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The Canadian Engineer

ESTABLISHED 1893

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Editor—E. A. JAMES, B.A. Sc.

Business Manager—JAMES J. SALMOND.

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HEAD OFFICE: 62 Church Street, and Court Street, Toronto
TELEPHONE MAIN 7404.

Montreal Office: B 32 Board of Trade Building. T. C. Allum, Business and
Editorial Representative. Phone M 2797.

Winnipeg Office: Room 315, Nanton Building. Phone 8142. G. W. Goodall,
Business and Editorial Representative.

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TO OUR READERS.

If you are coming to Toronto, Montreal or Winnipeg and
wish to have your mail forwarded the offices of the Canadian
Engineer are at your disposal. Have it addressed to our
offices and we will take care of it until you call or ask to have
it re-directed.

A SUPERVISING ENGINEER.

Great protest is made annually, during the summer months, by the daily press against the method of sewage disposal and the questionable purity of the water supply of many Canadian cities.

They do not carry on this publicity campaign because of any pleasure they find in it but because they feel it a public duty to familiarize the citizens with existing dangers. The city engineer or waterworks superintendent knows many of these imperfections—usually more about them than the newspapers, yet in many instances he is helpless. Too frequently he is looked upon as a servant, and servant only, employed by the municipality to carry out the instructions, and never allowed to take the initiative. The result is a condition not creditable to the engineering profession nor to our methods of civic government.

Sometimes these unsanitary conditions arise from poor installation, and sometimes from imperfect inspection and insufficient supervision. The Local Boards of Health take but little notice of such matters as drainage, pure water and sewage disposal. The Provincial Board of Health in the past have not taken the initiative in requiring the adoption of safe methods of sewage disposal, nor have they required municipalities to exercise any great care in securing a pure water supply. When invited to interfere or supervise they have always done so, but the day is past when matters of this kind can be left in this unsatisfactory condition.

Each Provincial Board of Health should have in their employ a competent sanitary engineer, whose duty would be not only to pass upon suitable plans for new plants and systems, but who should give some time to studying the plants now installed and report upon their efficiency.

WATER WASTE.

A problem ever present with the city and consulting engineer is how to increase the flow of water when the demand is almost equal to the supply. The securing of pure water for domestic purposes and a sufficient supply for manufacturing plants is frequently a serious problem with waterworks officials. Surveys are made, possible sources of supply explored, reservoirs enlarged, new pumping plants installed, yet little or no attempt is made to prevent or reduce the waste of water that occurs hourly in connection with every unmetered town or city water supply.

The causes of water waste are many. The installing of defective and leaky water mains, inferior plumbing and failure to keep taps in good repair; but the greatest waste of all occurs through the failure of the consumers to appreciate the cost of water and carelessness in its use. There may be another reason for this waste as important as any or all of those just mentioned—the persistent use of the flat rate as a method of raising money for municipal purposes.

When we read that Erie, Pa. consumes 127 gallons per person per day, Boston over 90 gallons, Chicago 126, Hamilton 115, and Toronto 110 we wonder how such British cities as Bath and Scarborough can continue to be healthy cities and only use 20 and 23 gallons of water per person per day. On the continent of Europe

we find that Berlin uses 17½ gallons, Dresden 17 3-5 gallons and Leipzig 23 gallons per person per day.

If the requirements of the citizens can be met, if the sanitary arrangements are complete, with this small consumption of water, there must be great waste in those cities using from six to eight times that volume.

Turning now to American cities where meters are used we find that the consumption is almost as low as in European cities: Worcester, Mass., 43 gallons per capita per day, Brockton 22, and Newton 34. Even with this low water consumption the sanitary requirements are well provided for, and the general health and cleanliness of the people are as in other cities. The only conclusion we can come to is that this great consumption of water by citizens is abuse, not use, and to prevent or check this waste would be better engineering than to increase the supply, for increased supply means increased expenditure, not only on capital account, but it increases the annual fixed charges for fuel and labor. The only way to prevent this waste is to install meters. Regulations and by-laws are too easily and successfully avoided. Education would be even better than regulation, but more effective than either would be a recording meter and a direct tax.

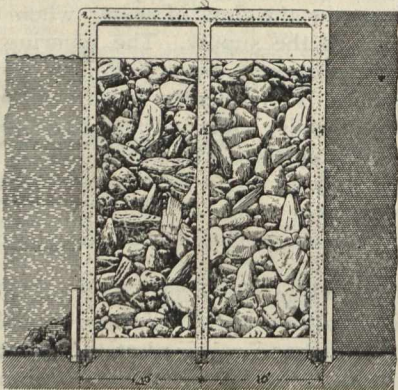
EDITORIAL NOTES.

The convention of the Canadian Manufacturers' Association is to be held in Montreal on September 14th to 18th this year. One of the features will be the general reception on Tuesday evening, September 15th, to the members of the Association, which will be held at McGill University. Next day the Harbor Commissioners will take the party on special steamer down the river; Thursday, probably a civic reception on the mountain. The event of the meeting will be a banquet at the Windsor Hotel on Thursday evening, when at least four hundred guests will be invited.

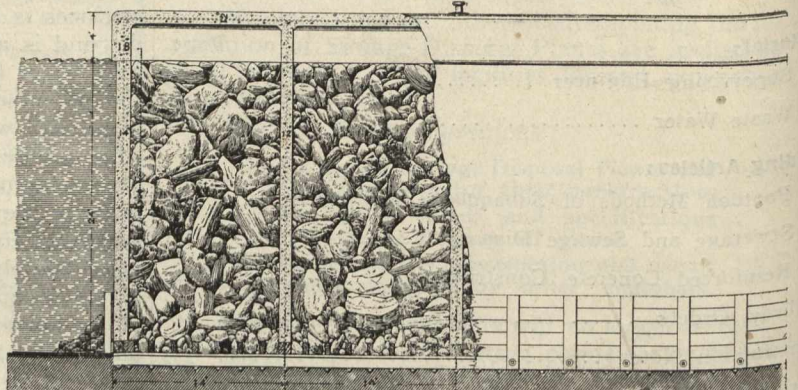
PONTOON METHOD OF SUBAQUEOUS CONCRETE CONSTRUCTION.

The superiority of reinforced monolithic concrete, over all other materials, for all classes of under water construction, is so apparent to a practical mind, as to scarcely warrant mention.

The principal qualities of concrete are, however, its great



Cross-Section of Breakwater.



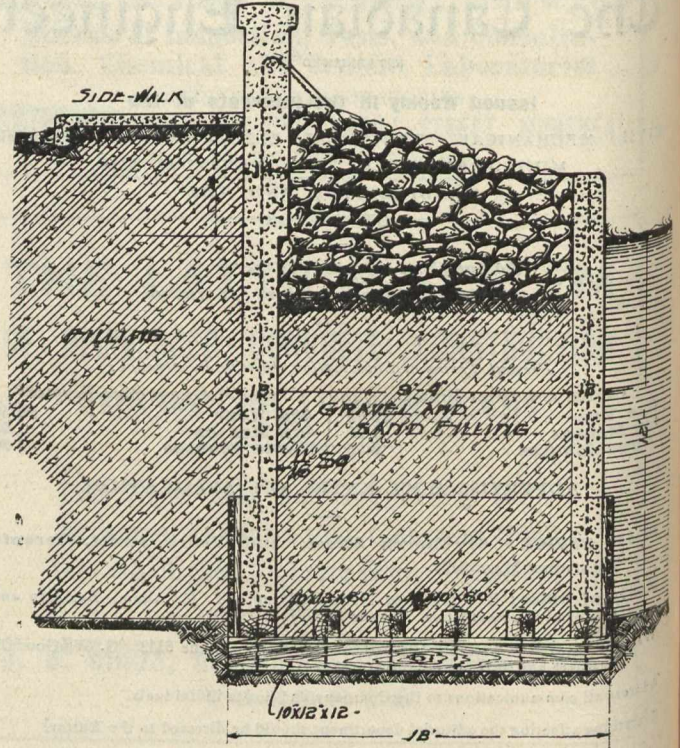
Longitudinal Section.

strength and permanent durability, its absolute resistance to the destructive Tereido worm, and its reasonable cost under proper methods of construction.

The hazard and difficulty of submerged concrete construction in exposed waters are so great, that engineers, while fully recognizing its superior qualities, have hesitated in its employment, solely on account of the risks they incurred and the heavy expense of open sea operation.

The usual methods, at present used in the construction of subaqueous concrete work, are to coffer dam, or built with blocks. By the first method, a coffer dam is built around the site of the proposed structure, the water pumped out and kept dry by pumping until the work of construction is completed within, the coffer dam and pumping frequently costing as much as the permanent work itself.

By the block method, the work is accomplished by making large blocks of concrete on shore, each block weighing many tons, these are transported by scows or trams to the site of the work, and are lowered into the water by heavy der-



Cross-Section of Dock.

ricks, the setting of the blocks being done by divers at the bottom.

Other methods have also been used, but these two are the most practical, either method is very expensive, and both are subject to the dangers and interruption of exposed construction.

When wooden piling, or timber cribs are used in this class of work, it is well-known that every few years all of the woodwork above water must be replaced, and in salt water, all of the submerged timbers must be creosoted to prolong its

life, and even then the Tereido is not prevented from getting in its destructive work.

For these reasons then, it would seem that the utility of concrete for subaqueous work, is, therefore, not a matter of suitability, but entirely a question of practical and economical construction.

The system of construction devised by Mr. J. H. Tromhauser, 604 Temple Building, Toronto, and covered by

patents in Canada and the United States, and upon which, patents have been applied for in most of the principal European countries, is intended to remove the danger and difficulty of building concrete under water in open sea.

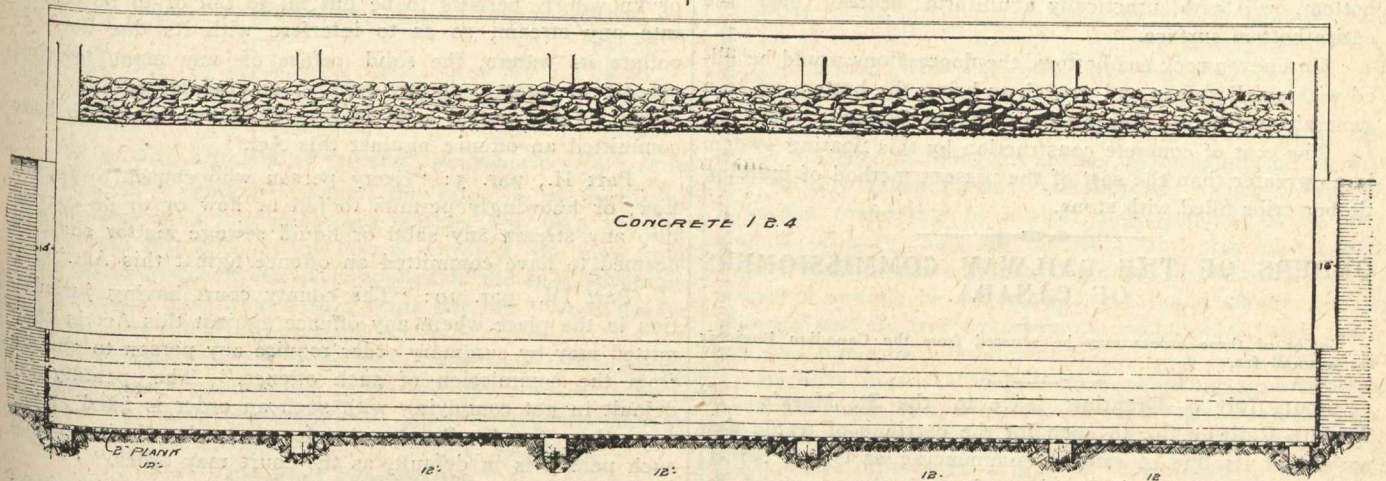
The system is applicable in the building of docks, piers, breakwaters, sea walls, coffer dams, lighthouse foundations, and for many other purposes. In fact, its application in subaqueous construction is almost unlimited.

The open sea hazard is entirely eliminated, for the work

basin, and are built up in layers of about two feet deep. The steel reinforcement, being built in as the walls progress.

As the walls rise, their weight, of course, sinks the pontoon, but as the displacement of the pontoon, per foot deep, is about double the tonnage of the walls per foot high, it follows that for every two foot course of concrete built, the pontoon will sink one foot lower, and the top of walls will rise one foot higher above the surface of the water.

Therefore, when the walls have reached a weight suffi-



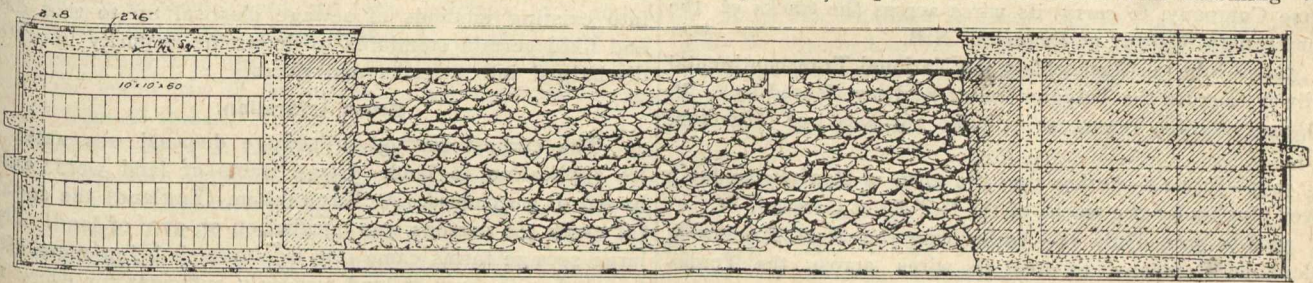
Elevation of Breakwater.

of construction is carried on within a harbor, or in well sheltered water, and when the concrete sections are completed, they are then towed out during calm sea, and sunk upon the intended site. The weight of the concrete sections being sufficient to withstand any reasonable sea, which might break over the sunken structure until ballasting of its compartments is completed.

Reference to the accompanying cuts, and the following

cient to entirely submerge the top of the pontoon basin, the top of the walls will also have reached a height above the surface of the water equal to the height of the pontoon sides, so that when the top of the basin passes below the water line, the hardened concrete walls will themselves form a continuation of the pontoon.

Some stationary ballast would be required on the bottom of the pontoon, to prevent the structure from becoming top



PLAN VIEW.

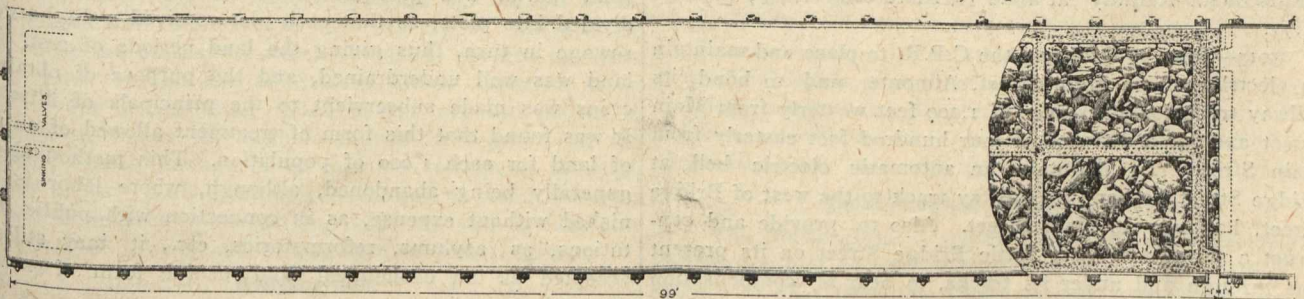
description, should give our readers a clear idea of the design; and also of the principles of construction employed. The simplicity and practical utility of which, should strongly appeal to all experienced engineers.

All of the concrete work is done floating, but above, and protected from the water.

Water-tight pontoon bottoms, or basins, are built on shore, one pontoon for each section. The sections should be

heavy and rolling over, as the walls are raised. In this manner, the walls are built up to a height somewhat greater than the depth of water in which the sections would be sunk, so that when the structure rested on the sea bottom, the top of the concrete walls would still project above the water.

Suitable sea valves are provided to admit water into the compartments for sinking the sections, and in case, a section should for some reason, require adjustment after being



Part Section Showing Interlocking Scheme.

preferably about 100 feet long, but may be longer or shorter as conditions demand.

Launch and float the pontoons into a sheltered location, convenient for building operations, but with sufficient depth of water for sinking while under construction.

The concrete walls, which are built to form square compartments, begin directly upon the floor of the pontoon

sunk, it may be refloat by closing the valves and pumping out a portion of the water.

The sections are made male and female for coupling together, and as the walls are perfectly water-tight, the washing action of the sea will have no effect upon the interior ballast, which may be of rock, gravel, sand or a concrete mixture of all.

After ballasting is completed to the surface of the water, and final settlement of the sections has taken place upon the sea bottom, then the upper, or above water portion of the structure may be completed in true line, and level, or in any form required.

All of the steel reinforcement is well protected against the rusting and corroding effect of the sea, and the timber frame of the pontoon bottom is a stiffening and protection to the lower edges of walls, and on sand, gravel, or mud sea bottom, will give practically a uniform bearing over the entire bottom surface.

On uneven rock sea bottom, the depressions would be filled with small stones and gravel, to bring the bottom up to a general level before sinking the concrete sections.

The cost of concrete construction by this floating system is no greater than the cost of the present method of building timber cribs filled with stone.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5001—July 9—Granting leave to the St. Mary's and Western Railway Co. to open for the carriage of traffic that portion of its line of railway commencing at Queen Street, St. Mary's, Ont., and running through the town of St. Mary's and the townships of Blanshard, Nissouri and West Zorra counties of Perth and Oxford, to a point in the village of Embro.

5002—July 9—Granting leave to the Tillsonburg, Lake Erie and Pacific Railway Co. to open for the carriage of traffic that portion of its line of railway from mileage 0, the connecting point of the London section of the C.P. Ry., to mileage 5.60, near the village of Embro, Ont.

5003—June 15—Authorizing the New Brunswick Telephone Company, to carry its wires across the tracks of the Temiscouata Railway at Evanston, N.B.

5004—July 14—Authorizing the National Transcontinental Railway to cross the Tobique Valley Railway (leased by C. P. R.) near station 27÷19, at mileage 165 west of Moncton, N.B.

5005—July 14—Authorizing the town of Renfrew to lay a sewer pipe under the tracks of the G.T.R. at Carswell St.

5006 to 5009—July 14—Authorizing the New Brunswick Telephone Company, to erect its wires across the Temiscouata Railway in Quebec and New Brunswick.

5010—July 14—Authorizing the C.P.R. to construct a spur to the premises of Calgary, Port Huron County, Calgary, Alta.

5011—July 14—Authorizing the Bell Telephone Company, to erect its wires across the tracks of the Schomberg & Aurora Railway at Main Street, Schomberg, Ont.

5012—July 14—Authorizing the New Brunswick Telephone Company to erect its wires across the tracks of the Temiscouata Railway at road to Riviere du Loup, mileage 41.71.

5013—June 3—Ordering the C.P.R. to place and maintain an electric bell on Main Street, Almonte, and to bond its railway track for a distance of 1,200 feet westerly from Main Street and for a distance of four hundred feet easterly from Main Street. To maintain an automatic electric bell at Bridge Street, to bond its railway track to the west of Bridge Street, half way to Main Street. Also to provide and construct a subway to carry Little Bridge Street on its present line through and under its tracks, to bear all compensation for land affected, and to remove the buildings of Messrs. Reid & Williams. Also ordering the town of Almonte to pay to the C.P.R. \$2,000 on December 1st, 1908, and on the same date one quarter of the amount allowed the owner of the buildings after deducting amount, if any, realized by the Railway Company for the sale of the buildings.

5014—July 15—Authorizing the New Brunswick Telephone Company to erect its wires across the tracks of the C.P.R. near McAdam Junction.

(Continued on Page 524).

SEWERAGE AND SEWAGE DISPOSAL.

T. Aird Murray, C.E.

The History of Sewage Disposal.

In Great Britain in the year 1876 an Act of Parliament came into force, called the "Rivers Pollution Prevention Act." Part I., par. 2, enacts:—

"Every person who puts, or causes to put or to fall, or knowingly permits to be put in, to fall or to be carried into any stream, so as to interfere with its due flow, or pollute its waters, the solid refuse of any manufacturing process or quarry, or any rubbish or cinders, or any other waste, or any putrid solid matter, shall be deemed to have committed an offence against this Act."

Part II., par. 3: "Every person who causes to fall or flow, or knowingly permits to fall or flow or to be carried into any stream any solid or liquid sewage matter shall be deemed to have committed an offence against this Act."

Part IV., par. 10: "The county court having jurisdiction in the place where any offence against this Act is committed may by summary order require any person to abstain from the commission of such offence." The penalty for default in not complying with such an order is fixed at not more than £50 (or \$250) a day for every day during which such person is in default, as the court may order."

This Act had become a public necessity, as the rivers of Great Britain were gradually becoming simply open sewers. Previous Acts of Parliament of a local character, such as "The Thames Conservancy Act, 1857," had been enacted. Other Acts also existed by which an injunction could be obtained against any person or persons polluting a stream and causing a nuisance. The above Act of 1876, however, was a bona fide attempt to put in force the recommendation of a Royal Commission, called "The Rivers Pollution Commission," which had made extensive enquiries into existing methods of sewage disposal up to that date, and fixed certain standards to determine impurity in waters discharged into streams and rivers.

Broad Irrigation.

The earliest method of sewage disposal was naturally its application to land. Large tracts of land were either leased or purchased. At Birmingham (England) the sewage for every 560 persons was purified on an acre of land. Thus large sewage farms came into existence, it being more often found that an acre of land was only sufficient for every 100 persons. These have, however, been almost universally abandoned. By this method the sewage was allowed to simply irrigate by means of ridge and furrow beds, the land being used for cropping.

Intermittent Land Filtration.

An improvement in broad irrigation was highly recommended by the "Rivers Pollution Commission," called "Intermittent land filtration." By this method much of the solid matter was precipitated in settling tanks, the land divided into plots, so that each plot received a discharge of sewage in turn, thus giving the land periods of rest. The land was well underdrained, and the purpose of obtaining crops was made subservient to the principals of filtration. It was found that this form of treatment allowed of an acre of land for each 1,000 of population. This method also is generally being abandoned, although, where labor is furnished without expense, as in connection with public institutions, as asylums, reformatories, etc., it may still be accepted as an economical and useful form of sewage disposal.

Objections to Land Treatment.

There are several reasons why the above systems have proved a failure. The principal ones are: The large amount of labor required; the fact that sewage requires daily treatment, unless accompanied by extremely large storage, which is most objectionable in the case of sewage. The sewage should be treated fresh. It is, therefore, necessary that the land shall continue to receive the sewage in both dry and wet weather. This means that at times of great rainfall,

when the land is saturated, it is called upon to deal with the maximum flow of sewage.

It has been found that land continuously treated with sewage becomes "sewage sick." The best of land becomes non-absorbent, and will only produce the rankest vegetation. Such land requires over one and two years for recovery.

The tillage properties of sewage have also been much exaggerated. Many people suffer from a most extraordinary idea of the value of water-carried sewage as a manure. The fertilizing properties in sewage are nitrogen, phosphoric acid and potash. A net ton of London sewage contains:—

	Pound.
Nitrogen	0.19
Phosphoric acid	0.052
Potash	0.029

Now, with nitrogen at 17 cents, phosphoric acid 7 cents and potash 5 cents per pound, the value of the fertilizing ingredients in a ton of sewage is thus less than 4 cents. If we take into account the loss of nitrogen, the most valuable element, the value when applied to the best advantage is not more than from 1 to 2 cents per ton. When flooded on land the value is practically nil.

The above sewage represents a daily water consumption of about forty gallons per capita per day. As in Canada the average water consumption is about double this amount, the value of the sewage in this country is even less.

Chemical Precipitation.

Sewage disposal has passed through an age of chemical treatment. It having been found that if raw sewage was allowed to stand in settling tanks, much of the solid matter settled by gravity, and was retained in the tanks. Consequently it was felt that if reagents of a precipitating character could be added to the sewage a larger proportion of the organic solids might be retained and the land treatment relieved of its most troublesome duty. This stage of sewage disposal may aptly be called "the sludge-making epoch." The reagents chiefly used are lime, sulphate of alumina, and ferrous sulphate. These chemicals combine with certain constituents in the sewage, and in precipitating drag down the major part of the suspended matter in the sewage in the form of sludge.

In many cases in England large chemical precipitating plants have been installed, notably in Sheffield, where some years ago over \$5,000,000 were expended in lime-precipitating tanks. These and other such plants now stand condemned, and are giving way to more improved methods.

Objections to Chemical Precipitation.

The chief objections to chemical precipitation are, an enormous amount of sludge is created, which has still to be dealt with. At one time it was thought that if this sludge was dried and pressed it would be useful as a manure. This however, has proved a fallacy. Sheffield has been face to face for years with the problem of either finding huge dumping grounds for its sludge or carrying it right out to sea, a distance of eighty miles. The treatment of sewage by precipitants tends to remove from the sewage the necessary organisms conducive to the process of nitrification, this being the process by which sewage is purified by filtration, either through land or artificial filters. Chemical treatment, while precipitating much of the organic matter in suspension, leaves the organic matter in solution in the effluent. Hence, sewage, after chemical treatment, although it may appear clarified, after it is allowed to stand, becomes turbid, undergoes putrefaction, and is still a favorable nidus for the growth and propagation of disease germs.

Nitrification.

Until the year 1877 the process by which the organic compounds in sewage were rendered harmless was not understood. It was known that by the aid of soil nitrogenous compounds were broken up and rendered harmless and reduced to their more primary forms of nitrates and nitrites. It was thought that this process was one of oxidation, performed by the action of the atmosphere.

In 1882 Robert Warrington read a paper before the Society of Arts, part of which is here quoted:—

"The purifying action of soil on sewage is probably due to three distinct actions: 1. Simple filtration, or the separation of suspended matter. 2. The precipitation and retention of ammonia and various organic substances previously in solution. 3. The oxidation of ammonia and organic matter by the agency of living organisms. The last mode of action is undoubtedly the most important, as without oxidation the sewage matter must accumulate and the filter bed lose its efficacy. It was formerly supposed that the oxidizing power of soil depended solely upon its porosity, oxidation being assumed to occur by simple contact with the air in the pores of the soil. We now know that nitrification of sewage will take place when passing it over the surface of polished pebbles."

This discovery that the nitrification of sewage is due to the presence of living organisms of the family of bacteria has entirely revolutionized methods of sewage disposal. It is now found that by a clear understanding of Nature's method of work, and by following the principles which Nature teaches, not only can the whole of the solid organic matter of sewage be destroyed, but a liquid effluent can be obtained entirely free from organic constituents, and, therefore, not liable to putrefaction.

Bacteria must be looked upon as being governed by much the same laws which govern other plants and animals. They are composed of protoplasm. The differences in protoplasm are differences in degree rather than in kind, and the laws which govern the protoplasm of bacteria govern animal and other vegetable protoplasm. Many of the processes of everyday life are intimately associated with the specific activities of micro organisms; we are constantly meeting with these organisms, and it is now proved beyond dispute that their presence is not merely accidental, but is absolutely essential to the most commonplace operations. Bacteria, in fact, serve to transform inert organic matter into inorganic substances. The whole of the stable manure placed upon land, and which at length disappears, would be of no use whatever to plant life, in fact, could not possibly be absorbed by the plants unless first reduced to their mineral component parts by the action of myriads of bacteria.

The leaves which fall in autumn and disappear in spring are, as it were, digested by bacteria, and their products form fresh nutriment for new growth, and so give back to the soil that which was taken from it.

Fermentation, putrefaction, and nitrification are all very similar processes, being the result of organisms. All organic compounds, whether in sewage or otherwise, are simply composed of a few mineral elements, held together in combination by the energy of heat. The decomposition or rearrangement of the elements is spoken of as a process of nitrification when there is a conversion of the nitrogenous elements into ammonia, nitrous and nitric acid, carbonic acid and water, or, speaking more generally, it may be said to be a process of mineralization of the organic forms of nitrogen, phosphorus, carbon, and hydrogen, during which they become finally oxidized or mineralized to nitric acid (HNO_3), phosphoric acid (H_3PO_4), carbonic acid (CO_2), and water (H_2O). In nature this process goes on in the superficial layers of the earth. In modern sewage works, in properly constructed filtration tanks, built and constructed so as to provide the most ideal homes in which the nitrifying organisms may exist and do the greatest amount of work.

Bacteriological Sewage Disposal.

The construction of special filter beds on bacteriological principles first became a matter of experiment in the year 1872. At that time the Massachusetts Legislature directed that experiments of a definite character should be made. To the report then published sewage disposal owes a deep sense of gratitude. The results of experiments of an exhaustive nature became public property, and the whole subject received an added interest throughout Europe. The experiments were mostly carried out with tanks containing various filtering media, including coarse gravel and fine sand. The most interesting and useful experiments are those by filtration through clean gravel, as the rougher

forms of filtering media are better suited to sewage filtration, such being not so easily choked. The results of two tank experiments are here given:—

Average quality of the effluents from a gravel filter in comparison with the original sewage when filtering at the rate of 108,500 gallons per acre per day (sewage applied fourteen times a day for six days in the week).

1889.		Ammonia.		Chlorine.	Nitrogen as		Bacteria per cub. C.C.
		Free.	Albuminoid.		Nitrates.	Nitrites.	
Sept. 24-Oct 24	Sewage Effluent Per cent	2.0550 .0068 0.3 of 1	0.6453 0.0325 5.	5.55 6.42	0.0 1 5700	0.0 0.0003	3,034,000 11,592 0.4 of 1

Average quality of the effluent from a gravel filter in comparison with the original sewage after filtration had taken place at the rate of 70,000 gallons per acre per day for seven months. Sewage applied nine times a day for six days in the week.

(Parts in 100,000.)

1889.		Ammonia		Chlorine	Nitrogen as		Bacteria per cub. c.c.
		Free	Albuminoid		Nitrates	Nitrites	
May 23-June 22	Sewage Effluent Per Cent.	1.9919 0.0031 0.2 of 1	0.6031 0.0375 6.	5.16 6.0	0.0 2.0700	0.0 0.0002 10,305
June 23-July 22	Sewage Effluent Per Cent.	2.5000 0.0050 0.2 of 1	0.7255 0.0354 5.	7.46 9.01	0.0 2.2500	0.0 0.0004	1,813,500 13,523 0.7 of 1

We see from the above that it is not a straining process. The liquid starting at the top reached the bottom with the organic matter nearly all burned out. The removal of the organic matter is in no sense a mechanical one of holding back material between the stones. After twelve months' continued use the filters were as clean as at the commencement. The liquid flowing out at the bottom is a clear, bright water, comparing favorably in every respect by both chemical and biological examination with many drinking waters. The above tanks were protected from snow and severe frost during winter months.

The System in Practice.

Since the Massachusetts enquiry into the subject and their report, dated 1891, the principle of nitrification as applied to sewage has become the general basis on which the problem has rested. Many plants of an extensive character have been put down, and the problem, like all new problems, has shown some marked improvement in the practice of construction, and we appear to have now arrived at a point when sewage disposal has taken up the position of an exact science.

Given an analysis of the constituents of a sewage and the amount to be dealt with, there remains no difficulty in the way of an engineer acquainted with the various data collected on the subject guaranteeing a plant to any municipality which is bound to give permanent satisfaction and give good value for the money spent thereon.

Snow and Frost.

A difficulty which has been felt in Canada is the effect the extreme cold of the winters may have upon such a plant. That parts of the plant must be guarded against severe frosts appears necessary. Such parts, however, occupy so small an area of land that the problem of protecting them is simplicity itself. An up-to-date system was installed for one of the large suburbs near Berlin (Europe) lately. Here the winters are often very severe. During last winter the temperature reached 7 degrees below zero Fahr., and, although the plant had no protective covering, it was unaffected in its working, and continued to give first-class results. The Massachusetts State Board of Health reported on the question of cold as follows:—

"When sand is frozen solidly after draining there still remain open pores through which the sewage easily finds its way, thawing to some extent the frost as it proceeds.

After the sewage has drained away the portion which remains in the filter again freezes, but open pores are still left which allow the passage of the next portion of sewage. If snow is upon the surface of the filter and sewage is applied uniformly to it, it is at once chilled to the freezing point, and has then no power of thawing the frost in the upper layers of sand, and if the weather is very cold the whole will solidify on the surface, effectually closing the filter. The two essential conditions to the passage of sewage through filters in winter are that sewage shall never be put into snow, and that the filtering material shall be open enough to absorb its dose rapidly."

The average temperature of sewage in winter as delivered to works is from 44 to 46° Fahr.

The next chapter will deal with the features of an up-to-date bacteriological sewage treatment plant.

(To be continued.)

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

(Continued from Page 522.)

5015—July 14—Authorizing the New Brunswick Telephone Company to erect its wires across the tracks of the C.P.R. at Edmunston, N.B.

5016—July 14—Authorizing the C.P.R. to re-construct bridge 26.73, Soo branch.

5017—July 14—Authorizing the C.P.R. to re-construct bridge 115.4 on the Cranbrook section.

5018—July 14—Authorizing the C.P.R. to re-construct bridge 132.5 on the Cranbrook section.

5019—July 14—Authorizing the G.T.R. to deviate its line or siding to the premises of the Lehigh Portland Cement Company, Lot 13, Concession 1, of the Township of Thurlow, Ont.

5020—July 14—Ordering that the crossing of the Intercolonial Railway by the National Transcontinental Railway in the County of Levis, Que., be protected by an interlocking plant.

5021—July 17—Ordering the C.N.R. to erect, operate and maintain a station at Denholm, Sask.

5022—July 7—Approving Supplement No. 3 to Canadian Freight Classification No. 13, subject to certain conditions.

5023—July 7—Ordering that ale, beer, porter, cider, ginger ale, and aerated and mineral waters, in boxes with pulp or fibreboard covers, be classified 3rd class in less than carloads, and 5th class in carloads.

5024—July 7—Approving a supplement to C.P.R. standard freight mileage tariff No. C.R.C. No. E 1, filed as Supplement No. 1 to C.R.C. E 1164, applying to local freight tariff on the new St. Mary's & Western Ontario Railway Company, the Walkerton & Lucknow Railway Company, and the Listowel branch of the Guelph & Goderich Railway, to be operated as portions of the C.P.R., Ontario division.

5025—July 14—Authorizing the C.P.R. to take additional lands along its railway in the village of Mountain for the purpose of enabling it to construct and maintain a ditch along its right of way.

5026—July 15—Recommending to the Governor-in-Council for sanction and approval of the following: 1. Conveyance, date Jan. 1, 1908, by the Galt, Preston & Hespeler St. Railway Company, to the Berlin, Waterloo, Wellesley & Lake Huron Company. 2. Conveyance dated January 1st, 1908, by the Preston & Berlin Street Railway Company, to the Berlin, Waterloo, Wellesley & Lake Huron Company. 3. Lease, dated January 1st, 1908, from the Berlin, Waterloo, Wellesley & Lake Huron Company to the C.P.R. Company.

5027—July 30—Authorizing the C.P.R. to construct a spur to the premises of Messrs. Riley & Julian, on its Lac du Bonnet branch at station 1096+35 on the north-east quarter of Section 21, Township 12, Range 9, east of principal meridian.

5028—July 16—Authorizing the Dominion Natural Gas Company to lay a gas main under the G.T.R. at Lot 4, Concession 4, Township of Woodhouse, County of Norfolk.

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.

Quebec.

THREE RIVERS.—Tender for dredging Three Rivers will be received until Tuesday, August, 4, 1908, at 4.30 p.m., for dredging required at Three Rivers, P.Q. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa.

Ontario.

GUELPH.—Tenders for work, addressed to the undersigned, will be received up to noon on Tuesday, the 4th of August, 1908, for the building of an addition to the Live Stock Building, in Guelph. Plans and specifications can be seen at the office of the City Clerk, Guelph, and at this department. H. F. McNaughten, Secretary Public Works Department, Department of Public Works, Ontario, Toronto.

OSNABRUCK.—The undersigned will receive tenders up to 7 o'clock p.m. of Saturday, August 1st, for the erection, supply of material and of abutments of cement concrete for the steel superstructure of the "Grant" Bridge, over River Aux Raisin, one half mile north of Lunenburg. An alternative tender for the erection of abutments of stone will also be received at the same time. Plans may be seen at the office of Magwood & Walker, Cornwall. H. E. Hodgins, Clerk Township Osnabruk, Osnabruk Centre, Ont.

OTTAWA.—Quotations will be received by The Upper Ottawa Improvement Company, Limited, Ottawa, Ont., up to the 15th August, 1908, for the furnishing of five thousand eight hundred and eighty lineal feet of British Columbia fir. Dimensions: 15 inches by 18 inches and 33 to 35 feet in length. Quality: must be sound timber free from shake or rot. Delivery: any time before 15th February, 1909, at Parker Station, C.P.R., Waltham branch. G. B. Greene, secretary-treasurer.

OTTAWA.—Tenders for the purchase of the Baie des Chaleurs Railway, from its junction at Metapedia with the Intercolonial Railway and extending for a distance of eighty miles to Caplin, in the County of Bonaventure, P.Q., and all its rolling stock equipment up to twelve o'clock noon, on the ninth day of September, 1908. L. A. Audette, Registrar Exchequer Court of Canada.

OTTAWA.—Tenders for the purchase of the Atlantic & Lake Superior Railway, from Caplin to a point at or near Paspebiac, in the County of Bonaventure, P.Q., where it joins the Atlantic, Quebec & Western Railway, being a total length of twenty miles of railway, and all its rolling stock equipment up to twelve o'clock noon, on the ninth day of September, 1908. L. A. Audette, Registrar Exchequer Court of Canada.

OTTAWA.—Tenders are invited by the National Transcontinental Commission for six more sections of that railway.

The sections are from a point near Weymontachene, in the Province of Quebec, 196.38 miles west of the north abutment of the Quebec bridge, westerly for a distance of about 107 miles.

From a point about 107 miles west of Weymontachene westerly to the end of the Grand Trunk Pacific Railway Company's contract, a distance of about 114.97 miles.

From the western end of Fauquier Brothers' Abitibi contract in the Province of Ontario, in a westerly direction of about 104 miles.

From a point about sixty miles west of the easterly boundary of District E in the Province of Ontario, easterly to the end of Fauquier Bros. contract, north of Lake Nepigon, a distance of above 100 miles.

From the western end of Fauquier Bros. contract north of Lake Nepigon, westerly to a point at or near Dog Lake, a distance of about 126 miles.

From Dog Lake, Ontario, to a point at or about mile 2.6 west of Peninsula Crossing, a distance of about 23.76 miles by the northerly route, and 24.13 miles by the southerly route, the selection of the route to be at the option of the commissioners.

The contracts are all to be completed by December 31st, 1910, except the last two, which are to be finished on September 1st, 1910, and September 1st, 1909, respectively. Tenders will be received up to August 20th.

WINNIPEG.—Tenders will be received until September 15th, 1908, for electric lighting plant and carbons. For fuller information apply F. A. Cambridge, city electrician, or M. Peterson, secretary Board of Control, Winnipeg. (Advertised in The Canadian Engineer.)

CONTRACTS AWARDED.

Nova Scotia.

DIGBY.—Tenders have been accepted and contracts will be immediately entered into, for Digby, with Maritime Dredging and Construction Company, for Yarmouth, with Dominion Dredging Company, Limited.

	Scow measurement.		Material cast over.	
	Rock, per cu. yd.	Other materials, per cu. yd.	Rock, per cu. yd.	Other materials, per cu. yd.
	\$	\$	\$	\$
Maritime Dredging and Construction Co., Ltd.	17.00	0.50	19.00	0.50
Dominion Dredging Co., Ltd.	5.00	0.60	5.00	0.40
W. J. Poupore Co., Ltd.	5.50	0.65	5.00	0.20
H. A. Drury & Co.	27.00	0.82½	15.00	0.72

For Yarmouth:—

	Scow measurement.		Material cast over.	
	Rock, per cu. yd.	Other materials, per cu. yd.	Rock, per cu. yd.	Other materials, per cu. yd.
	\$	\$	\$	\$
Dominion Dredging Co., Ltd.	5.00	0.50	5.00	0.35
Maritime Dredging and Construction Co., Ltd.	17.00	0.50	19.00	0.50
W. J. Poupore Co., Ltd.	5.50	0.55	5.00	0.20
G. S. Mayes	19.00	0.64	19.00	0.64
H. A. Drury & Co.	27.00	0.60	15.00	0.60

Following tenders have been received for Weymouth but no contract has been let:—

	Scow measurement.		Material cast over.	
	Rock, per cu. yd.	Other materials, per cu. yd.	Rock, per cu. yd.	Other materials, per cu. yd.
	\$	\$	\$	\$
Dominion Dredging Co., Ltd.	5.00	0.70	5.00	0.50
Maritime Dredging and Construction Co., Ltd.	17.00	0.50	19.00	0.50
W. J. Poupore Co., Ltd.	5.50	0.75	5.00	0.20
H. A. Drury & Co.	27.00	0.82½	15.00	0.72

Quebec.

MONTREAL.—Tenders were opened for the construction of the St. Catherine Road sewer, and the sewer on part of Wiseman Avenue, and the contract was awarded to Gillespie & Smith at \$21.25 per running yard.

Ontario.

ATHENS.—The contract for putting down the granolithic walks here has been awarded to Pruner & Company, of Morrisburg, at 15¾ cents per square foot. The Imperial Concrete Company, of Ottawa, tendered at 17 cents, and E. H. Schoales, of Toronto, at 25 cents per square foot.

HAMILTON.—Messrs. Stewart & McTaggart, structural engineers, Federal Life Building, Hamilton, have been awarded the contract for a 75 foot highway bridge span in the township of Willinot. Bowman & Connor, engineers.

KINGSTON.—William McCartney has been awarded the contract for the masonry and carpentry in connection with the new orphanage building for the House of Providence to be built on St. Mary's-of-the-Lake. The building will cost about \$50,000.

OWEN SOUND.—The contract for the bridge over the Pottawatamie at Wright's Mill was awarded to Louis Looby, of Dublin, Ont., at \$2,480. For the bridge over the Spey—a tributary of the Sydenham River—at a point a mile north of Chatsworth. John Walker, of Southampton, was the successful tenderer out of the nine, the contract price being \$607.50. Walker Bros., of Southampton, of which firm the gentleman who secured the last-named bridge is a member, secured the contract for the third bridge, which is to span Camp Creek, near Durham, the figures being \$657.50. There were seven tenders for the last named bridge. The fact that each contract goes to concerns whose places of business are outside the county, is remarkable.

ST. CATHARINES.—The Martin Electric Supply and Construction Company has received the contract for the electric wiring of the big Kenora Mills at Kenora, Ont.

TORONTO.—The York Commissioners have awarded the contract for two steel bridges. The one is over the Holland River near Bradford, and the other across the stream at Brownhill. The Dickson Bridge Company of Campbellford were awarded the contract for the Holland River bridge at \$7,000, and the Ontario Bridge Company the other at \$3,350.

Manitoba.

WINNIPEG.—Tenders for a 30-foot concrete culvert over the Seine River on Provencher Avenue were opened at a meeting of the St. Boniface Public Works Committee, the tender of City Engineer Blair, for \$7,000, was accepted and work will be begun at once, to be finished by October 1st. C. N. Noble, Winnipeg, will supply the reinforcement bars. The other tenders were as follows: F. Cotonnier, St. Boniface, \$10,190; W. Newman & Co., Winnipeg, \$10,990; Farrelly Bros., Winnipeg, \$15,133; J. Tremblay, St. Boniface, \$14,530; Waller & McKenzie, Norwood, \$10,360; Thurban & Co., Winnipeg, \$11,974; Charles Drake, Winnipeg, \$15,000.

Saskatchewan.

REGINA.—The contract for the new Collegiate Institute was awarded to Wilson & Wilson. The tenders on the general contract were as follows:—Wilson & Wilson, \$93,937; Smith Bros. & Wilson, \$96,600; May-Sharpe Co., \$97,302; Snyder Bros., \$97,570; Carter Bros., \$97,814; W. P. Gillespie Co., \$97,838; Bishop & Robertson, \$106,479. In addition to the general contract, there are certain extras connected with the construction, amounting in all to \$12,045, and bringing the total of Wilson & Wilson's contract to \$105,982.

REGINA.—Peter Lyall & Sons, contractors for the new Provincial Buildings, sub-let all the excavation work to a local firm composed of Messrs. John Brodt, Andrew Gottselig and Harry Zimmer. In sub-letting this work Mr. Lyall made it again clear that so long as he is able to make contracts on reasonable terms with local parties for work done, he is prepared to have the work done here, and to secure everything he possibly can from the business people of Regina.

British Columbia.

VICTORIA.—The following were the tenders received for the new pumping station. For the engine and pumps at the North Dairy pumping station: Halliday Machinery Company, \$21,761; George A. Walkem & Co., Vancouver, \$22,000; John Inglis & Co., Ltd., \$17,850; R. P. Rithet, & Co., three tenders of the following makes of engines, Laidlaw, Dunn, Gordon, Corliss, \$20,672; Laidlaw, Bunn, Gordon, Meyer, \$17,308; Snow Corliss, \$29,675; Vancouver Engineering Works, \$14,500; Lenfield & Kennedy, f.o.b., Glasgow, £2,305, shipment within nine months; Allis-Chalmers Bullock Company \$29,500. R. J. Knott, Victoria, alternative tenders, \$18,663, \$12,352, \$15,281; John McDougall, Caledonian Iron Works, \$20,000, and two alternative bids of \$16,000 and \$28,000. Tenders for high level tank of both styles were as follows: McDougall & Jenkins,

Victoria, \$17,520; John Inglis & Co., \$9,775; Hutchinson Bros. & Co., Victoria, \$8,800; Westholme Lumber Company, \$11,400; steel and concrete, \$16,500; Vancouver Engineering Works, \$16,000, steel and concrete, \$25,000; Ontario Wind Engine and Pump Company, \$6,777; C. Lennon, concrete and steel, \$10,515; Marine Iron Works, Portland, \$7,500; Halliday Machinery Company, \$8,226; Willamette Iron and Steel Company, Portland, \$8,495. The specifications called for the horizontal cross-compound crank and flywheel Corliss engine, but tenderers were given the privilege of making alternative tenders. The capacity of the engine and pump will be 3,600,000 gallons per twenty-four hours.

Foreign.

COTTESLOE, WEST AUSTRALIA.—The D. P. Battery Co., Ltd., of Bekewell, Eng., have received an order for the renewal of the Central Station Battery of 120 cells of their W.L. 9 type.

DULUTH, WIS.—The Duluth and Mesabi Railway Co. has given contract to the American Shipbuilding Company for a fire tug to be 125 feet long, 30 feet beam and 15 feet deep. The tug will be used to protect dock property at the head of the lakes.

LIGHT, HEAT, AND POWER.

Ontario.

MERRITTON.—The town of Merritton is going to reconstruct the electric light plant. K. L. Aitken, E.E., of Toronto, has been appointed consulting engineer.

HAMILTON.—Mayor Stewart has refused to sign the contract with the Cataract Power Company. He takes the ground that the ratepayers have voted for a contract with the Hydro-Electric Commission, and he believes it is in the interest of Hamilton that the city should make a contract with the Commission and not with a private company.

OTTAWA.—Now that the hydraulic power owners at the Chaudiere have decided to go on with the construction of a new dam, the city engineer is asking the Board of Control to make provision for beginning work on the proposed new aqueduct. The necessity of this being done now is because, when the dam is constructed, the water will be raised eight or nine feet, and it would be much easier and less expensive to do the work under existing conditions. The cost would be about \$75,000. The new aqueduct will be down Ottawa Street and its cost will total about \$150,000.

ST. CATHARINES.—The City Council unanimously adopted a resolution asking the Hydro-Electric Power Commission to give an estimate of the price to be charged to the municipality for one hundred horse-power to be supplied at St. Catharines.

ST. CATHARINES.—Though no move can be made until the 1st of August, the time given the Falls Power Company to begin lighting the streets of this city at \$39.50 per light, which they have made no move to do, it is understood that the city has been approached by a third light and power company, which will underbid the Hamilton Cataract people. The new concern is said to be one of the big companies generating power at Niagara Falls, and it is said they are dealing with the City Council direct. After the 1st of August the City Council will immediately ask for tenders for street lighting.

TORONTO.—The Canadian Weber Gas Engine Company has been incorporated with head offices in this city. The capital stock is \$300,000, and Robert G. Weber, of Kansas City, Mo., R. J. Gaudy, H. Macdonald, J. A. Gaudy, and H. Kiteley, Toronto, as provisional directors. The company purpose to manufacture gas producer, producer gas, and gasoline engines. They have made arrangements with the Weber Gas Engine Company of the United States by which they will manufacture and sell their producer in Canada.

Alberta.

LETHBRIDGE.—The City Council has decided to submit a by-law for the purchase of the electric company's plant

for \$74,000. Extensions and the removal of the plant will cost \$100,000. The city starts September 1.

British Columbia.

NELSON.—The municipality will install a 15 horse-power motor to run their rock crusher.

NELSON.—The municipal power plant at Bonnington, nine miles west of Nelson, on the Kootenay River, of 1,500 horse-power, supplying the city with light and power for tramway and industries, has been completed and taken over. The needs of the city are growing so fast that a second unit has become necessary, and a by-law will be submitted next month. The plant's capacity will be doubled by this time next year.

Foreign.

PITTSBURG, Pa.—An announcement was made here that bids had been asked on ten thousand tons of structural steel for the Ontario Government Power Commission. The steel is to be used for towers which will support the cables used in transmitting the current.

SEWERAGE AND WATERWORKS.

Ontario.

LINDSAY.—The Town Council have given the water commissioners the power to issue \$10,000 debentures for the purpose of purchasing new ozone filtration plant. This plant is being installed by its inventor, J. Howard Bridge, Philadelphia. He puts it in at his own expense and if, after a three months' trial, it proves satisfactory the commissioners are bound to buy it for the sum of \$6,500. The plant will be ready for the first test inside of nine weeks. As this is the first trial of the new ozone filtration system the test will be watched with interest, not only by the inventor, but by other cities thinking of installing a similar plant.

British Columbia.

VANCOUVER.—Superintendent Madison has stated that only one more mile of wooden pipe had to be laid on the north side of the inlet to complete the Seymour Creek water system on that side. As the contractors are laying this at the rate of from 200 to 250 feet per day, the section should be completed by the middle of next month. By that time it is expected that the narrow mains will be in place, and as the connecting mains to Victoria Drive are already in place the Seymour water may be at once turned into the city mains.

RAILWAYS—STEAM AND ELECTRIC.

Ontario.

DUNNVILLE.—There has been a revival of the project for the construction of an electric railway from this point across the Niagara Peninsula, which appeared to have fallen through after the ratepayers had carried a by-law to take \$39,000 of the bond issue to assist the scheme. The line now proposed would run from here by way of Wellandport and St. Ann's to Beamsville and connect there with the Hamilton, Grimsby & Beamsville Electric Railway. In connection with their proposals a party of surveyors began work on Monday to lay out the line. James A. Ross, of Wellandport, is president of the company.

NORTH BAY.—It is announced that the Grand Trunk Railway and the T. & N. O. Railway have signed an agreement by which these railroads will occupy their own station and freight sheds, entering the town on their own right-of-way from Nipissing Junction, with four passenger tracks leading to the new station. It is intended that the new building will be alongside the present union station and representatives of the Railway Commission will be in town in a few days to arrange the matter, as the land belongs to the C.P.R.

WALKERTON.—Two new railway stations are in course of erection. The C.P.R. are raising a splendid edifice on the bend, while the Grand Trunk in the south end of the town are placing a modern building on the site of their recently burned depot.

Saskatchewan.

NOKOMIS.—The steel on G.T.P. Railway reached Battle River July 23rd. No more steel will be laid till completion of either Battle River or Clover Bar steel bridge. Ballasting is being pushed from five or six pits.

Alberta.

EDMONTON.—Instead of the proposed high level bridge between Edmonton and Strathcona for which the Dominion and Local Governments, as well as the "Twin Cities" have promised grants, there is a probability that the C.P.R. may enter Edmonton by way of the Clover Bar bridge now being constructed by the Grand Trunk Pacific, and which will be ready for use before the end of 1908.

STRATHCONA.—A business meeting of the Strathcona Radical Tramway Company was held recently to discuss plans for commencing work in connection with the line. The charter requires that operations be started before August 1. It was decided to commence work before that date on the grading down to the bridge. The line has already been surveyed, a number of engineers being engaged on this work during the past ten days.

British Columbia.

FIELD.—About one-half the tunneling work on the C.P.R. line between Field and Hector, which is to cut the famous big hill grade in half, has already been performed, and the contractors, Messrs. Macdonell & Gzowski, of Vancouver, are now doubling their equipment so that it may be finished by the end of the present year. Altogether about one mile and a quarter of tunneling is embraced in both bores. Work has been proceeding at four faces of the tunnels since a start was made. These tunnels, besides being almost complete circles, carry throughout their length a 2.2 per cent. grade, and the driving of them is no mean engineering problem. Steam shovels are now being installed in both tunnels so that rock may be handled more expeditiously after blasting, the great desire being that the work shall be hurried along as rapidly as possible.

PRINCE RUPERT.—Another change has been made in the plans of the Grand Trunk Pacific in construction work at Prince Rupert. Instead of a thorough cut through the first big bluff on Ross & Carlson's contract, the company has decided to remove the whole bluff, and instead of 40,000 cubic yards of rock, over 100,000 cubic yards will now be removed and filled into the space between the bluff and wharf, making ground which will be used for terminal tracks.

MISCELLANEOUS.

Ontario.

CORNWALL.—The dredging to widen the channel in the Cornwall Canal, north of the New York Central Pier, is completed, and a full supply of water has been given to the mills. The plans and specifications for the rebuilding of the canal bank, which went out on June 23, have been completed, and tenders for the work will probably be asked for next week.

KINGSTON.—It has been decided by the City Council to replace the old dome on the city buildings with one of steel framework and metal sheeting. Plans and specifications will be prepared at once, and tenders will be called for the work. There is a chance of the dome being completed by the end of the year.

ST. CATHARINES.—A report comes from Wainfleet township that a deposit of silica has been found. A force of men have been at work testing the vein, which is said to be heavy.

WELLAND.—M. Beatty & Sons, Ltd., launched the second steel dump scow for M. J. Hogan of Port Colborne on Friday afternoon. The size of the new scow is 130 feet long, 30 feet wide, and 11 feet deep, with a capacity of 400 cubic yards of earth. This makes the third dump scow turned out by this firm this season.

New Brunswick.

ST. JOHN.—The Common Council has fixed \$1,500,000 as the amount which St. John will ask the Dominion Government to pay for that portion of the harbour which it is proposed to transfer to a Federal Commission. This will repre-

sent the money the city has spent on deep water piers for the ocean traffic. If the plan goes through, the Government will advance funds at 3 per cent. to the Commission to provide the additional terminal facilities demanded by the increase of freight for export arising from the growth of the Canadian Pacific and the completion of the Grand Trunk Pacific to this port.

Manitoba.

PORTAGE LA PRAIRIE.—A deputation waited on Hon. Robert Rogers and F. C. Patterson to secure a new telephone system to take the place of the obsolete outfit in use here. A central energy system was asked, but it was promised for next year. A new central exchange will, however, be erected here at a cost of \$25,000, on Campbell Street.

WINNIPEG.—The Dominion Bridge Company have commenced work on the Redwood Avenue Bridge, and will rush this work forward to completion.

WINNIPEG.—The City Engineer is being instructed to prepare estimates of the cost of new superstructures for Louise Bridge and the Main Street bridge; also an estimate of the cost of a bridge over the C.P.R. tracks at Brown and Brant Streets.

RECENT FIRES.

Ontario.

GALT.—Fire did damage to the extent of \$7,000 at the Crown Hat Company. The whole of the top storey was destroyed, together with the extensive stock. The building was owned by the town, and, with the contents, is fully insured.

OTTAWA.—The municipal asphalt plant was destroyed by fire early this morning. The building and machinery were practically destroyed, entailing a loss of several thousand dollars.

Manitoba.

SELKIRK.—The Selkirk Aerated Water and Bottling Works were destroyed by fire on July 24th. The complete machinery plant was destroyed. Sorensen and McDowell proprietors.

PERSONAL.

MR. D. J. ROBERTS has been appointed general manager of the Montreal and Southern Railway Company.

MR. R. B. EVANS, late of the C.P.R. Toronto sub-line, has been appointed engineer on the staff of the Superintendent of Parks, Toronto.

MR. E. L. MILES, assistant divisional engineer, C.P.R., who has been stationed at Embro, has for the present, been transferred to Woodbridge, Ont.

MR. R. H. CAMPBELL, Superintendent of Forestry, Ottawa, will spend the summer in the West, inspecting the various forest reserves within the railway belt.

MR. K. L. AITKEN, of Toronto, has been retained to make a test of the Producer Gas plant installed by the Colonial Engineering Company for the city of Chatham. There is no difficulty between the contractors and the municipality, this test being part of the agreement.

MR. C. B. HIBBARD, who has resigned as general manager of the Quebec, Montreal, & Southern Railway Company, came to Montreal nearly five years ago, when the property then known as the Quebec Southern Railway was at its lowest condition. It was placed under a receiver shortly after, and as general manager for the receiver, Mr. Hibbard greatly improved the railway and increased its traffic. This attracted the attention of officials of the Delaware & Hudson Company, who purchased the property in November, 1905. Mr. Hibbard has continued to manage the property since that date, and its present high condition is due to his efforts and effective work.

In 1907 British Columbia produced: Minerals, \$25,800,000; lumber, \$12,700,000.

REINFORCED CONCRETE CONSTRUCTION.

Although published with an entirely different object in view, the illustrated book, entitled "The Factory Behind the Great Arrow Car," presents a remarkably strong argument in favor of reinforced concrete, the material used throughout this plant of some 360,000 square feet of floor space at Buffalo, N.Y. The following is from the opening pages: "To get at the wherefore of this reinforced concrete construction, one must take counsel of the expert. Accepting Mr. Leonard C. Wason as a competent exponent of the process to which he has devoted most of his professional life, it appears that concrete of the usual mixture has three times the working strength of the very best brick work and seven times the strength of ordinary common brick work. Therefore, for columns, very much heavier loads can be carried on a given section, or smaller columns can be used, thus making a saving in floor space and in walls, permitting larger windows to be used. With floors, longer spans are possible, giving a freer floor space. The beam between the wall columns can be set above the floor slab, thus allowing the windows to be set higher, and at the same time forming the wall below the sills of the next storey. Reinforced concrete floors are very much more rigid than those of wood or of steel. Being built monolithic in large sections, with granolithic top, they are both germ and waterproof. There is no decay as with wood, but instead the cement becomes stronger with age. There have been long-time tests of cement showing a measurable increase for seventeen years. These floors are also very poor conductors of heat, thus reducing condensation when there is heat and moisture on one side and cold on the other side of either floor, wall or roof." To quote again from Mr. Wason: "This construction is especially adapted to heavy loads—the heavier, the greater the advantage to be obtained in price over wood. The heaviest floor yet built sustains a live load of 5,000-pounds per square foot on a span of 14 feet. In machine shops and foundries, where the loads are from 250 to 500 pounds per square foot, there is some advantage in first cost, while the greater rigidity enables the machines to run without vibration, thus enabling better work to be done and adding to the life and reducing the repairs necessary to the machines themselves. The floor is not affected by mineral or vegetable oils which may be spilled upon it, and is non-absorbent, so that it can be easily cleaned. Machines may be bolted through the slab of the floor without much difficulty. There are several convenient methods of attaching hangers for shafting to the ceiling. The best way is to embed bolts in the beams, projecting below a proper distance to receive wooden strips or steel channels, to which hangers for shafting may be attached."

MACHINERY WANTED.

No. 18.—A manufacturer of artificial stone would like to know at once where he can get red crushed stone to buy, or a machine suitable for performing the work.

MARKET CONDITIONS.

Toronto, July 30th, 1908.

There is not much that is new to be said about the state of business. Nor are there any startling features in the building trade. Hardware dealers find this one of the holiday months, but are still fairly busy on general orders of limited character. Structural steel moves but slowly, there being no new big orders to chronicle. The dullness in building is very noticeable the country over, Toronto dwellings being an exception. Roofing materials have gone still lower; cement is quiet at the reduction in price noted last week; some makers are disposed to cut prices, however. Accounts from the United States are hardly reassuring. Slackness in house-building and in railway extending disappoints the sanguine expectations of the spring, and prices fail to show the advance so confidently predicted. Metal markets in the United Kingdom show the features usual for some weeks. There is no activity in structural steel and not much in pig-iron.

The following are wholesale prices for Toronto, where not otherwise explained, although for broken quantities higher prices are quoted:—
Bar Iron.—\$2 base, from stock to the wholesale dealer.