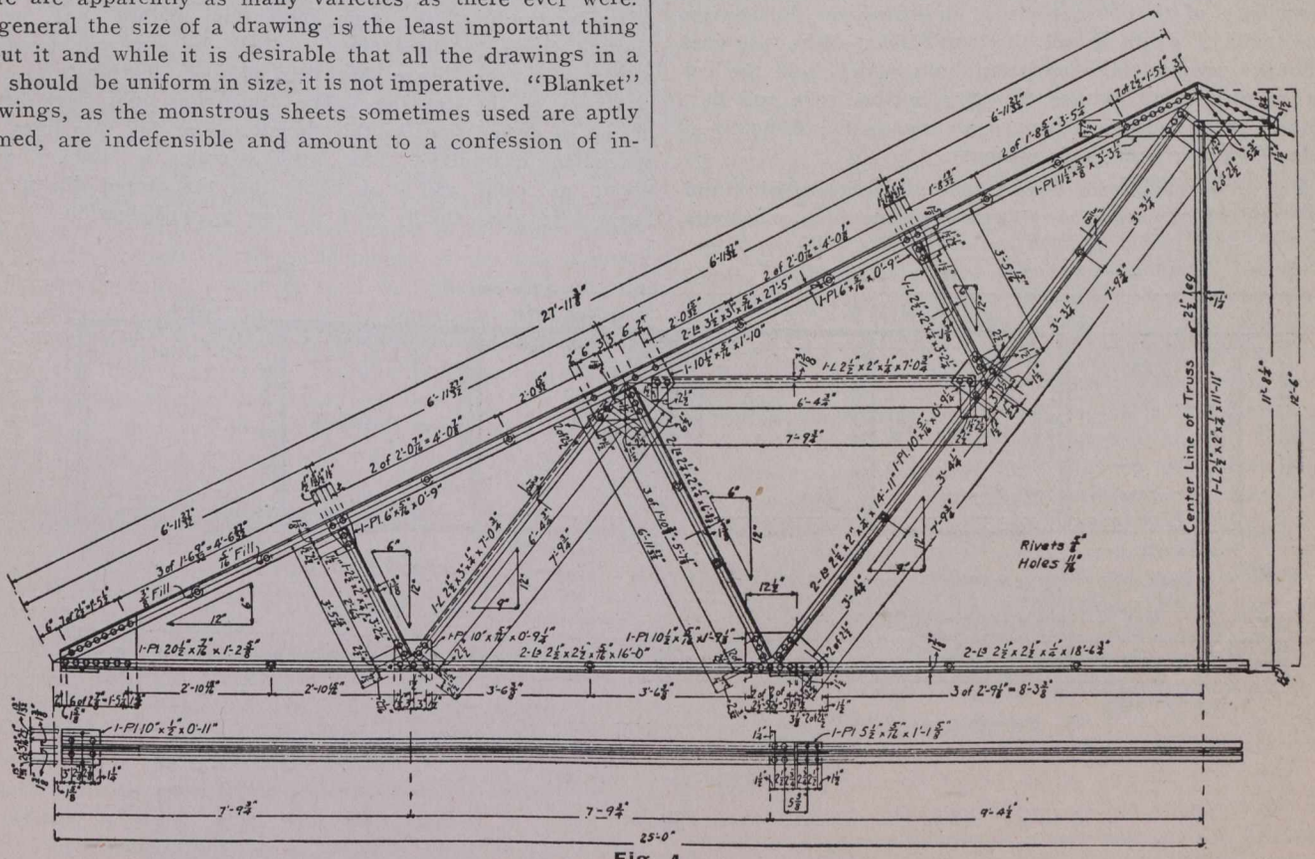

Fig. 4.

Examples of Detailing.

The scale of a simple drawing is of negligible value if it can be properly dimensioned. In the case of the drawing of an I-beam with connection angles, etc., it will not make any difference to the shop whether it is drawn to scale or not. In many large offices advantage is taken of this fact by having printed sheets with the commoner details blanked out, requiring only to be slightly added to and dimensioned. Fig. 1 illustrates such a sheet applied to I-beam details. Fig. 2 shows the same sheet filled in and dimensioned. Titles, etc., have been omitted in these figures but are, of course, printed on the sheets as well as general notes as to

rivet sizes, paint, etc. Not only do these sheets save a great deal of laborious work, but they promote accuracy and prevent omissions. In a small office where it might not be economy to have such sheets printed the method can be used to the extent of omitting the scale and drawing all beams the same size and filling in as in Fig. 2. If a blank sheet were constructed it could be traced over indefinitely.

The column base detail shown in Fig. 3 illustrates the placing of the three views and the method of dimensioning. The column consists of an H shape 8" x 8" weighing 34.5 lbs. per foot. The material in the base is specified in the drawing. It will be noted that the rivet heads are not shown by semi-circles in the plan or the elevations. No useful purpose would be served by taking the time to draw them in, since they have been completely indicated by the full circles. The fact that the rivets are countersunk in the bottom face of the base plate is indicated by the conventional method given in all the handbooks. The 1¼" inch field holes are for the foundation bolts which hold the column in place and whose diameter in this case will be 1 inch., allowing ample clearance, owing to the difficulty of placing bolts accurately in masonry.

Fig. 4 is reproduced from Ketchum's "Steel Mill Buildings" and represents a very completely detailed roof-truss. It will be seen that this drawing shows the exact number of rivets, and their positions, and the dimensions of every plate and member. A study of the way in which the dimensions have been placed will be profitable, and is illustrated better by the figure than by any description in words. The placing of the dimensions so that it will not be necessary to add or subtract in order to get any dimensions required in laying out the work in shop, has been admirably carried out. The position of the field holes clearly shows how the truss will be divided for shipment. It will be noted that fillers have been used in the compression members. These consist of round washers as thick as the space between the vertical legs of the angles making up the member, and their office is to make the two angles act as one member. They have in this case been used in some of the tension members as well, where they are not called for by any theoretical consideration. Their use is justified by several practical considerations. If there is any liability to vibration in the structure they will prevent the tension members from striking together. During erection it is quite possible that a reversal of stress may take place and members in tension in the finished structure may be required to take compression, and the fillers then become as necessary in them as in the actual compression members.

A number of points of technical interest attach to the plate girder illustrated in Fig. 5, which has been copied from W. Chase Thompson's "Bridge and Structural Design." It is inserted here, however, to illustrate the practice in detailing members of this class. A description of the figure is unnecessary. The remarks regarding the dimensioning of the roof truss apply equally to this example of detailing. It will be noted that the spacing of the rivets is the same in all the stiffeners and in the web splice. It is probable that the girder was designed with a view to punching the holes on a "spacing-table," or punching machine capable of punching a row of holes across the web plate at one operation. Where there is no ambiguity, nor any possibility of misunderstanding, the sign indicating inches has been omitted from the dimensions; it will be apparent from a reference to the figure that this adds, if anything, to the clearness of the drawing. The dimension lines have been drawn as dotted lines in this figure and as full thin lines in preceding examples. The latter practice is quicker and about as clear and it is likely that the dotted dimension lines were used chiefly with a view to reproduction.

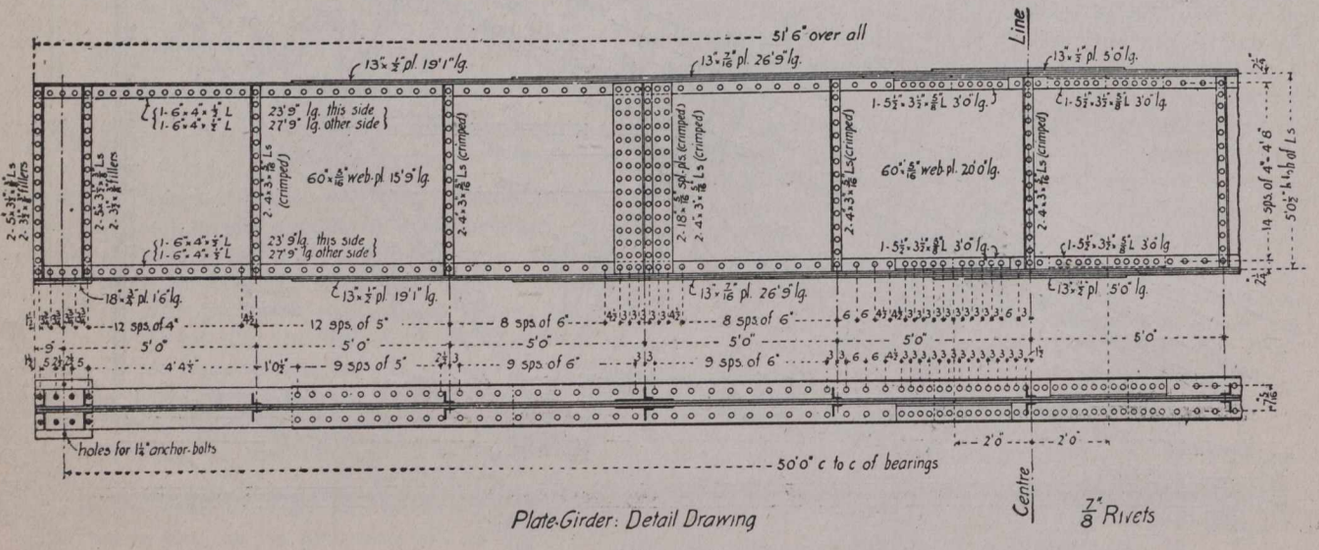

Plate-Girder: Detail Drawing

Fig. 5.

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British Columbia.—All Red Line, $150,000; Arbutus Development Co., $125,000; Columbia Encampment, No. 5, I.O.O.F.; El-Oso Paving Co. of British Columbia, $50,000; Farmstead Land Co., £10,000; Home Loan and Contract Co., $300,000; Japanese Merchants' Association, of Vancouver; Okanagan Renard Train Co., $75,000; Oliver Scrim Lumber Co., $100,000; Pearson, Limited, $1,000,000; Red Cliff Brick and Tile Co., $150,000; Summit Creek Hydraulic Mining Co., $125,000.

IRON AND STEEL.

At the meeting of the Toronto Engineers' Club an instructive address upon "Iron and Steel" was given by Mr. T. R. Loudon, lecturer in Ferro-Metallurgy in Toronto University. Mr. Loudon's address was aided by the stereopticon. An abstract of the address is here given.

In taking up the subject of iron and steel I desire to show some comparison of the different processes, showing the electric furnace to be the final successor to the present-day types, and also to say something concerning re-rolled rails. Concerning the subject of re-rolled rails, however, for some reason there is very little information to be had.

The electric process and the ordinary process are somewhat akin, and should not be thought of as distinctly different. As to the question of iron manufacture, we may say that from 25,000,000 to 30,000,000 tons of pig iron were manufactured in the United States last year. Germany is second with 14,000,000 to 15,000,000 tons, and this from a low-grade ore. Great Britain produces 8,000,000 tons of pig iron, being third among the nations producing this. About four-fifths of this pig iron, it is estimated, is made into steel. In the United States, which leads the rail industry, about 4,500,000 tons of steel rails are manufactured. So we see the study of the development of the steel industry is largely a study of the development of the rail industry. The phosphorous content in steel for the last twenty years has been increasing. At first we found but 0.5 per cent. present; later, .8 per cent., and to-day as high as 1 per cent. is found to be present. The quality of steel in gradually deteriorating, or else the present process does not meet the present demands. Ten years ago there was no electric furnace used, five years ago it was thought of, and to-day it is used in Sweden and Germany especially, and the result is that the steel produced is of extraordinary good quality. For various reasons, which I will show, it seems to be the final logical successor to the present type. Steel, of course, is not a homogeneous material; carbon, manganese, phosphorus, silicon and sulphur enter into its composition; either desirably or undesirably, they are present. Leaving just here the silicon and manganese out of account, we may say that by raising the carbon content the strength of the steel is raised, generally speaking. Phosphorus raises the strength of a steel, but has a detrimental effect in the manufacture which offsets any benefit from it. Sulphur is not desirable in steel. Steel with high sulphur content cannot be rolled successfully. The presence of oxides in steel is also undesirable. The steel will be extremely brittle if oxides are present. It would be well to remember in this discussion the properties of acids and bases. The acid, of course, seeks to attack the base and the base to attack the acid. In the blast furnace the ore is, of course, dumped in and iron is smelted out, and, as commercial ore is not pure iron, a large amount of impurities, known as slag, collects on top of the iron. Coke is used to reduce iron from the ore; and, furthermore, an excess of coke is used to aid in the production of heat. Herein lies one of the economical advantages of the electric furnace, for the electric furnace requires only the amount of coke necessary to give the chemical reaction, and this excess coke is not needed. Phosphorus is not eliminated in the blast furnace. To eliminate phosphorus large quantities of limestone are necessary, which would lower the temperature. The changes in atmospheric conditions have a rather more serious effect in the economic use of the blast furnace than is sometimes supposed. When thousands of feet of air per minute are being forced in by the blast, some days an enormous amount of water must be sent in, with great tendency to lower the temperature. This, then, is another point where the electric furnace would have the advantage, in that it needs no blast; consequently this moisture would not be introduced to seriously lower the temperature. The gas which comes from the blast furnace is to-day utilized, whereas years ago it was allowed to escape. The flue dust from the blast furnace, amounting to about 2 per cent. of ore put in, can be dispensed with by the use of the electric furnace. While 2 per cent. seems a small percentage, in a furnace that is turning out 500 tons of pig iron the ore would be about 1,000 tons, and 2 per cent. of this quantity as flue dust is a decided waste, and a large saving by the use of the electric furnace could be effected.

In the tracing of the process from pig iron to steel after leaving the blast furnace we come to the mixer. This takes the products for use and mixes them; and furthermore, as it has been seen, the mixer has developed another function unlooked for. The sulphur separates out, as much as 45 per cent. disappearing in the mixer, which is, as can easily be seen, a desirable feature.

The Bessemer process of steel manufacture has as its chief object the elimination of the impurities of the pig iron. In this process a blast of air is blown through the converter at a pressure of about 30 pounds per square inch. The great amount of oxygen thus introduced eliminates the metalloids, and finally produces the pure article. There are two types, the acid Bessemer and the basic Bessemer processes. Both of these have their disadvantages. In the acid Bessemer process care must be taken to avoid having an over-abundance of bases floating around, as the acid lining will be eaten away. In the basic Bessemer process acids floating around will eat away the basic lining. The method of telling the completion of the process in the acid process is by the flame when the carbon begins to burn. In the acid process, to keep sufficient heat to keep the metal molten one must have high silicon and low sulphur. Phosphorus cannot be eliminated by this process, as you would form an acid. Low phosphorous ore is expensive, and is disappearing, and the acid Bessemer process, it would seem, will likewise be eliminated. In the basic Bessemer process the phosphorus can be eliminated, but there cannot be high silicon; consequently there is high sulphur, which is also most undesirable. Hence the failing of the basic Bessemer process. In both the Bessemer processes we find the production of oxides, and, together with the inability to get rid of the sulphur by it, we are forced on to another process.

In the acid open-hearth process we cannot have large quantities of bases floating, as they will eat up the acid of the hearth. Acid open-hearth steel is looked upon as good steel. However, we must use steel low in phosphorus. On account of the fact that sulphur is not well eliminated, the tendency will be for this process to disappear. In the basic open-hearth process we use limestone, scrap and pig iron. We may eliminate phosphorus by having a large quantity of lime. The excess of oxygen in the flame eliminates to a certain extent these metalloids until the slag forms. To introduce the oxygen iron ore is used. If, however, there is present a large excess of iron oxide, the result will be oxides in the steel produced, and the sulphur cannot be eliminated. Thus we want a process to eliminate the sulphur; and none did it satisfactorily. The electric furnace, however, seems to do the required work. The electric furnace is supplied by currents producing an arc flame. The open-hearth is liable to introduce some sulphur, even by its flame; hence another advantage of the electric furnace, which has no sulphur flame. The open-hearth furnace can be raised to a high temperature, but only with the danger of melting the furnace. With the electric furnace the high temperature can be obtained without this danger. Regarding the problem of oxides, it might be said that iron ore

oxidizes out phosphorus. In the electric furnace it is possible to pour off the slag, and by the addition of coke we can entirely eliminate phosphorus. The Prussian Government gets its rails from the product of the electric furnace. The Illinois Steel Company eliminates partially by acid Bessemer process, and then using the electric furnace gets a good grade of steel. The electric furnace in every case can supersede the crucible steel process. With the electric furnace it is possible to utilize about 85 per cent. of the expended heat, whereas by the crucible method sometimes but 5 per cent. is utilized, with the enormous loss of 95 per cent. of the heat.

Regarding the re-rolling of rails, a few general remarks may be of interest. A diagonal pass is that used in the rolling. The things liable to happen if guides should get loose would be a tear in the web and a disfigured rail. What actually happens sometimes is the formation of what apparently is a small ribbon under the head of, perhaps, but 1-16-inch. This is not a ribbon, however, as a microscopic examination would show. It is unsightly, however, and would not appeal to the trackman, who might discard the rail as being defective. A waste is sometimes brought about by sawing off the end of the old rail because of the presence of a hole in the web. Since the rail seldom fails as a girder, this is unnecessary, and new holes could be bored between the old in the re-rolled rail without seriously injuring the strength of the rail. In re-rolling larger to a smaller section the wearing surface must be ½-inch deep. In re-rolling a 110-pound rail to an 80-pound rail, the 80-pound rail has been shown by test to be as strong as the 110-pound rail. In re-rolling there is a difficulty of getting straight rails. To straighten rails there is a method in vogue of placing them in the hub of a wheel, and by jerking this wheel straighten the rail. This does not seem to be a very satisfactory procedure. In some cases as much as 60 per cent. of the rails produced have been found to be twisted. To get a good rail the specifications should not allow but a certain per cent. of re-twisted rails. The re-rolling of rails produces a finer rail; and furthermore, there is nothing like re-rolling a rail to bring out any defect it may have.

In a discussion on Mr. Loudon's paper the principal objection to the electric furnace as expressed by those present was the present high cost of production by that method for anything but tool steel where it could be used to advantage.

SELLING HYDRO-ELECTRIC POWER.

Among the factors entering into the development of a water-power, it is undoubtedly true that the most important —the one that ultimately determines the success or failure of the project—is the market. This is quite a different state of affairs from that obtaining with steam or gas power, for in these cases, the cost of construction and the cost of operation bear the most weight. The prime importance of careful study of a possible market for hydro-electric power is well exemplified in the history of a small development on the Saluda River, near Greenville, S.C.

The promoters of this project after tentatively deciding upon a location, employed the engineering firm of Lockwood, Greene & Company, Boston, to study the situation and report on its possibilities. After an investigation of the river flow, surveys of the site and possible storage pond, and a careful study of the market available, the engineers made a complete report, reviewing the situation and recommending that the available power be exploited because of the excellent outlook for a market in the city of Greenville and its environs. The cost of constructing the plant entire was rather high, running to approximately $215 per primary horse-power delivered in Greenville, figured on the minimum dry season flow, or $175 figured on the average dry season flow, but the real value of the development lay in its location and its relation to the city of Greenville.

The engineers' faith in the intrinsic worth of the **situation** of this plant with regard to the power consumers of the section proved to be well founded. The plant had been operating but a few years, at a fair rate of profit to the investors, when an offer was made for the property by the Southern Power Company, which was so advantageous that it could not well be refused. The plant is now being operated by the Southern Power Company, in conjunction with its extended hydro-electric system in this region.

The main point of interest to be gleamed from the story of this power development is the influence of the first careful study of available market, on its subsequent destinies. The fact that it was located at a psychological point in the hydro-electric field of the state had far more influence on its final success as a business venture, than the cost of building or any of the usual factors of mechanical or electrical nature usually associated with the success or failure of a power plant.

STEAM TURBINES vs. PRODUCER GAS ENGINES.

Steam turbines have earned a wide and well-deserved reputation for the highest economy in driving very large generators, but it is perhaps less common to see an instance where on relatively small generators they give lower costs than even producer gas engines. Such a case is presented in a recent report by F. W. Dean, mill engineer and architect of Boston, on alternative plants for a factory requiring 1,000 i.h.p.

For a condensing Corliss engine, with generators, boilers, and full installation of plant and house, the estimated cost was $69.75 per i.h.p.; while the cost of operating, including fixed charges on the plant, was $19.19; or if the charges were reduced by the part chargeable to other than power uses, $18.00.

For gas engines and producers the cost of installation was estimated at $67.50 per i.h.p., made up as follows:—

Two horizontal double-acting gas engines	$21,000
Two 300 k.w. generators, 60 cyc., 220 v	6,600
Two 38 ½ k.w. exciter sets	3,000
Two producers	7,700
	$38,300
Add about 10 per cent. for freight and erection	3,800
	$42,100
Foundations	1,100
	$43,200
Add about 10 per cent. for contingencies	4,300
	$47,500
Cost of buildings	20,000
Total	$67,500

The cost of operating this producer plant was estimated as follows:

Fixed charges on plant, 14 per cent. of $67.50..	$ 9.45
Attendance per i.h.p. per year	3.21
Oil, waste, and supplies	0.50
	$13.16

To this figure was added the cost of coal, which was taken as 2 lbs. per k.w. hour, including stand-by losses, equivalent to 1.28 lbs. per i.h.p. per hour. The total cost per i.h.p. per year was figured as follows:

1 h.p. x 1.28 lbs. x 9 hrs. x 310 ds. = 1.786 tons.
2,000 lbs.

1.786 tons at $2.35 (the local price)	$ 4.02
This added to $13.16 gives the yearly cost per i.h.p. per year with gas engines as	$17.18

For steam turbines, estimates were given, "nearly correct," as follows:

Two 300 k.w. steam turbines with condensers at $47 per k.w.	$28,200
Boilers, $12 per k.w.	7,200
Piping, flues, heaters, pumps, etc., at $7	4,200
Foundations, at $1	600
Chimney, at $4	2,400
Building, at $20	12,000
	$54,600
Cost per k.w.	90
Cost on indicated h.p. basis	57

This shows an initial cost considerably lower than the gas installation, and the cost of attendance and operation would, of course, be less than for the reciprocating plant, and at least no greater than for the gas plant.

COST OF MOTOR TRUCK OPERATION.

In eight years, the price of work horses has increased one-half. Drivers' wages have risen one-third. Feed costs twenty per cent. more, says D. V. Casey in "System." For this extra outlay, however, the man who owns or hires teams to haul his materials or merchandise, gets nothing in return. If he can't cut production or inside handling cost, he must take the added toll out of his goods, his customers or his own pocket.

At the same time, service demands have been growing. Cities have expanded. Trolley lines have multiplied suburban buyers. Customers insist on swift and frequent deliveries. Distribution has been speeded up to the point where horse flesh cannot hold the pace and keep expense within the limit business can pay. Hiring teams—two-thirds of Chicago's trucking is done thus—has shifted part of the burden. But hired or owned, a two-horse team cannot average more than twenty miles a day and haul seven thousand pounds over half the distance.

Five-ton Gasoline Wagon.

In an endeavor to cut this increased expense of hauling many large firms have introduced the motor-truck. One of the difficulties in the introduction of the motor-truck has been the cost of up-keep, and the difficulty of securing accurate information as to what this probable cost may be.

The table given herewith covers a complete order giving the mileage, tonnage and complete costs, and shows a remarkable saving over the horse teaming.

What It Costs to Operate a Five Ton Motor Truck One Year.

This is one of three heavy-duty gasoline trucks now in use in New York. Hauls are short, ranging from four to six miles, though a few trips run up to eighteen miles.

1909-1910	Miles	Tonnage	Gasoline	Oil	Supplies	Repairs	Wages	Totals
August	679	342.5	$25.54	$ 6.79	$ .22	$ 1.55	$117.00	$151.10
September	666.5	381	23.46	7.98	.22	1.10	117.00	149.76
October	705.5	363.5	19.98	7.22	.52	4.66	117.00	149.38
November	645	333	19.03	7.28	.47	5.24	117.00	149.02
December	553	326	17.89	7.42	5.59	77.01	121.50	229.51
January	676	337	24.03	8.50	.13	430.45	121.50	584.61
February	692	334.5	20.77	8.97	.29	3.21	111.01	144.25
March	761	362.5	20.56	11.06	1.42	8.31	126.01	167.36
April	680.5	333	19.56	8.35	.71	47.89	116.15	192.66
May	717	326	21.42	8.55		335.81	121.34	487.12
June	813.5	424	25.62	9.88	.58	5.26	121.32	162.56
July	564	284	16.75	7.20	.34	.32	111.28	135.89
One year	8153	4147	$254.61	$99.20	$10.49	$920.81	$1418.11	$2703.22
Add charges for Interest $235, Depreciation $740, Insurance $100								1075.00
Subtract Credits for Tires sold, March $75.54, June $8.24								83.78
Total cost of truck for year								$3694.44
Average cost per day			$12.31					
Average cost per ton hauled			.89					
Profit on truck per year			$2529.67					
Average teaming cost per ton			$1.50					
Saving per ton by motor			.61					

THE SANITARY REVIEW

SPRINKLING FILTER PLANT FOR SUBURBAN COMMUNITY.*

Filters Enclosed in Building—Provision for Two Hundred Thousand Gallons a Day—Preliminary and Final Sedimentation Basins and Dosing Tanks—Details of the Plan—Cost of Construction.

By Paul Hansen, Assoc. Mem. Am. Soc. C.E., State Sanitary Engineer of Kentucky.

In June, 1910, there was completed and placed in operation a small sewage purification plant of the sprinkling filter type at the village of College Hill, a residence suburb of the City of Cincinnati. This little installation involves no new principles or novelties of design not hitherto known to the sanitary engineering profession, but it does present a rather interesting object lesson in the solution of a sewage disposal problem.

General Considerations.

The village of College Hill lies about one mile to the northward of the northern corporation line of Cincinnati. It is built on a rather level tableland of the highlands bordering the valley of Mill Creek, a fairly large stream which discharges into the Ohio River within the Cincinnati borders. The natural drainage of College Hill is toward the southward into a number of deep ravines which have hilly slopes and are generally sparsely inhabited. Most of the drainage within the built-up portion of the village may be readily conducted toward one of these ravines, which reaches nearly to the central part of the village. A small water course (see photo, page 2) occupies this ravine, and after flowing a distance of about two and one-half miles discharges into Mill Creek. The ravine has been taken advantage of for the location of an electric traction line which follows the general course of the stream.

The present population of College Hill is estimated at 2,000. In the way of public improvements there is a public water supply obtained from the Cincinnati Water Works, a number of miles of good sidewalks, and many roadways paved with well constructed macadam. The village in general presents a very picturesque and attractive appearance and is one of the most popular of the more recently developed suburban towns.

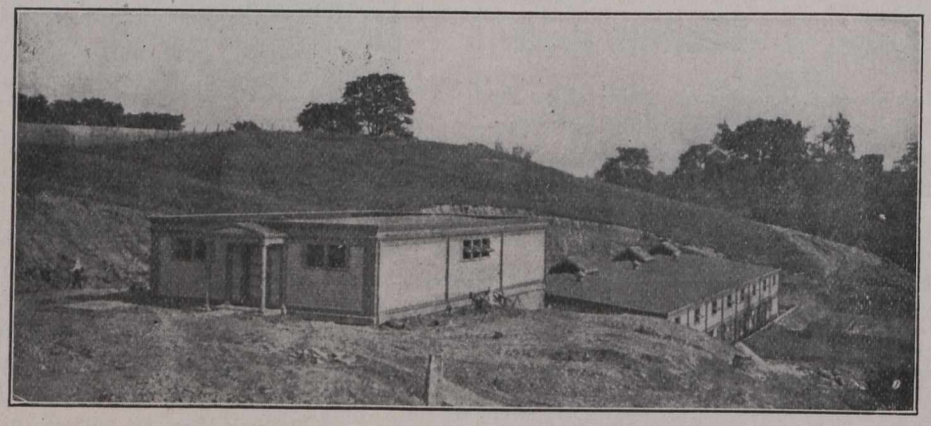
*From "Municipal Journal and Engineer."

One of the necessary requirements of a suburban community near Cincinnati is a good sanitary sewerage system, and it was to meet this requirement that early in 1908 the village authorities took active steps toward the installation of such a system.

Sewerage System.

While the sewage purification works form the subject matter of this article, yet a brief description of the sewerage system proper is essential to an understanding of certain phases of the purification problem. The sewers are, of course, built upon the strictly separate plan, that is to say, all wastes that are not offensively putrescible are conveyed through storm water drains to the nearest water course, while only house sewage is permitted to enter the sanitary sewers. The sanitary system is designed to ultimately meet the demands of a population of 10,000, but the present installation covers only about half of the territory that may ultimately be covered. The design is such that all the sewage is conveyed by gravity into a main trunk sewer occupying the ravine above described.

While the sanitary sewerage system is, for the most part, substantially constructed, no attempt was made to underdrain the sewers in wet ground. For this reason the sewers receive a considerable quantity of ground water leakage which averages about 30,000 gallons per 24 hours. It seems that most of the ground water enters at one point on the main sewer and may, therefore, be eliminated at comparatively small expense. The village officials in charge of the sewerage system have had great difficulty on account of numerous rain water leader connections to the sanitary sewers, and a determined effort is now being made to eliminate these connections.



General View of Sewage Purification Plant. Primary Sedimentation Basins in Foreground.

Sewage Purification.

Owing to the inadequacy of the small stream occupying the ravine into which the main trunk sewer is carried for sufficiently diluting the sewage flow to prevent a nuisance, it was at once evident that sewage purification works were necessary. The problem of selecting the type of purification works now presented itself, and it was soon found that the peculiar local conditions would constitute the determining factors in the solution of this problem.

Based upon experience in other Ohio villages similarly located, the assumption was made that purification works capable of caring for the sewage of 2,000 persons tributary

to the sewers and representing a sewage flow of perhaps 200,000 gallons per 24 hours would meet the needs of the village for about ten years. The growth of the village, however, has been so very rapid and the general desire for sewerage facilities is so great that it now appears that a safer assumption would have placed the time required to make the sewerage system available to 2,000 persons at five years instead of ten years. The quantity of sewage flow will probably also exceed the assumed quantity on account of ground water leakage, permitted by the absence of underdrains, even though the worst places be reconstructed. In considering possible future extensions it was assumed that the ultimate population that can be made tributary to the sewers is 10,000 representing a sewage flow of 1,000,000 gallons per day. It is not expected that these conditions will obtain before fifty years hence, and moreover, before this period has expired connections will have been made with the steadily widening sewerage system of the City of Cincinnati. Consequently a doubling or trebling of the present installation is all that need be looked forward to.

Having determined upon the capacity of the first installation and the possibility of future extensions, it next became necessary to decide in a general way upon the degree of purification that must be obtained in order to place limiting conditions upon the type of purification devices that might be considered. Fortunately conditions were such that no rigorous restrictions were imposed by this aspect of the problem. While the stream which receives the sewage effluent is small, yet it has a rapid fall so as to cause the water to pass over a series of small cascades. Further, the ravine contains but a few houses, and these are at considerable distance from the stream, nor is the water of the stream used for cattle watering or any other purpose until it has reached a distance of two and one-half miles from the village. Such facts as these led to the conclusion that all that could be reasonably demanded was a merely non-putrescible effluent practically free from suspended matter.

In considering the type of plant, it was, of course, recognized that intermittent sand filtration for a community of this size and character would prove the most all-round satisfactory method of purification that could be adopted, but this method was ruled out of consideration almost at the start, for the reason that there was no site available which could be utilized without involving an excessive amount of excavation and grading, and this mostly in difficult material.

The use of contact beds, assuming the necessity of using one-tenth acre of bed 5 ft. in depth, for each 500 or 600 persons tributary to the sewers, was considered as practicable, but even this involved a large amount of excavating and grading. Moreover, there had to be taken into consideration the difficulty of conveying materials during construction to any available site, for this involved a long and difficult wagon haul from the nearest steam railroad siding.

While sprinkling or percolating filters are not likely to give best results for small communities, owing to their relative complexity of design as compared with intermittent sand filtration and contact beds, yet it appeared that this type of plant was the only one that could be built without excessive expense. There were several considerations which further encouraged the adoption of sprinkling or percolating filters. First was the fact that the village of College Hill is a moderately wealthy community and can afford to employ a competent person to operate the plant; and, moreover, the character of the citizenship is such that public utilities are not likely to suffer neglect. In the second place, a recently enacted law enables the State Board of Health to effectively demand the proper operation of all water purification and sewage purification works. All things considered, therefore, a sprinkling filter plant was deemed most suitable.

There was selected as the most suitable site for the construction of the purification works a plot of land near the upper end of the ravine, at a point where one side of the ravine has a comparatively gentle slope. This site is not a good one in one important respect, namely: it is rather too near the buildings of a sanitorium, the nearest of these buildings being about 300 ft. distant. In addition there are twenty residences within a radius of 1,000 feet of the plant. While it was doubtful whether odors from contact beds or intermittent sand filters would be carried 300 feet, it was a certainty that odors from sprinkling filters would be carried a much greater distance than this. Computation, however, showed that this type of plant on the site selected would still prove by far the most economical, even though it became necessary to cover the filters. Accordingly superstructures were decided upon which thus far have been eminently successful in confining odors to the immediate neighborhood of the plant. The striking feature of the superstructures is that while they are not unreasonably expensive, they have been designed with such artistic skill as to render this plant one of the most sightly of the smaller plants in the country.

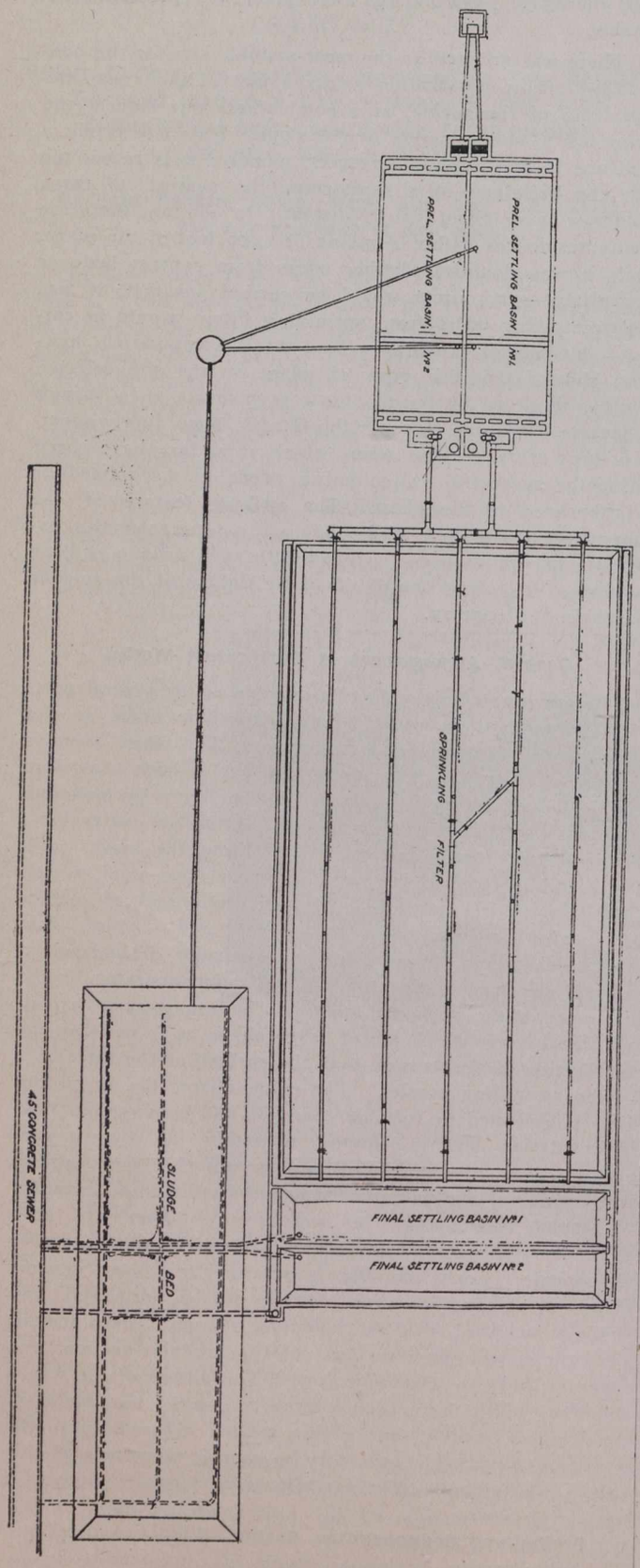
General Arrangement of Purification Works.

Before proceeding with a description of the several parts of the purification works it will be well to make a brief statement of the general arrangement. The plant occupies an area of about 210 ft. by 65 ft. and lies in such a position that its capacity may be increased in the future by moderate additions on either side and by longitudinal extensions. Sewage enters the plant by gravity from the main trunk sewer and is received into one or both of two small screen chambers. After screening, the sewage passes to one or both of two sedimentation tanks and thence into syphon chambers, from which it is rapidly discharged at intervals by means of automatic syphonic apparatus. The discharge of the syphonic apparatus is into so-called equalizing chambers, which are of such shape as to equalize the distribution of the sewage over the surface of the filter beds by the sprinkling nozzles. The effluent from the sprinkling filter is collected in suitable channels and conveyed to final sedimentation basins designed to retain the coarser suspended matters. A sludge bed is provided for draining and drying the sludge from the primary sedimentation tanks.

Screen Chambers.—The two screen chambers are each 3 ft. by 3 ft. in plan and 2 ft. 6 in. in depth, inside dimensions. Each chamber is provided with two screens placed at an angle of 60 degrees to the horizontal and sloping backward from the incoming sewage. These screens are built of wrought iron bars of ⅜-in. circular sections and spaced with ⅜-in. clear openings. The design of the screen chambers might have been improved upon by making them considerably longer, thus giving greater accessibilty to the screens. A valuable accessory to screen chambers of this sort is stop plank grooves which may serve to support a measuring weir.

Preliminary Sedimentation Basins.—The two preliminary sedimentation basins are built of reinforced concrete, each 45 feet long, 15 feet wide and 10 feet in total depth. The depth to the flow line is 7 feet 6 inches. The basins thus each have a capacity of 50,000 gallons, representing a flow period of 6 hours or a total flow period of 12 hours

based upon the nominal capacity of the plant. The tanks involve no novel features of arrangement, but the design of the reinforced concrete is such as to require for the struc-



GENERAL PLAN OF PURIFICATION PLANT

ture a minimum of excavation. Provision is made for distributing the inflow evenly across the width of the tanks by means of distributing channels provided with a number of gate-controlled openings into the tanks and equi-distantly spaced. A similar channel is provided for drawing off the sewage from the outlet end. The distribution of sewage across the tanks is further assisted by hanging baffles placed 2 feet from inlet and outlet ends. At a point two-thirds distant from the inlet to the outlet ends is placed one hanging and one submerged baffle within a foot of each other for the purpose of intercepting sludge and scum and thereby preventing in a measure ebullition near the outlet of the tanks. Suitable sludge drains are provided near the center of the bottoms of the tanks. In order to prevent the dissemination of odors the tanks are covered with a superstructure which is designed primarily to give ready accessibility to all parts of the tanks as well as the automatic apparatus. The satisfactory appearance of the exterior of the superstructure has already been commented upon.

Dosing Tanks.—There are two dosing tanks each 4 feet by 4 feet in plan and 2 feet 6 inches in depth to the flow line; the capacity of each is thus 300 gallons. Based upon the average rate of flow when the plant is operating at its nominal capacity, these tanks would be filled every 5.4 minutes when both are in use, or once in every 2.7 minutes when one is in use. Under ordinary operating conditions it is proposed that only one tank be used and the other held in reserve for use in case of break-down or stoppage. In order to permit a free discharge of the syphons uninfluenced by the back pressure from the sprinkling nozzles on the filters, and furthermore to assist in the equal distribution of the sewage by the nozzles over the surface of the filter, an equalizing chamber was provided for receiving the syphon discharge from each dosing chamber. The syphonic apparatus used is that manufactured by the Merritt Company, of Philadelphia, Pa.

The proper shape for the equalizing chamber was a matter which could not be definitely settled without some preliminary experimentation. Accordingly, under the general direction of the writer, a small experimental plant was devised which comprised in prototype a small dosing chamber and an equalizing chamber of sufficient size to supply a single nozzle. One side of the equalizing chamber was made adjustable in order to secure some indication of the best form to give this chamber. The funds and time available did not permit of these experiments being exhaustive in character, but they did serve to furnish practical assistance in arriving at the design ultimately to be adopted. The above experiments also were utilized to obtain data which would assist in the selection of the type of nozzle to be used. Inasmuch as the experimental methods and results are of considerable interest they will be made the subject of another article by Mr. W. H. Dittoe, Assistant Engineer of the Ohio State Board of health, under whose immediate supervision the experiments were carried out.

Sprinkling Filter.—The sprinkling filter is rectangular in plan, 115 feet long and 60 feet wide, which gives an area of 6,900 square feet or 0.158 acre. Based upon the nominal capacity of the plant, namely, a capacity for treating the sewage of 2,000 persons, the above area would represent one acre for each 12,660 persons tributary to the sewers. The filtering material, for the most part, consists of broken stone such as will pass a 3 inch ring and be retained by a ½ inch ring. The lower 12 inches of filtering material is made somewhat coarser than this to facilitate drainage. The total depth of the filtering material is 5 feet. The bottom of the filter consists of a concrete floor 4 inches in thickness with a slope of one foot in 90 in either direction from a central ridge.

The underdrains consist of 6-inch half tile 2 feet in length and provided with notches at the sides to permit the ready entrance of the effluent. The design of the underdrains is quite similar to that used at Columbus, O., but the ends of the pipe are provided with half bells which permits of an over lapping of the joints which facilitates obtaining alignment of the pipe and possibly prevents more or less solid material from entering them. Unfortunately the mistake was made of having the tile burned after they were split. This resulted in excessive warping so that but few of the tile lie with an even bearing. While it is likely that a great many of the tile will be broken by the weight of the stone, it is not probable that underdrainage will be greatly interfered with since the effect of the warping will be to cause the pipes to break transversely rather than longitudinally. To secure the best results with half tile underdrains in sprinkling filters the writer would recommend floating the surface of the floor of the filter with ½ to ¾ of an inch of cement mortar and, placing the drain tile while the cement is still soft, pressing the edges down into the cement until they have an even bearing. This method not only insures the drain tile against breakage by superincumbent weight but also holds them firmly in alignment while the filtering material is being placed and provides smooth channels for carrying off the effluent. By all means the tile should be burned whole and split afterwards.

The walls surrounding the filter are made of concrete. The underdrains are carried directly under the wall and discharged into open gutters extending longitudinally along either side of the filter. This arrangement permits of accessibility to the underdrains for cleaning by flushing or other means.

The sewage from the equalizing chamber is conveyed to the filter through a system of cast iron pipe. The main pipes leading from the equalizing chambers are 10 inches in diameter; these in turn enter a header, also 10 inches in diameter, which extends across the upper end of the filter just outside the filter wall. Leading off from this header are five lines of 6-inch and 8-inch cast iron lateral pipe extending longitudinally across the filter bed and at a depth of 12 inches below the surface of the stone. The laterals have a spacing, centre to centre, of 11 feet 3 inches. At intervals of 12 feet 6 inches along these are placed uprights which rise to a few inches above the filtering material and support the sprinkling nozzles. The spacing of the nozzles brought about by the above described arrangement brings the nozzles approximately at the vertices of the equilateral triangles into which the bed is thus divided. The several laterals are provided with valves at both ends. Those next the headers will permit the laterals to be used independently, and those at the opposite ends permit of the laterals being flushed out. It may be mentioned that the laterals extend through the filter walls, as shown in the accompanying photograph. A valve-controlled cross-over between the central and one of the adjacent laterals permits an even division of the filter into two parts. A valve in the header permits the independent operation of the two equalizing chambers.

The elevation of the orifices of the sprinkling nozzles is such that they will operate under a head varying from a maximum of 7½ feet down to zero. The equalizing chamber has its bottom 2 feet above the nozzles, so that practically the entire discharge through the nozzles takes place above this head.

Final Sedimentation Basins.—The effluent from the sprinkling filter is conveyed by means of the troughs already mentioned to the final sedimentation basins. There are two of these basins, built of concrete, each 59 feet 6 inches long, 10 feet wide and 4 feet 6 inches deep to the flow line. The basins each have a capacity, making due allowance for sloping sides, of 7,000 gallons, thus giving a total capacity of 14,000 gallons, which represents a flow period, based upon the nominal capacity of the plant, of a little over 2 hours. The effluent is admitted to one end of the sedimentation basins by means of a distributing channel having four rectangular 8-inch openings equi-distantly spaced across the width of each basin. The effluent is drawn off at the opposite end over weirs extending the entire width of the basins. The flow from the weirs falls into a collecting trough of concrete which in turn discharges into a 12-inch vitrified pipe which conveys the sewage to the creek. Provision was made for cleaning the basins by placing 6-inch sludge outlets in the bottoms, which outlets in turn have connecting pipes leading to the creek. Cleaning of the final sedimentation basins will not be attempted except at times when the stream is carrying a large volume of water.

Sludge Bed.—The sludge bed is located near the lower end and at one side of the purification works. This bed is simply a sand filter constructed essentially the same as would be an intermittent sewage filter. It is 30 feet by 100 feet in plan at the sand line, thus giving it an area of 3,000 square feet. This area is such that it may receive the entire contents of one of the preliminary sedimentation tanks without covering it to a depth greater than 1¾ feet. If the bed is kept in proper condition the thin liquid will pass through in the course of a few hours and leave the sludge to dry. It is to be expected that the process of removing sludge from the preliminary sedimentation tanks will be accompanied by some odor, but if the process is well managed, this odor need not result in an objectionable nuisance.

Operation.

At the present time it is estimated that there are 800 persons tributary to the sewerage system at College Hill and the flow, as measured on Nov. 28th, 1910, was 92,400 gallons per 24 hours. The maximum rate observed was 105,000 gallons per 24 hours and the minimum 82,000. As these measurements extended but from 1 p.m. to 4 p.m. the actual minimum for the day was not obtained, but this minimum presumably occurred during the early morning hours. When it is considered that about 30,000 gallons of the day's flow is clear ground water the comparative weakness of the crude sewage as shown in the accompanying table of anaylses will be understood. Three-fifths of the filter area was in use at the time of the test and while this does not represent a rate of treatment for which the plant was nominally designed, yet the results as indicated by the analyses may be taken as an indication that the plant is good for a much heavier burden than is now being imposed upon it. The analyses of the water from the stream into which the effluent is discharged are interesting as showing the practically negligible effect which the sewage has on the character of the water.

Costs.

The total cost of the sewerage system proper was $44,522.00. The cost of the disposal works was $20,700.00. The unit costs of the purification works as presented in the bid of the contractor are given in the following table:

Results of Analysis of Sewage, Sewage Effluent and Creek Water at College Hill, Ohio.

Field Number	No. 1 Composite crude sewage	No. 2 Preliminary sedimentation effluent	No. 3 Filter effluent	No. 4 Final sedimentation effluent	No. 5 Stream above outlet	No. 6 Stream below outlet	No. 7 Stream 2,000 ft. below effluent outlet
No. of sample	1078	1079	1080	1081	1082	1083	1084
Temperature	48	50	40	38	38	38	38
Color	45	36	36	35	18	32	35
Turbidity	250	110	68	43	25	22	22
Sediment	Distinct	Distinct	Distinct	Distinct	Slight	Trace	Trace
Odor	Sewage	Strong sewage	Mouldy	Earthy	Earthy	Earthy	Slt. Earthy
Dissolved oxygen	2.4	0.0	4.5	4.5	5.7	5.5	6.0
Oxygen consumed	74.	27.75	19.	13.2	6.9	10.9	9.3
Total Kjeldahl	34.5	33.3	15.6	10.3	4.	6.9	5.9
Nitrogen as:							
Am. free	12.	13.	8.	5.	.14	4.2	3.6
Nitrites	.040	.300	.240	.240	.008	.200	.150
Nitrates	.4	.4	4.4	5.6	1.6	5.	4.6
Chlorine	62.	51.	54.	53.	35.	47.	45.
Alkalinity	288.	248.	216.	206.	260.	220.	216.
Total solids	915.	654.	660.	636.	593.	613.	605.
Loss on ignition	236.	104.	111.	142.	113.	100.	91.
Dissolved solids	743.	597.	606.	600.	586.	595.	585.
Loss on ignition	125.	79.	94.	95.	85.	91.	86.
No. bacteria per c.c.	....	....	....	730,000	90,000	120,000	48,000
Colon bacillus	....	....	....	Pos., 1 c.c.	Pos., 1 c.c.	Pos., 1 c.c.	Pos., 1 c.c.

Statement of Cost of Sewage Disposal Plant.

10,300 cu. yds. grading, at 49c. per cu. yd.	$5,047.00
1,890 cu. yds. broken stone, at 52c. per cu. yd.	982.80
317 cu. yds. sand, at $1.60 per cu. yd.	507.20
404 cu. yds. plain concrete, at $4.55 per cu. yd.	1,838.20
158 cu. yds. reinforced concrete, at $6.50 per cu. yd.	1,027.00
507 lin. ft. 6-in. vitrified pipe, at 21c. per lin. ft.	106.47
161 lin. ft. 8-in. vitrified pipe, at 32c. per lin. ft.	51.52
334 lin. ft. 12-in. vitrified pipe, at 55c. per lin. ft.	183.70
7,000 lin. ft. 6-in. split pipe, at 10c. per cu. yd.	700.00
31.61 tons cast iron pipe, at $49 per ton	1,548.89
7.50 tons special castings, at $25 per ton	187.50
7.50 tons special castings, at $50 per ton	375.00
(Allowance for error in bid.)	
1 fire hydrant, at $19 each	19.00
6 8-in. shear valves, at $18 each	108.00
20 6-in shear valves, at $13.75 each	275.00
3 10-in. gate valves, at $47 each	141.00
11 6-in. gate valves, at $18 each	198.00
2 extra valves, at $34 each	68.00
6 8-in. flap valves, at $17.75 each	106.50
1 superstructure for settling basin, at $1,415 each.	1,415.00
1 superstructure for filter bed, at $3,114 each.	3,114.00
2 manholes, round, at $35 each	70.00
4 screens, at $14.50 each	58.00
6 baffles, at $30 each	180.00
1 sludge distributor, at $40 each	40.00
5 cast iron covers, at $12.50 each	62.50
45 sq. ft. cement walk, at 16c. per sq. ft.	7.20
50 sq. ft. cement steps, at 29c. per sq. ft.	14.50
Extra bills allowed	215.10
Total Contract Items	$18,647.08
Eng. and supt. construction	1,118.82
Topographical survey, 10-acre tract	240.00
Nozzles	200.00
Dosing siphons	400.00
Printing, etc.	94.10
Total cost of improvement	$20,700.00

An examination of the above figures will show that the bid was unbalanced—the price for concrete is especially low. It may be noted that the contract price was a close one and that in all probability the contractor lost two or three thousand dollars. Moreover, the contractor, after the death of one member of the firm, proved unenterprising and it was with great difficulty that the engineers could force him to complete the work. It is unfortunate also that some of the work suffered in quality, due to the inefficiency of the contractors; but except for the placing of some soft and friable stone in the filter beds it is not likely that any of these defects in construction will materially affect the results obtainable.

Mr. J. A. Stewart, of Cincinnati, was consulting engineer, and Mr. C. A. Riggs, also of Cincinnati, was assistant engineer in direct charge of the work. The contractors were Medidith & Deckeback of Cincinnati. Some of the early work in connection with preliminary inspections and preparation of plans was done in co-operation with the writer, then of the engineering department of the Ohio State Board of Health.

NEW BOARD OF HEALTH.

A new Board of Health has been appointed for Ontario. By an order-in-Council passed on January 27th, the Provincial Government appointed Dr. Adam Wright, of Toronto, as chairman of the board. His associates are Dr. David B. Bentley, of Sarnia; Dr. Geo. Clinton, of Belleville; Dr. W. H. Howey, of Sudbury; Dr. Paul J. Maloney, of Cornwall; Dr. James Roberts, of Hamilton; and Dr. J. W. S. McCullough, who was re-appointed secretary and chief health officer of the province.

This board succeeds the one appointed by the Whitney Government in 1906. Dr. Charles Sheard, of Toronto, was made chairman, and his associates were:—Dr. M. I. Beeman, of Newburgh; Dr. W. R. Hall, of Chatham; Dr. Coughlin, of Peterboro; Dr. Robinson, of Guelph; Dr. J. W. S. McCullough, and Dr. C. A. Hodgetts, secretary.

THE INSTALLATION OF AN INCINERATOR.

J. A. Stewart, Manager Edmonton Incinerator.

The general principles to be aimed at in a refuse disposal utilization plant are the same whenever and wherever destruction by fire is to be adopted, and the desirability or otherwise of any particular make of incinerator depends upon the extent to which they are to be carried into effect. I place these general principles in the following order:

1. High temperature in furnaces and flues, with complete combustion of all solids on the grate.

2. Complete exposure of all gases produced by combustion and distillation of the refuse to the highest temperature before they are permitted to escape from the furnace.

3. The prevention of escape of dust to the chimney. The foregoing are the primary necessities in an incinerator from the point of view of the sanitarian; as, however, sanitary engineers must be economists as well as scientists, these further points must be borne in mind.

4. Economy in working principally in relation to the labor bill, but also in relation to cost of maintenance and repairs.

5. Utilization of the heat produced by the burning of refuse.

6. Utilization of the thoroughly burnt clinker.

7. Reasonable first cost must also be considered; but in this as well as in every other engineering matter the lowest price is generally to be avoided. It must be borne in mind that when tenders are invited for refuse disposal plant each patentee is offering his own specialty. The conditions are, therefore, totally different from those which obtain when an engineer or architect issues a set of drawings and quantities for a building, a sewer, or a new road, it may easily happen that the firm which asks the highest price is giving much greater proportionate value than the firm which asks the lowest, and that if the lowest tender be accepted the contractor will make a greater profit than would the contractor who sends in the highest tender. It is a not uncommon error to suppose that the firm which offers the highest pecuniary penalty in case of failure is the most reliable. The inventor, however, is proverbially sanguine and in attempting to introduce a new and untried scheme will usually agree to any conditions which may be proposed in order to get the scheme adopted, his faith in his own inventions being in inverse ratio to his experience of their results.

Complicated mechanisms designed to save labor are frequently brought forward in connection with these plants. It should always be remembered that the conditions under which an incinerator works are all against the success of mechanical arrangements situated within the furnace. Every appliance, whether for opening or closing doors, producing the necessary forced draughts, charging or clinkering the furnace, should be of the simplest and most direct character.

An apparent economy is often entirely discounted by the cost of maintenance, and, what is still more serious, by the stoppage of the works during repairs. The scheme of placing the boilers over the furnace was at one time adopted so as to obtain greater evaporation from the burning refuse. This practice, however, whilst increasing the steam raising capacity of the plant, sacrifices the completeness of the combustion, as the large cooling surface afforded by a boiler placed immediately over the cells so far reduces the temperature of the gases that the organic matter therein is not thoroughly destroyed, passes off by the chimney and a nuisance results. In modern practice it is the rule to first insure the complete destruction of all organic matter and offensive gases in a combustion chamber, wherein all the gases from the furnace mingle together at a high temperature and afterwards passed through a boiler, the heat being utilized only after it has fulfilled its primary duty in the incinerator, and it is only under those conditions that the combination of an incinerator for steam raising with any other plant can be considered satisfactory..

To secure the thorough destruction of refuse, a high temperature is absolutely necessary—not occasional high temperature, but a continuity of high temperature—the fluctuations being confined within the narrowest limits. Those with only an elementary knowledge of the subject will agree that this is the great essential, and the success of the incinerator as an incinerator depends entirely upon the continuity of high temperature working. Similarly, the value of an incinerator in its secondary duty; the production of power also depends upon the attainment and continuity of high temperature.

There has grown up recently a strong tendency to lay much stress upon the results of short evaporate tests—some have even been published showing very high temperatures taken on a six-hour run; no incinerator test less than a full working day of twenty-four hours is of any value whatever. I am strongly of the opinion that no corporation should take over an incinerator plant at less than a three months' test. I would always recommend the adoption of a plant which has been tried by experience in preference to a plant on which even superlative results have been obtained for a short period. In saying this I am not, of course, condemning minor departures from or improvements on tried systems when such departures grow out of experience so that their results can be foreseen with certainty. One consequence of the publishing results based on brief experience is that the whole system of refuse disposal by fire is to some extent discredited by the failure to fulfil exaggerated and fanciful estimates and we have the most respected of our engineering periodicals opening its pages to serious discussion as to whether or not it is of any use to attempt to utilize the steam from an incinerator or whether the additional cost of the boilers is not sufficient to deter a municipality from the attempt; it is often forgotten that the principal factor in steam raising with any modern incinerator is not the name of the patentee, but the calorific value of the refuse, which varies enormously in different towns. A safe figure to be taken as a basis is that evaporation of one pound of water per pound of refuse may usually be confidently predicted, and if this figure be adopted as a basis of estimation it will frequently be exceeded in practice, with the result that those responsible will have the credit of exceeding their estimates, instead of the discredit of failing to fulfil. The power thus obtained is being utilized in different countries for very varied purposes; among these are: municipal electric lighting, pumping of sewerage, driving of tramways, manufacture of mortar and concrete flags. It will thus be seen that in laying out an incinerator plant, sound mechanical knowledge and experience are very necessary as well as knowledge of incinerators in themselves. Several types of boilers are in successful use in connection with incinerators; good results have been obtained from "Lancashire" boilers, "Multi-Tubular" boilers and "Water Tube" boilers. On the whole I prefer the "Water Tube" boilers, for several reasons: in the first place it lends itself much more readily to building into a brick flue for gas

firing purposes than any other type; in the second place, steam is raised much more rapidly in a water tube boiler. This is highly important, because the incinerator itself cannot work at full power until the forced draught is applied and in most cases that cannot be done until steam is raised in the boiler attached to the incinerator. This difficulty can be overcome by providing a coal firing furnace to the boiler, but the quantity of coal burned to raise steam should be kept as low as possible. It is again very easy to provide such a coal furnace in a water tube boiler, and very difficult to provide it in a Lancashire boiler. In the latter case, it involves a separate brick erection outside of the boiler which is exposed to radiation and which usually serves to admit quantities of cold air to the flues while the incinerator is working, and so reduces its steam raising powers.

One of the most important and successful electric lighting and incinerator plants hitherto erected, is that of Fulham corporation, which consists of a twelve cell incinerator provided with six water tube boilers, the furnaces being arranged in two blocks of six cells each, with the range of six boilers between the two blocks; there are also two full economizers behind the boilers and a centrifugal dust catcher. The gases from each block of cells can be led to any pair of boilers, and the boilers are provided with mechanical stokers and with forced draught; thus the boilers which are not being fired with incinerator gases can be fired with coal, and vice versa. The results obtained from the burning of refuse are thus kept quite distinct from those due to any coal which may be used and there is no room for the endless discussions which have taken place in some instances as to whether or not any steam was raised by the refuse, or whether it was all raised from coal; the steam pipes pass from the boilers to the electric light engine house adjoining. The general design of this plant is complete and convenient, and it has been fully justified by the excellent results obtained both in steam raising and in economy of working.

Speaking briefly of the Milwaukee incinerator. The plant consists of four independent units, each of 75 tons daily capacity. Each furnace consists of six separate grates, located three on each side of a central combustion chamber through which the products of combustion of all six grates pass and are thoroughly mixed. After leaving the combustion chamber the gases from each unit pass over the heating surface of a 200 h.p. water tube boiler and then through an air heater or regenerator on their way to the chimney. The combustion is entirely controlled by forced draught, all the air being drawn from ventilating ducts in the building by an engine-driven fan and raised to a temperature of over 300 degrees in the air heater. The refuse burned is composed of material as follows: Garbage, 41 per cent; ashes, 41 per cent.; rubbish, 5 per cent.; manure, 13 per cent. Steam evaporated from and at 212 degrees Fahrenheit per lb. of refuse destroyed 1.34 lb. The steam made by the boilers in the plant is not used for any commercial purposes other than operating the engine driving the necessary machinery throughout the plant. The excess steam is allowed to go to waste through a reducing valve in a sump filled with rocks to deaden the sound. It costs the city of Milwaukee $25,000 a year to operate two flushing pumping plants and one sewerage pumping station. It is stated on good authority that the steam allowed to go to waste from the incinerator boiler into the sump would be sufficient to operate these three pumping stations, provided the necessary equipment were procured to utilize this power, which would not exceed an estimated amount of from $75,000 to $100,000.

THE IMPERIAL GALLON.

Sir,—In your issue of the 14th inst., in which a correspondent, E. L. Miles, is in doubt as to the exact size and volume of the Imperial gallon, the following information may be useful:—

Weight and Volume of Water at Various Temperatures.

Temp. in Deg. Cent.	Fahr.	Rel. volume.	Rel. density.	Wt. in lbs., 1 cu. ft.	Wt in lbs., 1 gal.
0	32	1.000130	.999870	62.3396	10.0098
4	39.2	1.000000	1.000000	62.3477	10.0111
10	50	1.000265	.999735	62.3312	10.0084
16.67	62	1.001110	.998891	62.2786	10.0000
20	68	1.001746	.998257	62.2391	9.9937
30	86	1.004261	.995757	62.0832	9.9686
40	104	1.007692	.992367	61.8718	9.9347
50	122	1.011968	.988174	61.6104	9.8927
60	140	1.016981	.983303	61.3067	9.8439
70	158	1.022662	.977840	60.9661	9.7893
80	176	1.028986	.971831	60.5915	9.7291
90	194	1.035827	.965412	60.1912	9.6648
100	212	1.043234	.958558	59.7639	9.5962

The relative volumes given in the above tables are the **means** of the results of the experiments of Despretz, Kopp, Pierre, Hagan, and Mathiessen. The relative densities are the reciprocals of the relative volumes.

The weight of a cubic foot of water at 62° Fahrenheit is that given by Mr. H. J. Chaney, of the Standards Department of the Board of Trade, after most elaborate and careful experiments.* The water was twice distilled and afterwards freed from air by boiling.

It was found that at the temperature of 62° Fahrenheit, and the barometer at 30 inches, a cubic foot of distilled water freed from air, weighed about 321 grains (.04586 lb.) more than when nearly saturated with air.

Taking the weight of a cubic foot of pure water at 62° Fahrenheit as 62.2786 lbs., the following results are obtained:—

1 ton of pure water at 62° Fahrenheit contains 35.9674 cub. ft.

1 lb. of pure water at 62° Fahrenheit contains 27.7463 cub. inches.

1 ton of pure water at 62° Fahrenheit contains 224 gals.

1 cub. ft. of pure water at 62° Fahrenheit contains 6.22786 gallons.

1 gallon of pure water at 62° Fahrenheit contains 277.463 cubic inches.

1 cubic inch of pure water at 62° Fahrenheit weighs .03604 lb.

The tables I have used may be found in David Allan Law's pocket book, 1907 edition. Mr. Law is Professor of Engineering at East London College, London; Whitworth Scholar, and M.I.M.E., and is a recognized authority on standards, rules and formulae.

Trusting this information will be welcome to Mr. E. L. Miles, I remain.

Yours truly,

A. Baldwin, (Draughtsman).

41 Church Street, Montreal.

*Philosophical transactions of the Royal Society, 1892.

The Canadian Engineer

ESTABLISHED 1893.

Issued Weekly in the interests of the

CIVIL, MECHANICAL, STRUCTURAL, ELECTRICAL, MARINE AND MINING ENGINEER, THE SURVEYOR, THE MANUFACTURER, AND THE CONTRACTOR.

Editor.—F. A. James, B.A.Sc.
Assistant Editor.—H. Jones, B.S.
Business Manager.—James J. Salmond.
Advertising Manager.—A. E. Jennings.

Present Terms of Subscription, payable in advance:

Canada and Great Britain:		United States and other Countries:	
One Year	$3.00	One Year	$3.50
Six Months	1.75	Six Months	2.00
Three Months	1.00	Three Months	1.25

Copies Antedating This Issue by Two Months or More, 25 Cents.

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Everything affecting the editorial department should be directed to the Editor.

The Canadian Engineer absorbed The Canadian Cement and Concrete Review in 1910.

NOTICE TO ADVERTISERS.

Changes of advertisement copy should reach the Head Office two weeks before the date of publication, except in cases where proofs are to be submitted, for which the necessary extra time should be allowed.

Printed at the Office of The Monetary Times Printing Company, Limited, Toronto, Canada.

Vol. 20. TORONTO, CANADA, FEB. 2, 1911. No. 5.

CONTENTS OF THIS ISSUE.

CITY ENGINEERS AND THEIR DIFFICULTIES.

The position of a city engineer from several points of view is not an enviable one. He has not only to perform his duties as a member of the profession of engineering, but he has to fulfil other duties which belong more to the role of the politician or the administrator than to that of the engineer.

The annual meeting of the Canadian Society of Civil Engineers had to face a question relative to the above proposition inasmuch as it was brought before the notice of the convention that Mr. Clement, city engineer of Vancouver, had been discharged without any real or sensible reason being given.

The Canadian Society of Civil Engineers have so far refused to interfere in all questions relating to the differences between the engineer and his employer. In this case, however, it was felt that an engineer was being treated unfairly. The question, therefore, became more a sentimental one than a practical one. The society knew that any action which they might take could have no practical value whatever. In spite of this knowledge, by a majority vote the action of the Vancouver council was condemned.

This action on the part of the society simply means that Mr. Clement can refer to the Canadian Society of Civil Engineers, of which he is a member, in supporting him so far that he has been discharged without apparently a legitimate hearing. This action on the part of the society should have the effect of offsetting the biased press reports which have been appearing from time to time in reference to Mr. Clement.

ÆSTHETICS IN BRIDGE DESIGN.

Among the numerous papers presented to the Canadian Society of Civil Engineers during the past year, one of particular interest is that of "Æsthetics in Bridge Design," by Mr. C. R. Young, A.M., Can. Soc. C.E. The æsthetics of bridge design is a subject which has not received the attention which it might, yet the number of pleasing designs which Mr. Young has presented in his paper is evidence that experienced bridge engineers have given the subject in some cases thoughtful and appreciative consideration.

One of the simplest requirements, and yet one which is frequently discarded in the designing of bridges, especially highway bridges, is that the structure must conform with the local physical conditions as well as being entirely suitable to the work which it has to perform, and among the illustrations which accompany this paper numerous good examples of the following of this principle are given.

Although the paper may not be strictly a technical paper, yet it is one, the study of which will be profitable to engineers, and more especially to those who have to do with the preparing and approval of bridge plans.

THE DEATH OF MR. J. E. SCHWITZER.

The death of Mr. John E. Schwitzer by the stroke of one of those swift diseases which surround men who have to stand the strain and stress of railroad work will

sound a warning in the ears of many of his fellow-practitioners, who too frequently disregard the little things of health.

There seems to be a nerve tension and excitement in the handling of large affairs that numb the senses, obliterate the self, and outdo the common limits of flesh and blood.

The active head of the engineering department of a great, modern corporation, which reaches across the continent and carries on a competitive business in two countries, must bear a mental strain which cannot be long endured except by one well schooled. Most men thought J. E. Schwitzer was to be envied when, a month ago, he was appointed to the highest position in his profession, in the service of the C.P.R., and many a man has looked longingly at the five figures which represented his annual income. Those who win such prizes and hold the highest seats of responsibility in railroad organizations are sometimes to be more pitied than envied. And so it was with Mr. Schwitzer. Day and night he travelled and planned and reported for the company of his choice. Home life and his own fireside were practically denied him, and when death struck him down, a normally healthy man in the prime of life, his friends, his professional associates, and his business acquaintances experienced a sudden shock that repeated experiences do nothing to minimize.

Such constructions as the Lethbridge viaduct and the spiral tunnels of the Rockies will stand as monuments of Mr. Schwitzer's eminence in the profession to which his all too short life was devoted.

Mr. Schwitzer was not only a successful engineer, but he was a man who never permitted his accomplishments to cause him to forget the presence of others or a man's individual place in the community.

THE WINNIPEG CONVENTION.

The twenty-fifth annual convention of the Canadian Society of Civil Engineers, which was brought to a close last Friday noon, was a successful gathering, not only in numbers, but also in the importance of the work accomplished, the improvement in the legislation of the society, and the exchange of practical ideas among the engineers.

It was one of the most representative gatherings of Canadian engineers that could be wished for. Not only was every district represented, and well represented, but every class of engineering paid tribute to the national character of the society, and all grades in knowledge and experience, from the university student to the oldest Canadian practitioners, were found gathered at this annual convention.

The city of Winnipeg was a most entertaining hostess, and by luncheons, dinners, public receptions and private parties the visitors were made welcome, and were made to feel that Winnipeg and Winnipeg homes were glad to see the Canadian engineers assemble in their city.

The discussions on committee reports were unusual in that in adopting the reports exception was frequently taken to the findings, and in a number of cases the reports were amended.

We are giving a verbatim report of the proceedings in The Canadian Engineer, and we believe every Canadian engineer, whether a member of the society or not, will find very interesting information in this report.

AIDING THE PROFESSION.

The engineering profession is one which has been frequently discussed of late in scientific spheres. Just what status has the profession of engineering, or how is it considered? How should it be considered? What can be done to raise the standard? These may not at first seem fundamental questions, but, judging from the consideration being given to them, too, by eminent engineers, they would appear to be rather important ones.

The field of the engineer is so broad in its mastery of the elements and the forces of nature, that it is sometimes hard for the lay public to discriminate properly as to who the engineer really is. The engineer is the man that does things, and, as long as the materials, the means and the opportunity to do are offered to him, he is usually satisfied to perform his work and say nothing about it. This trait in the engineer may be to some extent laudable, but perhaps not always wise. The result has been that the general public are often not at all clear upon the real importance of the engineer in the community.

The engineer should expect just return from his labors, but he should also aim to uplift the status of his profession, and by so doing make himself as a member of that profession worthy to receive that compensation. It is gratifying to see that much is being done now by engineers to bring about this desirable result. In Canada the engineering profession holds a peculiarly important position. Whether this fact is recognized by the public at large, it matters not so much as far as the truth of the matter is concerned. In fact, it may almost be said that Canada will grow in proportion as the practical application of engineering knowledge is increased. The building of railways, the building of cities, the irrigation of the vast territories and the development of the great mining fields, the most important factors in contributing to the growth of the Dominion, depend very largely upon the trained engineer.

It would seem, then, that if the role of the engineer is so important in this country, that every effort should be made to bring the status of the engineer up to the best possible. While there are tremendous commercial prospects in Canada, it would seem that there are also great problems to be met in order to make Nature yield her treasure. The cities offer their problems to the engineer in the shape of water supply and sewerage questions, apparently far from solved. The prairie land offers the problem of irrigation, and the mines, the problem of a better reduction of ore for still more paying results. Some of these may be great hindrances to the growth of business, but they offer great scope to the engineer, and will probably have a beneficial result in stimulating the spirit of research to successfully solve these problems. United action will do much to help the engineering profession, and will help the individual engineer. It seems as if the desire to more widely spread the idea of mutual assistance was gaining ground in a very practical way. An evidence of this fact is that in several of the large centres of the Dominion the engineering clubs have either enlarged their quarters or are contemplating so doing. These clubs are formed upon a broad basis, and include among their members representatives of all the various branches of engineering and their kindred spheres. The Canadian Society of Civil Engineers, which recently held its convention at Winnipeg, likewise has for its aim

the mutual betterment of its members. Aside from privileges which it is not necessary here to discuss, the instructive work of these organizations may be made of great interest to most of their members, but the accumulation of engineering libraries and the proper discussion of current topics can be brought about to the greatest success only by a more united effort of those of the profession.

These are movements which it would seem will not only keep the profession at its present high station, but will hasten the ideal in Canada in placing the engineering profession in its proper place as the best organized and among the most progressive of the professions. It has been said that there is not the time spent and not the facilities offered for a thorough form of research work, experimentation and consequent progress in engineering as there is in the medical and other scientific branches. To a large extent this is true, but much can be done to offset this by the dissemination of what might advantageously be made common knowledge by the interchanging of ideas and experiences of works in practical engineering. This good work, which has been kept alive by the efforts of comparatively few, might very well engage the attention of a larger number of the profession.

THE CANADIAN SOCIETY OF CIVIL ENGINEERS AND THE SEWAGE DISPOSAL PROBLEM.

At the recent annual meeting at Winnipeg the committee's report on Sewage Disposal was held over for further consideration.

A distinct feeling of uncertainty was manifested by the members in the acceptance of a report, which stated that all modern systems of sewage disposal were inadequate, as far as the removal of disease germs is concerned.

The committee's main conclusion, and, in fact, the principle upon which their report is founded, is that, while it is possible to remove any nuisance from sewage caused by the decomposition of organic matter, the only method of guarding a water supply from a sewage polluted source is by treatment of the water by those using the water.

While we must, in part, agree with the conclusion of the committee, yet we must disagree with the conclusion that all modern systems of sewage disposal are incapable of removing disease germs from the effluent.

Unquestionably the ordinary methods employed for the removal of putrescibility do not remove pathogenity. On the other hand, the ordinary methods for the removal of putrescibility, if followed up by adoption of the modern method of disinfection with hypochlorite, will remove both putrescibility and pathogenity.

The committee's report in concluding that sewage disposal must stop short at the removal of an æsthetic nuisance and leave the removal of the pathogenic nuisance to the towns and cities using the water, takes no cognizance of the individuals and small hamlets relying upon a sewage polluted stream for water supply.

Individuals and small communities cannot afford the luxury of efficient systems of water purification treatment. All such methods of treatment are expensive, both in first cost and maintenance, and require the supervision of the chemist and bacteriologist in order to maintain maximum rates of efficiency.

We do not, for one moment, wish to argue that the treatment of all sewage by disinfection will obviate the necessity of treatment of river waters to render such perfectly wholesome for domestic purposes. On the other hand, we do argue and hold that the treatment of sewage effluents for the removal of typhoid and other germs will prove a distinct advantage and gain to small communities and farmers.

An illustration was presented at the annual meeting. The city of Moose Jaw traced a typhoid epidemic to a single milk supply. The farmer supplying the milk washed his cans and used water from the Moose Jaw Creek, nine miles below the point where the sewage of the city entered the creek. The city treated the sewage by sedimentation, but not by any method of disinfection. What apparently happened was simply this: The city handed typhoid to the creek by way of its sewage. The farmer collected the typhoid in cans and handed it back to Moose Jaw. Can anyone deny but that, if the sewage of Moose Jaw had been sterilized, the typhoid epidemic would have been obviated?

Typhoid is much more prevalent in the rural districts than in the urban, simply because the rural districts cannot afford water purification treatment.

The elimination of typhoid and other intestinal bacteria from sewage will greatly tend to maintain the natural purity of our waters, and will not only give protection to the small communities, but will also make for greater efficiency in water treatment processes, the efficiencies of such depending upon percentage removal of bacteria. It is obvious that the fewer bacteria in the raw water, the fewer there will be in any treated water.

It is to be regretted that the committee did not go more thoroughly into this important feature of sewage disposal, and the Society are to be congratulated upon the decision that the matter must receive further consideration before the report can be adopted.

The Engineers' Club of Toronto

Programme for February, 1911

Thursday, 2nd, 8 p.m.

"The Book of a Forest Engineer." Illustrated address by Mr. A. H. D. Ross, M.A., M.F., Faculty of Forestry, University of Toronto.

Monday, 6th, 8 p.m.

Annual Meeting for Election of Directors and other business, notice of which was mailed on January 25th.

Thursday, 9th, 8 p.m.

No meeting.

Thursday, 16th, 8 p.m.

"The Construction of the Reinforced Concrete Conduit of the Ontario Power Co., Niagara Falls, Ont." Illustrated address by Mr. Charles H. Mitchell, C.E.

Thursday, 23rd, 8 p.m.

Meeting of Toronto Branch, Canadian Society of Civil Engineers.

CANADIAN SOCIETY OF CIVIL ENGINEERS' TWENTY-FIFTH ANNUAL MEETING.

(Continued from last week.)

The first session was held in the Assembly Room in the Royal Alexandra Hotel, Winnipeg, on January 24th, 1911, at 10 a.m., Colonel H. N. Ruttan, President, in the chair.

Chairman:

Gentlemen: Before opening the meeting and going on with our regular business, I would suggest to the members present that it would be fitting for us to express our sense of the great loss which this Society has sustained in the death of one of its most prominent members. I refer to the death of Mr. J. E. Schwitzer, of which we heard only yesterday morning. The engineers of Winnipeg feel this matter with peculiar sadness. Mr. Schwitzer has been here so long, has been so prominently connected with our Society, and so many of us have had intimate relations with him; and the fact that we have always been able to get on in connection with any business we had to do, no matter how intricate, how involved it was, with perfect satisfaction; and the fact that Mr. Schwitzer had just received what we, who know him very well, are bound to consider the just reward of his merits as an engineer and a faithful servant of the company with which he was employed—these all add particular sadness to the occasion. While Mr. Schwitzer, I am sure, would not have had us change our programme in any way—would not have had us cut out a college song or anything of that kind—still we feel that we could not with any heart go on with the smoking concert to-night, and a joint meeting of the Local Committee and the members of the Council yesterday morning decided to cancel the smoker. I would suggest to the meeting that it would be fitting for us to take some action in respect to Mr. Schwitzer's death.

Mr. J. Kennedy.—Mr. President: The sad duty has fallen upon me of moving a resolution expressing our regret at the death of Mr. Schwitzer, and of condolence with his widow. I regret greatly that I have not words to do so fittingly. You who know him so intimately here in Winnipeg, and those, his fellow officers on the Canadian Pacific Railway, who know so well his ability and his sound judgment and grasp of things and his genial manner, have rejoiced at his rapid promotion and the latter step which seemed to crown his progress, for the Chief Engineership of the Canadian Pacific Railway is undoubtedly one of the prizes of the profession, it would be useless for me to try to impress upon you the worth of Mr. Schwitzer, whom you know so well, and it would only deepen your sadness. All throughout Canada, I am sure, we had come to know Mr. Schwitzer, had greatly appreciated him, and had come to look upon him as a worthy successor of those who had gone before him in that particular office, and possibly a worthy successor of some of the old names like Samuel Keefer, Watt, Shanly, Col. Sir C. W. Gzowski, John Page, and others whom I could name; and the regret of all of us at his sudden taking away is all the more keen in that respect. I will not attempt to say any more to disturb your feelings, but just move the resolution, which the Secretary will be kind enough to read for us.

Mr. C. H. McLeod, Secretary, read the resolution as follows:—

Be it resolved that the members of the Canadian Society of Civil Engineers, assembled in Annual Meeting in Winnipeg, desire to take the opportunity of expressing their sorrow on hearing of the sudden death of Mr. J. E. Schwitzer, one of the most distinguished members of the Society. This sorrow is emphasized by the fact that he had just received promotion to the Chief Engineership of the Canadian Pacific Railway, which appointment marked the appreciation of a great corporation for one of its most able and devoted officers. Mr. Schwitzer was one of the most manly, lovable and popular of the members of the Society, and his death is mourned by each member as a personal loss.

Be it resolved, that the Society respectfully begs to express its deepest sympathy with Mrs. Schwitzer in her bereavement, and that a copy of the above resolution be forwarded to her.

Prof. J. Galbraith: I beg leave to second the resolution which has just been read, which was proposed by Mr. Kennedy. It does not become me to add anything to what has been said to you by the Chairman and Mr. Kennedy. I had not the pleasure of meeting Mr. Schwitzer except within the last three or four years, and I wish at least to bear testimony to the genial, lovable character of the man. I know I have been never more impressed with any man I know than with him in his social relations. I am sure that that resolution expresses the regret that we all feel, and it is peculiarly fitting that at this annual meeting, in this city of Winnipeg, and in this Canadian Pacific Hotel, that we should carry now such a resolution.

Motion carried unanimously, standing.

Chairman: I now declare the meeting open for the transaction of business. The first order of business is the reading of the minutes.

The Secretary then read the minutes of the last meeting and they were confirmed.

The next order of business is the nomination of scrutineers. The following members have been nominated as scrutineers of the ballot for officers and members: Mr. F. P. Fetherstonhaugh, Mr. A. R. Dufresne, Mr. G. E. Howie, Mr. L. B. Elliott.

For scrutineers of the By-laws, the following are suggested: Mr. Le Grant, Chairman; Mr. M. P. Blair, Mr. Sherwood, Mr. H. A. Bowman, Mr. James White.

Carried.

Col. W. P. Anderson: I beg to move that the Report of Council as printed and distributed be received and adopted.

See Can. Eng. Vol. 20., Page 225.

Prof. Galbraith: I second that. Carried.

Chairman: The Report of Council is now open for discussion.

Secretary: I might say that in regard to the Committees, there is a slight typographical error on page four—beginning on page three, the following have been the Committees of Council during the year:—Library and House Committee, Finance Committee, the Gzowski Medal Committee—and that ends the committees of Council. The rest are committees of the Society. There is a heading omitted there.

Mr. Mountain: I move that the report of the Library and House Committee be received and adopted.

Mr. Rust: I second that. Carried.

Chairman: The next matter is receiving and considering the Finance Report.

Mr. H. J. Lamb: I would move that this report be received and adopted.

Mr. Montague: I second that motion. Carried.

Chairman: The next order of business is receiving the Reports of Branches; Quebec Branch first.

Report was read by Mr. Oliver, Secretary of the Branch.

Report on the Annual Proceedings of the Quebec Branch.

We have the honor to report that since the 21st January, 1910, the date of the last Annual Meeting, the Quebec Branch of the Canadian Society of Civil Engineers have held ten meetings for general purposes and for the election of new members.

This Branch has at present a membership of forty-nine corporate members, four student members, and two associates.

I regret to say that during the year no papers were read before this Society. This may be due to a certain extent to the fact that most of our members are compelled, by their professional duties, to be absent from Quebec for a great part of the year. A great deal of interest, however, has been manifested in the doings of the engineering profession, and discussions have been frequently held on important works which are now in course of construction.

On several occasions members of the Branch have discussed the advisability of stricter measures being taken to enforce the payment of dues to the parent Society, and representations have been made to this effect, as it is felt that such enforcement would then enable the parent Society to make the necessary rebates to the Branches in order to put them on a proper footing to enable them to carry on the work of holding the members together, and for the benefit of the Engineering Society at large.

It is also felt that the members of the Society, in the Province of Quebec, do not enjoy the protection to which they are entitled and have a right to look forward to, according to the Charter of this Society. In many cases it has been brought to the attention of the Quebec Branch of the Society that engineers who do not belong to the Canadian Society of Civil Engineers have been brought in from foreign countries to carry on important engineering works, which, it is felt, would have equally been as well looked after by Canadian engineers, members of the Society.

It is generally felt among the members of the Quebec Branch that stricter measures should be taken to enforce the carrying out of our by-laws, which provide that no engineer, not a member of the Canadian Society of Civil Engineers, although such may be a graduate of some university, is entitled to call himself or to practise as an engineer in the Province of Quebec without complying with the by-laws.

The Quebec Branch have very comfortable rooms, which have been placed at their disposal by the Mayor of Quebec. The leading engineering reviews and magazines are at the disposal of the members of the Branch. A library has been started, to which the members have free access at all times of the day.

The annual meeting of this Branch was held on the 10th January, 1911, at which Mr. P. E. Parent was elected Chairman and Mr. S. S. Oliver, Secretary-Treasurer, to replace Mr. A. E. Doucet, retiring chairman, and Mr. P. E. Parent, the retiring secretary-treasurer.

Messrs. A. R. Decary, W. R. Russell and R. O. Sweezey were elected members of the Executive Committee, as well as E. A. Hoare, L. A. Vallee and A. E. Doucet, who, as past chairmen, formed part "ipso facto" of this Committee.

Chairman: The next report is from the Ottawa Branch.

Report was read by Mr. James White.

Annual Report of Ottawa Branch for Year 1910.

To the President and Members of the Canadian Society of Civil Engineers—

Gentlemen:

The Managing Committee of the Ottawa Branch of the Society beg to make the following report for the year 1910:

Membership.—The total membership of the Branch at the close of the year was 228, of which 4 were honorary members, 47 members, 88 associate members, 1 associate of the main Society, 20 associates of the Ottawa Branch, and 68 students.

We regret to record the death of:—Z. J. Fowler, member; G. C. Rainboth, member; J. B. Spence, member.

Annual Meeting.—The annual meeting of the Branch was held on the 5th October, and the following officers were elected for the year 1910-11: Chairman, A. A. Dion; Secretary-Treasurer, H. Victor Brayley; Managing Committee, S. J. Chapleau, J. E. N. Cauchon, Gordon Grant, John B. McRae, James White.

Attendance.—The attendance at the meetings varied from 15 to 87, with an average of 26. The interest taken in the Branch and the Society has been on the increase during the year, and it has been a surprise and a pleasure to the Managing Committee to note the great zeal shown by the members of the Branch.

Finance.—It is found that the necessary expenditure of the Branch, such as rent, light, caretaking, library, postage, printing, etc., requires about $650.00 per annum.

The Branch at the end of the year has a deficit of $175.00. The Branch lost refunds for 1909 on over 23 Corporate members, owing to the present system of making credits to branches. We also lost refunds for 17 more members for being in arrears. We received in 1910 refunds for 117 Corporate members out of 131 Corporate members. A subscription of $2.50 was asked from all Corporate members towards furnishing the rooms of the Branch. This was well responded to.

Library.—The nucleus of a Library has been started by subscribing to the Technical Press and from donations from individual members of the Branch. In the former this is limited owing to the pressing demands of the Branch on its funds for the cost of rooms, advertising and general running expenses, etc. In the latter much has been obtained from individual members, but lack of space forbids placing, at present, such data in the manner that would be desirable.

Rooms.—The headquarters of the Branch is situated at 177 Sparks Street, and is open to all members of the Society. It is hoped visiting members will make use of the Ottawa Branch rooms when visiting Ottawa, as they have the same privileges as visiting members, where they may attend to correspondence, read the technical books and periodicals to be found there, meet the local members, and will find a list of all resident members with their addresses. Wednesday evening is the meeting night of the Branch. If no papers, etc., are being read, members generally drop in to smoke and chat. The rooms of the Branch are well furnished, and while they seemed large enough a year ago are now quite too small. We should get into larger quarters as soon as our finances will admit of the necessary expenditure.

We would strongly recommend:—A better system of making refunds to branches; payments to be made at least three times a year, at regular intervals. Refunds to be made for every member who has paid his fees at the time

of such refund. The published list of members sent out by the Head Office each year to govern.

We recommend that the Council consider if some means may be devised whereby assistance of some kind may not be given to Branches to form local libraries, in order that members of Branches who will be, under proposed amendments to By-laws, considered as resident members, may derive more of the benefits of resident members in Montreal.

We recommend that papers of merit read before Branches should be published in the transactions of the Society when desired by the Branch, subject to censorship at headquarters, instead of compelling authors to read at Montreal first in all cases.

We recommend that the mode of election of officers and Council be considered, with a view of giving Branches representing the various districts some voice in the selection of the members of the Nominating Committee.

Mr. J. White: I beg to move the adoption of the report.

Mr. Mountain: I have pleasure in seconding the motion. Carried.

Chairman: The next Branch Report to be considered is that of Toronto.

Mr. T. C. Irving, Jr., read the report.

Annual Report of the Toronto Branch.

To the President and Members of the Canadian Society of Civil Engineers—

Gentlemen:

The Executive of the Toronto Branch beg to submit the following report for the year 1910:—

The total membership of this Branch at the close of the year was 275, of which 60 were members, 87 associate members, 7 associates and 121 students. These according to the constitution represent the members of the Society within a radius of 50 miles of Toronto. Due to removals, deaths and the non-payment of dues, only 86 members are on the contributing list, so that this Branch has derived from the parent Society one hundred and seventy-two dollars as a refund during the current year.

We regret to record the deaths of Messrs, John Galt, C. E. Goad, and George Masson.

The members of the Branch have, by an arrangement continued from previous years, had the privileges this year of the rooms of the Engineers' Club of Toronto. Because of the launching of the new organization, which is to become the successor of the club just referred to, it will be necessary for the incoming executive to make other plans for its quarters for the year 1911.

As in previous years, the meetings this year were limited to one each month during the winter season. All but two were held at the headquarters of the Branch, 96 King Street West.

The papers read were as follows:—

"The Detroit River Tunnel," by W. S. Kinnear.

"The Hydrostatic Chord," by R. D. Johnson.

"Grade Separation," by W. H. Breithaupt.

"Bridge and Building Foundations," by T. K. Thomson.

"The Toronto Sewage Disposal Works," by A. C. D. Blanchard.

It will be observed that the policy of the executive has been to secure addresses from eminent engineers from this and other cities, in addition to the usual discussions of papers delivered before the parent Society.

The question of securing the importation of technical magazines for individual members of the Branch through other channels than the mails has been under consideration, and some progress toward the solution of this problem has been made.

The auditor's report shows a balance on hand of $125.08.

Mr. Irving: I move the adoption of the report.

Mr. C. W. Dill: I beg to second the motion. Carried.

Chairman: The next is the report of the Manitoba Branch.

Report was read by Prof. E. E. Brydone-Jack.

Annual Report of the Manitoba Branch.

The Manitoba Branch of the Canadian Society of Civil Engineers begs leave to submit the following annual report for the year 1910.

The officers for the year 1910 were as follows:—Chairman, J. E. Schwitzer; Executive Committee, C. H. Dancer, J. A. Hesketh, T. Turnbull, Col. H. N. Ruttan, Past Chairman; Sec-Treas, E. Brydone-Jack.

Meetings.—The following papers were discussed at the regular meetings of the Branch:

Nov. 4, 1909—"The Power Plant of the City of Winnipeg," by W. G. Chace.

Jan. 6th, 1910—"The Design and Construction of the Lethbridge Viaduct," by J. E. Schwitzer.

Feb. 3rd, 1910—"The St. Andrew's Locks and Dam," by A. R. Dufresne.

April 14th, 1910—"Wireless Communication," by Dr. Lee de Forrest.

Attendance.—The attendance at these meetings averaged about thirty.

The annual meeting of the Branch was held December 1st, 1910, at which the following officers were elected:—Chairman, C. H. Dancer; Executive Committee, E. P. Fetherstonhaugh, J. A. Hesketh, T. Turnbull, J. E. Schwitzer and Col. Ruttan (Past Chairman); Sec.-Treas., E. Brydone-Jack.

Members in the Branch.—The total number of the mailing list of the Branch is 166.

Recommendations.—The members of the Branch wish to recommend that the By-laws of the Society be revised so that papers which have been read before the Branches of the Society may be published in the Transactions, providing the Council considers them worthy of publication.

Prof. Brydone-Jack: I move the adoption of the report.

Mr. Chas. H. Dancer: I second the motion. Carried.

Chairman: The next report is that of the Vancouver Branch.

Secretary: I have not received a report from the Vancouver Branch. I don't know if there is anybody representing it here.

Mr. Mountain: In reference to the business coming out of the suggestions and resolutions of the Branches just read, when do they come up for discussion, or do they come up for discussion at this meeting? For instance, the reading of the papers.

Chairman: I may say in answer to Mr. Mountain, that I think those reports should have been discussed, if there was any discussion, while they were before the meeting. There is no objection to opening up the meeting again to permit of any discussion which the meeting likes to give on the various reports.

Col. Anderson: I should like to ask if it is intended to publish those reports. It appears to me a good many valuable suggestions to the Society are embodied in them, and if they could be put before the members so that they could consider them at their leisure it is almost impossible for them not to discuss them. I would move that they be in-

corporated in the transactions, and I would also move that the several suggestions contained in the reports of the Branches be referred to the incoming Council for consideration.

Chairman: The Secretary informs me that the reports are always published in the transactions.

A motion to refer the different suggestions to the Council was moved by Col. Anderson, and seconded by Mr. Mountain, that the reports of the various Branches be referred to the incoming Council for consideration. Carried.

Mr. White: Do I understand that to mean there is to be no discussion—that they are simply to be referred to the incoming Council?

Chairman: That is the effect of the motion that has been carried, but there is no objection to discussion on the reports now, if the meeting desires it.

Mr. White: I would like to say a few words on behalf of the Ottawa Branch, particularly in respect to the question of refunds.

We had a considerable deficit this year, and the result has been that the managing committee has had to shoulder the brunt of the work of wiping off that deficit. According to the by-laws, the meetings begin on the first of January, but the payments are not made till the close of the year. That means the branch will have to finance themselves for practically twelve months. We think payments should be made at least three times a year or, preferably, quarterly. I understand the objection has been raised that this would involve a great deal of labor and complication. I confess myself that I don't see why on the first of January a list of members of each branch cannot be prepared, and as each of the members, say, of the Ottawa Branch, pays his fees, why the Ottawa Branch should not be duly credited. Unfortunately one is unable to make any amendment to the by-laws. I would like to know if there is not some way, by instruction of council or otherwise, whereby we can have those payments made as I propose, either three times a year or four times a year.

Chairman: I would ask Mr. McLeod, the secretary, to explain the practice in respect to the payments to branches.

Secretary: While the by-law reads as Mr. White states, the Council has given an instruction that advances be made on account practically at the convenience of the branches, and each one of the secretaries has been notified to that effect. Last year, for example, there was an advance about the first of May, as I recollect, to the Ottawa Branch, $75.00. Then during the summer, about the first of August, there was another advance of seventy-five dollars, and later on, near the end of the year, the balance was paid. Now if that is not satisfactory, larger advances can be made, but we don't want to overpay the amount that is likely to be to the credit at the end of the year. That is an instruction by resolution of the Council.

Mr. White: As I understand it, while the by-law reads one way the practice is the other way.

Secretary: The by-law does not read except that the final settlement is to be made on the basis of membership at the end of the year. Payments are made in advance. We really don't know until the thirty-first of December what the total credit to the Branch may be.

Col. Anderson: Are the Branches credited with the payments made at the close of the year, or do they lose absolutely?

Secretary: Under the new by-law they would be credited with all payments made during the next year. That is, in 1911, Branches will be credited with arrears paid for 1910.

Mr. White: Of course, so long as in practice we get out refunds at stated intervals, approximately equal intervals, or three of four times a year, that is quite satisfactory; but I confess the Managing Committee, on reading over the by-laws, did not draw that inference from them. The way the by-laws are drawn, to my mind, leaves it open to the Secretary to pay anything during the year.

Secretary: I may say that I explained in several letters to the Secretary of the Ottawa Branch what the resolution of the Council was under which we were acting, and he certainly had the letters in his hands.

Mr. Uniacke: One thing in regard to a matter that came up in the Ottawa Branch, and I don't think was covered by Col Anderson's motion, was that in order that a paper read at a branch be recorded in the transactions of the Society. On one occasion we had a most valuable paper read before our branch, which meets every Wednesday, and we have as a rule forty or fifty members at every meeting, and it was moved and seconded at the branch as the paper was of such general interest to engineers throughout Canada, that it be published in the transactions. The reply from the Secretary was, I understand, that it could not be published in the transactions of the Society from the fact that it had to be read simultaneously at the head Society and the branch. I think this is a physical impossibility to have them read simultaneously, and I would be very much in favor of any revision of the by-laws which would permit a paper of such general interest to be published in the transactions of the Society, where everybody could read and see the paper, instead of about forty or fifty members who were present at the time.

Secretary: There is a Committee on Papers and under our method of conducting business that Committee first approves of a paper when it is sent in, and it is passed for reading. Sometimes, unfortunately, we have to read the papers from manuscript, but that should not be the practice. If the paper is typed, why there is no difficulty in having it read simultaneously, unless there is some special reason for reading it at a branch before the head Society.

Mr. Uniacke: The paper I refer to particularly was illustrated by lantern slides. It was read by Mr. Murphy, a paper on Frizial Ice. He brought up some new points. It was prepared particularly for the branch society, and I don't see why in similar cases it could not be printed in the transactions.

Prof. Galbraith: I am not very familiar now with the practice of the Institution of Civil Engineers, but my impression is that they have no such things as branches. What I was thinking of was this, that in so far as we take them as a model we must adopt their methods with modifications. I did not know when I rose up whether they had any system of branches or not, but I see now there is none. I think as the number of branches increases and the number of papers increases, each branch stimulating a certain number of writers, that we shall probably have to devise some new method of handling those papers. It will be practically impossible that every paper should be read at meetings at headquarters, and then read simultaneously or otherwise at the branches. We shan't be able to cover half or a quarter of the good papers, and I believe the Council should take into consideration the whole question of handling papers, which arises from the rapid increase in the number of these papers coming from the increasing number of branches.

Prof. Brydone-Jack: I think that there have been some very valuable papers read at the meetings of the Manitoba Branch. Although brought forward in lecture form they

would be extremely valuable to the main Society. Under the present regulation we are not able to have them published in the main Society, and I think the main Society loses some very valuable papers by that very means, and it seems to me that some arrangement must be made by the whole Society whereby these papers may be read at once at the branch and then refer them back to the main Society for publication, if Council considers them worthy of publication. In practice it works out somewhat this way. A paper is usually prepared for the meeting at a branch. Sometimes very careful attention is given to it. At the same time it is very seldom that that paper is completely ready until the meeting of the branch at which it is to be read, and if the time should elapse until that paper should go to Montreal first, and be passed on there, and then come back here to Winnipeg, the result is the paper will be so late that the members of the Manitoba Branch will not care for it and it will fall flat, and I think in that way the main Society will lose very valuable points. I think it should be read here first, and then sent on to the Council and considered by them for publication. I think in that way the Society would have some very valuable papers for publication. I think, Mr. President, this recommendation, both of the Ottawa Branch and the Manitoba Branch should be given very careful consideration by the incoming Council.

Mr. Rust: Wouldn't it be better for this matter to be referred to the incoming Council?

Chairman: It has already been referred under the general motion by Col. Anderson.

Mr. White: I just want to say that Mr. Brydone-Jack has put admirably the views of the Ottawa Branch. We have no idea of asking the parent Society to publish all the papers or anything like it. The idea is this: that the parent Society should only publish the important papers. It would be too great a strain upon the resources of the Society to publish all the papers. It should only be a limited number of the best papers that should be published.

Col. Anderson: I think the feeling of this meeting is very strongly in favor of the proposition of Mr. Uniacke and Prof. Brydone-Jack, and I think it desirable that this meeting should give instructions to the incoming Council that it is their feeling that papers that are worthy of publication should be considered by the Council and published by the Council. I want to say this, that the Canadian Society of Civil Engineers is suffering in comparison with the Institute of Civil Engineers, because we are not publishing as good papers or as many papers, and we are not really giving any consecutive record of the great engineering works that are being done in Canada in such form as they should be preserved for permanent record. The reason for that is that as a rule we are too busy to write papers, but there are a great many papers that have been presented to these branches that contain either original investigations or records of big works done. Mr. Murphy's paper on Frizial Ice is a most valuable paper, and worthy of a permanent record, and the advantage to the Society as a whole is that that should be in such shape that we can get at it for future reference. Take our late friend's, Mr. Schwitzer paper on the Lethbridge viaduct. That is a monumental work, and it isn't recorded in any permanent form. It ought to be in the transactions of the Canadian Society of Civil Engineers without any question. If it is the opinion of the great majority of this meeting that the incoming Council should take cognizance of the best of the work that is done by the branches, I think we ought to say so with no uncertain voice. I would suggest that Mr. Uniacke move a resolution to that effect and Mr. Brydone-Jack second it.

Chairman: I might say, gentlemen, that I think we are all satisfied that for some reason or another we are not publishing a sufficient number of papers to indicate the character and the importance of the work being done in Canada. There are several reasons for this. The principal one, I think, is the formal and cumbersome method at present in use by the Society of introducing and publishing these papers. It is a comparatively easy matter to get a man to spend a week or two in preparing a paper to read before a local branch, and while a great many of those papers no doubt would be rejected if they were sent to the parent Society, at the same time a great many very valuable papers might be published in our proceedings. It appears to me that the branches are breeding grounds, as it were, for papers, and if we can do something to facilitate the bringing of those papers before the Society, while they might be first crude papers in the form of lectures, still, if we get into the habit of writing these papers the people who do so will take more care with them, and I think in two or three years it would be a very good thing for the Society if papers from branches were allowed to be published in the transactions.

Mr. Uniacke: In line with the discussion that has just taken place, I beg leave to move the following resolution: "That the incoming Council be instructed to take such action as to facilitate the reproduction in the transactions of the Society of papers read before the branches of the Society, as may be considered to be to the general interest of engineers."

In commenting on that resolution, I may say that after a paper has been read at a branch it might be well for a resolution to be passed at that branch that the branch considers the paper of such general interest and from them the paper be transmitted to the Council for their further action in the matter, and in line with this resolution the Council will be instructed to do what they can to bring this paper before the Society as a whole.

Prof. Brydone-Jack: I have much pleasure in seconding that motion.

Mr. Kennedy: Wouldn't there be some arrangement for the reading of the paper before the main Society also? The branches have progressed with great success, and are doing a great deal of good, and more good than was expected. Of course we have hardly means to record everything and to get the benefits of everything. Surely some arrangement can be made for reading at the main Society as well as the publication.

There is another matter as to the support of the Society —the amount of money. It has come to such a pass that it seems to me that the branches must really face some deficit. If they keep rooms and a library and publications, keep them in vigorous condition, it means somebody to look after them; there will be really more expense incurred than can be really very well provided for by the main Society. What it practically means is it would be supporting the societies all over the country. It would be almost too much for the parent Society, and the vigorous branches ought to supplement their subscriptions or the amount returned by the main Society by some contributions of their own, or we will have to increase the subscriptions or do something to meet the general expenses. I think the resolution for reconsideration of the whole matter will put matters right. I think, as Dr. Galbraith has referred to the Institute of Civil Engineers, they have no arrangement for branches at all. We are really in advance of them. We are in advance

of the American Society, too. They are copying us to some extent; they have what they call "Sections" that have been established, but the Canadian Society has inaugurated this matter and is carrying it on with great success.

Prof. Galbraith: I might point out that there are two different styles of lectures, both of which are useful and popular. One, the lantern slide, which can be got up quickly, and is most interesting to an audience. The other, the lecture, that is best suited for printing, with its necessary illustrations, and I know personally and I believe it is more or less common that many persons can get up an extremely interesting lecture to his local audience, and use lantern slides, and he is apt to forget that that lecture is of no use to others. It must be printed and illustrated with special care, and the original lecture can be used only as a basis. I think that every writer of a paper for our Society, or every giver of a lecture, if he wishes to have his lecture printed, should give out a special written paper for the Society, even although he may not read that paper word for word in the branch.

Secretary: While the resolution is being written I would like if those who have advocated this change would indicate in some way how these papers should be printed; whether they should be printed especially as papers read before the branch, whether they are to be prepared with that object, or whether if prepared and sent in and printed in the form of advance proofs, they should be sent out to the Society as a whole in the same manner as we have been doing with the regular papers. If they are merely printed as papers that are read at branches, perhaps after being put in some different form, then they do not reach the membership until they appear in the transactions, but if they are sent in on approval, and accepted by the Council, it would perhaps be an advantage if they were distributed as proofs.

Prof. Brydone-Jack: It seems to me that the detail arrangement of anything of that kind must be gone into very thoroughly in a way that will benefit the Society as a whole, and I think that in referring the matter to the incoming Council, it means that they will have to go into the detail thoroughly, and consider what really is the best arrangement in detail. I take it in reality that this motion is simply instructing the Council to consider the question in detail.

Motion carried unanimously.

Chairman: The next order of business is the report of committees. The first is the Report on Ties.

Mr. McPherson: As this report of the Committee on Ties was printed and distributed to the members some time ago, I don't think I can add anything to it. I will simply present the report for discussion.

Mr. Mountain: I would like to ask the Committee what induced them to go into this question or who recommended these long ties, and from what experience they had derived this information. I just want to get the views of the Society on it.

Mr. McPherson: I think I may say that we have not recommended the use; we have suggested experimenting with them. I think the reasons are given pretty well in the body of the report why we suggest that. Of course they have not been tried. I have had experience myself with long ties over bogs and on places where tracks were creeping, and they are very satisfactory indeed. It does not seem logical that we should go on with a tie of nearly 50 years ago, when we have increased our weight two or three hundred per cent. We have made them a little closer and a little larger section, but we have kept them at eight feet long. The weight is not evenly distributed; they are liable to break. You cannot tamp the full length of your eight foot tie and get the full bearing power. I think I am entirely responsible for the suggestion. A good number of the members of the committee discussed it with me, and the committee thought there was something in it, and we thought we had better recommend that an experiment should be made. We do not expect that the railways should go right round from an eight foot tie to the ten foot six tie. I move the adoption of the report.

Mr. Mountain: I think the suggestion that Mr. McPherson as Chairman of the Tie Committee brought up is very proper. The only question is how far we are to go in this matter without a full discussion of it. If this is adopted, does it mean that we give it out as a recommendation that ten foot six ties should be used? I presume that is probably what it means if this is adopted. I thought, perhaps, there would be some discussion on it.

Chairman: I don't think it has been our usual practice to consider the adoption of a report as indicating the concurrence of the Council. I think the practice is that the report expresses the ideas of the people who wrote them and not as the opinion of the Society.

Mr. Mountain: What is the difference?

Mr. McPherson: The Committee would suggest the testing of ten foot six ties, that is all.

Mr. Mountain: I think probably it should go in the same way as the other.

Chairman: We ought to be very careful in that respect. We don't want the Society to adopt anything definitely that has not been fully tried out, but there can be no harm in adopting the report asking for tests to be made. Carried.

Chairman: The next report is Transportation Routes. This is a report on progress.

Report adopted.

Chairman: The next is a report of the Committee on Rails, Fastenings and Tie Plates.

Mr. McPherson: I move the reception of the report.

Chairman: I understand that Mr. Kelly expected to be present. He has not yet arrived, and it might be well to lay this report over till a future time in the hope that he may reach here. It is understood that this report lies in the meantime.

On page seven there is a report of the Committee on Road Bed and Ballasting.

Report adopted.

Chairman: The next report is that of the Committee on the establishment of Testing Laboratories.

Prof. Galbraith: I beg to move the adoption of the report. I direct the attention of the meeting to the foot of page 13, the last letter in the series. The Committee was directed by the Council to ask the Government for an appropriation, and instead of doing that, the chairman of the committee, Mr. Keefer, met Dr. Pugsley and his deputy, and discussed the matter how best to make progress, and you see the result here and the Committee took upon themselves to make this report to the Council instead of to report to the Council its action, and to take whatever blame the Council might assign to it for not following strict instructions.

Mr. Gabraith then read the report.

Motion carried.

Chairman: The next report is that on Conservation.

Mr. White: The report is fairly complete. In its inception it was confronted by one great difficulty, that was to decide what the members of the Society could do to assist the commission in the work it now has in hand. Naturally a commission dealing with the natural resources of the coun-

try touches upon every phase of human activity, and it would demand a very much larger staff than it is usual for a commission to employ. The first thing to do was to get all possible information concerning what we had based upon our present knowledge, and then proceed as far as possible to fill the gaps.

We now have in the press a report on the Water Power of Canada, which is fairly complete so far as our present knowledge goes, in Ontario and Quebec, but I regret to say is sadly deficient in regard to water power in British Columbia, the three prairie provinces and New Brunswick Nova Scotia, we have also managed to accumulate a fair amount of knowledge in respect to it.

In addition to the information contained in the report, I prepared a circular which was sent to members. It was printed and a copy was sent to each member of the Society residing in Canada. I trust that all the members of the Society, particularly those residing in the prairie provinces and New Brunswick, will give us fuller information if possible. As soon as it is received, it will be compiled and published, and I will have much pleasure in sending that report and other information to every member of the society.

As soon as we have disposed of this question of water power, we will endeavor to enlist your services and get the assistance of the members of the Society on other resources, and I congratulate the Society as engineers. I assure you that the Commission is doing its best to cover our resources, and to place before the people of this country their ideas so far as they are able, respecting the best use of all the natural resources which have been given to us.

Report adopted.

Chairman: There is another report on the Improvement of the Government Engineering Service. That is a report that caused a great deal of trouble at our last annual meeting.

Mr. Lamb: As a member of both committees mentioned in this report, that is the committee of the Canadian Society of Civil Engineers, that were deputed to investigate this matter, and also the committee formed by the Government Engineers at Ottawa, it might be in order for me to say that we have fortunately made fair progress in regard to this improvement. As most of the members are aware, the the Premier accorded us a meeting on Friday last. The delegation was a large and representative one, and was accompanied by a representation from the Canadian Society of Civil Engineers. The result of that meeting with the Premier was to the effect that Dr. Pugsley was instructed to fully investigate the matter, and he has, I am pleased to say, invited the committee to go into the matter with him, and to furnish all the data at their disposal so that he may report to the Government as to what steps he would advise to be taken. We hope that the Minister of Public Works will take this matter up within the next few days, and the Committee of Government Engineers are now awaiting to work with him on the matter in Ottawa.

Session of Tuesday Afternoon, January 24th, 1911, 3 p.m.

The meeting was called to order, the president, Colonel Ruttan, occupying the chair.

President Ruttan: Gentlemen, the next report on the list is that of the Usefulness of the Society and Educational Requirements. This is a short report, and the Secretary tells me it is a very important one, so perhaps it will be well to have it read.

Secretary McLeod: The importance of it consists of the recommendations.

President Ruttan read the report, as follows:

"In its reports of 1909 and 1910 this Committee had made a number of recommendations and suggestions, a few of which only have been dealt with by the Society.

"It is thought advisable at this stage, to refer both these reports to the present Annual Meeting for further discussion of such of the suggestions and recommendations upon which no decision has so far been arrived at.

"This Committee is also of the opinion that better results would be obtained, in respect of the objects for which it was created, if several local committees were appointed by the Annual Meeting with instructions to each of them to deal with these objects, either in toto or in part."

The idea there is, you will have to know, it was felt by that Committee perhaps better work would be done if a Committee here had a certain definite subject to work out, and a Committee in Montreal had a certain other definite subject in the proposed branches of the Committee's work.

(Continuing): "With regard to qualifications for admission into the Society, the Committee recommend:

"(1) That By-law No. 10, concerning the admission of students, be rigidly enforced."

That by-law, as you are aware, calls for a certain educational standard and in many cases it is almost impossible to learn through certificates presented, the ability of students, those seeking admission, of students or associate members unless they are college students or graduates.

(Concluding): "2. That, in case of any doubt as to the qualifications of applicants for admission to any grade below that of membership, the Council be instructed to prescribe and conduct the necessary examinations; this new regulation to be embodied in a by-law to be voted on before the next Annual Meeting. Ernest Marceau, Chairman."

And you see, under the by-law, there is no reason why the Council cannot act along that now, but the Committee say that passing a by-law might emphasize the action of the Committee.

Gentlemen, what shall we do with this report? Some one will please move that the report be adopted.

G. A. Mountain: I move the reception of the report, Mr. Chairman. Might I ask the Secretary to state again how the Council have power to prescribe and conduct the necessary examinations?

Secretary McLeod: The by-law requires a certain educational standard. Now it requires that certificates should be presented, but very often men come up for admission to the Society as students or as associate members even, and they cannot put up the certificate. It may be obvious that their educational attainment is in every respect admirable, but there are no certificates to be presented, and the Council has no means of ascertaining whether they are qualified educationally, or not. I do not think there is a thing in the by-laws to prevent them to do it, but there is no positive instruction in the by-laws to require them to apply an educational test by way of examination.

G. A. Mountain: Of course, in addition the branches assist in that way, because, as you know, the Council often ask the branches to advise on a man from their district, and then generally give valuable information; but I can see that they have to be pretty rigid in that stand.

Colonel W. P. Anderson: It appears to me that the time has come when the Society not only can, but should, take a much firmer stand with regard to the qualifications of the education of the men in any grade of the Society below that of member. Personally I have heard a good many criticisms with regard to the qualifications of some of the men who have been admitted, but I do not think under our pre-

sent regulations that our Council, or any portion of the Society, has absolutely the information at hand, or can get the information that will enable them to grade members without some fear of making mistakes. For instance: One man, in making out a list of his qualifications, will be very modest and will only mention the more important of his works and points that are really worthy of attention, and another man will put in every little job he has ever been on, putting in his qualifications in such a way that you would think he had done a great deal of work, when, if the work was analyzed and the different statements followed to the ground, it would be found that these pieces of work he had been doing were not of such a nature as would, under our charter, qualify.

Lately, some of us have seen in communication with the Heads of Departments with regard to bettering the conditions attached to engineering in the Government service, and we urged that the certification in the Canadian Society of Engineers should be taken as being the testimony of qualification. They seemed a little annoyed with the fact that there were seemingly many men who were admitted to the Society whose qualifications were doubtful. The answer is: Let us get the Canadian Society of Engineers to stiffen up their requirements with regard to these men; and personally I should welcome any change in the by-laws which would enable the Council to apply more severe tests to candidates for admission to ensure our getting the best men in the field. We can afford, as well as any University in Canada can afford, to pluck men if they are not up to the standard in their work. I would like to see these qualifications stiffened, and I think this would benefit the whole country a great deal.

President Ruttan: Mr. Duggan, I think that is a matter in which you are interested. Kindly give us your ideas.

G. H. Duggan: When I gave up taking an active interest in the Society this question of examination of qualifications was one which had been under consideration and examinations had started to be held—that is, they had started to hold one or two examinations, and I was under the impression the requirements would be made much more severe, and I am surprised to hear they should be less. I am entirely agreed with Mr. Anderson that they should be made greater. With regard to students, I do not think it makes much difference, because, after all, the admission of a student is not admission to the Society in any way, and should not have any effect upon the subsequent admission of the student into the grade of membership or associate membership, but I think this matter should be carefully considered. I think the Committee has now arrived, if it has not arrived before, at the time when we can afford to make admission into this Society one which will show that a man is capable of carrying out the works that an engineer should be qualified to take in charge.

W. P. Anderson: I did not intend to convey the impression that the conditions are more lax than they were. What I meant was, they should be made still more stringent than they have been.

G. H. Duggan: Continuing with the stiffening up of the regulations, within reason; in other words, if a man is admitted to any grade in the Society it will depend on his qualifications for the profession of Engineering.

Secretary McLeod: I think all who have been on the Council will admit there has been stringency applied to the tests for admission, but perhaps what Mr. Duggan has stated requires some light. There has been a tentative assumption that a man, having been admitted a student is qualified to go forward to associate membership so far as his general educational training was concerned; that what was looked to, after that, was merely his professional employments, and perhaps we have got into some difficulty in that connection. Our by-law only requires a general educational training insofar as the student requirement is concerned, it does not specify the same qualification tests should be applied for associate members. It is assumed that those applying direct for membership should have the educational qualifications. Our difficulty in men coming up for associate membership are men who have been engaged on important works, who have very limited school or college training in a scholastic way.

Duncan MacPherson: Take a man who would have very great practical experience, and probably for some other very good reasons should have joined our Society. He might have had a good college education, but have been so long out of college that his mathematics had become very rusty, and if the same examinations were applied to a man who is but four or five years out of college the younger man would surpass him, although his more practical work would be better. I would be very sorry, indeed, to have to pass a rigid examination in mathematics now.

Secretary McLeod: As I am the only one who was present at the Committee, and although I am not a member of it, I should say that the question came up and the solution was that a man should be called upon to write a report upon one or two subjects, giving an account of, say an engineering work; one set being, say prescribed, and another one such as he would select for himself, and he must be able to describe his work, and able to express himself clearly, and this would count for a very large factor in his examination.

Duncan MacPherson: A man might have the ability to describe the work, but not have the ability to carry out the work.

President Ruttan: Gentlemen, it seems that this move is in the right direction; there does not seem to be any very definite conclusion arrived at. I think Colonel Anderson's suggestion that this be referred to the Council with the request to prepare a by-law to be submitted at the next meeting, or perhaps in the alternative that they be requested to report at the next annual meeting a system under which members would be admitted to the association. The Institution of Civil Engineers, Professor tells me, have examinations for all classes up to that of member, including associate member. They do not examine members, but associate members, and all lower grades are examined.

Duncan MacPherson: Does that mean a man who had never belonged could join as a member without being examined?

Secretary McLeod: Yes. Mr. Schwitzer was admitted as a member a year ago.

Mr. Mountain: Yes, and Mr. Kelly was admitted as a member.

President Ruttan: It must be recognized a man eminent in his profession must be admitted without passing lower grade examinations; that is, you take them on their works, without passing the lower grade of examinations for admissibility to the Association. I think Colonel Anderson's suggestion would be a very good one for this report.

G. H. Duggan: The admission of a student is of no importance, it seems to me; it gives the trouble of the examinations and the student membership does not carry anything with it at all. If it is a question of admission of associate members or other grades, then I am entirely in accord with you, but the student membership, I do not think

really its standing in the Society is worth anything at all so far as we are concerned.

Secretary McLeod: There is another rule that is not desirable to admit students who are not qualified.

G. H. Duggan: You cannot tell what they will be, later on.

Duncan McPherson: It seems to me that Mr. Duggan's suggestion is a good one. When they pass up to the grade of junior or associate and cannot pass, then they can be eliminated.

John Kennedy: All Engineers' Societies have found this subject a very difficult one. There is no use in admitting a student who has not some knowledge to begin with, and who has not shown some aptitude for the work of engineering. Better wait until he does. It is like matriculation. He should know something, and show some education; but the most important point is, we should find out if he is a good engineer. He might be a good poet, or a good merchant, and have no success as an engineer. Or he might be a good engineer of one sort and not good as another. The mere scholastic education is the mere tools with which he works; his experience, that is whether he has been on large works, means what he has had to do with. If he has had a set of plans in the field with which he has had nothing to do and from which he has merely had to set out the work or lay out the work or see it done, that would not do him much good. If he has been engaged as a contractor and builder and has had to devise methods, that is a high qualification, and so is designing the works. So we have to find out what makes an engineer, and what kind of mind he has and what facility for designing, and that will set forth a pretty good qualification for membership. So the examination needs to deal with more than mere technical education, and more than mere experience; but beneath all is, what kind of ability has a man as an engineer? and that is difficult to find out. I am not trying to give you the solution to the question, because I do not know it.

Col. Anderson: I would move that this report be received and referred to the Council for the purpose of drafting regulations for the examination of candidates for admission to the grades of Junior and Associate Member, such regulations to be submitted to vote before next annual meeting. In that way I leave out the consideration as to the qualification of students because I agree with Mr. Duggan that if a student cannot advance to Junior Member without proper examination there is not very much harm done in having him in as a student, and I leave out the question of member, because I think we all agree when a man has attained that progress in the profession he is entitled to be a full member, the Council should be better qualified to deal with him on his record than they are on the examination. I think that is the practice in the Institution that the students and associate members are admitted on examination, and the full members are a mitted on the judgment of the Council.

A Member: I think the discussion of the United States Civil Service Department might be of use. Their methods of examination are practically divided into three lines. They ask a man to write a technical paper and make a report and a sworn statement as to his qualifications and experience; then the marks are divided up on those papers that even though he does not pass on the technical paper, he may still qualify on the experience and sworn statement of qualifications. Some such scheme as that might be able to overcome the difficulty Mr. Anderson speaks of.

Col. Anderson: Personally, I don't care how it is done; what I am aiming at is to see such regulations put in force by the Council of the Society as shall form a guarantee to the public, as coming from the Society, that a man who has our commission as an Engineer or Assistant, has the qualifications that should be expected from a man in that way, and that is what I meant by stiffening up the regulations. What I want is, that our membership in the Society, associate membership or junior membership in the Society, shall mean something, and that it shall be utterly impossible for a man to pick up a record and get a poor man. I say there is just the suspicion that it has been done in the past, and it is for us to see that it cannot be done.

Secretary: One of our difficulties, if we were to put into force more rigidly than we have in the past some exacting qualifications with regard to standing is this, that the by-law reads: "Every candidate before election as a student must be at least sixteen years of age, and must present a certificate of having successfully passed an examination equivalent to the final examination of a high school or the matriculation of the arts or science course." In a great many cases we cannot get such certificates. We may suspect a man may be qualified, but we have no way of getting that except by examining them.

Col. Anderson: I am not bothering my head about students.

Secretary: Then we will have to keep them out; if they cannot present certificates we will have to keep them out. Except in the case of a college man it is almost impossible to get certificates. We put them up for examination, or I understand that it is thought it is not advisable.

John Kennedy: What is the objection to having the Council formulate something now, without waiting for the next annual meeting?

W. Chase Thomson: Why not? Where they are unable to present a certificate, why shouldn't the Council then prepare an examination on their own account? That could very easily be done. It would be much more satisfactory than admitting students without any recommendation.

Mr. J. M. Wilson: I would like to ask, Mr. President, if we have any regulations prohibiting Engineering Salesmen becoming members of the Society. It seems to me that many men who have sufficient technical education to pass any examination immediately they leave college they enter the employ of some firm as salesman and have very little real knowledge as to civil engineering. I would like to know if it is the feeling of the meeting that such men should be discriminated against?

John Kennedy: How could they go forward? They have no experience for any higher grade.

Mr. Wilson: I believe we have men of that type as associate members.

President: Once a man is a member or associate member, or junior of this Society, there is nothing binding upon him as to what occupation he shall follow. On the other hand, if a man is simply engaged as an engineer's salesman, without the qualifications which would entitle him to membership, I do not see that he could be admitted to the Society. I take it, what Mr. Wilson refers to is a system which is a good deal in vogue in the United States in connection with a good many of the large Engineering Societies, for instance, the Great Waterways Association (?), where they have a membership outside of the engineering membership. Of course we have nothing corresponding with that in this Association.

A Member: Associate.

President (continuing): Of course we have Associates, but that does not qualify in any way for member. We are getting a little away from the question. I will read Colonel Anderson's motion: "That the report be received and

adopted and referred to the Council for the purpose of drafting regulations for the examination of candidates for admission to the grades of Junior and Associate Member, such regulations to be submitted to vote before next annual meeting." Mr. Thomson, I think, made some remarks which might indicate that he wanted that motion slightly amended.

Mr. Thomson: Yes, with regard to students. I do not think it would be very much trouble to make that slight alteration that this would not apply to students who were able to produce the certificates.

President: That is covered by the report itself, which is now under consideration; namely, that in case of any doubt as to the qualifications of the applicant for admission to any grade below membership, that the Council be instructed to prescribe and conduct the necessary examinations. That is covered in the reports.

Col. Anderson: That covers it. I withdraw my motion. I would like an expression of this meeting as to the matter of stricter regulations for the admission to the grade of Junior of the Society, and if that means that as the general expression of this meeting, we shall let our sentiments go forward to guide the Council in their action. I would withdraw that regulation, but would ask those who agree with me to stand up now. (Rising was practically unanimous). I think, Mr. President, you can tell the Council this Winnipeg meeting is in favor of some amendment to the legislation.

Secretary: Along the lines of the report?

Col. Anderson: Yes.

President: Do I understand that Col. Anderson moves the adoption of this report?

Col. Anderson: Yes.

The President: Seconded by Mr. McPherson. (Carried).

The President: The next item is the report of the Committee on Standard Specifications for Cast Iron Water Pipes and Special Castings. I do not think that should have properly appeared on the Order Paper, because the instructions of the last meeting to the Council to prepare such specifications have been carried out and standard specifications have been issued: it is not necessary, therefore, to take any action on that item.

The next report is that on Sewage Disposal, which is printed in the Bulletin which we have.

John Kennedy: I must regret that I am the only member of that Committee, so far as I know, who is present. Unfortunately the Chairman of the Committee, Mr. Lea, who took an active interest in the matter, was caught up and laid aside with that fashionable disease, appendicitis, and has not recovered sufficiently to be here. The report was issued here lately, and probably all have not had time to study it, but the essence, as you will see by glancing over it, is to give a general history and study of the art of purification, and then deal with it as to the pollution of streams in two respects: First, as to visible pollution, and second, as to sanitary pollution. Now the Committee came to the conclusion, and I think it is in accord with what has been the practical conclusion of all who have really gone into the matter, that it is comparatively easy, and at least entirely reasonable, that municipalities and communities and large manufacturing establishments should be obliged to clarify their effluence, as to not visibly pollute streams and make them offensive and make them worse in appearance than they were. But, on the other hand, it is utterly impracticable to keep streams in such a condition or to maintain streams in any way in such a condition as to be wholesome from a sanitary viewpoint that another city, situated below, no matter how good the intentions of the upper city would be, could not in any way depend on the efforts of purification which the upper city might take to make the water good enough for domestic or drinking purposes for the lower city; so that our conclusion was that there should be such legislation that would prevent communities from discharging effluence into streams which would make them offensive or visibly worse than they are at present. (Hear, hear). But, on the other hand, all cities should take care of their own water supply; they should, of themselves, see to their own purification and chemical and bacteriological purification of water.

It is hoped the discussion here will have some effect on the legislation of the country, and so some recommendation is put in there. You will find a pretty complete collection of what has been done in the way of legislation elsewhere, and pretty good statements of what the condition is throughout the country, and if you will look a little between the lines you will find, if you just think a moment, of the towns that do not reply as to what they were doing in the way of water purification and sewage purification, you will find it is pretty largely those who are doing nothing and do not want their condition to be disclosed, that have kept silent; and so the report may be taken as showing pretty well all who are doing anything, and that those who have not replied are not always, but broadly speaking, those who are not in very good condition.

Now we recommend something in the way of legislation, and you will find this as a sample, and that is really the substance of the report, for the benefit of those who may not have time to study it over, because it is rather voluminous and has been but so recently issued. I do not know just what the effect of adopting that would be, but I think it would be in a sense committing ourselves to recommendation in that way; but the question is, should the Society bring that to the notice of Parliament in some shape? What should we do with it so it will not be a dead issue?

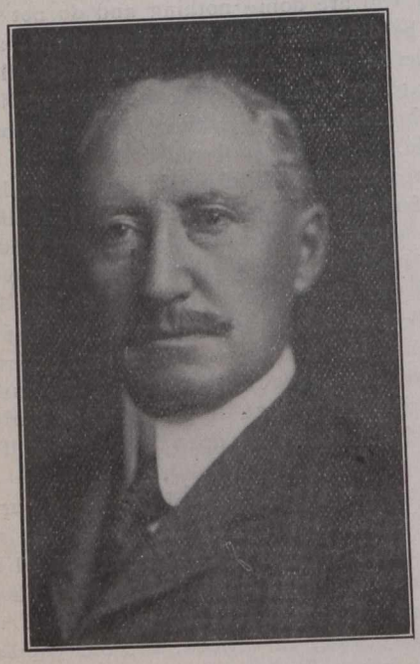
The Senators got a good deal of help from our last session, and the branch at Winnipeg have taken the matter up lately at their meetings, and the sentiment abroad is largely in favor of something being done, and that we have arrived at a stage when we should take up this matter. We have had so much pure water in Canada, and our population has been so scarce, it has not been necessary for us to do anything, but that condition will not last very much longer, and the question is, what are we going to do about it?

C. H. Rust: I do not think it is wise to adopt this report at the present time. As Brother Kennedy has just said, we would possibly tie ourselves up to something we do not believe in, and something that we have not had an opportunity to digest. I, myself, went into the report this morning and there are several matters in it, which, I think, should be discussed.

In the question of sewage disposal, you cannot, of course, apply a general sewage method to all the cities and towns. Each has to be treated separately. Take our cities situated on the Great Lakes and on large rivers, the best purification you can have there is the water itself. It is much cheaper and probably a great deal more efficient than any works you can put up. There is another matter, too, which I think the Society should take up, and that is the question of the formation of these various Provincial Boards of Health. They are, in nearly every case, composed almost entirely of medical men not represented at all by engineers, (applause), and we frequently have to go before them with plans of which they understand nothing. They, looking, of course, to the health of the public, are apt to insist upon conditions which are so arbitrary and make it impossible for a number of small municipalities to carry them

out, and if the society can do so, I think we should bring to the attention of the various provinces the advisability of having a representative of our Society upon these Boards. Of course, they all should engage a sanitary engineer to advise them and report on all these plans that are submitted to them, and, therefore, I do not think this report should be adopted at the present time. If Mr. Murray takes this matter up I think he can talk on and a great deal better than I can. He has made a special study in some of the provinces of the things we are up against.

T. Aird Murray: I am somewhat disappointed with the principle which has been adopted in the report. For the last two years I have been Consulting Engineer for the Province of Saskatchewan. We have there a Board of Health entirely ruled by medical men, and I have had the privilege of forming a policy in connection with sewage disposal which has been adopted by the Government, and which has now been put into effect by all the cities in Saskatchewan—Regina,



H. N. RUTTAN.

Moose Jaw, Prince Albert, Saskatoon, and I notice the Engineer for Prince Albert is next to me, and the Engineer for Moose Jaw is behind me, and they can speak of the class of the work.

The principle in this report, so far as I can gather from it, is this: That it is only practicable to remove from sewage the nuisance of a character which appeal to the senses, such as a nuisance formed by putrescence and decomposition of the organic matter in the sewage. In fact the report appeared to me to be based entirely on the conclusion of the report of the Royal Commission on sewage disposal, Great Britain, published at the end of 1909. So far as Great Britain is concerned this is an efficiency report, because, with the exception of the London water supply, there is no water supply in England which is drawn from streams. The water supplies are drawn from lakes, or the upper reaches of rivers which are entirely free from any sewage pollution.

We have also in the United States the policy of removal of putrescence only in practical exceptance, because of the fact that the rivers in the United States have become so polluted that it is almost impossible to abstain pathogenic purity by any means of sewage disposal. In Canada we have not got to that stage in which our rivers and lakes are entirely polluted to such an extent that we cannot possibly overcome the amount of pollution which is in them. Furthermore, we have rivers and lakes practically pure. We have Lake Ontario and other lakes which represent the purest water in the world. We have water 15 miles—yes, 5 and 6 miles from Toronto—which contain only 8 to 10 bacteria per cubic centimetre. In the North and South Saskatchewan Rivers, at certain seasons of the year, we have water which is almost sterile, free from intestinal bacteria, whereas in the spring of the year, when the ice melts, we may have, and do have, a contaminated water owing to the fact that sewage is carried down in the ice by means of cold storage. This is evidenced particularly at Saskatoon and Prince Albert. These cities have never been free from typhoid at these particular periods of the year.

Now, I would ask the question: "What is it in connection with sewage disposal that will appeal most to these people?" Surely it must be the promise that sewage disposal in some way or other will tend to eliminate this chance of typhoid infection?

(To be Concluded Next Week.)

J. G. SULLIVAN.

Officers of the Canadian Society of Civil Engineers for 1911.

Immediate past president, Mr. H. N. Ruttan.

President, Mr. C. H. Rust.

Vice-presidents, Messrs. Holgate and Dodwell.

Councillors, representing District No. 1—Messrs. Herdt, Johnson, Kelly, Shanly, Sullivan and Vaughn.

District No. 2—Archibald, Doane and McColl.

District No. 3—Doucet, Morkill and Parent.

District No. 4—Coutlee, MacPherson and Stewart.

District No. 5—Haultain, Stewart and Fellows.

District No. 6—Messrs. Brydone-Jack, Heskett and Legrand.

District No. 7—Messrs. Busteed, Dennis and Kennedy.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

12699—January 3—Rescinding Order of the Board No. 11246, dated July 14th, 1910, which authorized C.P.R. to construct spur commencing at a point on the spur track already constructed at the Western Boundary of Lot 3, in Block 67, of subdivision of part of Section 15, Township 24, Range 1, east of the 5th Meridian, premises of G. F. & J. Galt, Ltd., Calgary.

Order rescinded on application of J. I. Case, Threshing Machine Co., Calgary.

12700—December 12—Authorizing C.P.R. to construct additional track across Main Street, Clive, Alberta.

12701—January 5—Authorizing C.P.R. to join its tracks to the industrial tracks of the Corporation of the city of Toronto on east side of the River Don.

12702—January 3—Directing the C.N.R. to insert a diamond in the track of the G.T.R. at crossing of its Harwood Branch at Cobourg, Ont., to be protected by interlocking plant, derails and home and distant signals.

12703—January 9—Authorizing C.P.R. to change Main Line as now located through the city of Kamloops, B.C., and to cross Lorne Street with the new location.

12704—January 9—Approving revised location of Georgian Bay & Seaboard Railway (C.P.R.) from a point in Lot 6, Concession 11, Township of Thorah, at mile 44.22, thence in a south-easterly direction to a point in Lot 17, Concession 1, Township of Eldon, at mile 47.42, County of Victoria, Province of Ontario.

12705—January 9—Amending Order No. 12504, by substituting the word "Saturday" for the word "Friday" in the fifth line of the 1st paragraph re inadequate train service of G.T.R. between Ste. Martins and Beauharnois, P.Q.

12706—January 9—Directing the C.N.R. to provide suitable highway crossings at intersection of highway between Lots 5 and 6, Township of Paipoonge. Work to be completed by May 15th, 1911.

12707—January 4—Authorizing Armstrong Cartage & Warehouse Co., Ltd., to construct sewer under tracks of T. H. & B. Ry. and G.T.R., in the city of Hamilton, Ont.

12708—January 9—Approving plans of subway under C.P.R. at Broad St., Regina, Sask.

12709—January 9—Approving revised location of the Shannonville Station grounds in the Township of Tyendinaga, County of Hastings, C.N.R.

12710—January 9—Authorizing Saraguay Electric & Water Co. to cross with wires C.N.Q. Ry. at Broadview Ave., Montreal East, Parish of Pointe aux Trembles, Que.

12711—December 30—Authorizing municipal council of Richmond, B.C., to lay water pipes under tracks of the Vancouver & Lulu Island Railway.

12712—January 4—Authorizing the M. P. & I. Ry. Co. to construct branch line to the Dominion Bridge Co.'s yard in the County of Jacques Cartier, Que.

12713—January 9—Authorizing C.P.R. and C.N.R. crossing in Camrose, Alta., without their trains being brought to a stop.

12714—December 12—Authorizing G.T.R. to expropriate lands required for diversion of highways at Raike's and Woodlands crossings, Township of Oro, Ont.

12715—December 12—Approving location of proposed new station of C.P.R. at Guelph, Ont.

12716 to 12721 Inc.—December 6—12722—January 9—Authorizing C.N.O.R. to carry its tracks across the public road between Lots 20 and 21, Township of Gloucester, and across public road between Lots 21 and 22, also public road between Co. 2, also across public road between Lots 10 and 11, and across public road between Lots 11 and 12, and construct across and divert Stanley Ave., and across Metcalfe Road on Lot 18, by overhead structure. All crossings in Junction Gore, Township of Gloucester, County of Carleton, Ont.

12723—December 6—Authorizing the C.N.O.R. to construct its tracks across Hurdman's Road, Township of Nepean, Ont., subject to certain conditions.

12724—January 10—Directing C.N.R. Co. before May 1st, 1911, to install proper crossing-signs and cattle-guards along line of railway between Lloydminster and Aberfeldy, company liable to a fine of $25 per day for failure to do so.

12725—January 10—Authorizing city of Toronto to erect and maintain wires across track of Northern Division of the G.T.R., the G.N.W. Tel. Co., and under the wires of the Toronto & Niagara Power Co.

12726—January 10—Authorizing Seymour Power & Electric Co., Ltd., to erect and maintain electric transmission line across C.N.R. in Lot 27, Concession B, Township of Brighton, County of Northumberland, Ont.

12727—January 10—Authorizing municipality of village of Weston to erect and maintain wires across track of G.T.R. at Weston Road, village of Weston, Ont.

12728-29—January 10—Authorizing Hydro-Electric Commission to maintain wires across wires of Bell Tel. Co., at Lot 3, Range 2, Township of Etobicoke, County of York, and track of G.T.R. at Concession Street, town of Tillsonburg.

12730—January 10—Authorizing Canadian Light & Power Co. to erect and maintain wires across track of C.P.R. at Lachine Canal, south bank, west of Canada Paint Co.'s factory, Cote St. Paul Road.

12731—January 11—Authorizing Quebec Railway, Light, Heat & Power Co. to erect and maintain wires across track of C.P.R. on Prince Edward Street, city of Quebec, Que.

12732—January 11—Authorizing city of Winnipeg to make an alteration to its present transmission line across track of C.P.R. Co.'s main line, Elmwood, to city pump station No. 6.

12733-34—January 11—Authorizing city of Winnipeg to lay water mains under tracks of C.P.R. at Selkirk Branch where it intersects Magnus Ave., and where Stonewall Branch intersects Pritchard Ave., city of Winnipeg.

12735—January 11—12736—January 10—Relieving M.C.R.R. from further protecting crossing one-half mile south of ship yards, Niagara Division, and at crossing known as Town Road Crossing, at Townsend Station, Ont.

12737—January 10—Approving location of Alberta Central Railway Co.'s line from mileage 40 to mileage 80, easterly from Red Deer, Alta.

12738—January 11—Authorizing Qu'Appelle, Long Lake & Sask. Ry. Co. to construct its line across Short St. produced, and Beaver St. produced, and to close and divert a Government road allowance between Section 3 and 4, Township 44, Range 2, west 3rd Meridian, in town of Duck Lake, Sask.

12739—January 10—Approving plans showing train shed for elevated passenger yard, Union Terminal, Winnipeg, Man.

12740—January 11—Authorizing Government of the Province of Alberta to construct a highway across C.N.R. in Section 11, Township 38, Range 5, west 3rd Meridian, Saskatchewan.

12741—January 11—Authorizing Tillsonburg, Lake Erie & Pacific Railway to construct spur to premises of Ingersoll Nut Co., on Lots 6 to 14, south side Carnegie St., Ingersoll, Ont.

12742—January 11—Authorizing C.P.R. to construct additional main line track (double track) across Main St. and Tupper St., Portage la Prairie, Man.

12743—January 11—Authorizing G.T.R. to construct spur in city of Toronto upon and across Thackeray St., Dickens St., and Carlaw Avenue.

12744—January 11—Authorizing C.P.R. to construct spur for Pine Lumber Co., mileage 129.96, Chapleau Subdivision.

12745—January 9—Approving forms used in transmitting messages of C.P.R. Tel. Co., G.N.W. Tel. Co., C.N. Tel. Co., the North American Telegraph Co., the Western Union Tel. Co., the Anglo-American Tel. Co., the White Pass & Yukon Rte., the Marconi Wireless Tel. Co., and the G.T.P. Tel. Co., for a period of four months from date of this Order, or until further Order of the Board.

12746—January 12—Directing G.T.R. to protect crossing at the intersection of Cannon Street, Hamilton, with the Port Dover Branch, with two watchmen. Cost to be paid by G.T.R.

12747—January 12—Directing Hamilton Street Railway and G.T.R. to provide proper protection at the intersection of King Street with the Port Dover Branch of the G.T.R., in city of Hamilton. Half interlocking plant to be installed.

12748—January 12—Ordering that complaint of city of Hamilton re engines, trains be allowed to stand across King St., that complaint stand for further consideration if arrangement undertaken by G.T.R. is not satisfactory.

12749—January 12—Authorizing city of Winnipeg to lay and maintain sewer under track of C.P.R. at Nairn Avenue, Winnipeg.

12750—January 12—Authorizing G.T.R. and C.P.R. to operate interlocking plant at Lot 7. Concession 1, Township of Etobicoke, Ont., without coming to a full stop.

12751—December 6—Authorizing C.N.O.R. to connect its tracks with the Ottawa & New York Railway, in the Township of Nepean, Ont., County of Carleton.

12752—January 13—Approving plans of G.T.R. for re-construction of swing bridge (No. 42) over Rideau Canal, at Ottawa, Ont.

12753—January 13—Authorizing C.P.R. to open for carriage of traffic its second track from Islington to Islington Jct., Ont.

12754—January 12—Authorizing C.N.O.R. to cross with telegraph wires wires of the Lachute Electric Co., in the Township of Chatham, County of Argenteuil, Que.

12755—January 13—Amending Order No. 11762 by substituting the word "Fourth" for the word "Seventh" in sub-clauses 1 and 2 of clause 3, of the operative part of order re opening of Sumas St., Township of Sumas, B.C., across C.P.R.

12756—January 12—Extending time to 30th June, 1911, for completion of spur to Saskatoon Brick & Supply Co., by C.P.R., granted by Order of the Board, No. 11935.

12757—January 12—Authorizing Consumers' Gas Co., of Toronto, to lay and maintain gas main under C.P.R. at St. Clair Ave., Toronto.

12758—January 16—Authorizing Province of Alberta to maintain highway across the Calgary & Edmonton Railway (C.P.R.) in Section 12, Township 27, Range 1, west 5th Meridian, at Airdrie, Alta.

12759—January 14—Directing that C.P.R. and G.T.R. construct a transfer track before May 15th, 1911, at St. Mary's, Ont., on application of town of St. Mary's.

12760—March 22—Re protection of highway crossing 2½ miles west of Acton West Station, Ont., Townships of Eramosa, Esquesing, Erin, and Nassagameya, made parties to the application with G.T.R.

12761-62—January 16—Authorizing Hydro-Electric Commission of Ontario to cross with its wires wires of the Bell Telephone Co. at Lot 4, Concession 3, Township of London, County of Middlesex, and at Stone Road, in the city of Woodstock, Township of East and West Oxford, Ontario.

12763—January 16—Approving revised location of C.P.R. of a portion of its Regina, Saskatoon & North Saskatchewan Branch, granted by Order No. 3428, August 13th, 1907, in Section 23, Township 20, Range 21, west 2nd Meridian, at mileage 21.9, to a point in Section 7, Township 22, Range 23, west 2nd Meridian, at mileage 43.2 (from Regina), Province of Saskatchewan.

12764—January 16—Authorizing C.P.R. to construct additional main line track (double track) across the road allowances from mileage 29.05 to mileage 35.5 on the Brandon Subdivision.

12765—January 16—Authorizing James Marshall, lime manufacturer, of Township of Barton, County of Wentworth, Ont., to lay gas main under tracks of G.T.R. at second road south of the Indian Line, between Lots 7 and 8, 2nd Concession, 2nd Range East, in the Township of Seneca, County of Haldimand, Ont.

12766—January 16—Authorizing Consumers' Gas Co. to cross with gas main under track of C.P.R. at Bathurst St., Toronto, Ont.

12767—January 17—12768-69—January 16—Authorizing James Marshall, lime manufacturer, to lay gas main under tracks of G.T.R. at Indian Line, between the Townships of Glanford, in the County of Wentworth, and Township of Seneca, County of Haldimand, Ont., and at or near Lot 36, River Range, Township of Seneca, County of Haldimand, also at road between the 2nd Range west and the River Range, in the 2nd Concession, Township of Seneca, County of Haldimand, Ontario.

12770—January 16—Authorizing C.P.R. to construct spur to premises of Massey-Harris Co., Moose Jaw, Sask.

12771 to 12776 Inc.—January 16—Temporarily approving contracts of Bell Telephone Co. with La Compagnie de Telephone, St. Laurent, the Brougham & Grattan Telephone Co., Ltd., the Wright & Pontiac Telephone Co., the Ahmic Telephone Co., the Municipal Council of the Township of North Easthope, Ont., the Schomberg Telephone Co., Ltd.

12777—January 17—Extending time until July 1st, 1911, for installation of interlocking plant by C.N.O.R., at Cobourg, Ont.

12778—January 17—Approving "Coldproof" Fire Extinguisher of the Staff Fire Extinguisher Co. for use on steam railroad cars and Pullman sleeping cars.

12779—January 17—Approving change in location of G.T.R. railway as well as grade and alignment on what is known as Part 1 of the Toronto Grade Separation.

12780—January 18—Approving location of Kettle River Valley Railway from mileage 9.79 to mileage 29.0 Merritt to Coldwater Summit location.

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc. Printed forms for the purpose will be furnished upon application.

TENDERS PENDING.

In addition to those in this issue.

Further information may be had from the issues of The Canadian Engineer referred to.

Place of Work.	Tenders Close.	Issue of.	Page.
Moose Jaw, Sask., supply of coal	Feb. 6.	Jan. 19.	203
Mount Laurier, P.Q., water supply	Feb. 20.	Jan. 26.	65
Ottawa, Ont., civic supplies	Feb. 14.	Jan. 26.	66
Ottawa, Ont., waterworks supplies	Feb. 14.	Jan. 26.	66
Ottawa, Ont., steel tug boat	Feb. 13.	Jan. 26.	235
Ottawa, Ont., wharf at Ste. Famille	Feb. 20.	Jan. 26.	235
Ottawa, Ont., wharf	Feb. 13.	Jan. 19.	203
Ottawa, Ont., marine boiler	Feb. 15.	Jan. 12.	66
Ottawa, Ont., twin screw steel steamer	Feb. 15.	Dec. 29.	821
Ottawa, Ont., departmental bldg.	Feb. 28.	Jan. 5.	131
Pembroke, Ont., laying and jointing intake pipe	Feb. 13.	Jan. 26.	66
Pembroke, Ont., laying and jointing water mains	Feb. 13.	Jan. 26.	66
South Middleton, Ont., schoolhouse	Mar. 15.	Jan. 12.	163
Strathcona, Alta., engine, boilers and generator	Mar. 1.	Jan. 26.	65
St. George de Beauce, Que., iron and concrete bridge	Feb. 13.	Jan. 26.	235
Toronto, Ont., concrete paving, etc.,	Feb. 13.	Jan. 26.	235
Toronto, Ont., low level interceptor	Feb. 7.	Jan. 5.	60
Toronto, Ont., right to cut pulpwood	Apr. 10.	Jan. 19.	203
Vancouver, B.C., road roller	Feb. 7.	Dec. 29.	68
Winnipeg, Man., pumping plants	Feb. 6.	Jan. 12.	66
Winnipeg, Man., supply of asphalt	Mar. 1.	Jan. 26.	235

TENDERS.

Ottawa, Ont.—Sealed tenders will be received until February 13, 1911, for alterations on the Examining Warehouse, Toronto. R. C. Desrochers, Secretary Department of Public Works, Ottawa. (Advertisement in the Canadian Engineer).

Brockville, Ont.—Tenders will be received until February 4th, 1911, for the erection of an addition to the residence of H. A. Stewart, K.C., corner of King and Orchard Sts. B. Dillon, Architect.

Kingston, Ont.—Sealed tenders will be received until February 7th, 1911, by Mr. R. F. Elliott, Chairman Light, Heat & Power Committee, for the year's supplies in connection with the Light, Heat & Power Co. Kingston Light, Heat & Power Dept., C. C. Folger, Gen. Man., Kingston.

St. Thomas, Ont.—Tenders will be received until February 13th, 1911, for the building of a clear water covered reservoir at the St. Thomas Waterworks. Geo. K. Croker, Chairman Board of Water Commissioners, St. Thomas.

Winnipeg, Man.—Tenders will be received until February 3, 1911, for the supply of brass goods to be delivered f.o.b. cars, City Yards, Winnipeg. M. Peterson, Secretary, Board of Control, Winnipeg.

Regina, Sask.—Tenders will be received until February 9th, 1911, for telephone supplies. S. P. Porter, Deputy Minister, Dept. of Railways and Telephones, Regina.

Calgary, Alta.—Tenders will be received until the 18th day of February, 1911, for the complete construction, including all the material for an apartment block in Calgary for O. G. Devenish, Esq. Alex, Pirie, Architect.

Calgary, Alta.—Tenders will be received until February 16th, 1911, for the erection of a solid brick and stone building for Messrs. Beveridge Bros. on corner of Seventh avenue and First street east. Hodgson, Bates & Butler, Architects, Grain Exchange, Calgary.

Victoria, B.C.—Tenders will be received until March 3rd, 1911, for the following:—350 4-inch double gate valves; 100 6-inch double gate valves; 10 12-inch double gate valves; 15 tons best blue pig lead. Wm. W. Northcott, Purchasing Agent, City Hall, Victoria.

Vancouver, B.C.—Tenders will be received until February 6th, 1911, for the supplies for the electrical department for the year 1911. Wm. McQueen, City Clerk, City Hall, Vancouver, B.C.

North Vancouver, B.C.—Tenders will be received until February 13th, 1911, for the supplying and delivering to the city of North Vancouver, a quantity of water pipe. George S. Hanes, City Engineer, North Vancouver.

Monterrey, N. L. Mexico.—Tenders will be received until March 1st, 1911, for the erection of a gas plant to serve the requirements of Monterrey. Lewis Lukes, vice-president and general manager Monterrey Railway Light & Power Co., Ltd., Apartado (P.O. Box) 58, Monterrey, Mexico. (Advertisement in the Canadian Engineer.)

CONTRACTS AWARDED.

Stratford, P.Q.—The contract for the construction of a landing pier has been awarded to Messrs. McLaughlin Bros., of Ottawa, the total amount of the contract being $5,975.

Montreal, Que.—A contract has been signed with the Bishop Construction Co. for the building of a railway from a little below St. Anne de Beaupre to St. Catharines Bay, at the mouth of the Saguenay River, a distance of about 160 miles.

Ottawa, Ont.—The contract for breakwater extension at Margaree Harbor, N.S., has been awarded to Messrs. Robert and Bartholomew Musgrave, of North Sydney, N.S., at $5,300.

Port Arthur, Ont.—R. Homer has been awarded the contract by the Dominion Government for the construction of a fish hatchery in the mouth of Current River, here, $5,000.

IS YOUR ADDRESS CORRECT?

Readers of The Canadian Engineer are urgently requested to examine the manner in which their copies of the paper are addressed. If the subscriber's name or address is spelled wrongly, or if the wrong address is given on the label or wrapper, kindly notify The Canadian Engineer, Department J, at once. The mail sheets are now being thoroughly examined and rectified, and it is requested that all subscribers co-operate to make them exactly right. If the name and address are printed correctly on the mail sheets, the subscriber will get his paper much sooner than otherwise.

Guelph, Ont.—Contracts for the extensive alterations and remodelling of the Bank of Montreal premises have been awarded by Architect Mahoney as follows: Robt. Dunbar, mason work; Geo. Scroggie, carpenter; Geo. Wolcott, galvanized iron; J. J. Mahoney, plastering; Stevenson & Malcolm, electric wiring and lighting; Wm. Scriven, painting; Fred Smith, heating and plumbing; Hamilton Bridge Works, steel and iron works. The estimated cost of the entire alterations will be in the neighborhood of $17,000.

Gravenhurst, Ont.—Contractor D. G. Stewart, of Ottawa, has been awarded the contract for the construction of a wharf, the amount being $12,984.

Winnipeg, Man.—The contract for the steel work substation 1 has been awarded to the Manitoba Bridge & Iron Works, Ltd., of Winnipeg, at $12,413.00.

Winnipeg, Man.—The Winnipeg Board of Control has awarded the contract for electric travelling crane to The Advance Machine Works, Ltd., Walkerville, Ont., at $4,630, and for two 500 k.w. motor generator sets to Messrs. Siemens Bros. Dynamo Works, Ltd., Toronto, at $16,410.

Calgary, Alta.—Messrs. Doyle & Thomas, of Lethbridge, Alta., have been awarded the contract for the erection of the big new $100,000 Col. Walker school.

Calgary, Alta.—At a meeting of the School Board the following contracts were awarded: Grant Bros., for building an eight-room school at Mission Bridge, $57,000; Marrs Plumbing Co., for plumbing and heating in Mission Bridge School, $12,934, the two contracts amounting to $69,934. James McPhail, for building a five-room addition to the High School, $32,850, and Grant Bros., for plumbing and heating in addition to High School, $11,616, the total of the two contracts being $44,466. E. J. Young for plumbing and heating in 12-room school at Hillhurst, $17,745, and W. Head for plumbing, heating and ventilation in 12-room school near Col Walker's estate, $18,036.

Vancouver, B.C.—The contract for the work of that portion of the Canadian Pacific Railway extending from a point about 4.7 miles from Victoria westerly for a distance of approximately forty miles, has been let to Messrs. Grant Smith & Co., of 1408 Main Street, Vancouver.

Prince Rupert, B.C.—The contract for the depot to be established by the Marine and Fisheries Department at Prince Rupert, consisting of a reinforced concrete wharf 405 feet long and 50 feet wide with a long approach and eight frame buildings, including a buoy warehouse, power house, offices and residences, and a coal bunker to be erected on the end of the wharf, has been awarded to the Pacific Coast Construction Company, of Victoria. The contract price is about $200,000.

RAILWAYS—STEAM AND ELECTRIC.

Montreal, Que.—It is said that in the programme for C.P.R. extensions this coming year the following work is planned: 380 miles of new lines, 100 7/10 miles of double tracking, 40 miles extension to sidings, 4 new steel bridges at Medicine Hat and Calgary, Winnipeg shops increased one-third in size, 200 miles track rock-ballasted, yard extensions at Fort William, Regina, Moose Jaw, Medicine Hat and Vancouver.

Ottawa, Ont.—Notice is given that application will be made to the Parliament of Canada at its present session, for an Act incorporating a company under the name of the "High River, Saskatchewan and Hudson Bay Railway Company," with power to construct a line of railway from a point in townships 25 to 29, range one, west of the fourth meridian, in Alberta, thence northeasterly to the city of Saskatoon in Saskatchewan, thence northeasterly to a point in or about townships 52 to 56 on the easterly boundary of the province of Saskatchewan, thence northeasterly, passing the northwest territories with power to generate and use electrical and other energy and operate vessels, telephone and telegraph lines. They also ask power to own and operate hotels. Ballachey and Black of High River are solicitors for the applicants.

Ottawa, Ont.—It was announced here that the Grand Trunk has plans in contemplation for extensive improvements, and probable rebuilding altogether of the local shops and roundhouse next summer. The large accommodation is made necessary owing to Ottawa being the terminal point of the company's new short line to Toronto, and also the fact that the city is to have connection with the Grand Trunk Pacific. The staff of workmen will be largely augmented here.

Toronto, Ont.—Objections have been raised by the Guild of Civic Art and the civic improvement committee to the new G.T.R. bridge now under construction over the Humber. They contend that the large pier in the centre of the river will effect a dam and cause a flooding of the lowlands. An injunction is being sought to restrain them from continuing the work, and local members of parliament will bring the matter before the government. On the reconstructed line of the Grand Trunk, 4 tracks will replace the two which now run side by side, hence a much wider and stronger bridge is required. The Guild and improvement committee claim that a larger bridge of the present one-span type would serve the purpose just as well

Port Arthur, Ont.—The Canadian Northern Coal and Ore Dock Co., Ltd., are preparing plans to double their capacity for the handling and storage of coal. At present the company can reload 100 cars of bituminous and 25 cars of anthracite coal in 10 hours and have a storage capacity of 500,000 tons. A second storage area for bituminous, 250 ft. by 2,000 ft., will be filled; an anthracite shed will be remodelled and enlarged to 278 ft. square and a second reloading bridge and trestle will be erected. The bridge will be of steel, but the trestle and coal pockets will be of timber construction.

Winnipeg, Man.—A party of surveyors of the Grand Trunk Pacific commenced work recently in the vicinity of Frobisher, under the direction of M. A. Burbank. The party number about 17 and will establish their first camp near the Souris River, south of Frobisher. It is likely that they will remain there for several weeks.

Moose Jaw, Sask.—C.P.R. lines contemplated in the West include the following: Line southwest from Moose Jaw to meet finally Weyburn-Lethbridge line, 35 miles; southeast from Swift Current to meet Weyburn-Lethbridge line, 45 miles; northwest from Swift Current, 35 miles; northwest from Estevan to meet the Weyburn-Lethbridge line, 35 miles; extension of line from Lacombe, 60 miles; line south of Wilkie on both sides of Tramping Lake, 50 miles; line northwest from Wilkie into Cut Knife country, 32 miles; line from Lethbridge west will be completed to Alberside, 26½ miles; line south from Golden, B.C., 42 miles.

Minneapolis, Minn.—An outlet for the "Soo" Line from the Northwest to the Atlantic seaboard at Newportnews, Va., via Cincinnati, over the Chesapeake and Ohio, has been provided through the Canadian Pacific effecting a close traffic agreement with the Chesapeake and Ohio, effective May 1st. Railroad rumors also have it that the Canadian Pacific will either take over the Wabash between Detroit and Chicago, or will buid an entirely new line between these cities to connect the Eastern Canadian Pacific Railway and Chicago division of the Soo and the C. and N.

SEWAGE AND WATER.

Toronto, Ont.—The Board of Control received the city engineers's report on necessary extensions to the water works system directly due to the expansion of the city and the necessity of providing for a larger supply of water. The

whole work will cost $626,544 and the Board of Control recommend to the city council that application be made to the Legislature for authority to spend the money on this work. The city engineer's report is as follows: "As th present system of conduits can only be depended upon to deliver about 50 million gallons per 24 hours during low stages of the lake, and as the maximum rate of pumpage during the busy hours of the day, viz., from 9 a.m. to 3 p.m. is at the rate of 45 to 47 million gallons per 24 hours, a duplicate intake and 6 foot steel conduit should be constructed and laid between the tunnel and the lake, at a total estimated cost of $465,000. That portion of the work lying between the short crib or filter pumping system and the intake in the lake should be put in hand immediately, and it will take two full years to complete the same. The estimated cost of this portion of the work is $215,000. In order to meet the very large increased yearly demand and provide the necessary supply and pressure, additional pumping mains are required to enable the supply pumped at the main station to be distributed to the various service mains, so that the pressure and supply may be kept up; the estimated cost of which is $161,544.

The Mains.—The mains are as follows:

36-inch main from main pumping station to Front St. and along Front to Simcoe	$37,000
36-inch main from Wellington St. along John St., Grange and Beverley to College St.	70,000
24-inch main on Sumach St. from Queen to Wellesley	41,688
12-inch main to feed north Rosedale	5,829
12-inch main on Wilton from River to Broadview avenue	7,027
	$161,544

MISCELLANEOUS.

Port Arthur, Ont.—The following statistics for Port Arthur, for the year 1910, have been given out by City Clerk J. McTeigue:—

Total amount of wheat handled	39,487,449 bu.
Total amount of freight handled	1,618,057 tons.
Total number of vessels calling at this port	1,750
Tonnage of these boats	2,487,650
Value of railway terminals	$3,575,295
Year's cut, Pigeon River Lumber Co.	25,000,000 ft.

LIGHT, HEAT AND POWER.

Toronto, Ont.—It is said that the city of Toronto will shortly float a loan for one million dollars to meet the cost of installing the hydro-electric system in the city. So far $700,000 has been spent upon the system within the city limits; this was secured by local loans. Two years ago the city secured authority to issue debentures for $2,750,000 for the installation of the system.

CURRENT NEWS.

Halifax, N.S.—The Halifax Board of Trade recently unanimously passed a resolution asking the government of Nova Scotia to confer with the city council of Halifax in regard to granting assistance to drydock company to enable it to enlarge the dock in this port to eight hundred feet. It is now about five hundred and eighty feet long and the company proposes extending to six hundred and fifty feet, but the board is anxious for greater extension.

Quebec, Que.—According to Hon. Charles Devlin, the arrangements are practically completed for the construction of the interprovincial bridge across the Ottawa River at North Temiskaming. A deputation waited on Hon. Mr. Pugsley at Ottawa and secured from him a promise that the Dominion Government will include a subsidy of $50,000 for the structure in the supplementary estimates. The Quebec Government will give $15,000, and the Ontario Government is also expected to contribute towards the cost. It is expected that the building of the bridge will eventually lead to the building of a railway to Ville Marie.

Ottawa, Ont.—The government has appointed Mr. W H. Hodge, an eminent bridge expert of New York, and Mr M. J. Butler, general manager of the Dominion Steel Company, to decide the difference of opinion among the members of the Quebec Bridge Commission, with regard to the plans for the bridge. They will decide the disputed points of mechanical principle involved.

Toronto, Ont.—Good roads near Toronto, as provided by the passing of the recent Good Roads By-law, is about to bring a large increase in the use of motor trucks here. At the New York show last week the manager of the delivery department of one of the large departmental stores in Toronto purchased two large trucks. He states that the increased motor service for delivery to suburban districts will be put in when the roads are completed. The manager of the Toronto Automobile Show says that fully four times as many commercial cars will be shown at the coming Automobile Show in the Armories, February 25th to March 4th, as at last year's show, and that there is a great interest in this class of cars in Toronto.

Welland, Ont.—The Canadian Steel Foundries, Limited, has been incorporated with a capital stock of $5,000,000 with headquarters at Montreal. It is said here that it is in this concern the Montreal Steel Company and the Ontario Iron and Steel Company are to be merged. The Ontario Iron and Steel Company's works are at Welland, Ont. A syndicate has obtained a controlling proportion of the stock of each of the companies.

Cobourg, Ont.—A new mill has been erected for the Provincial Steel Company here, and the machinery is now being installed.

Porcupine City, Ont.—In looking forward to the development of the gold-bearing district, which to-day extends over an area of 12 miles square, cheaper power is considered as a most important factor.

Winnipeg, Man.—Three hundred and eighty miles of new track, 10 miles of double tracking, 40 miles of siding extension, 200 miles of rock ballasting, four new steel bridges, an increase in size of Winnipeg shops by a third and yard extensions at many points is, in brief, the programme of the C.P.R. in the west this year, as announced by Mr. William Whyte, second vice-president, upon his return from the east. The work will run into millions. Most of the new lines will be in Saskatchewan. The Canadian Pacific Railway has placed an order with the Canada Cycle and Motor Co. for a number of automobiles of the "30" type for the use of the engineers in the extension work of the irrigation ditches in the west.

Winnipeg, Man.—A party of surveyors are at work on the big Julius muskeg, seven miles west of Whitemouth, determining its exact area with the object of erecting a large peat plant. If the quality equals the extent of the deposits a very valuable industry will be the result. That coal lies right under Whitemouth is the opinion of several who are acquainted with the soil croppings of other coal fields. The output of the steam shovel at Scots' Hill pit three years ago confirms this, as the huge lumps of black clay, dumped at the big fill-in at the bridge, burned freely when broken up and dry.

New Westminster, B.C.—One of the busiest years in the history of the engineering department of the city was closed out on December 31 and the annual report prepared by City Engineer J. W. B. Blackman indicates in a measure the magnitude of the work carried on this year. The total value of contract work and of schemes prepared during the year aggregates $999,187.54, or practically a million dollars. In his report the engineer states that plans and specifications have been prepared by the department for the 8th street sewerage system which consists of over 14 miles of vitrified pipe. There is at present a total mileage of 23.39 miles of main sewers, 7.26 miles of house connections or a total of 30.65. For cement sidewalks, plans have been prepared for walks on portions of nineteen streets. The total amount laid during the year was 23,192 lineal feet, or 4.5 miles. Contracts have been let, although the work has not yet been done for 1.25 miles more.

Copies of the Canadian Engineer of the issue of Jan. 12th, 1911, are desired. By forwarding such copies your subscription will cover another month.

Vancouver, B.C.—Mr. William Price, of Seattle, general manager of the Western Steel Corporation, states that it is the intention of the company to start the construction of a $500,000 merchant steel plant on their property near Sunbury by April 1st. The plant is to cover about 10 acres.

North Vancouver, B.C.—The report of the operations of the drillers at the site of the Second Narrows bridge is to the effect that the drills have gone down about 100 feet below the high-water mark. The operations have shown, as was expected, that the formation of the north shore is entirely different to that of the south side of the inlet. The early stages of the boring went down through alluvial earth to boulders and coarse gravel. These passed, the drills came on fine sand interspersed with sea shells, and this continued till a depth of 96 feet was reached. The last four feet consists of what appears to be the original bottom of the inlet at that point, containing as it does, fine alluvial matter mixed with large sea shells. The present bore hole may be in a deep pocket, and a second bore to be immediately sunk nearer to the low-water mark will show if this is so.

Victoria, B.C.—Mr. Angus Smith, city engineer, submitted a report on the year's work at a meeting of the city council. The report shows that the amount of sidewalk work completed was 25.48 miles, compared with 13.45 in the previous year; 4.65 miles of sewers were laid, as against 6.40, and the amount of curb and gutters laid was 10¾ miles compared with 3½ miles for the previous year.

PERSONAL.

Mr. H. W. Pretty, of Peterborough, Ont., has been notified that he has been awarded the full academic privileges of diplomates of the Imperial College of Science and Technology, London England, with gown and hood of the institution. Mr. Pretty is a Whitworth scholar in engineering, an associate of the Royal College of Science, London, England, a fellow of the Physical Society of London, England, an associate member of the Institution of Civil Engineers, London, England, and was at one time a student under he famous Professor Huxley. He has been on the Trent Canal staff for the past three and a half years.

Mr. J. Wilson who has been assistant city engineer of Fort William the past few years, has been appointed city engineer to succeed H. S. Hancock, jr., resigned.

F. A. Terbury vice-president and managing director of the Canadian Boving Company, Limited, left Toronto last Saturday for an extended business trip through Western Canada.

Mr. Charles J. Leacock has received an appointment as supervising engineer of Niagara power for the district around Stratford. Mr. Leacock will assume charge over the systems at Stratford, St. Mary's, Tavistock, Mitchell and Seaforth about the middle of the present month.

Dr. J. A. L. Waddell the senior member of the firm of Waddell and Harrington, Kansas City, Mo., who is a Canadian by birth, received, on February 18th, the degree of Doctor of Engineering, from the University of Nebraska, in appreciation of his services to the engineering profession. Mr. Bion J. Arnold, of Chicago, representing the electrical branch and Dean M. C. Cooley of the University of Michigan, representing the mechanical branch of the profession, also had similar degrees conferred upon them at that time.

SOCIETY NOTES.

The Engineers' Club, of Montreal, on Beaver Hall Square, is to be renovated, and extensive additions made. The scheme embraces a handsome dining-room of some 2,000 feet area, capable of seating 200 guests; a new billiard room for 8 tables; reception room for the use of ladies; 8 new bedrooms for the use of non-resident members, besides several new dining-rooms and accommodation for the service of the club, including up-to-date and well-equipped kitchen and pantry. The plans, which have been prepared by Messrs. Saxe and Archibald, have been based on an expenditure of about $100,000. The work will be commenced early in the spring, and when completed will furnish the engineers with one of the finest and best-appointed clubs in the city.

MARKET CONDITIONS.

Halifax, N.S., January 30th, 1911.

Weather conditions at the opening of the New Year have not been such as would encourage a large volume of trade. The price situation is steady, and it is expected the values will continue firm. Imported pig-iron is very steady in price, and an increase in metal prices is expected.

Axes.—Ordinary chopping axes, single bit, $6.50 per dozen, double bit, $11. Special brands, prices on application to jobbers.

Bar Iron.—The market for bar iron is open, but the situation is firm, and prices range as high as $2.25 base.

Black Sheet Iron.—This commodity is in good demand. We quote 24-gauge, $2.40.

Cast Steel.—The market is steady at 10 to 15c., according to makers.

Cement.—Stocks are low and market is steady, $2 per bbl.

Montreal, February 1st, 1911.

Advices from the other side of the line tend to the belief that although improvement is noted in certain lines of iron and steel, the improvement is largely confined to tin plate, wire, and steel rails. Sales of wire were large before the price advanced, but even yet specifications continue of considerable volume. Some of the companies report that new business is much better than it was a year ago.

Pig-iron conditions are far from satisfactory. It would seem that furnace interests are loaded up with iron ore, and at a recent meeting the general view seemed to be that these stocks should be got rid of even though it were necessary to sell the pig below cost. Furnace men declare that they could conduct their business in a much more satisfactory manner if the ore producers would only adopt a more definite policy regarding ore prices. The users of non-Bessemer ore are disposed to refrain from making reservations, and many declare that they will buy no more ore for this season's use unless business conditions improve. They would prefer to blow out their furnaces than to carry such loads as some of them now have.

Even yet, in the Central West, there is a tendency for the price of pig-iron to sag, and in the South some iron has been sold below $11 per ton, for No. 2, Birmingham.

Although the United States Steel Corporation did a less profitable trade last year than for some years past, the export trade was actually 40 per cent. greater than the largest previous year. The total exports in 1910 amounted to 1,480,819 tons, whereas the exports in 1906 amounted to 1,079,319 tons, this being the largest previous year.

The Bureau of Statistics estimates that the value of the total exports of iron and steel from the United States during 1910 was in excess of $200,000,000, as against $157,674,394 in 1909, $151,113,114 in 1908, and the previous high record of $197,066,781 in 1907. Showing how much lower the price was in 1910 than in 1907, it may be said that the tonnage shipped in 1910 was 1,540,000 gross tons, against 1,302,000 in 1907.

In the whole, the orders for finished steel are increasing somewhat, the total volume being still below 50 per cent. of the capacity of the plants, and yet exceeding the rate of production.

The Scotch market is firm, with an upward tendency, and the English are just holding their own. The effect of the dullness in the United States is noticeable.

In Ontario, the Midland and Hamilton pig-iron furnaces are being compelled to meet competition from Buffalo. Furnaces there are taking low prices, and are laying pig-iron down in Canada at about $18, duty paid. Hence, this is all Canadian furnaces can get. The situation in Montreal is unchanged, prices being the same as at the close of navigation. The Canadian rail mills are very busy, being heavily booked up—exceptionally so, in fact, for this time of year. It is said that the steel mills were never in as good a position as they are at the present moment.

The rest of the market is steady.

Bar Iron and Steel.—Trade is reported first-class. Bar iron, $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $1.95; sleigh shoe steel, $1.95 for 1 x ⅜ base; tire steel, $2.05 for 1 x ⅜-base; toe calk steel, $2.75; machine steel, iron finish, $2.00; imported, $2.05.

Antimony.—The market is steady at 8¼c.

Building Paper.—Tar paper, 7, 10, or 16 ounces, $1.80 per 100 pounds; carpet felt, $2.50 per 100 pounds; tar sheathing, 36c. per roll of 400 square feet; dry sheathing, No. 1, 28c. per roll of 400 square feet; tarred fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch).

Cement.—Canadian cement is quotable, as follows, in car lots, f.o.b. Montreal:—$1.35 to $1.40 per 350-lb bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight.

Chain.—The market is unchanged, being now per 100 lbs., as follows:—¼-in., $5.30; 5-16-in., $4.70; ⅜-in., $3.90; 7-16-in., $3.65; ½-in., $3.55; 9-16-in., $3.45; ⅝-in., $3.40; ¾-in., $3.35; ⅞-in., $3.35; 1-in., $3.35.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $7 per ton, net; furnace coal, $6.75, net. Bituminous or soft coal: Run of mine, Nova Scotia coal, carload lots, basis, Montreal, $3.85 to $4 per ton; cannel coal, $9 per ton; coke, single ton, $5; large lots, special rates, approximately $4 f.o.b., cars, Montreal

Copper.—Prices are easy at 13¾c.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 15c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, $2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 5,000, 75c. per 100; broken lots, $1; electric blasting apparatus:—Batteries, 1 to 10 holes, $15; 1 to 20 holes, $25; 1 to 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.10; Colborne Crown, $3.85; Apollo, 10¾ oz., $4.05. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge, American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge.

Galvanized Pipe.—(See Pipe, Wrought and Galvanized).

Iron.—The following quotations are now given, basis of carloads, ex-store:—No. 1 Summerlee, $21.50 to $22 per ton; selected Summerlee, $21 to $21.50; soft Summerlee, $20.50 to $21; Carron special, $21 to $21.50; Carron soft, $20.50 to $21; Clarence, $18.50 to $19; Cleveland, $18.50 to $19.

Laths.—See Lumber, etc.

Lead.—Prices are firm at $3.65.

Lead Wool.—$10.50 per hundred, $200 per ton, f.o.b., factory.

Lumber, Etc.—Prices on lumber are for car lots, to contractors, at mill points, carrying a freight of $1.50. Red pine, mill culls out, $17 to $21 per 1,000 feet; white pine, mill culls, $16 to $17. Spruce, 1-in. by 4-in. and up, $15 to $17 per 1,000 ft.; mill culls, $12 to $14. Hemlock, log run, culls out, $12 to $15. Railway Ties; Standard Railway Ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal. Laths: Quotations per 1,000 laths, at points carrying $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X. $1.50; XX, 2.50; XXX, $3.

Nails.—Demand for nails is steady and prices are: $2.40 per keg for cut, and $2.30 for wire, base prices. Wire roofing nails, 5c. lb.

Paints.—Roof, barn and fence paint, $1.25 to $1.45 per gallon; girder, bridge, and structural paint for steel or iron—shop or field— $1.45 to $1.55 per gallon, in barrels; liquid red lead in gallon cans, $2 per gallon.

Pipe.—Cast Iron.—The market shows a firm tone and trade is said to have been most satisfactory. Prices are firm, and approximately as follows:—$33 for 6 and 8-inch pipe and larger; $34 for 3-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—Demand is about the same, and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50, with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 63 per cent. off for black, and 48 per cent. off for galvanized; ½-inch, $8.50, with 69 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 72½ per cent. off for black, and 62½ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27. On the following the discount is 73½ per cent. for black, and 63½ per cent. for galvanized: 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50. Discount on the following is 71½ per cent. off on black, and 61½ per cent. off for galvanized: 3½-inch, $95; 4-inch, $1.08.

Plates and Sheets.—Steel.—The market is steady. Quotations are: $2.20 for 3-16; $2.30 for ⅛, and $2.10 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10.

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location.

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 70c. per roll; three-ply, 95c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. Roofing cement in bbls., of 40 gallons, 15c.; in 5-gallon tins, 20c. per gallon. (See Building Paper; Tar and Pitch; Nails, Roofing).

Rope.—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steeel, six-strands, nineteen wires; ¼-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $5.25; ⅝, $6.25; ¾, $8; ⅞, $10; 1-in., $12 per 100 feet.

Spikes.—Railway spikes are steady, at $2.45 per 100 pounds, base of 5½ x 9-16. Ship spikes are steady at $2.85 per 100 pounds, base of ⅝ x 10-inch, and ⅝ x 12-inch.

Steel Shafting.—Prices are steady at the list, less 25 per cent. Demand is on the dull side.

Telegraph Poles.—See lumber, etc.

Tar and Pitch.—Coal tar, $4 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, 75c. per 100 pounds; No. 2, 55c. per 100 pounds; pine tar, $9.50 per barrel of 40 gallons; refined coal tar, $4.50 per barrel, pine pitch, 3c. per lb.; rosin, 3¼c. (See building paper, also roofing).

Tin.—Prices are firm at $44.

Zinc.—The tone is easy, at 6¼c.

CAMP SUPPLIES.

Beans.—Prime beans, $1.85 to $1.90.

Butter.—Fresh made creamery, 24 to 26c.

Canned Goods.—Per Dozen.—Corn, $1.00; peas, $1.20 to $2.00; beans, $1.00; tomatoes, $1.45; peaches, 2s, $1.90; and 3s, $2.90; pears, 2s, $1.80; and 3s, $2.40; salmon best brands, 1-lb. talls, $2.07, and flats, $2.25; other grades, $1.40 to $2.10.

Cheese.—The market ranges from 11 to 12c., covering all Canadian makes.

Coffee.—Mocha, 22 to 30c.; Santos, 18 to 21c.; Rio, 15 to 18c.

Dried Fruits.—Currants, Filiatras, 6¾ to 9½c.; dates, 5½c.; raisins, Valentias, 7¾ to 8¾c.; prunes, 8¾ to 12c.

Eggs.—No. 1 eggs are 26c.; selects, 30c.; new laid, 50 to 60c.

Flour.—Manitoba, 1st patents, $5.60 per barrel; and patents, $5.10, strong bakers', $4.90.

Molasses and Syrup.—Molasses, New Orleans, 27 to 28c.; Barbados, 34 to 36c.; Porto Rico, 40 to 43c; syrup, barrels, 3c.; 2-lb. tins, 2 dozen to case, $2.25 per case.

Potatoes.—Per 90 lbs., good quality, 85 to 95c.

Rice and Tapioca.—Rice, grade B, in 100-lb. bags, 3¾ to 3½; Tapioca, medium pearl, 5½ to 8c.

Rolled Oats.—Oatmeal $2.45 per bag; rolled oats, $2.20, bags.

Sugar.—Granulated, bags, $4.60; yellow, $4.20 to $4.45; Barrels 5c. above bag prices.

Tea.—Japans, 20 to 38c.; Ceylons, 20 to 40c.; Ceylon, greens, 19 to 25c.; China, green, 14 to 50c.

Fish.—Salt fish.—No. 1 green cod, $8 to $9 per bbl.; herring, $4.50 per bbl.; salmon, $8.50 per half barrel. Smoked fish.—Bloaters, $1.25 per large box; haddies, 8c. per lb.; kippered herring, per box, $1.20 to $1.40.

Provisions.—Salt Pork.—$24 to $31 per bbl.; beef, $18 per bbl.; smoked hams, 14 to 19c. per lb.; lard, 14 to 15c. for pure, and 11½ to 12c. per lb. for compound; bacon, 13 to 18c.

Toronto, February 1st, 1911.

Advices from the best-informed sources in the United States forbid the expectation that the proposed reciprocity arrangement with Canada will be agreed to on their side of the line. Many of their best people

and best journals praise the agreement of the commissioners highly, but the political powers are likely to be superior to the more enlightened commercial sense.

A rather better feeling was engendered in iron and steel circles by the report of the United States Iron & Steel Company, showing earnings of $141,000,000 for 1910, which is better than 1909, and vastly higher than 1907. And at a meeting of sheet steel manufacturers at Pittsburg on Saturday last, the experience was general that a gradual improvement has been noticed of late in orders for sheet steel.

Prices in Canada are well maintained so far as metals and building materials go. Tin is higher, copper steady and active, pig-iron steady with no chance of a further fall. Among camp supplies, while flour is lower, bran and feed are both higher, heavy pork lower, cheese slightly higher.

The following are the wholesale prices for Toronto, where not otherwise explained, although for broken quantities higher prices are quoted:—

Antimony.—The demand is less active, and the price remains unchanged at $8.50.

Axes.—Standard makes, double bitted, $8 to $10; single bitted, per dozen, $7 to $9.

Bar Iron.—$2.05 to $2.15, base, per 100 lbs., from stock to wholesale dealer. Free movement.

Bar Mild Steel.—Per 100 lbs., $2.15 to $2.25. Sleigh shoe and other take same relative advance.

Boiler Plates.—¼-inch and heavier $2.20. Boiler heads 25c. per 100 pounds advance on plate. Tank plate, 3-16-inch, $2.40 per 100 pounds.

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per 10 foot; 2-inch, $8.50 to $9; 2¼-inch, $10; 2½-inch, $10.50; 3-inch, $12.10; 3½-inch, $15; 4-inch, $19.

Building Paper.—Plain, 27c. per roll; tarred, 35c. Nothing doing.

Bricks.—In active movement, with very firm tone. Price at some yards $9.50, at others, $10.00 to $11.00 for common. Don Valley pressed brick are in request. Red and buff pressed are worth $18 delivered and $17 at works per 1,000.

Broken Stone.—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 70c. until further notice, per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. Rubble stone, 55c. per ton, Schaw station, and a good deal moving. Broken granite is selling at $3 per ton for good Oshawa, or Quebec Province. In October and November competition forced prices of limestone up to 90c., the city and the province competing for several thousand tons. But the reservoir and the hydro-electric being both supplied, normal prices have been resumed. One quarry (Maloney's) will run all winter to supply stone for the Island.

Cement.—Car lots, $1.65 per barrel, without bags. In 1,000 barrel lots, $1.55. In smaller parcels $1.90 is asked by city dealers. Bags, 40c. extra.

Coal.—Anthracite egg and stove, $7.25 per ton; chestnut, scarce, $7.50; pea coal $6.00 per ton. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote: Youghiogheny lump coal on cars here, $3.75 to $3.80; mine run, $3.65 to $3.70; slack, $2.75 to $2.85; lump coal from other districts, $3.55 to $3.70; mine run 10c. less; slack, $2.60 to $2.70; cannel coal plentiful at $7.50 per ton; coke, Solvey foundry, which is largely used here, quotes at from $5.75 to $6.00; Reynoldsville, $4.90 to $5.10; Connelsville, 72-hour coke, $5.00 to $5.25. Nut coal is very scarce.

Copper Ingot.—The market has reached a firm basis, and holders are quite stiff at $13.50 per 100 lbs. There is a good demand.

Detonator Caps.—75c. to $1 per 100; case ots; 75c. per 100; broken quantities, $1.

Dynamite, per pound, 21 to 25c., as to quantity

Felt Roofing.—Not much moving, price continues as before, $1.80 per 100 lbs.

Fire Bricks.—English and Scotch, $30 to $35; American, $25 to $35 per 1,000. Fire clay, $8 to $12 per ton.

Fuses.—Electric Blasting.—Double strength 4 feet, $4.50; 6 feet, $5; 8 feet, $5.50; 10 feet, $6. Single strength, 4 feet, $3.50; 6 feet, $4; 8 feet, $4.50; 10 feet, $5, per 100 count. Bennett's double tape fuse, $6 per 1,000 feet.

Iron Chain.—¼-inch. $5.75; 5-16-inch, $5.15; ⅜-inch, $4.15; 7-16-inch, $3.95; ½-inch, $3.75; 9-16-inch, $3.70; ⅝-inch, $3.55; ¾-inch, $3.45; ⅞-inch, $3.40; 1-inch, $3.40, per 100 lbs.

Iron Pipe.—A steady request at former prices:—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch, $3.28; 1-inch, $4.70; 1¼-inch, $6.41; 1½-inch, $7.70; 2-inch, $10.26; 2½-inch, $16.30; 3-inch, $21.52; 3½-inch, 27.08; 4-inch, $30.78; 4½-inch, $35.75; 5-inch, $39.85; 6-inch, $51.70. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.43; 1-inch, $6.25; 1¼-inch, $8.66; 1½-inch, $10.40; 2-inch, $13.86, per 100 feet.

Pig Iron.—We quote Clarence at $20.50, for No. 3; Cleveland, $20.50; Summerlee, $22; Hamilton quotes a little irregular, between $19 and $20. Any change must be upward.

Lead.—A fair business is doing at prices unaltered from $3.75 to $4.

Lime.—Retail price in city 35c. per 100 lbs. f.o.b., car; in large lots at kilns outside city 22c. per 100 lbs. f.o.b. car without freight. Demand is moderate.

Lumber.—Demand less brisk, because of the late season of the year, but prices are not materially altered. Pine is good value at $32 to $40 per M. for dressing, according to width required: common stock boards, $28 to $33; cull stocks, $20; cull sidings, $17.50. Southern pine dimension timber from $30 to $45, according to size and grade; finished Southern pine, according to thickness and width, $30 to $40; hemlock is in demand and held quite firmly, we quote $17.50 to $18; spruce flooring in car lots, $22 to $24; shingles, British Columbia, are steady, we quote $3.10; lath, No. 1, $4.60; white pine, 48-inch, No. 2, $3.75; for 32-inch, $1.85 is asked.

Nails.—Wire, $2.35 base; cut, $2.60; spikes, $2.85 per keg of 100 lbs.

Pitch and Tar.—Pitch, unchanged at 70c. per 100 lbs. Coal tar, $3.50 per barrel. Season is over.

Plaster of Paris.—Calcined, New Brunswick, hammer brand, car lots, $1.05; retail, $2.15 per barrel of 300 lbs.

Putty.—In bladders, strictly pure, per 100 lbs., $2.60; in barrel lots, $2.10. Plasterer's, $2.15 per barrel of three bushels.

Ready Roofing.—Prices are as per catalogue.

Roofing Slate.—Most of the slate used in Canada comes now from Pennsylvania or Maine, the Canadian supply being slender and mostly from the Rockland quarries of the Eastern Townships in Quebec. There is a great variety of sizes and qualities, so that it is difficult to indicate prices

But No. 1 Bangor slate 10 x 16 may be quoted at $7 per square of 100 square feet, f.o.b., cars, Toronto; seconds, 50c. less. Mottled, $7.25; green, $7, with a prospect of advance. Dealers are fairly busy.

Rope.—Sisal, 9½c. per lb.; pure Manila, 10½c. per lb., Base.

Sand.—Sharp, for cement or brick work, $1.05 per ton f.o.b., cars, Toronto siding.

Sewer Pipe.—

	4-in.	6-in.	9-in.	12-in.	24-in.
Straight pipe, per foot	$0.25	$0.40	$0.65	$1.00	$3.25
Single junction, 1 or 2 ft. long	1.00	1.60	2.60	4.00	13.00
Double junctions	1.25	2.00	3.25	5.00	16.25
Increasers and reducers	....	1.60	2.60	4.00	13.00
P. & H. H. traps	2.00	3.20	6.50	15.00	.....
Bends	0.75	1.20	1.95	3.00	9.75

Above is the October list, as changed. The retail price is less 65 per cent. off these figures on all sizes 9 inches and under, or less 60 per cent. off these figures on anything over 9 inches. For car-load lots 73 per cent. off list at factory. Demand normal.

Steel Beams and Channels.—Active.—We quote:—$2.75 per 100 lbs., according to size and quantity; if cut, $3 per 100 lbs.; angles, 1¼ by 3-16 and larger, $2.50; tees, $2.80 to $3 per 100 pounds. Extra for smaller sizes of angles and tees.

Sheet Steel.—American Bessemer, 10-gauge, $2.50; 12-gauge, $2.55; 14-gauge, $2.35; 17, 18, and 20-gauge, $2.45; 22 and 24-gauge, $2.55; 26-gauge $2.65; 28-gauge, $2.80. A very active movement is reported at unchanged prices.

Sheets Galvanized.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.00; 12-14-gauge, $3.00; 16, 18, 20, $3.20; 22-24, $3.35; 26, $3.50; 28, $3.95; 29, $4.25; 10¾, $4.25 per 100 lbs. Fleur de Lis—28-gauge, $4.10; 26, $3.80 per 100 lbs. Active and firm at these prices.

Tank Plate.—3-16-inch, $2.40 per 100 lbs.

Tool Steel.—Jowett's special pink label, 10½c. Cammel-Laird, 16c. "H.R.D." high speed tool steel, 65c.

Tin.—The market is cornered, stocks are light and prices are advanced to 45c. to 46c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.60 per dozen; set up, $22.60. Pan Canadian, navvy, steel tray, steel wheel, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each.

Zinc Spelter.—Demand not so brisk, and the market easier at $6.

CAMP SUPPLIES.

Beef.—By carcases, $8.50 to $9.50.

Butter.—Butter is firmly held since last issue, dairy prints are 21 to 23c., creamery prints, 27 to 28c. per lb.

Canned Goods.—Peas, $1.35 to $1.75; tomatoes, 3s, $1.35 to $1.40; pumpkins, 3s, 97½c.; corn, 95c. to 97½c.; peaches, 2s, $1.87½; yellow, $1.82½ to $1.87½; strawberries, 2s, heavy syrup, $1.80; raspberries 2s, $1.80 to $1.97½.

Cheese.—Moderately firm, large, 12¾c. to 13c.; twins, 13c. to 13¼c.

Coffee.—Rio, Green, 15 to 16c.; Mocha, 23 to 25c.; Java, 25 to 31c.; Santos, 16 to 17c.

Dried Fruits.—Raisins, new, Valencia, 8 to 8½c.; seeded, 1-lb. packets, fancy, 8c.; 16-oz. packets, choice, 7½c.; Sultanas, good, 8½c.; fine, 9½c.; choice, 10 to 11c.; fancy, 12c.; Filiatras currants, cleaned, 7¼ to 8c.; Vostizzas, 9 to 10c.; uncleaned currants, 7 to 7¼c.

Eggs.—Strictly new-laid, 30c.; storage, 23c. dozen.

Flour.—Prices unchanged thus far; thus, Manitoba flour, first patents, $5.20; second, $4.70; strong bakers', $4.60; Ontario flour winter wheat patents, $3.90; $4 per barrel.

Feed.—Bran, $22 per ton; shorts, $23 to $24 per ton.

Lard.—Tierces, ¾c. up abroad, and we quote 13c. here; tubs, 13¼c.; pails, 13½c.

Molasses.—Barbados, barrels, 37 to 45c.; West Indian, 27 to 30c.; New Orleans, 30 to 33c. for medium.

Pork.—Not much doing, short cut, $26 to $26.50 per barrel; mess, $1 off, heavy, $22 to $22.50.

Rice.—B. grade, 3¼c. per lb.; Patna, 5 to 5¾c.; Japan, 5 to 6c.

Salmon.—As before stated. We quote Fraser River, talls, $2.05; flats $2.20; River Inlet, $1.90; cohoes, $1.70.

Smoked and Dry Salt Meats.—Long clear bacon, 12 to 12¼c. per lb., tons and cases; hams, large, 14 to 15c.; small 16 to 16½c.; rolls, 12 to 13c.; breakfast bacon, 17 to 18c.; backs (plain), 19 to 20c.; backs (pea-meal), 19 to 20c.; shoulder hams, 14c.; green meats out of pickle, 1c. less than smoked.

Spices.—Allspice, 18 to 19c.; nutmegs, 30 to 75c.; cream tartar, 25 to 28c.; compound, 18 to 20c.; pepper, black, pure Singapore, 14 to 17c.; pepper, white, 25 to 30c.

Sugar.—Granulated, $4.45 per 100 lbs., in barrels; Acadia, $4.35; yellow, $4.05.

Syrup.—Corn syrup, special bright, 3¼c. per lb.

Teas.—Japans, 20 to 35c. per lb.; Young Hysons, 16 to 35c.; Ceylons, 17 to 38c. per lb.

Vegetables.—Potatoes—Ontario, $1 per bag, on railway track, Toronto; Ontario Delawares bring $1, and New Brunswick Delawares $1.10; onions by crate, Spanish, $3; cabbages bring from $1.25 to $1.50 per barrel; Canadian, $1.50 per bag; carrots, 60c. per bag; beets, 80c. per bag; turnips, 40c. per bag. Fall apples sell at $4 per barrel, for ordinary, but first-class scarce at $5.

TORONTO HORSE MARKET.

The local horse market is a little slack, but this is the usual feature of the January trade. Farm workers, especially mares, which cannot be bought below $250, have the call.

Desirable drafters, 1,700 lbs. and over, are going at $225 to $325, lighter drafters $175 to $225, and chunks, 1,350 to 1,500 lbs., at $150 to $200.

Winnipeg, January 30th, 1911.

Trading shows that the markets are still quiet, but from inquiries made last week, the outlook for the building trade for 1911 is very bright indeed. Local architects assure inquirers that the instructions they have already received for all classes of buildings are greater in number and in importance than ever before given them at this season of the year.

The probable erection during the summer of head offices for the Winnipeg Electric Railway at the corner of Notre Dame and Albert Street, the building of the Sterling Bank on Portage Avenue, and the re-erection of a great building for the Bank of Commerce on Main Street, together with the building of a head office for the Grain Growers on Lombard Street are only a few of the great buildings for which plans have been made and intentions indicated for the present year. As it is, builders look forward to a big year, and the architects say that the documents are in course of preparation in their offices to prove it, even if public announcement may not yet be made regarding them.

Anvils.—Per pound, 10 to 12½c.; Buckworth anvils, 80 lbs., and up, 10¾c.; anvil and vice combined, each, $5.50.

Axes.—Chopping axes, per dozen, $6 to $9; double bits, $12.10 per dozen.

Barbed Wire.—4 point and 2 point, common, $3.15 per cwt.; Baker, $3.20; Waukegan, $3.30.

Bar Iron.—$2.50 to $2.60.

Bars.—Crow, $4 per 100 pounds.

Beams and Channels.—$3 to $3.10 per 100 up to 15-inch, (4, 30, 41, 50, 118, 119, 127, 132, 145, 176.)

Boards.—No. 1 Common Pine, 8 in. to 12 in., $38 to $45; siding, No. 2 White Pine, 6 in., $55; cull red or white pine or spruce, $24.50; No. 1 Clear Cedar, 6 in., 8 to 16 ft., $60; Nos. 1 and 2 British Columbia spruce, 4 to 6in., $55; No. 3, $45.

Bricks.—$11, $12, $13 per M, three grades.

Building Paper.—4½ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No. 2 tarred, 62½c.; plain, 56c.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $0.75 large lots to $10.50 ton lots, net; Alleghany soft coal; carload lots, basis, Winnipeg, f.o.b., cars, $6 per ton; cannel coal, $10.50 per ton; Galt coal, $2 f.o.b., carload lots, $9 single ton; coke, single ton, $7 at yard; large lots special rates. American coke, $11 to $11.50 a ton; Crow's Nest, $10 a ton.

Copper Wire.—Coppered market wire, No. 7, $4 per 100 lbs.; No. 6, $4; No. 10, $4.06; No. 12, $4.20; No. 14, $4.40; No. 16, $4.70.

Cement.—$2.40 to $2.75 per barrel in cotton bags.

Chain.—Coil, proof, ¼-inch, $7; 5-16-inch, $5.50; ⅜-inch, $4.90; 7-16-inch, $4.75; ½-inch, $4.40; ⅝-inch, $4.20; ¾-inch, $4.05; logging chain, 5-16-inch, $6.50; ⅜-inch, $6; ¼-inch, $8.50; jack iron, single, per dozen yards, 15c. to 75c.; double, 25c. to $1; trace-chains, per dozen, $5.25 to $6.

Copper.—Tinned, boiler, 26½c.; planished, 29½c.; boiler and T. K. pits, plain, tinned, 45 per cent. discount.

Dynamite.—$11 to $13 per case.

Hair.—Plasterers', 90c. to $1.15 per bale.

Hinges.—Heavy T and strap, per 100 lbs., $6 to $7.50; light, do., 65 per cent.; screw hook and hinge, 6 to 10 inches, 5¼c. per lb.; 12 inches up, per lb., 4¼c.

Galvanized Iron.—Apollo, 10¾, $4.90; 28, $4.70; 26, $4.30; 22, $4.10; 24, $4.10; 20, $4; 18, $3.95; 16, $3.90; Queen's Head, 28, $4.90; 26, $4.70; 24, $4.30; 22, $4.30; 20, $4.10 per cwt.

Iron.—Swedish iron, 100 lbs., $4.75 base; sheet, black, 14 to 22 gauge, $3.75; 24-gauge, $3.90; 26-gauge, $4; 28-gauge, $4.10. Galvanized—American, 18 to 20-gauge, $4.40; 22 to 24-gauge, $4.65; 26-gauge, $4.65; 28-gauge, $4.00; 30-gauge, $5.15 per 100 lbs. Queen's Head, 22 to 24-gauge, $4.65; 26-gauge English, or 30-gauge American, $4.90; 30-gauge American, $5.15; Fleur de Lis, 22 to 24-gauge, $4.50; 28-gauge American, $4.75; 30-gauge American, $5.

POSITIONS WANTED

WATERWORKS ENGINEER with valuable experience in design and construction of reservoirs and other hydraulic works, management of works, waste prevention, etc., is open for engagement. Box 144, Canadian Engineer.

AN ENGINEER, with considerable experience (abroad) on railway's survey and construction, good testimonials and references; desirous of obtaining work on any railway in Canada, six years on railways in India. Apply, care of Box 150, The Canadian Engineer.

POSITIONS VACANT

WANTED for a town in British Columbia a road-way foreman or inspector. In applying, state fully experience, I. D., Box 408, Canadian Engineer.

APPLICATIONS will be received by undersigned for the position of Commissioner of Works for Town of North Bay. Applicants will state salary, experience and references. M. W. Flannery, Town Clerk, North Bay.

FOR SALE

FOR SALE—Set of books on stationary engineering; also a set on telegraph engineering, including a complete electrical experimenting outfit. Address Box 146, Canadian Engineer.

Generator Sets direct coupled with engine—
1, 115 volt, 30 K.W.
1, 45 volt, 30 K.W.
also
1, Cornish Boiler, 50 H.P., working pressure, 80 lbs.
Apply, Secretary's Office,
Jan. 30th, 1911. McGill University.

Lumber.—No. 1 pine, spruce, tamarac, 2 x 4, 2 x 6, 2 x 8, 8 to 16 feet, except 10 feet, $29; British Columbia fir and cedar, 2 x 4, 2 x 6, and 2 x 8, 12 to 16 feet, $32; 2 x 20, 4 x 20, up to 32 feet, $42.

Nails.—$4 to $4.25 per 100. Wire base, $2.85; cut base, $2.90.

Picks.—Clay, $5 per dozen; pick mattocks, $6 per dozen; clevishes, 7c. per lb. (132.)

Pipe.—Iron, black, per 100 feet, 1/4-inch, $2.50; 3/8-inch, $2.80; 1/2-inch, $3.40; 3/4-inch, $4.60; 1-inch, $6.60; 1 1/4-inch, $9; 1 1/2-inch, $10.75; 2-inch, $14.40; galvanized, 1/2-inch, $4.25; 3/4-inch $5.75; 1-inch, $8.35; 1 1/4-inch, $11.35; 1 1/2-inch, $13.60; 2-inch, $18.10. Lead, 6 1/2c. per lb.

Pitch.—Pine, $6.50 per barrel; in less than barrel lots, 4c. per lb.; roofing pitch, $1 per cwt.

Plaster.—Per barrel, $3.25.

Roofing Paper.—60 to 67 1/2cc. per roll.

Rope.—Cotton, 1/4 to 1/2-in., and larger 23c. lb.; deep sea, 16 1/2c.; lath yarn, 9 1/2 to 9 3/4c.; pure Manila, per lb., 13 1/4c.; British Manila, 11 1/4c., sisal, 10 1/4c.

Shingles.—No. 1 British Columbia cedar, $4; No. 2, $3.50; No. 1 dimension, $5; No. 1 band saw, $6.

Spikes.—Basis as follows:—1 1/4, 5 and 6, $4.75; 5-15 x 5 and 6, $4.40; 1/2 x 6, 7 and 8, $4.25; 1/2 x 8, 9, 10, and 12, $4.05; 25c. extra on other sides.

Steel Plates, Rolled.—3-16-in., $3.35 base; machinery, $3 base; share, $4.50 base; share crucible, $5.50; cast share steel, $7.50; toe calk, $4.50 base; tire steel, $3 base; cast tool steel, lb., 9 to 12 1/2c.

Staples.—Fence, $2.40 per 190 lbs.

Timber.—Rough, 8 x 2 to 14 x 16 up to 32 feet, $38; 6 x 20, 8 x 20, up to 32 feet, $42.

Tool Steel.—8 1/2 to 15c. per pound.

Index to Advertisements

Tenders Called For

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Alterations, Examining Warehouse, Toronto, Ont.," will be received at this office until 4 p.m., on Monday, February 13th, 1911, for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F, Yonge St., Toronto, and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, made payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the preson tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works, Ottawa, January 21, 1911.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.

(Continued on page 66.)

Technical Books

The Filtration of Public Water Supplies.—By Allen Hazen. Third edition, revised and enlarged, 8vo., xii. + 321 pages, fully illustrated with line and half-tone cuts, cloth, $3.00.

Sewer Design.—By H. N. Ogden, C.E., Assistant Professor of Civil Engineering, Cornell University. 12mo., xi. + 234 pages, 54 figures, five plates, cloth, $2.00.

Sewage Disposal in the United States.—By Geo. W. Rafter, M. Am. Soc. C.E., and M. N. Baker. Third edition, 625 pages, 4to., illustrated, $6.00.

Waterworks for Small Cities and Towns.—By John Goodell, 281 pages, 6 x 9, 53 illustrations, $2.00

Development and Electrical Distribution of Water-power.—By Lamar Lyndon. A purely engineering treatise. 158 illustrations, 8vo., cloth, 324 pages. New York, 1908. $3.00.

Hydro-Electric Practice.—By Henry A. E. C. Von Schon. A practical manual of the development of water-power, its conversion into electric energy and its distant transmission. 236 illustrations, 8vo., cloth, 348 pages, $6.00.

Disposal of Municipal Refuse.—By H. de B. Parsons. 8vo., x. + 186 pages, 73 figures, mostly half-tones, cloth, $2.00.

Book Department, Canadian Engineer

Tenders Called For

NOTICE TO CONTRACTORS.

Civic Supplies.

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Ottawa, will be received by the Secretary of the Board of Control, City Hall, Ottawa, up to 4 p.m., Tuesday, February 14th, 1911, endorsed "Tender for Broken Stone, Brick, Stone Curbing, Stone Setts, Cement, Plank and Cedar, Sand Vitrified Clay Pipe, Asphalt, Castings, or Hardware, as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
Ottawa, January 21st, 1911. City Engineer.

TENDERS CALLED FOR.

MUNICIPALITY OF MONT-LAURIER, CO. LABELLE, P.Q.

Water Supply.

Sealed tenders addressed to the undersigned, registered and endorsed "TENDER FOR WATER SUPPLY AT MONT-LAURIER, P.Q.," will be received until Monday, February 20th, 1911, for the construction of a water supply for the said municipality.

Plans, specifications and form of contract can be seen, and form of tenders obtained at Mont-Laurier or at the office of the Engineers of the Municipality, Messrs. BEIQUE & CHARTON, Room 502, Quebec Bank Building, Montreal.

Persons tendering are notified that tenders will not be considered unless made on the forms supplied, and signed with their actual signatures, stating their occupations and places of residence. Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Mayor of Mont-Laurier, for the sum of three hundred dollars ($300.00), which will be forfeited if the person tendering declines to enter into the contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

The municipality does not bind itself to accept the lowest or any tender.

By order,
ANTHIME DUBREUIL,
Mayor of Mont-Laurier,
Rapide de l'Orignal, P.Q.
Mont-Laurier, January 19th, 1911.

NOTICE TO CONTRACTORS.

Waterworks Supplies.

Sealed tenders addressed to the Chairman of the Waterworks Committee, City Hall, Ottawa, will be received by registered post only, up to 4 p.m., Tuesday, February 14th, 1911, for the supply and delivery of Brasswork, Special Pipe Castings, Hydrants, Cast Iron Pipe, Lead Pipe and Pig Lead, Valves or Oils and Grease as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
Ottawa, January 21st, 1911. City Engineer.

CITY OF STRATHCONA, ALBERTA.

Tenders for Engine, Boilers and Generator.

Tenders addressed to David Ewing, Chief Engineer, Power House, Strathcona, Alberta, for above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.

ERECTION OF GAS PLANT.

Tenders will be received by the undersigned up to March 1st, 1911, at the offices of the company, for the erection of a gas plant to serve the requirements of Monterrey, Mexico, a modern city of 85,000 inhabitants, with first-class railroad facilities. Plans and specifications may be seen at the company's offices. Copies of plans and specifications, form of tender, and other necessary information will be furnished responsible bidders on request.

Separate or supplemental tenders will also be received at the same time for the laying of gas mains and curb connections.

All interested parties should communicate with
LEWIS LUKES,

Vice-President and General Manager, Monterrey Railway Light & Power Company, Ltd., Apartado (P.O. Box) 58, Monterrey, N. L. Mexico.

CATALOGUE INDEX

Some of the most valuable information on engineering and contracting subjects is to be found in the trade literature of the large supply houses.

The Canadian Engineer maintains a card index upon which is kept an up-to-date list of manufacturers of contractors supplies and engineering equipment. If you want the catalogues of any of these firms all you need do is to send us a postal giving your address and the list numbers (as printed below) of the catalogues you wish sent. This will save you time and labor and insure prompt service. This department can put you in direct communication with the principal manufacturers of and dealers in engineering equipment of all kinds.

1 Air compressors.
2 Air lift pumping machinery.
3 Alloys.
4 Aluminum.
5 Angles (see structural steel).
6 Architects' supplies.
7 Asbestos and Asbestos Products.
8 Asphalt.
9 Asphalt plants and tools.

10 Bars (steel)
11 Bearing Metals.
12 Bearings, ball and roller.
13 Belt dressing.
14 Belt tighteners.
15 Belting, chain, link, canvas, etc.
16 Benders (rail).
17 Blacksmiths' tools.
18 Blast furnaces and fittings.
19 Blasting powder.
20 Blocks and tackle.
21 Blowers.
22 Boiler fittings, mountings and tubes.
23 Boiler tubes.
24 Boilers (tubular).
25 Boilers (water-tube).
26 Bolts.
27 Bolts (machine).
27A Bonding for Concrete.
28 Bonds (Contractors').
29 Books (engineering and technical).
30 Boots.
31 Brackets and cross-arms.
32 Brick and tile.
33 Brick (paving).
34 Bridge builders.
35 Bridge engineers.
36 Bridges (concrete).
37 Buckets.
38 Buckets (clam shell).
39 Buckets (concrete).
40 Buckets (dredging and excavating).

41 Cables (manila).
42 Cableways.
43 Caisson Foundations.
44 Car replacers.
45 Carbolineum.
46 Cars (ballast).
47 Cars (concrete).
48 Cars (dumping).
49 Cars (industrial).
50 Cars (inspection).
51 Carts and wagons (ash and dump).
52 Carts (concrete).
53 Castings (malleable iron).
54 Castings (steel).
55 Cement.
56 Cement block and brick machines.
57 Cement-making machinery.
58 Cement testing machines.
59 Cement waterproofing.
60 Centers.
61 Chemists.
62 Chimneys (concrete).
63 Chimneys (steel).
64 Clutches (friction).
65 Coal and ore-handling machinery.
66 Cofferdams.
67 Compressed-air tools.
68 Concrete block machines
69 Concrete reinforcement.
70 Conduits (steel)
71 Conduits (vitrified clay).
72 Contractors' (general).
73 Conveying machinery.
74 Conveyers (belt).
75 Conveyers (cable).
76 Cordage.
77 Cranes and hoists.
78 Cranes (derrick).
79 Cranes (electric).
80 Cranes (hand-power).
81 Cranes (locomotive).
82 Cranes (travelling).
83 Crusher castings (rock).
84 Crushing rolls.
85 Culverts.
86 Curb (steel).

87 Dams (concrete).
88 Derails.
89 Derricks (pile driving).
90 Derricks (steam).
91 Drafting Instruments and supplies (see engineers' and surveyors' instruments and supplies).
92 Dredging machinery.
93 Drills (pneumatic).
94 Drills (rock).
95 Drums (hoisting).
96 Dryers (cement, asphalt and sand).
97 Dynamite.

98 Elevators (bucket).
99 Engineers and contractors.
100 Engineers' and surveyors' instruments and supplies.
101 Engines (compressed air).
102 Engines (gas, gasoline, oil).
103 Engines (high duty—pumping).
104 Engines (hoisting).
105 Engines (oil).
106 Engines (steam).
107 Engines (traction).
108 Excavating machinery.
109 Explosives.
110 Fans.
111 Fence, railing and posts
112 Filters (feed water).
113 Filters (water).
114 Fire brick and fire clay.
115 Forgings (steel).
116 Foundations.
117 Foundry equipment and supplies.
118 Frogs and switches (ry.).

119 Garbage crematories.
120 Gas producers.
121 Gates and valves.
122 Gauges (steam), (see steam specialties).
123 Generators (electric).
124 Governors (water-wheel).
125 Grain elevators and storage tanks.
126 Grinding & Mixing Machinery.

127 Hand cars.
128 Heating and ventilating machinery.
129 Hoists (chain and rope).
130 Hoists (pneumatic).
131 Hoists (steam).
132 Hydrants.

133 Ice and refrigerating machinery.
134 Incline cableway engines.
135 Inspection of materials.
136 Irrigation supplies.

137 Jacks (screw and lever)
138 Jacks (hydraulic).
139 Jacks (pneumatic).
140 Jacks (track).

141 Kilns (cement).

142 Lamp posts.
143 Levels.
143A Lights (Contractors' & Municipal).
144 Locomotives (industrial and light).
145 Locomotives (steam)
146 Locomotives (traction).

147 Manganese steel.
148 Manhole covers.
149 Meters (water, oil and gas).
150 Mixers (asphalt).

151 Oakum.

152 Paints and metal coatings.
153 Paving joint filter.
154 Penstocks.
155 Pile driving machinery.
156 Pile protection.
157 Piling (interlocking steel).
158 Pipe (galvanized iron).
159 Pipe (reinforced concrete).
160 Pipe (riveted steel).
161 Pipe (wood).
162 Portland cement.
163 Pulverizers.
164 Pumps (pneumatic).
165 Pumps (centrifugal).
166 Pumps (diaphragm).
167 Pumps (waterworks).

168 Rail joints, fastenings and specialties.
169 Railroad track supplies.
170 Rails and track.
171 Rails, second-hand.
172 Railways, industrial and narrow-gauge.
173 Reinforcement steel for concrete structures.
174 Riveting hammers.
175 Riveting machines.
176 Road machinery.
177 Road oils.
178 Road rollers.
179 Roofing.
180 Rope (wire).
181 Rubber boots.

182 Sand-blast machines.
183 Scarifiers.
184 Schools and colleges.
185 Scrapers, road.
186 Second-hand machinery and supplies.
187 Sewage disposal.
188 Sewer braces.
189 Sewer buckets.
190 Sewer flushers (automatic).
191 Sewer pipe.
192 Shovels (steam).
193 Shovels and picks (hand).
194 Sluice gates.
195 Steam specialties.
196 Steel substructures for tanks.
197 Street-cleaning implements, machinery and snow plows
198 Street sprinklers.
199 Structural materials
200 Structural steel.

201 Testing laboratories (chemists, etc.).
202 Ties (steel and wood).
203 Tile.
204 Track tools.
205 Traction ditching machines.
206 Transits.
207 Trench excavating machi
208 Turbine pumps.
209 Turntables (overhead).

210 Valves (sluice).

211 Wagons (contracto
212 Wagons (garbage).
213 Wagons (oil).
214 Well-drilling machin
215 Wheelbarrows.
216 Winches.

PATENT ATTORNEYS

AMONG THE MANUFACTURERS

A department for the benefit of all readers to contain news from the manufacturer and inventor to the profession.

OPERATION OF TROLLEY POLE TESTING MACHINE.

The machine used for testing trolley poles was designed to test material of circular cross-section as a beam loaded at one end and fixed at the other. The capacity of the machine is up to a bending moment of 30,000 inch-pounds, taking diameters up to four inches.

The machine consists of a frame or base of heavy 15-inch steel channels, the rigidity of which is so great that the deflection of the frame is negligible.

At the other end of the frame is the device for applying carrying the load-weighing device, consisting of a scale of 500 pounds capacity, reading to half pounds, and sensitive to two ounces. This scale is vertically adjustable in the stand to accommodate the position of the end of the piece under test.

At the other end of the frame is the device for applying the stress to the piece under test. This device consists of a frame carrying a horizontal shaft capable of being rotated by means of a hand-wheel operating a worm and gear through an angle of about 10 degrees. This amount of rotation will produce a deflection of 30 inches on a test-piece of 16 feet in length. The horizontal shaft carries a chucking arrangement by which the piece under test is clamped rigidly with the centre lines of the horizontal shaft and the piece under test intersecting. The end of the horizontal shaft carries an arm, in the end of which is fixed a micrometer reading to .001-inch, whereby the movement of the horizontal shaft is measured. The reading of the micrometer is translated into deflection of the test-piece by simple proportion.

The design of the machine is such that it is not necessary to apply any correction to the reading unless the test requires an accuracy greater than 1 per cent. error.

In testing trolley poles on this machine, the scale is set at the proper distance from the rotating chuck, corresponding to the length of the trolley pole under test; the pole is then placed in the chuck and on the scale, and the weight of the pole so supported recorded. The chuck is then tightened. The micrometer is set at 0, and the scale elevated or depressed in its stand until it indicates the weight of the pole as before recorded. Load is then applied by the hand-wheel and the deflection measured by the micrometer. The elastic limit is easily detected by an increase in the deflection indicated by the micrometer, for equal increments of load, or by measuring the set by the micrometer on removal of the load.—John Millen & Son.'s Catalogue.

NEW INCORPORATIONS

Shediac, N.S.—E. Paturel Co., $7,000. T. R. Robertson, H. H. Munro, R. Miner.

St. Basile, Que.—Eastern Paper Co., $10,000. E. R. Pepin, J. O. Collette, J. S. Piche.

St. Euphemie, Que.—Compagnie G. Blais, $45,000. G. Blais, Z. Cloutier, H. Tardif, St. Pierre.

Winnipeg, Man.—Western Manufacturing Co., $250,000; C. M. Boyton, R. T. Ferguson, H. Lillie.

Collingwood, Ont.—Nottawasaga Curling Club, $5,000. W. A. Copeland, F. F. Telfer, W. T. Toner.

Brockville, Ont.—Brockville Construction Co., $100,000. W. S. Buell, J. H. Botsford, G. H. Mallory.

St. Michel de Rougemont, Que.—Rougemont Orchard Co., $20,000. F. Paquette, N. Desautels, J. Fournier.

Grand Mere, Que.—Laurentide Printing Co., $20,000. J. O. H. Picard, L. Catelier, W. Demphouse.

Lake Megantic, Que.—Lake Megantic Iron Mining Co., $99,000. J. A. Courville, W. W. Pringle, Lake Megantic; G. K. Vann, Spring Hill.

Ottawa, Ont.—Daniel J. McA'Nulty Realty Co., $500,000. D. J. McA'Nulty, Ottawa; M. J. Hogan, H. Quinlan, Montreal. Canadian Quarries and Construction Co., $2,000,000. J. Black, R. T. Mullin, Montreal; S. Bilsky, Ottawa. Calder Mining Co., $500,000. F. H. Chrysler, C. J. R. Bethune, N. G. Larmonth.

British Columbia.—British Columbia Central Land Co., $25,000. Canadian E. T. Syndicate, $50,000. Canadian National Estates, $50,000. Compressed Gas Co., $25,000. Dominion Mutual Fire Insurance Co. of Vancouver, $100,000. George Lloyd Co., $25,000. Okanagan Falls Land Co., $250,000. Pacific Westrumite Asphalt, $300,000. Premier Home Builders, $50,000. R. D. Rorison & Son, $1,000,000. Hudson's Bay Mutual Fire Insurance Co. of Vancouver, $100,000.

Winnipeg, Man.—Grand Pacific Land Co., $10,000; F. S. Andrews, H. A. Burbidge, F. M. Burbidge. Grose & Walker, $60,000; P. Walker, J. K. Sparling, F. W. Sparling. Winnipeg Bridge and Construction Co., $60,000; J. Frankman, H. Frankman, J. Frankman, Minneapolis. Implement Specialties Corporation, $80,000; J. M. Johnson, A. McCurdy, A. Parker. Silvester and Willson, $100,000; G. Silvester, Calgary; H. L. Willson, W. M. Crichton, Winnipeg. Canadian Hotel Supply Co., $60,000; J. M. Allan, J. Simpson, T. S. Ewart. Sterling Investment Co., $5,000; J. H. Holtby, O. Badcock, J. Simpson.

Montreal.—Williams & Wilson, $250,000. A. R. Williams, Toronto; F. C. Wilson, W. A. Wilson. Central Canada Iron and Steel Corporation, $500,000. G. V. Cousins, O. B. MacCallum, S. T. Mains. Quebec Pulp and Paper Co., $15,000,000. C. G. Greenshields, E. R. Parkins, R. Brodeur. Bell's Galleries, $400,000. L. Barry, E. A. Barnard, E. D. Maguire. Progress Realty and Investment Co., $50,000. O. Marchand, W. Marchand, H. Lauzon. International Shows, $50,000. P. A. Boivin, J. H. Ostigny, J. Fluet. Hair Goods, $49,000. C. W. Schickendanstz, H. Schickendanstz, A. W. P. Buchanan. International Gully and Manufacturing Co., $20,000. A. Colas, S. Whiteside, E. Colas.

Toronto.—Standard Chemical, Iron and Lumber Company of Canada, $6,000,000. J. Wood, T. W. Lawson, J. E. Riley. Yrwold Land Co., $40,000. D. Lowrey, B. D. Lowrey, W. B. Russel. Business Men's Club. H. Baldwin, W. J. Duncan, A. T. Sprowl. Vermont Athletic Club. J. Richardson, F. E. Coath, A. E. Gilmore. A. & T. Hall, $40,000. H. S. Harwood, E. Rive, G. E. McCann. Maple Leaf Oil Co., $1,000,000. J. T. White, G. R. Sproat, J. H. Cavell. Dominion Historical Association; J. F. Selby, C. T. Patterson, W. McComb. Augustine Automatic Rotary Engine Co. of Canada, $1,000,000. B. F. Augustine, J. Franey, Buffalo; R. D. Hume, Toronto. Plastics, $170,000. R. H. Parmenter, W. S. Morlock, N. B. Wormwith. Atlantic Securities, $200,000. J. S. Lovell, W. Bain, R. Gowans.