

PAGES

MISSING

The Canadian Engineer

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ESTABLISHED 1893

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TORONTO, CANADA, DECEMBER 31st, 1909.

No. 26

The Canadian Engineer

ESTABLISHED 1893.

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

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TORONTO, CANADA, DECEMBER 31, 1909.

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A HAPPY AND PROSPEROUS NEW YEAR.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

Will meet in Ottawa

January 25th, 26th and 27th, 1910.

Many important committee reports will be considered.

Several excursions to works of great interest to engineers will be possible.

The dinner on Wednesday evening will be the most brilliant and entertaining and social yet held.

Ottawa is central, the home of many engineers, the headquarters for large engineering interests, and has a strong branch of the Canadian Society, whose members will be glad to greet you.

A SOCIAL CLUB FOR ENGINEERS.

As a city of homes Toronto has been growing until her population is over three hundred and fifty thousand; as a commercial metropolis Toronto has now greater postal revenue and customs returns than any Canadian city, and as an engineering centre Toronto has increased in importance, but has not come to her own because of two great lacks—a comprehensive library and a social club, controlled by architects, chemists, contractors, surveyors and engineers.

Toronto is the only city of such size and importance which lacks such institutions, either separate or combined, which are necessary in centres where technically trained men work.

The daily press of Toronto has had some reference to the formation of a social club for engineers. We are not informed as to the details of the scheme, but feel certain it will be pushed forward to successful completion.

A social club composed of engineers, architects, contractors and business men with like interests would at first be a great convenience, and afterward a necessity. It would become a centre around which the technical societies of the city would group, and might become the home of a well-equipped and extensive technical library.

The doctors, the lawyers, the dentists, and even the clergy, have their organizations, with permanent secretaries, housed in well-equipped offices and surrounded by a staff equal to the work of protecting and safeguarding the profession and the individual in the profession.

The technical men of Toronto and vicinity would greatly benefit if they had such an organization looking after their interests. A society with a secretary and librarian, who would devote his whole time to carrying out the direction, performing the routine work and

assisting the secretaries of the various technical societies to act as centre; a club where men with common interests would meet and exchange greeting; a club where the visiting engineer or architect could be entertained and quickly meet the men of his profession that reside in this city.

Toronto requires such a club—and requires it now, and we wish the men behind the movement every success.

BRIDGE DESIGN.

Mr. L. H. Chase, M. Inst. C.E., Great Britain, read before the Liverpool Engineering Society recently a paper on the "Theory of Suspension Bridges."

The author criticizes the statement of Prof. Rankine when he says: "The effect of the stiffening girder is to distribute a partial uniform load uniformly all over the chain."

The author then proceeds to develop formulæ which explain his contention. Two cases were considered, namely, a bridge with a hinge at the centre of the span, and a girder without a hinge. In the first case the resulting formula is $x = 2W \frac{c}{L}$ where x is the load carried by the cable, W a concentrated load at a point c feet from the abutment, and L is half the span. In the second case

$$x = WK \frac{I}{I + c} - \frac{g}{g}$$

where K is a factor varying with the position of W and representing the ratio of the average deflection of a detached girder, due to a concentrated load, to the average deflection, due to the same load distributed; c is the average deflection due to any load distributed uniformly on the suspenders of the detached cable; g is the average deflection of detached girder due to the same load distributed.

VOLUME XVII.

With this issue we close another volume. The index for the numbers since July will be found on page 43, and by glancing over the list of authors and subjects readers will secure some idea of the field we have endeavored to cover.

We have placed the index on the last few pages, so that it may be detached and placed in the first issue of Volume XVII.

Volume XVIII. will, editorially (advertisements included) and typographically, be superior to any yet issued.

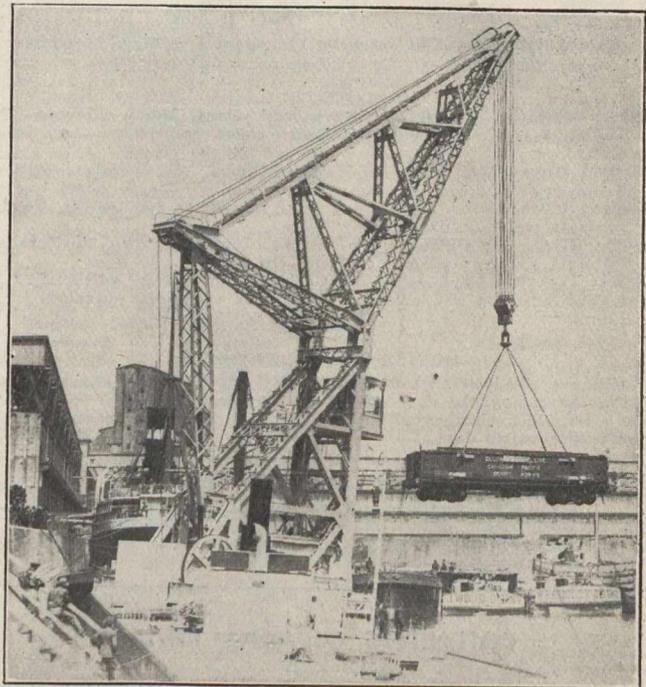
EDITORIAL NOTE.

The total returns of the Dominion for the eight months of the fiscal year to November 30th amounted to \$439,959,213, an increase of \$62,037,972, compared with the same period last year. Of this increase, \$45,280,968 was in imports and \$14,970,238 in exports. For November the total trade was \$73,151,731. The imports for the month increased 40 per cent. and the exports 10 per cent.

75-TON FLOATING CRANE.

The continued growth of shipping at the port of Montreal has made necessary improvements in methods of transshipping. Recently the Montreal Harbor Commissioners added to their equipment a 75-ton floating crane. The design used was the outcome of a careful consideration of the relative advantages of floating and permanent. The crane selected can be taken alongside of any ship at any berth. Its radius can be varied: it can deal at a height of 100 ft. above water level, with loads from 75 tons downwards, and while suitable for unshipping such heavy units as locomotives, can be utilized on occasion for carrying the grain band conveyers loading ships in outer berths from barges, canal-boats, or warehouses. It has therefore a wide range of service.

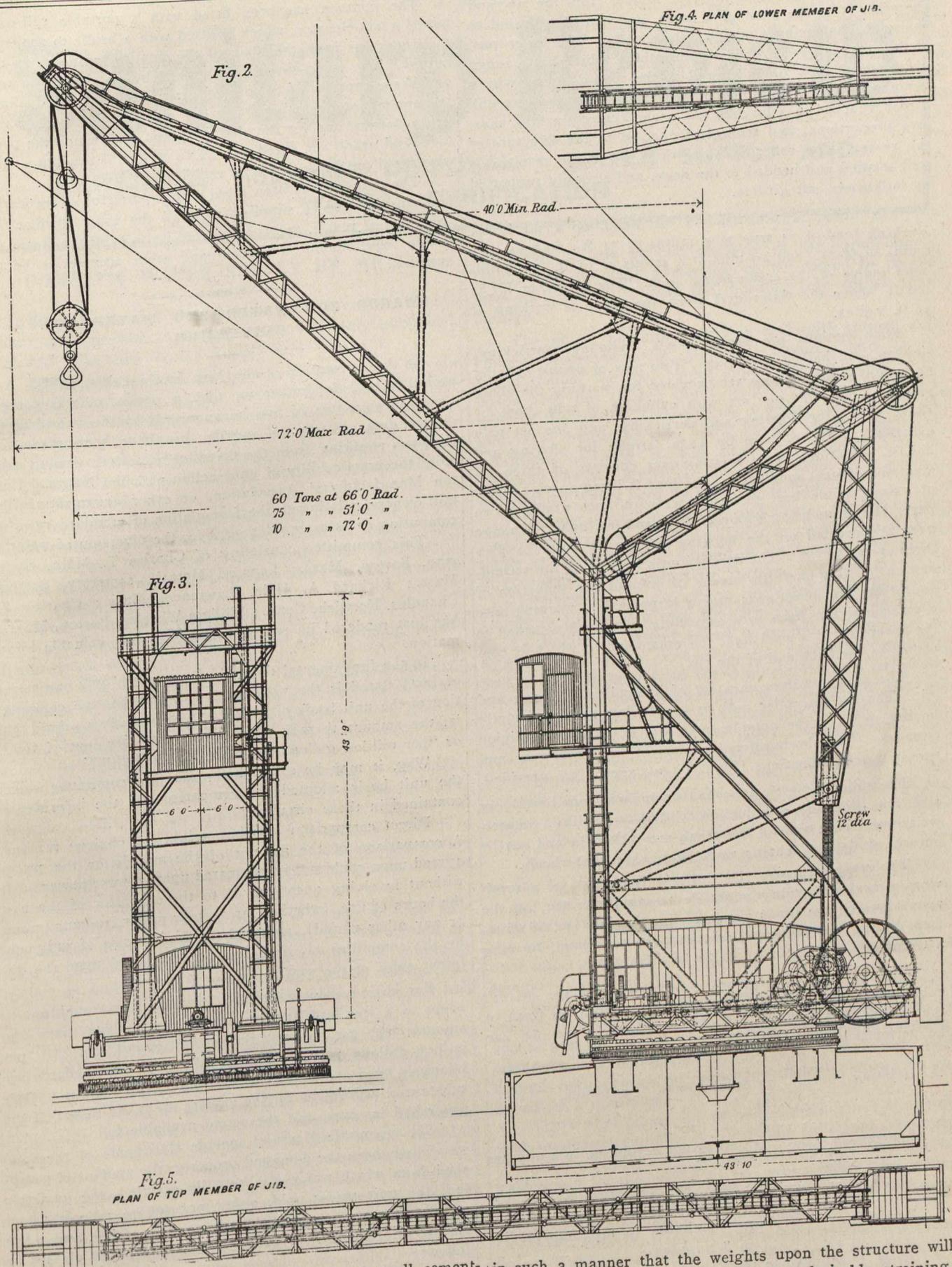
The crane, of which a perspective view is given above, and elevation, sections and plans on the opposite page, was built by Messrs. Applebys, Limited, Leicester and Glasgow, and the pontoon, boiler, engines, &c., by Messrs. Vickers Sons and Maxim, Limited, at Barrow-in-Furness. This pontoon is of the following dimensions:—



Harbor Crane Raising Load.
(Photo by The Montreal Star.)

- Length, moulded 200 ft. 5 in.
- Breadth, moulded 43 ft.
- Breadth, extreme 43 ft. 10 in.
- Depth, moulded 10 ft.

The pontoon is strongly made, of mild steel, and has been built under the supervision of Lloyd's surveyors for their special class. A centre line bulkhead is built between the end bulkheads, and before and abaft these is tapered to the bottom. Strongly-built girders, well supported by deep floors, are fitted on each side to resist the strains set up under the varying conditions of working. Six transverse bulkheads are fitted, and the necessary store-rooms, &c., are placed in the hold of the pontoon between these bulkheads. A strong elm fender is fitted all round the pontoon at the level of the deck, securely bolted between angles. A walking gangway of white pine is fitted all fore and aft on the top of the floors on each side of the pontoon. A rudder, worked



by hand gear, is also fitted. The pontoon is well cement-washed on the inside and suitably drained for pumping out. In order to ensure the safety of the crane, 300 tons of ballast are placed well down between the floor-plates, and distributed

in such a manner that the weights upon the structure will be even throughout, and thus avoid undesirable straining. Specially arranged balance-weights are fitted to minimize the angle of heel. One of these weights is fixed on

the base of the crane on the side remote from the jib, and the other is in the form of a truck, and can be adjusted to assist the balancing under varying loads. The lower part of the crane is fixed to the revolving table, which has a range of 360 deg. The jib is hinged at the top of strongly-built uprights, and can be adjusted by means of a connecting-link girder attached to a large screw. The centre-pin is of massive proportions, and strongly-connected to the structure of the vessel. The roller-path on which the crane revolves is well secured and bedded to the deck, and strongly supported by bulkheads and girders.

The crane is proportioned for handling a maximum working load of 75 tons at a radius of 51 ft., 60 tons at a radius of 66 ft., and 10 tons at a radius of 72 ft., the minimum radius of the crane being 40 ft. The height of lift is 100 ft. above the water-level when the crane is working at 51 ft. radius.

Four motions are provided—viz., hoisting, derricking, slewing, and ballast adjusting. Two sets of double-cylinder horizontal steam-engines are provided for working the above motions (Fig. 6): one set with cylinders of 9-in. bore by 18-in. stroke for hoisting and derricking, and one set with cylinders at 8½-in. bore by 12-in. stroke for slewing and ballast adjusting. The hoisting-gear consists of three reductions of steel spur-gear. The load is lifted on eight parts of extra flexible best plough steel wire-rope, winding two parts, the drum being grooved right and left hand. Change gear is provided on the hoisting motion in order to give three speeds of lift. The derricking is worked off the second-motion hoisting-shaft by means of one further reduction of spur-gear, one bevel-gear and a large screw, working into a gun-metal nut fixed to a swivelling crosshead attached to the lower end of a steel link, the upper end of which is connected to the back end of the jib.

The crane revolves on a set of live rollers (Figs. 2 and 3). The bottom roller path is a complete cast-steel circle, having teeth on the outside, with which the slewing-pinion engages. The slewing-gear consists of two bevel-gear and two spur-gear reductions (Fig. 6); two speeds are provided.

The ballast-adjusting mechanism includes one bevel-gear and one worm-gear reduction. The travelling counterweights on each side of the crane are racked in and out by means of flat-link chains working on sprocket-wheels.

The crane structure (Figs. 2 and 3) consists of a revolving turntable carrying a double triangular frame, on the apex of which the jib is pivoted. The jib is a lattice structure, having two bottom booms and one top boom, forming a triangle.

The various motions are controlled from the driver's cabin, which is situated in an elevated position in front of the crane. The speeds at which the various motions can be performed are as follow:—

Hoisting.....	75 tons at 3 ft. per minute.
“	25 “ 9 “
“	10 “ 20 “
Slewing.....	75 tons at one revolution in 4 minutes (slow gear).
“	10 tons at one revolution in 2½ minutes (fast gear).
Derricking.....	From maximum to minimum radius in 8 minutes.

Steam is supplied to the engines at a pressure of 80 lb. from a large vertical boiler situated on the pontoon, with a steam-pipe led up through the centre-pin of the crane.

The pontoon has been fitted with a portable self-contained grain-elevator, which is fitted with a bridle to suspend the apparatus from the hook of the floating crane when required. The grain-elevator is worked by an electric motor, and has a capacity of 80 tons of grain per hour. A dynamo is supplied and fitted suitable for supplying power to the grain-elevator and for the electric lamps with which the pontoon and crane are fitted up. Two powerful arc-lamps are also fitted on the deck of the vessel.

The pontoon has been fitted with a powerful steam warping-capstan, and is supplied with all the usual fittings for this class of vessel, and is also fitted up to fulfil the Board of Trade requirements, a lifeboat and other accessories being supplied.

AWARDS FOR WATER AND WATER POWER DIVERSION

At the convention of the New England Waterworks Association held September 12, 1907, a resolution was passed “that a committee of five be appointed by the president to collect data relating to awards that have been made for damages resulting from the diversion of water; also to consider the practicability of joint action with the National Cotton Manufacturers' Association, or other organizations of mill owners, relating to the formulation of standard rules of computing or assessing damages for the diversion of water.”

This committee consisting of Charles T. Main, chairman, Boston, Mass.; Leonard Metcalf, secretary, Boston, Mass.; Richard A. Hale, Lawrence, Mass.; Charles E. Chandler, Norwich, Conn.; William Wheeler, Boston, Mass.; has just rendered its report* which contains valuable information.

In the fundamental data which are given only one series of facts stated is the work of the committee—the computation of the unit basis of award or agreed selling price; that is, the amount thereof “per square mile per foot of fall,” or “per million gallons daily per foot of fall.”

Why, it may be asked here, did this committee select the unit basis adopted for comparison of the information contained in these circulars?

Direct comparison was impossible for obvious reasons. A comparison of the amount of the awards or the prices agreed upon could not be compared upon a horse-power basis without involving questions as to the character of the use, the hours of use, (whether for 24-hour power, 10-hour power, or any other period), and without the exercise of judgment by the committee or of the experts employed upon the different sides of the case.

For this reason it seemed wiser to the committee to adopt as a standard unit of comparison in these cases, the amount “(\$ per square mile per foot of fall,” or “(\$ per million gallons daily per foot of fall.” These standards are relatively fixed and easy of determination, for there is usually substantial agreement by the experts as to the extent of the watershed involved and the actual available fall.

The summarized results include statements of the total watershed above the damaged property, the amount of watershed from which water was actually diverted, the available fall, the unit prices paid, either per square mile per foot of fall or per million gallons daily per foot of fall, and a few significant remarks, all grouped into four broad classes as follows:

*The complete report will appear in the Journal of the New England Waterworks Association.

(Continued on page 726.)

THE Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND
WATER PURIFICATION

DOMESTIC WATER SUPPLY BY METER.

The Water and Gas Review for the current month quote and comment upon an article we lately published, entitled "Toronto Water Supply and Waste."

Several authorities are quoted by the above Review in favor of a meter supply system. The quotations appear to be in answer to a statement made by an Assistant Commissioner of Health of the city of Chicago, wherein the policy of metering the supply for business purposes is advocated, but for domestic supply is condemned on sanitary grounds.

The authorities quoted are fairly unanimous in concluding that the above Assistant Commissioner's conclusion is not warranted in assuming that decrease in health efficiency will follow the introduction of a domestic meter supply system.

Two points of view are strongly held, viz. :—

(a) Sewers receive practically no cleansing benefit from casual waste.

(b) The amount of supply for legitimate domestic purposes is not diminished by the introduction of meters as long as "a minimum charge per annum," guaranteeing the user all the water he can possibly use at a moderate figure is adopted.

The Water and Gas Review, referring to our statement that it is not usual to adopt meter service in Great Britain, where the per capita supply is low, states that this is owing to thoroughness of inspection, which in American cities would be a practical impossibility owing to political complications arising from frequent changes in administration.

As far as the United States is concerned, we have no quarrel with the latter statement, but we cannot see that it holds good in Canada. Continuity of municipal policy is just as much a factor in Canada as in Great Britain. The argument of chaotic politics does not hold good on this side of the line.

With reference to the point of view (a): "Sewers do not benefit," etc., we quite agree, and it is our point that the 21,500,000 gallons pumped to waste every day in Toronto serve no good purpose whatever.

With reference to (b), the adoption of the meter system for domestic supply in Toronto would certainly have the effect of causing scores of householders to call in a plumber to repair fittings, and show a consequent reduction in the gross amount of water supply at an early date, while the per capita supply would, no doubt, continue on the average to show a sufficiency of water for each individual, it would remain impossible, however, to arrive at minimum per capita supplies.

In Toronto we have a large population who are termed "roomers." These people generally occupy one or more rooms, with the use of the bath room. With

the meter system we can conceive of the parsimonious landlord or landlady preferring to let rooms to people who are content to miss the morning tub, rather than indulge.

The point, however, remains that with proper and efficient supervision of plumbing fixtures and good, sound mains, the per capita supply for domestic purposes need not exceed thirty gallons per day, and this without the trouble and expense of fixing meters to each individual house service. Not having similar political conditions to those in the States to contend with in Canada, can we arrive at the same point in efficiency decrease in waste here as in Great Britain?

Nothing is said in the Gas and Water Review of the cost, maintenance and depreciation in connection with a meter system. Nothing is said of the trouble and worry in connection with untruthful meters.

In Toronto to provide an universal domestic meter supply in accordance with the city waterworks engineer, C. L. Fellowes, would entail a capital expenditure of \$720,000. At 4 per cent. this sum represents annually \$28,800. A sinking fund for depreciation at 2 per cent. represents a further annual sum of \$14,400. Repairs at 2 per cent. entail a further annual payment of \$14,400. A meter system based on the above figures would cost Toronto an annual sum of \$57,600.

The above sum, of course, includes no part of the cost to the individual in keeping in repair taps and fittings, and the introduction of meters would certainly cause a huge annual expenditure in this direction.

Now, the question appears to us to be simply this as far as Toronto is concerned: Are the people willing to pay the annual sum of \$57,600 to maintain a meter system, or would they rather pay half this sum to ensure the establishment of a thorough system of water appliance supervision such as exists in most British cities and towns?

Twenty-eight thousand eight hundred dollars would, roughly, provide for a staff of twenty-eight qualified inspectors at \$1,000 per annum each, and should result in water fittings being put in of such a character that annual maintenance in rectifying defects would be reduced to a minimum.

There is at times apt to be a tendency in connection with municipal supplies to the public to assume the total cost of the supply only as equivalent to the rates, etc., paid direct by the public to the municipality and ignore all the incidental costs which are entailed to the individual as a consequence of the supply.

For example, a municipality may introduce a meter system, charge rent for the meter, and call this "income," and deduct the sum from "expenditure."

All such tricks are only on a par with taking a sum of money from a man's pocket and returning it to an-

other of his pockets and trying to persuade him he has obtained something.

Every cent that a water system costs, whether paid direct as a tax or rate or to the private plumber for repairs to fittings, is part of the cost of the water provided.

The more simple the method of water supply the less complicated by mechanical appliances, such as meters, the more efficient the supervision of plumbing work by the municipality in connection with new buildings or repairs to old, the less will be the total cost to the individual for a free, unbounded supply of water for all purposes represented at a per capita figure of about thirty gallons per day.

NOTES ON THE METER QUESTION.*

"A few years ago an Assistant Commissioner of Health of the City of Chicago placed himself on record as opposed to the introduction of meters in dwelling houses by the following statement: 'The City Health Department,' he said, 'is uncompromisingly opposed to the installation of meters in dwellings, but favors putting them in factories, business blocks and all other buildings where water is used for commercial or ornamental purposes. The opposition of the department is based on sanitary grounds and the general protection of the public health. Running water is one of the greatest of all sanitary agents. It absorbs foul and noxious gases, is a dilutant of filth and a carrier away of excreta. If the flat buildings and tenement houses of this city should be equipped with meters, resulting in a decreased use of water, as would be the case, there would be an instant and heavy rise in the death rate. There can be no such thing as a waste of purifying agent like water in a dwelling house, and with Chicago's unlimited and inexhaustible supply there should be no limit placed upon the amount to be used for domestic purposes.'"

As this statement was of rather a radical nature, and quite at variance with well-known facts, it was deemed advisable by the Review to submit it for the opinions of a few water-works engineers and superintendents. Here is, in part, what some of these gentlemen had to say. They very explicitly controverted the statement of the Assistant Commissioner of Health at the time, and will serve now as a supplemental answer to the publication named:

'I most positively disagree with the views that the metering of tenement houses would cause a heavy rise in the death rate of Chicago. In the first place, it would not follow that the placing of meters as above stated would cause a decrease in the use of water; it would undoubtedly reduce the consumption, but that is a different matter.

'I am at a loss to conjecture what he bases his opinion upon. He certainly cannot find any support for such an opinion in the experience of cities that have meters in general use. Water is, of course, a purifying agent, but no one who has given the matter much study believes that the constant running of water from a leaky fixture has any cleansing or purifying effect; rather, on the contrary, the belief is that such streams have an unsanitary effect inasmuch as they merely stir up the foulness in the drainage appliances causing the emanation of injurious gases therefrom, which have been known to cause illness in more than one instance.

'As to there being 'no such thing as a waste of a purifying agent like water,' there certainly can be, and what is more, there is surely a grievous and deplorable waste of this great purifying agent, for which it is applied for the purpose of cleansing in any other way than by what is known as 'flushing,' it fails in its effect and is wasted.

'Every man engaged in the maintenance of public sewers knows that, notwithstanding the number of small streams constantly pouring into them, if they are not occasionally flushed out they would become eventually clogged up tight. Furthermore, it is well understood that water mains carrying water at their full capacity under great pressure have to be 'blown out' in order to remove sediment, etc., which accumulates on the bottom and sides of the pipe.

'A very common mistake is made by people not having a practical knowledge of waterworks matters in assuming that meters are intended to curtail the legitimate use of water instead of being aimed at the monstrous, unjustifiable and unsanitary waste of an extremely valuable commodity.'—Robert J. Thomas, Superintendent Waterworks, Lowell, Mass.

'In response to your inquiry as to the detrimental effect of water meters on the public health of a community, I would say that in all my direct experience and study of the subject, I have never encountered any valid sanitary objection to the use of such meters, when the same are made of insoluble or non-corrosive materials and according to a national design. In some cases, complaint has been made of noisy action, in others stoppages have occurred in consequence of the formation of rust when the premises have been unoccupied for a considerable period of time, and occasionally the brass work becomes slightly affected; but none of these causes has ever been sufficient to injure the health of the persons who use the water which passes through the meter.

'The assumption that the installation of water meters in a city will result in 'an instant and heavy rise of the death rate,' is wholly unwarranted and cannot be regarded seriously. Not the slightest foundation for making such a statement can be adduced if the water itself is wholesome. The only vestige of a reason for such a deplorable consequence is that by reducing useless leakage and waste in the water fittings of a household, the drain pipes will not discharge as much liquid as before, whence the inference is covertly conveyed that the drains will not be properly flushed or rinsed. This inference, however, is entirely wrong, as the dribble from a leaky faucet has no flushing power whatever, and is incapable of absorbing any appreciable quantity of foul gas, or of diluting or carrying away any filth that may have been lodged on the inner surface of a drain pipe.

'Efficient flushing can be done only when the volume of water is large enough to nearly fill the pipe, and pass through it rapidly like a piston. A few such flushes will clear the pipe as well as if the water were running constantly at the same high rate, just as one thorough washing of a dish makes it as clean as if it were kept thereafter continually in a flowing stream. In all modern sanitary appliances, care is taken to provide ample flushing capacity for keeping the pipes clear, and the use of water in excess of this becomes waste. Furthermore, the quantity of such flushing water cannot usually be controlled by the householder, but is fixed by the maker of the appliance, whence it follows that the legitimate consumption is not reduced by having a water meter in the premiss.

'The constant dribble from a single leaky faucet may easily become, in the course of twenty-four hours, more than the legitimate use of an entire family. By actual measurement, the quantity of water thus escaping ranges from 100 to 300

*The Water and Gas Review (December, 1909).

gallons per day, depending on the head; and as experience has demonstrated that from 35 to 50 gallons of water per head and day is ample for all ordinary purposes, the registration of avoidable leakage by the meter induces the thrifty householder to make repairs promptly, and incidentally causes the available supply to serve a large population.' Emil Kuichling, Consulting Engineer, Former Superintendent and Engineer of Waterworks, Rochester, N. Y.

'The contention that the introduction of water meters tends to lower the sanitary condition of towns by decreasing the use of water might be entertained by an occasional layman, who had not taken the trouble to inquire into the subject, but that a physician and public health officer, should make such a claim is, to put it mildly, surprising. Certainly, so far as our knowledge goes, no such effect has been noted heretofore in cities that have introduced the meter system extensively, such as Atlanta, Atlantic City, Cleveland, Fall River, Providence, Worcester and Yonkers. The facts, in any case, may be readily obtained from the health statistics of those places.

'Unquestionably, if the lowest classes of the population of a city were to pay pro rata for all water used there would be a tendency to use too little water to insure sanitary conditions, but this danger is eliminated by the minimum rate provision by which the poorest water taker may draw an ample supply for purposes of health. Beyond this, water used for purposes of luxury or water wasted should be paid for at such a rate as to equitably compensate the city or company that furnishes it.

'Having had considerable experience in connection with sewerage works I may say with confidence that the introduction of meters in an American city will not increase the percentage of solids suspended in the sewage (usually about one or two parts per 1,000) to such an extent as to be objectionable in any ordinary sewerage system. On the contrary, where the sewage has to be pumped or treated, there is an economic advantage in the slightest decrease in volume.

'In short, the net result from metering a water supply appears to be, first, in restricting waste; hence, second, in decreasing the annual cost of operation, and, third, in equitably apportioning the charges for water, as under any other system the water wasted by one taken is largely paid for by his more economical neighbor.'—Kennet Allen, C.E., Engineer and Superintendent Waterworks, Atlantic City, N. J.

'I have found that water-taking communities are roughly divisible into two great classes:

(1) Those who know something of the water meter, and who have only a compassionate smile for communities still adhering to the antiquated schedule system, and

(2) Those who are 'uncompromisingly opposed to the installation of meters.'

'The assistant commissioner of health of Chicago appears to be unaware of certain important facts.

'1st. That it is usually, if not universally, the practice, in applying meters, to establish a minimum charge per annum, guaranteeing the user all the water he can possibly use at a moderate figure, usually less than he would pay by schedule, so that there is no inducement to the user to be economical in his use of water.

'2nd. That, as the experience of many communities has shown, the vast majority of the population, while using water with perfect freedom, nevertheless use it decently and rationally, while the waste is perpetuated by a very small minority, usually between 10 and 20 per cent. of the entire population, who recklessly throw away, without benefit even to

themselves, more water than they and all the others combined can possibly use.

'3rd. That the oceans of water thus wasted, flowing sluggishly through our large sewers, exert little or no cleansing effect, whereas a very much smaller quantity discharged into the sewers periodically, at a high velocity, would really be of some benefit in a sanitary sense.

'While Chief of the Bureau of Water of this city, between 1895 and 1899, I had excellent opportunity to study the effect of the non-use of meters upon the sanitary conditions of our dwellings.

'As you may be aware, we were between the devil and the deep sea, the devil being represented by an organization which was holding up all appropriations for the benefit of an administration more to its liking, while the deep sea was a public 'uncompromisingly opposed to the installation of meters in dwellings.'

'We begged for meters in order that the supply might be put upon a sensible basis, but the refusal of this request was of course a foregone conclusion. We begged for pumps in order that we might supply more oceans of water to be wasted by a few careless or unscrupulous people, in order that the majority might have enough for their needs, but the organization turned a deaf ear to this request.

'With our existing pumping facilities, a general use of meters would have made the supply ample for all. As it was, I was overburdened with daily complaints from people who could not obtain water enough to flush their closets, and all because of 'uncompromising opposition' from people who did not know what they were talking about and would not take the trouble to learn.'—John C. Trautwine, jr., Consulting Engineer, Philadelphia, Pa., Former Chief of the Bureau of Water of that City.

'In regard to meters in tenement houses, as the landlord pays the water bills the tenants do not restrict themselves in the use of water for the landlord's sake, the charge does not come out of their pockets; on the other hand, the putting in of meters has the effect of making the landlord use the very best appliances to prevent waste, hence there is better sanitary conditions than running water will ever bring about. I believe that the only equitable way to furnish water is by meter measurement, and with a proper allowance for a minimum rate there will be no trouble from a sanitary point.'—R. N. Ellis, Superintendent of Waterworks, Jacksonville, Fla.

'In reply to your inquiry, asking my views upon the effect of meters upon the health of a community, I would say: '1st. The records of the Health Department have been carefully examined several times to see whether there is greater sickness among the 20,000 houses that are metered than in the case of the 35,000 that are not metered. We cannot find any difference.

'2nd. The able Chairman of the Board of Health, Dr. M. Rosenwasser, and Mr. Geo. C. Whipple, the most eminent expert on Water Analysis in the United States, I suppose, have examined the slight deposit of mud that collects around the fish traps of our meters, as it does in all other portions of any pipe system, and have reported that they find no evidence of contamination or of disease germs more than would be found anywhere else in the system.

'3rd. Certain extensive correspondence with cities that have used the most meters shows similar results, and the meters are not in any way productive of ill health.

'4th. The meters have a tendency to improve the health of a community, because when people pay for the water used, rather than in proportion to the number of closets, faucets, etc., they are not so much tempted to restrict the number of closets in a house and of bath tubs.

'5th. A minimum rate as we have so compels people to pay for a considerable amount of water whether they use it or not. The temptation for undue economy in the use of water is taken away. Especially is this true after the first six months, as shown by people who have been greatly economizing and have used less water than they are entitled to. Our lowest minimum of \$1.25 for six months, joined to a regular water rate of only 40 cents a thousand feet, or 5½ cents a 1,000 gallons, allows one to use 130 gallons per day. This is sufficient to flush a water closet 20 times every day; allows 42 gallons a day for cleaning; 56 pint glasses a day for drinking, and enough to completely flush out three times a day 200 feet of ¾-inch pipe if there be that amount running from the street main to the faucet.

'6th. Any knowledge of sewage would show that the flushing of sewers would not be greatly affected by the reduction in water pumped through the saving effected by meters. The great flushing of sewers is done by rains.

'7th. It is absolute nonsense to state that there is an unlimited and inexhaustible supply of water in Cleveland or Chicago or anywhere else, unless we assume an equally inexhaustible supply of money in the hands of people with which to pay for the costly pumps, street mains, tunnels or other apparatus necessary to get such supply of water to the consumer.

'8th. Meters lead consumers to stop the great source of waste which does not come from the water they drink or use for cleaning, but what they waste through leaking pipes and trickling streams in closets. Any such leaks are no benefit, but rather tend, if there are leaks in pipes to cause mold and unhealthful dampness in a house or basement. The renovation of plumbing which generally comes in such houses after meters are set would be pronounced by any sanitary expert to be an improvement on the former conditions of the house.

'9th. Nearly every report of any expert commission upon the improvement of the water supply of any city in America has been accompanied by a recommendation for meters, and never by a recommendation against them. Of course, no expert commission or engineer would recommend meters if they were going to destroy the value of the improved water supply, which they recommend in the same report.'—Prof. Edward W. Bemis, Superintendent Waterworks, Cleveland, O.

'Selling water by meter measurement does not imply a stinting in the use of water, unless the water is sold at actual measurement without a minimum charge. To encourage the liberal use of water we have fixed a minimum charge of \$2.00, per six months, for 1,500 cubic feet of water. This gives an ordinary family 61 gallons of water per day, nearly two barrels. We adopted the general meter system in 1888, now nearly sixteen years. We have over 3,400 water takers, 96 per cent. of which are metered. Being a university town, we have a great many tenement houses, and we have yet to hear of a healthier city in the country. The main issue of a water supply is a good and wholesome water, a general meter system, because it is not fair to restrict the commercial or ornamental water and allow the wanton waste of water in dwellings. Running water is one of the greatest of all sanitary agents, but it is not necessary to be under constant flow, wherewith it requires a constant adding of pumping machinery, and even with that, reduces the required fire pressure. A city has no right to allow classification of its citizens endangering the property of one against the other by want of sufficient pressure caused by the misuse of allowing the water to run a constant flow. There is more danger of foul and noxious gases in restricting the use of water in

factories, where hundreds are employed, than in dwellings.

'The same question was raised against our adopting the general meter system in 1888. It was claimed that it would be detrimental to the health of our city. Our records of health during all these years will prove just the contrary, and a correspondence with our board of health and with our physicians, especially of those that have practised during the past sixteen years, will verify my statement.

'A general meter system, with rates to encourage a plentiful use of water, is the only fair system of selling water to both the city and consumer, and a safeguard against large conflagrations, the water pressure being ever ready when the fire is still in its incipiency.'—John B. Heim, Superintendent of the Waterworks, Madison, Wis.

'The reference to towns in Great Britain also needs some amendment. In Manchester and several of the larger English cities it has been for many years the custom for the city to supervise the plumbing very closely, testing every fixture before it is allowed to be used and stamping it with an official seal if satisfactory in make, material and style, and properly passing the prescribed tests. In one small English town where the plumbing had become so hopelessly bad that repairs seemed impossible the water department practically installed new and satisfactory fixtures in every house before attempting to control leakage and wastage.

It is true that in Great Britain water meters are not extensively employed—but even there they are coming slowly but surely into use—nearly all the water used for domestic purposes being paid for on the basis of the rental value of the property occupied by the consumer instead of being based, as is commonly done in America, on the frontage rates with additional charges for the extra fixtures in use; and the control of wastage and leakage is effected by frequent, thorough, house-to-house inspections coupled with the use of only approved plumbing fixtures. In these cities, however, the municipal organizations are very different from those in our American cities. With our political complications arising from frequent changes of administration it has always been impossible to accomplish lasting reforms, in the matter of waste suppression, by means which have been satisfactory in other countries. With constant changing of the heads of departments and of the members of council, and committees on whom reliance must be placed for appropriations, reforms inaugurated by one administration may be discontinued by the one succeeding and probably before any substantial benefits may have been secured. This is the condensed history of waste reduction by inspection in the American cities which have tried it.'

A UNIQUE CAR BARN HEATING SYSTEM

The new system of heating installed in the car barn of the Toronto and York Radial Railway, at Claire Avenue, Toronto, Canada, is unique. In place of a steam boiler, which in ordinary car barns provides steam for heating but seldom for power, there will be a heater for transferring the heat in the coal direct to air, and a fan will force this heated air through the distributing system. The heater, which resembles a sectional water-tube boiler, is called an "air-tube" heater. It is the unique feature of this system which is being installed by the Harrison Engineering Company of New York City. This new method of heating will be watched with interest for there are no steam pipes or coils to be drained, no boiler to burst, and no accessories to be emptied or blown down in order to prevent freezing should it be necessary to shut down the plant during the winter.

LEGAL NOTES.

J. E. Parsons, B. A., Barrister-at-Law.

[This department will appear in the third issue of every month. Should there be any particular case you wish reported we would be pleased to give it special attention, providing it is a case that will be of special interest to engineers or contractors.—Ed.]

CORPORATIONS' CONTRACTS SHOULD BE UNDER SEAL.

In dealings between man and man each person is known by his signature. In trivial and everyday matters word of mouth is sufficient but in most matters of importance the signature is essential and when given is binding. But corporations stand in a different category; to be sure the law calls them "persons" and refers to them as such but it is only the law that does so. The corporation in the words of one learned judge "has no body to be burned and no soul to be damned." It has no existence in substance or in being but is a "legal entity," having an existence and rights to the mind only and being able to contract only by grace of the law.

How then are we to know when the corporation is bound? And the law has replied that some special formality must be observed and, searching for an observance not entirely new or strange to jurisprudence, has decided that this should be a corporate seal.

In some matters the attachment of the corporate seal would be a nuisance and almost an impossibility, and corporate contracts are allowed to be good without it in such trivial matters as are wont to occur from day to day and again in matters of urgent necessity, e.g., where a municipal council suddenly finds itself face to face with some crises such as a fire which necessitates immediate action, and in which the council would be neglecting their duty if they failed to provide at once; here the courts will allow as good a contract made without seal on the spur of the moment, but as a rule require the seal.

Hamilton vs. Niagara Harbor and Dock Company.

The plaintiff sued alleging that the defendants had contracted to supply two engines and set them up in a steamboat belonging to the plaintiff, but was not able to produce any writing to that effect and failed by reason of that defect, the learned judge remarking,—“It is a leading principle in the law as respects corporations, that they can only contract under their common seal. The affixing of the seal of the proper authority is the only evidence or proof of the assent of the corporate body to the contract. There is reason in the principle. It is necessary for the protection of all the members of the body, that except in matters of common occurrence which are transacted in course, there should be something to supply the evidence of a joint contract.”

6 U. C., Q. B., O. S.

Smith vs. London Gas Company.

The plaintiff sued the company upon a special contract to supply his hotel with gas but was not able to produce any written agreement. The court stated that as he failed to show any reason which could bring his case into any of the classes of exceptions, the general rule was applicable. His

agreement may have been bona fide and deliberately discussed, entered into by both himself and the company, but as it lacked the formality required by law it could not be enforced.

7 Gr. 112.

Where a plaintiff has performed his part of the contract as, e.g., by doing the work, and the corporation has accepted the work and received the benefits the courts will seldom excuse them from payment.

Perry vs. City of Ottawa.

The Council of the Corporation appointed a committee with power among other things, to treat with and recommend to the council an engineer to make requisite surveys, etc., for supplying the city with water. This committee formulated a scheme for the construction of a reservoir on a hill in the locality, and the chairman of the committee swore at trial that they (the committee) employed the plaintiff to make plans, to be laid before the Commissioner of Public Works, of the hill in question in the action and of the reservoir proposed to be constructed upon it. Also that the plans had been necessary for the work of the committee and it was shown that the plaintiff was a well-known engineer who had on other occasions done work for the city. It was shown that in due course the committee had made their report to the council and that the report contained what had been done by the plaintiff for them. The council had then by resolution approved and adopted the action of the committee.

The gist of the defence set up by the city was that no contract under the seal of the corporation was proved and that they were not therefore bound to pay the plaintiff.

One of the learned judges was inclined to think that the engineer should have been engaged by by-law under seal but found that as the work was embodied in the report and that had been accepted by council the city was bound to pay.

23 U.C., O.B., 391.

Pim vs. County of Ontario.

The plaintiff had been employed as a contractor in the erection of a court house and gaol for the County of Ontario. His employment had not been under seal, but he was able to show that he had worked regularly under inspection of the County Council's architect, a man authorized by resolutions of the Council to employ persons to do this very work. His evidence at trial also proved that he had completed the buildings, the value of the work, and that the defendants were in possession of the buildings, using them regularly as gaol and court house and council chamber.

The defendants disputed the claim for payment and the gist of their defence was that they were not bound as there was neither a by-law nor contract under seal to prove employment of the plaintiff. The Court after some remarks not complimentary to the defendants pointed out that in prior decisions there was a distinction made between executory contracts, those where the work was still to be performed and executed contracts such as this, where the plaintiff had performed his part of the contract and consequently the defendant had received all the benefit to which he was entitled in terms of the contract but refused to perform his own part in return. In this case the plaintiff had erected the buildings and the defendants were in possession and enjoyment of same,

and the Court refused to allow the defendants to escape payment.

Judgment for plaintiff.

Pim vs. Municipal Council of Ontario, 9 V.C., C.P., 304.

Waterous Engine Works Co., vs. Town of Palmerston.

The facts in this case were shortly as follows:—In April, 1890, the town council appointed a committee to consider prices and terms and advisability of purchasing a fire engine, and one month later the committee brought in its report recommending the purchase of an engine from the plaintiffs. The report was approved and adopted whereupon a contract was entered into, sealed by the engine company and signed by the mayor and clerk of the town with the corporate seal attached.

By the Municipal Act then, and apparently still, in force in Ontario (see R.S.O. Cap. 19, Sec. 544), town councils have authority to purchase fire engines upon petition of a majority of the ratepayers and by the passing of a by-law for that purpose. In the case in question, there had been no petition of ratepayers and no by-law but the council acted upon their own initiative.

The plaintiffs prepared an engine for the defendants pursuant to the contract and specifications attached and the same were delivered at Palmerston as per contract prior to 19th June. The council did not assume possession and control of the engine but the matter was brought up in council and three of the members were appointed to engage experts to be present when the machine was tested and investigate the working of the engine and appliances. On June 19th the engine was tested in the presence of these experts who reported satisfactory results. Three weeks later, the council passed a resolution that all negotiations be dropped and the plaintiffs instructed to remove the engine from the Town Hall where they had been allowed to shelter it.

The case reached the Supreme Court which held that, as a municipal corporation exists only by virtue of the Statutes and has only such powers as the Statutes say it shall have, and in this case the Statute gives power to purchase an engine after a petition by ratepayers and the passing of a by-law but not otherwise,—therefore, the signing and sealing of the contract in this case was ineffectual and void, for the mayor and council were attempting to do something beyond their powers and which was therefore void. Held that the contract was not binding at all upon the town and that the plaintiffs have no redress.

N. B.—That the decision might have been entirely different had the council already accepted delivery of the engine and been making use of it for purposes of the town.

21 S.C.R., 556.

Clemenshaw vs. Corporation of Dublin.

The municipal council proposed to buy out the rights of a local gas compny and as it was necessary first to get an Act through Parliament authorizing the move, they advertised for engineers to prepare plans, estimates, etc., to be used in support of the proposed application to Parliament and later. In answer to these the plaintiff applied to be employed and was informed that he had been appointed. He then entered upon his duties and at the bidding of the council did a considerable amount of work, but his appointment was not under the corporate seal. The council refused to pay him and he brought action for the amount of his accounts.

It was held that the appointment having been without the corporate seal was not binding and that the plaintiff could not recover.

Ir. R., 10 C.L., 1.

PROBLEMS IN APPLIED STATICS.

T. R. Loudon, B.A.Sc.

(Registered in Accordance with the Copyright Act.)

This series of problems began in the issue for the week, October 22nd, 1909. It is assumed that the reader either has an elementary knowledge of the subject of Statics, or is in a position to read some text on such theory.

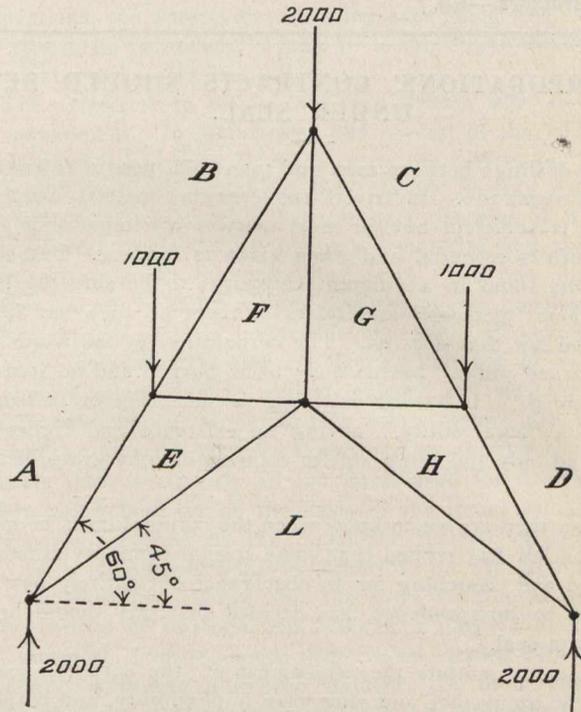


Fig. 96.

Consider the forces acting at the point LEA.

$$\sum X = X_{LE} + X_{EA} + X_{AL} = 0.$$

$$LE \cos 45^\circ + EA \cos 60^\circ + 0 = 0.$$

$$LE = -\frac{EA}{\sqrt{2}} \dots (4.)$$

$$\sum Y = Y_{LE} + Y_{EA} + Y_{AL} = 0.$$

In accordance with the assumptions as to the X_{LE} and X_{EA} , the Y_{LE} and Y_{EA} will both be positive.

$$\sum Y = LE \sin 45^\circ + EA \sin 60^\circ + 2,000 = 0 \dots (5.)$$

substituting value of LE from (4.) into (5.).

$$\left(-\frac{EA}{\sqrt{2}}\right) \cdot \frac{1}{\sqrt{2}} + EA \frac{\sqrt{3}}{2} + 2,000 = 0.$$

$$EA \frac{(\sqrt{3}-1)}{2} = -2,000.$$

$$EA = -\frac{4,000}{(\sqrt{3}-1)} (6.)$$

From the negative result, the assumptions as to X_{EA} and Y_{EA} are seen to be wrong. X_{EA} and Y_{EA} are, therefore, both negative; i.e., EA acts against the point. The

member EA is in compression $\frac{4,000}{(\sqrt{3}-1)}$ pounds.

Substituting the value of EA from (6.) into (4.):—

$$LE = - \left(- \frac{4,000}{\sqrt{3}-1} \right) \frac{1}{\sqrt{2}}$$

$$= \frac{4,000}{(\sqrt{3}-1)\sqrt{2}}$$

It follows from the positive result that the assumptions as to XLE and YLE are correct; i.e., XLE and YLE are positive. LE, therefore, acts away from the point.

The member LE is in tension $\frac{4,000}{(\sqrt{3}-1)\sqrt{2}}$ pounds.

The Queen Post Truss.

The panel widths in the Queen Post Truss (Fig. 97) will be taken as equal. The forces acting on the truss are in equilibrium. Therefore, if in Fig. 97 moments be

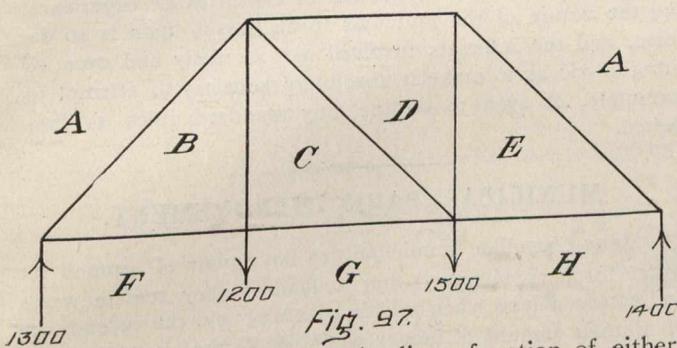


Fig. 97.

taken about some point in the line of action of either abutment reaction, and if the equation $\Sigma M = 0$ be ap-

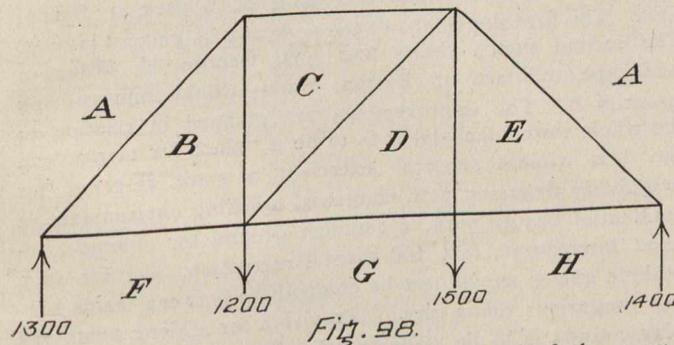


Fig. 98.

plied, the abutment reactions will be found of the magnitudes indicated on the diagram.

Stress Diagram.

Fig. 99 is the Stress Diagram for the truss, Fig. 97. In this diagram, the same system of double, thin, and heavy lines is used as in all the preceding Stress Diagrams drawn.

The reader is advised to construct Fig. 97 on a loose sheet of paper, and, as the stress in each member is found, indicate it on this diagram. This will enable one to see more clearly how the various Statical Diagrams are arrived at. (It must be kept in mind that the Statical Diagram merely represents the known forces when the point is first considered.)

If the following Vector Polygons also be drawn on a separate sheet of paper as they are pointed out in Fig. 99, using the same scale in each case, the construction of the Stress Diagram will then be more easily followed, for it is generally the presence of lines which have not yet been arrived at that serve to confuse the reader.

Consider the point AFB (Statical Diagram, Fig. 100). AF, FB, BA (Fig. 99) evidently form a Vector Polygon for the forces acting at this point. From this polygon, the force FB is seen to act away from the point and BA against the point. The member FB is, therefore,

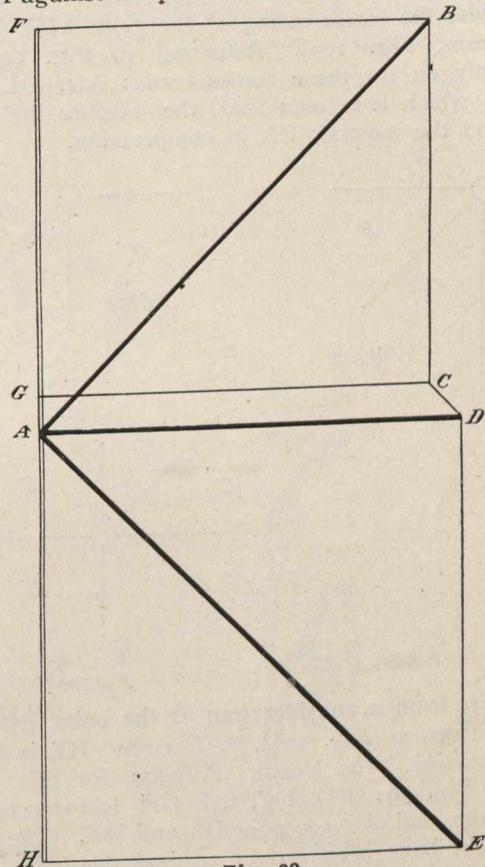


Fig. 99.

in tension and the member BA in compression. (The magnitudes of these stresses will, of course, be given by scaling the lengths of the lines FB and B.A.)

Consider the point BFGC (Statical Diagram, Fig. 101).

The known force BF (Fig. 101) is exerted by the tension member BF (or FB). This force, is, therefore, equal and opposite to the force exerted by the same member at the point AFB. But FB (Fig. 99) represents the force exerted at the point AFB; therefore, the same line read BF will represent the force BF exerted at the

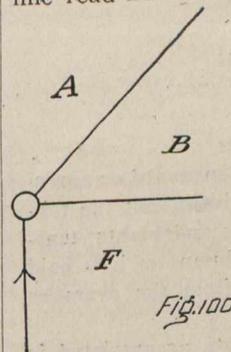


Fig. 100.

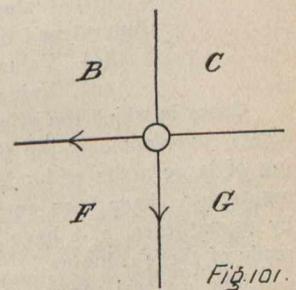


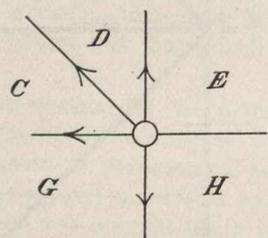
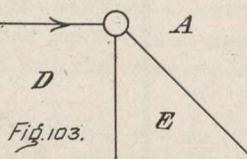
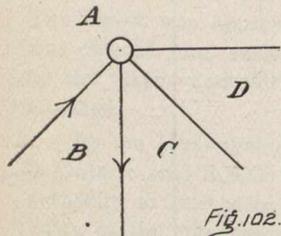
Fig. 101.

point BFGC. The line FG (Fig. 99) represents the load FG. (The load FG is less than the reaction AF.) The lines GC and CB complete the polygon, which should then read: BF, FG, GC, and CB. The members GC and CB are evidently both in tension.

Consider the point ABCD (Statical Diagram, Fig. 102).

The Vector Polygon for this point reads on Fig. 99: AB, BC, CD, and DA, from which it is seen that the force CD acts away from the point and the force DA against the point. The member CD is, therefore, in tension and the member DA in compression.

Consider the forces acting at the point ADE (Statical Diagram, Fig. 103). Referring to Fig. 99, the Vector Polygon for these forces reads: AD, DE, and EA, from which it is seen that the member DE is in tension and the member EA in compression.



Finally, from a consideration of the point EDCGH (Statical Diagram, Fig. 104), the member HE is found to be in tension. The Vector Polygon for this point reads on Fig. 99: ED, DC, CG, GH (constructed to represent the load of 1,500 pounds), and HE. (The same result would have been arrived at had the point AEH been considered.)

Fig. 98 represents a Truss, on which the loading is identical to that on the truss, Fig. 97. The Stress Diagram for this last truss is shown at Fig. 105, the construction of which may be seen by considering the various points of the truss in the following order: AFB, ABC, CBF, GD, ACDE, EDGH.

AWARDS FOR WATER AND WATER POWER DIVERSION.

(Continued from page 718.)

- Developed Privileges:
 - (a) Value on Award
 - (b) Value on Agreement
- Undeveloped or Unused Privileges:
 - (c) Value on Award
 - (d) Value on Agreement.

Cases in which the prices paid (either on award or agreement) cover not only the power privilege itself, but the taking of large areas of land, mill properties and plants, tenements, etc., have been enclosed in the columns of unit paid by parentheses, and have been omitted from the averages made of these columns.

The general range covered by the data accumulated is shown in the following table:—

	No. of Cases.	Value per Square Mile of Watershed per Foot of Fall.		
		Max.	Min.	Average.
Developed Privileges:				
a. By award	112	\$366.10	\$2.45	\$81.42
b. By agreement	66	181.20	2.80	54.90

Combined (a and b)....	178	366.10	2.45	71.55
Undeveloped, unused, or abandoned privileges:				
c. By award	10	15.72	0.20	6.22
d. By agreement	11	25.60	1.04	8.15
Combined (c and d)....	21	25.60	0.20	7.23

It hardly seems necessary to allude to the fact, which must be patent to any student of this subject, that none of the results submitted can be applied directly to new cases, for the reason that no two cases are identical or even thoroughly similar.

The committee considered carefully the practicability of joint action with the National Cotton Manufacturers' Association, or other organizations of mill owners, relating to the formulation of standard rules of computing or assessing damages for the diversion of water, but reports the impracticability of such action. The questions involved are so much a matter of law, the outgrowth of centuries of experience, and the nature of the problems to be passed upon is so diverse, and the interests involved are so many and even so antagonistic as to make it absolutely hopeless to attempt to formulate, or even to outline, any standard rules as suggested.

MUNICIPAL PARK IMPROVEMENT.

Many Canadian municipalities have plots of ground set apart for park purposes, but frequently they remain waste and common land when a little planning and the expenditure of a small amount of money would make these parks beauty spots, attractive recreation grounds, and a place for rest and relaxation.

We give in the article two plans of a park at Barrie, Ont. The first sketch shows the park and its general lay out. The second sketch shows how Mr. George H. Miller, a landscape architect, of Boston, Mass., would improve and beautify it. The improvements are planned in relation to the whole town plan and it is to be a "place for mental and the less violent physical exercises, a space reserved for neighborly diversion with congenial uplifting environment, a residential beauty park, a common ground for quietude, refined intercourse, rest and mental recreation, and for such athletic games as will not be competitive between teams having gregarious followings." Provision for athletic fields and playgrounds is to be made in other more suitable locations. Among the features proposed are "the great lawn," "the promenade," "the outdoor auditorium," "the grove," "the flower mall," and "the ravine." Each feature correlates with the other and takes advantage of the natural existing conditions; of the shape of the tract, of topography, tree growth, natural traffic and views. There will be a central dominant feature in the form of a concrete pavilion, and there will be a concrete entrance exedra monumental in design, a concrete bridge and many minor features such as belvederes, a spring-nookery and colonade.

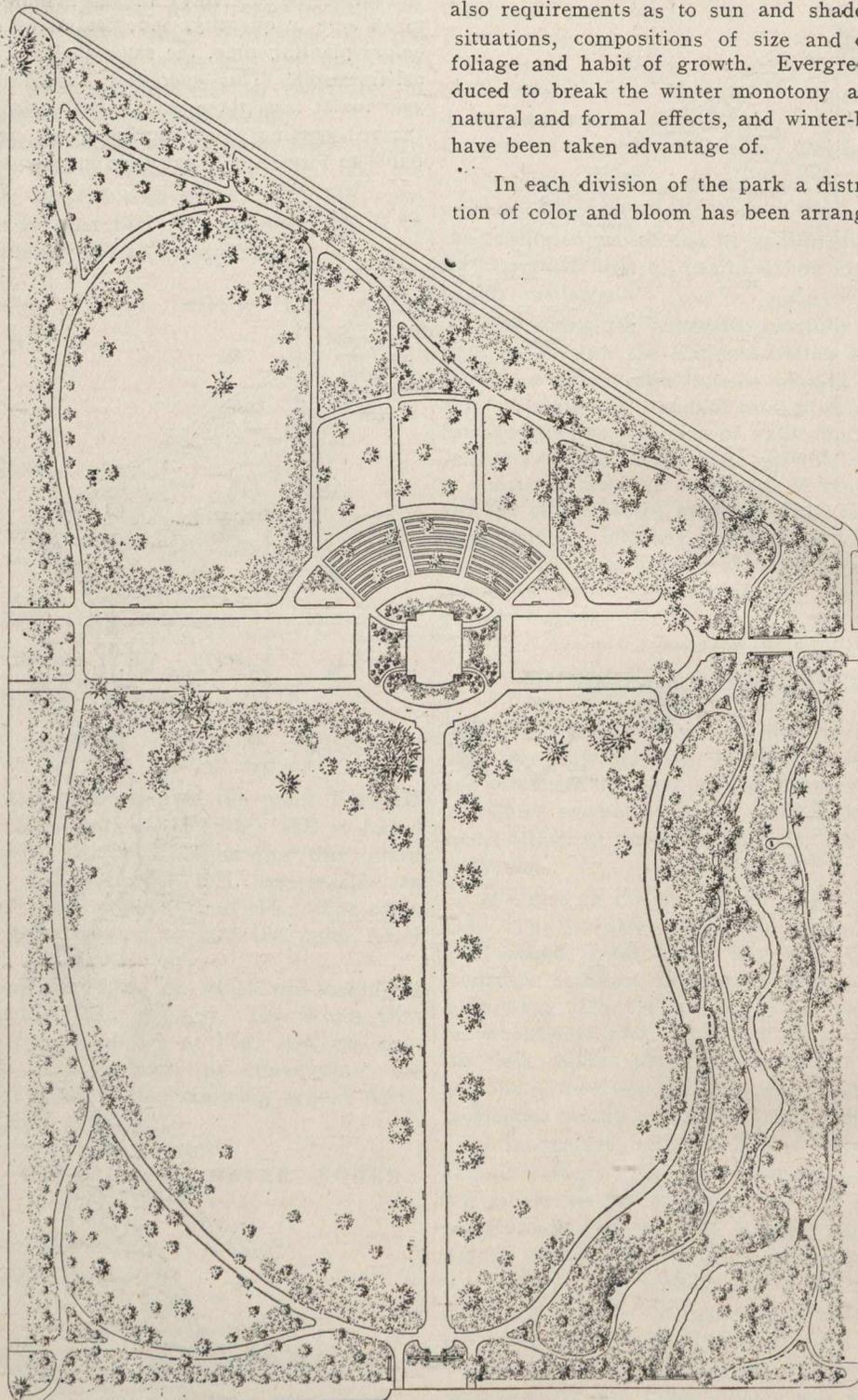
Mr. Miller's Report.

The planting is used for esthetic and educational purposes and the varieties selected are those known to be hardy in the Barrie region through their being native, tried locally by me, or recommended by the Central Experiment Farm at Ottawa. A great many attractive varieties which might thrive have been omitted from the list, and none included that are not positively determined as above.

The soil condition is especially suitable for a limited number of varieties, such as the Caragana, Corylus, Ceano-

also requirements as to sun and shade and moist and dry situations, compositions of size and color and texture of foliage and habit of growth. Evergreens have been introduced to break the winter monotony and are composed for natural and formal effects, and winter-berry and twig-values have been taken advantage of.

In each division of the park a distribution and composition of color and bloom has been arranged and certain strik-



The Plan for Arrangements Contains Many Suggestions for adoption by other Municipalities,

Shows a charming scheme involving little expense for construction because existing features are taken advantage of in an attractive way.

thoroughfares and at the same time to furnish sufficient seclusion within the park, framing the house-gables and shutting out the dirt road-surface of boundary streets as now seen from the park.

The divisions of the park are defined by foliage masses and all the matured existing trees have been taken advantage of and conforming varieties selected to complement them in the groups. In the arrangement consideration has been given to economic values, such as that of binding root formations suitable for holding up the sandy banks of the ravine,

ing features made to dominate the division in season. For instance, in "the flower mall," the two straight formal borders will be alive in the spring with the dotted rows of lilac blossoms against the yellow bloom of the taller irregular caragana in back and these will be faced with bridal wreath, the graceful branches of which later when in bloom will form long striking lines of showering white flowers.

The "great lawn," on the other hand, although containing large groups with different colored bloom for different months, is dominated by striking masses of the common

snowball circulated through every portion of its borders, a sight which will enlist the public interest and regard for the beauty of the park and arouse a pride in it and a desire to visit it.

Again, the upper lawn is dominated by hydrangeas planted as border edgings so that the heavy blossoms may droop over to the lawn surface, and there are the white and pink diervillas in the lawn to the northeast, and long strips of *Spiraea arguta* by the walk leading thereto.

In the ravine, the existing growth and shoulders of the banks prevent long views, and the winding stream channel naturally divides the whole into many parts. These parts are quite defined by the planting groups indicated on planting plan and as far as possible open grass plots have been retained. The purpose of the planting has been to make a series of these parts, each having a different characteristic.

After the trees and shrubs are matured and the park maintenance is on an established basis, the ravine will possess an opportunity for feature planting that will make it famous. I have in mind facing with perennials, biennials and annuals the irregular borders which cover the banks and surround each grass plot, filling the openings or bays in the shrub groups and edges of channel, the varieties to be selected being those which will be in bloom when the shrubs are not, and which planted in quantities will form striking sheets of color. It is purposed that each section shall have a different selection of varieties, and that the varieties should be at least two in number flowering at the same time. For instance, in one section we may have helianthus forming a white sheet of flowers against the darker shade of shrub and tree foliage and before it agreeably contrasted the yellow of the golden glow. In the next section we may have naught but the yellow and blue of the iris at the stream edges or crocuses coming up through the grass, while farther on we may be attracted by other wholesome irregular sheets of red contrasted with the white. And it is intended that this same scheme in variety shall be extended also to all the open spaces in the ravine and smaller lawn openings throughout the park, and that each section shall not be limited to one period of bloom, but rather that it be sufficiently continued to make the whole a veritable garden spot from the beginning to the end of the season and especially when the features on the larger lawn spaces are not the paramount attraction. The perennials used should be those requiring little attention after being once established and they should be of varieties generally wild in nature.

The planting at the main entrance and at the pavilion is mostly evergreen in irregular formality, the dark greens contrasting strikingly with the gray of the architectural features and the bronze shades of the shrubs indicated. This planting must be done with the utmost care and the exercise of taste in the spacing of the plants, for the irregular formal grouping of evergreens is most effectual when properly executed. The arbor vitae are specified as wild plants to be collected in the nearby woods and as far as possible low-branched, well-developed plants should be sought.

The Educational Purpose.

The educational values of the plants are so many and so obvious that I will only mention a few of the more striking ones that appeal to me as relating to Barrie.

Never in the history of this continent has so much been heard of the conservation of natural resources as now. We read daily the reports of tragic wastes that have been accomplished in the reckless destruction of trees and the re-

sultant exorbitant prices of lumber, resultant expense with which municipalities have been penalized in getting water supplies, and the resultant exhaustion of permanent natural power for industry, the resultant amount of arid land and resultant impairment of natural transportation facilities, and the losses by floods and freshets. The facts are appalling and on their presentation there is a lack of public response which only bespeaks an inability to appreciate the truth.

The great mass of this continental people never has had an appreciation of the value of natural growth with which the lands have been covered, and to-day it is regrettable that there is not a keener awakening, but it is not surprising when one stops to think how little recognition the practical study of the subject has been given by the public authorities. I believe that one of the greatest agencies for preparing the public mind for a sympathetic consideration of the subject is permitting the public to become more intimate with the subject matter, to know trees and natural growth, see the limitations and the time that nature requires to effect a worthy growth, and how easily the process is impaired by the ruthless hand of man. And there is no greater agency through which to bring these things to the sympathetic attention of the great body of the people in our cities and towns who wield so much power in legislation than in having rich masses of this natural growth as part of their daily environment, having it in their own entrustment and on their own public lands where all own, see and know the different varieties being reserved, and for which in this way they may develop an inherent sympathy and respect.

There is also the scientific phase in the aid and encouragement to botanical research as a matter of local enlightenment and contribution to the complete world records. Another educational value is in the demonstration of the individual, collective and relative uses of a considerable number of hardy varieties of trees and shrubs which are mostly native and can be adapted to use on home grounds, a demonstration which satisfies a prospective planter in selecting what he wants and in being sure of what he orders and that he gets what he does order. In this regard I wish to bring to your attention the advisability of having attached to each tree and shrub group an easily seen label bearing the botanical and common name of variety and the source of its nativity. This should prove a great stimulus to the private ornamentation of home grounds and the consequent beautification of the town. Moreover, an acquaintance with the native varieties will make them recognizable in woodlands whence they can be selected with little or no expense.

NEW INCORPORATIONS

Ontario

- La Myrrh Chemical Company, Ltd., Georgetown; share capital \$100,000.
- Carter & Kenney, Ltd., Toronto; \$40,000.
- Hamilton Ferry Company, Hamilton; \$40,000.
- Leslie & McNeill, Ltd., St. Mary's; \$40,000.
- Modern Malleable Range Company, Ltd., Chatham, \$40,000.
- Cobalt Electric Equipment Company, Ltd., \$40,000.
- Halls, Ltd., Brockville, \$100,000.
- New Ontario Slate Company, Ltd., New Liskeard; \$500,000.
- The Berlin Fuel Savers, Ltd., Berlin; \$40,000.

CONSULT OUR CATALOGUE INDEX on page 6.

We can put you into immediate touch with the principal manufacturers of and dealers in all kinds of engineering and contracting equipment. A postcard to this department will insure the receipt of the desired catalogue.

RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	EARNINGS		STOCK QUOTATIONS												
				Week of Dec. 21		TORONTO				MONTREAL								
				1909	1908	Price Dec. 23 '08	Price Dec. 16 '09	Price Dec. 23 '09	Sales Week End'd Dec. 23	Price Dec. 24 '08	Price Dec. 16 '09	Price Dec. 23 '09	Week End'g Dec. 2					
Canadian Pacific Railway	8,920.6	\$150,000	\$100	1,873,000	1,597,000	175½	180½	179½	180½	179	2	176½	176½	180½	180½	179½	179	924
Canadian Northern Railway	3,180			253,700	225,100													
*Grand Trunk Railway	3,536	226,000	100	845,465	743,817													
T. & N. O.	334	(Gov. Road)		35,526	18,009													
Montreal Street Railway	138.3	18,000	100	76,565	69,296													
Toronto Street Railway	114	8,000	100	82,399	73,812	108	107	127		127	126½	178	203	201½	215½	214½	217	216½
Winnipeg Electric	70	6,000	100															
Halifax Electric	13.14	1,400	100	3,654	3,477													

* G.T.R. Stock is not listed on Canadian Exchanges. These prices are quoted on the London Stock Exchange.

ONTARIO ELECTRIC RAILWAYS.

From week to week we propose to give, on our page devoted to transportation interests, particulars of the equipment, mileage, and other information regarding the railways of Canada, together with a list of the officials. This series of articles commenced in our issue of October 1st.

Previously Given:—

- Brantford and Hamilton Railway.
- Chatham, Wallaceburg and Erie Railway.
- Cornwall Street Railway.
- Guelph Radial Railway.
- Galt, Preston and Hespeler Railway.
- London St. Railway.
- International Transit Co., Sault Ste. Marie.
- Kingston, Portsmouth & Cataraqui Elec. Ry., Kingston
- Toronto & York Radial Railway.
- Windsor, Essex & Lake Shore Railway.
- Ottawa Electric Railway.
- Southwestern Traction Co., London.
- Toronto Street Railway.
- Niagara, St. Catharines and Toronto Railway.
- Peterborough Radial Railway.
- Berlin and Waterloo.

SARNIA STREET RAILWAY COMPANY.

President, J. D. Beatty.
 Secretary, general manager, superintendent, and purchasing agent, H. W. Mills.
 Chief Engineer, William Williams.
Kind of Road: Interurban and street.
Length of Road, in Miles: Single track, 7 miles.
 Double track, 2¼ miles.
 Total in single miles, 9¼ miles.
Character of Service:
 Car equipment No.: 10.
 Number of motors, 28.
 Method of controlling, ratchet controller.
 Method of braking, ratchet brake (Peacock).
 Gauge of tracks, 4.8½.
 Weight of rails, 56-65-70.
 Type, double track.
 Power of motors, 40 h.p.
Power:
 Direct current.
 Voltage of transmission, 500 to 600.
 Trolley voltage, 500 to 600.

COMING MEETINGS.

- Montana Society of Engineers.**—January 6-8. Annual meeting at Butte, Mont. Secretary, Clinton, H. Moore, Butte.
- American Society of Engineering Contractors.**—Feb. 24-26, 1910. Annual convention at Chicago, Ill. Secretary, Daniel J. Hauer, Park Row Building, New York, N.Y.

Indiana Engineering Society.—January 14-16. Annual convention at Indianapolis, Ind. Secretary, Chas. Crossmann, Union Trust Building, Indianapolis, Ind.

Michigan Engineering Society.—January 12-14. Annual meeting at Lansing, Mich. Secretary, Alba L. Holmes, 574 Wealthy Ave., Grand Rapids, Mich.

Michigan Engineering Society.—January 12-14. Annual meeting at Lansing, Mich. Secretary, Alba L. Holmes, 574 Wealthy Avenue, Grand Rapids, Mich.

Indiana Engineering Society.—January 13-15. Annual convention at Indianapolis, Ind. Secretary, Charles Crossman, Union Trust Building, Indianapolis, Ind.

American Society of Heating and Ventilating Engineers.—January 18-20. Annual meeting, New York, N.Y. W. H. Mackay, secretary, P.O. Box 1818, New York, N.Y.

American Society of Inspectors of Plumbing and Sanitary Engineers.—January 20-22. Annual convention, Trenton, N.J. C. S. McCosker, secretary, Mobile, Ala.

National Brick Manufacturers Association.—February 7-12. Annual convention, Pittsburg, Pa. T. A. Randall, secretary, Indianapolis.

National Association of Cement Users.—February 21-25. Annual meeting, Chicago, Ill. George C. Wright, secretary. Address communications to Edw. E. Krause, Asst. to President, Harrison Building, Philadelphia, Pa.

SOCIETY NOTES.

Western Canada Railway Club, Winnipeg.—The next regular monthly meeting of above club will be held in the Royal Alexandra Hotel, Winnipeg, on Monday evening, January 10th, at 8 o'clock. A paper will be read by Mr. A. E. Cox, Storekeeper, Canadian Northern Railway, on "The Stores Department and its relation to the other departments." There will also be the continued discussion on "Water Supply," and "Copper versus Steel Fireboxes."

Union of British Columbia Municipalities.—The following officers were elected for a year by the Union of British Columbia Municipalities, at the annual meeting held in North Vancouver, B.C., on December 18th:—President, Mayor Bell, Enderby; vice-president, ex-Mayor Planta, Nanaimo; secretary-treasurer, Reeve Bose, Surrey; Executive Committee, Mayor Hall, Victoria; Mayor Robinson, Kamloops; Reeve Burne, Burnaby; Reeve Quick, Saanich; Reeve McNaughton, North Vancouver; Reeve Evans, Salmon Arm; Reeve Kickbush, Chilliwack.

Some of the resolutions passed were:—

- That a committee be appointed to secure all the necessary data dealing with the cement merger question.
- That the Dominion government be asked to contribute to roads and bridges in the railway belt, where they draw a revenue from timber lands and water powers.
- That the government be asked to appoint a committee of three men familiar with municipal legislation to assist the government in its efforts to simplify and codify the municipal laws of the province.

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.

Nova Scotia.

HALIFAX.—Tenders will be received up to January 17th for the purchase of a large lot of second-hand material, the property of the Department of Public Works of Canada, consisting of anchors, propellers, gear wheels, buckets, pins, rollers, castings, engine parts, zinc, copper, rope, plank, tubes, wire rope and sundry other articles stored there. Inspection of goods may be had on application of P. Brown & Son, Church Street, Pictou, N.S. G. M. Graham, Supt. Dredging, Nova Scotia.

Quebec

GRANBY.—Tenders for the erection and construction on the racetrack of the "L'Hippodrome Granby Limitee" will be received up to the 7th January. L'Hippodrome Granby Limitee.

Ontario

OTTAWA.—Tenders will be received up to January 5th for six hundred and twenty-four tons of steel plates and shapes required at the Government Shipyard at Sorel, P.Q., delivered free. Specifications and detailed information can be obtained from the Purchasing Agent of the Department of Marine and Fisheries, Ottawa, and from the Director of Shipyard, Sorel, P.Q. G. J. Desbarats, Deputy Minister of Marine and Fisheries, Ottawa.

OTTAWA.—Tenders will be received until Tuesday, 18th January, for the supply of timber, hardware, castings, oils, etc., for use on the Welland Canal and its branches for the year 1910. Information may be obtained at the Superintending Engineer's office, St. Catharines, Ont. L. K. Jones, Secretary, Department of Railways and Canals.

STRATFORD.—Until Saturday, January 15th, the city of Stratford wants tenders for two electrically-driven turbine pumps of one million and one and a half million gallons capacity. They should be addressed to Mr. J. Davis Barnett, chairman, water commissioners. Mellis Ferguson is city engineer.

Manitoba

WINNIPEG.—Tenders will be received up to Tuesday, January 18, for removing the present superstructure and furnishing and erecting new steel superstructure and floor, complete, for Louise Bridge across the Red River. Plans, specification and forms of tender may be obtained at the office of Colonel Ruttan, the city engineer. M. Peterson, secretary Board of Control.

WINNIPEG.—Tenders for alterations to old post-office building, Winnipeg, will be received until 5 p.m., Tuesday, January 11th. Further information may be obtained on application to Mr. Joseph Greenfield, Resident Superintendent, Public Works Department, Winnipeg, Man., or from Napoleon Tessier, Secretary Department of Public Works, Ottawa, Ont.

WINNIPEG.—Tenders will be received up to Tuesday, February 15th, for the supply and erection of the various portions of the equipment for the terminal station at Winnipeg, and for the turbine governors and gate valves for the generating station. Specifications and plans, etc., may be seen at the office of Messrs. Smith, Kerry & Chace, Confederation Life Building, Toronto, and Carnegie Library Building, Winnipeg. Individual tenders will be received for:—

18. Terminal station.
 - 19 and 20. Step-down transformers and terminal station switching and accessory apparatus.
 21. Terminal station, light, heat and power systems.
 22. Terminal station, light, heat and power systems.
 24. Testing transformers and apparatus.
 26. Turbine governors (seven).
 - 27A. Two five-foot gate valves.
- M. Peterson, Secretary, Board of Control.

WINNIPEG.—Street Commissioner Tallman recently stated that the Canadian Northern Railway would invite tenders for the construction of the Pembina Street Subway next week.

British Columbia.

VANCOUVER.—Tenders are invited by the North Vancouver City Ferries, Limited, for the construction of a double-end steel ferry steamer, 165 feet long, with 29-foot beam until the 20th January. H. E. Kemp, secretary.

VICTORIA.—Tenders are now being invited for the construction of the V., V. and E. line between Abbotsford and Hope, a distance of 78 miles, and also between Princeton and Tulameen. The gap between Tulameen and Hope is to be covered, it is expected, by the proposed eight-mile tunnel.

U. S. A.

HEBRON, NEBR.—Tenders for the construction of improvements, extension and enlargement of the Hebron City Waterworks System will be received until January 12th. Instructions to bidders, plans and specifications are on file in the office of O. P. Hess, City Clerk. C. H. Meeker, of McCook, Nebr., is the Engineer.

GUAYAMA, Porto Rico.—Tenders will be received until January 17th for the construction of the Carite Tunnel near Guayama, and the Toro Negro Tunnel near Villalba, the aggregate length of said tunnels being about 6,000 linear feet, and the estimated cost being about \$100,000. Plans and specifications may be obtained from the Commissioner of the Interior, San Juan, Porto Rico, from the United States Reclamation Service, Washington, D.C., or from B. M. Hall, Chief Engineer, Porto Rico Irrigation Service by deposit of one dollar.

CONTRACTS AWARDED.

Nova Scotia.

HALIFAX.—At a recent council meeting tenders for 10,000 brick were opened. The General Contractors Supply Company offered them at \$7 per 1,000 at the depot or \$7.25 at the Cotton Factory Siding. J. Simmonds & Company offered to supply them at \$6.95 at the depot and \$7.25 at the Cotton Factory siding. Simmonds & Company's tender, delivered at siding, was accepted.

Quebec.

HULL.—The William Hamilton Company, of Peterborough, Ont., received the contract for a pump at \$14,850 and for additional turbine wheel at \$2,315. A complete list of tenders appeared in our issue of last week.

MONTREAL.—Messrs. Laurin & Leitch, of Montreal, were awarded a contract for work on Clark Street and Villeneuve Street at \$34,000.

MONTREAL.—Tenders for the construction of a public bath at the corner of St. Dominique and McGuire Streets were opened, and the contract was awarded to the lowest tenderer, D. Lalonde, whose price was \$24,448. Five tenders were received for the work as follows: W. Duquette, \$28,365; O. Galarneau, \$29,497.17; Carriere Company, Ltd., \$35,300; J. B. Gratton, \$33,800; D. Lalonde, \$24,448.

MONTREAL.—The Calkins Tile and Mosaic Company, Ltd., of Montreal, were awarded a contract for tile floor, city hall building, for which the following tenders were received: Calkins Tile & Mosaic Company, Montreal, \$840; G. Gilbert, Montreal, \$900; A. T. Riopelle, Montreal, \$1,350.

Ontario

BUXTON.—F. Smithson has been awarded a contract by the Raleigh Township Council for sewer construction at \$3,388.

HAMILTON.—M. S. Kappelle was awarded the contract for supplying 40,000 feet of timber for re-decking the Stewart Bridge at \$978.96.

TORONTO.—The Polson Iron Works, Toronto, have been awarded a contract by the Toronto Ferry Company for a new ferry boat 185 feet long, 44 feet beam, to carry 2,200 passengers. Contract price, \$80,000. The "Bluebell," built last year for the Ferry Company, at the Polson Works, is 150 feet long.

Alberta

CALGARY.—The street railway commissioners recommended that the Ottawa Car Company's tender for three car bodies at \$2,396 each and Brill trucks for same at \$749 each, total \$3,145 f.o.b., Ottawa, be accepted, and that the Preston Car and Coach Company's tender for three car bodies at \$2,430 each and Brill trucks at \$763 each, total \$3,193 f.o.b. Preston, be accepted. The difference in these prices, \$48, makes the prices equal when the difference in freight in favor of Preston is considered. The commission also recommend that three sets of Canadian Westinghouse brakes be secured at \$395 per set, f.o.b. Hamilton, and three sets of Canadian General Electric Company's brakes at \$325 per set f.o.b. Peterborough. They advise the acceptance of the Westinghouse Company's tender for controllers, viz.: \$333 per car f.o.b. Hamilton. This includes trolley base, motor, cables, controllers and circuit breaker.

EDMONTON.—The McInnis Lumber Company of Edmonton have received a contract for 340,000 ties, 500,000 feet of bridge timber, 150,000 feet of culvert timber and 140,000 fence posts to be used in constructing the first 100 miles of the Alberta & Great Waterways Railway.

British Columbia.

VANCOUVER.—Contracts have been let by the British Columbia Electric Railway Company for an auxiliary steam plant. The C. C. Moore Company, of San Francisco, have been awarded a contract for work estimated to cost \$250,000, which includes the construction of a reinforced concrete chimney 250 feet high. The Allis-Chalmers-Bullock Company, of Montreal, received an order for the installation of turbine generators of 6,000 horse-power. There will also be special condensing apparatus, a coal-handling machine, and special automatic stoking apparatus, together with an ash conveying machine. It is the intention of the company to dredge the channel of False Creek at the rear of the Westminster Avenue barns, to admit of the entrance of coal barges up to the docks, which are to be built at the back of the new plant at the end of Barnard Street.

U. S. A.

BUFFALO (N.Y.)—The Pierce Arrow Motor Car Company has placed a second contract for new buildings with the Aberthaw Construction Company, of Boston. The buildings contracted for late in September are now under roof, and the new contract is for an additional building four storeys in height, 180 feet long, and additions to the power plant. The new buildings will match the rest of the plant in general design and will be absolutely fireproof reinforced concrete construction throughout.

SEWAGE AND WATERWORKS.

Ontario

TORONTO.—At a recent meeting of the Provincial Board of Health, plans for sewage disposal works for the village of Nepigon and the towns of New Liskeard, Oshawa and Kincardine were approved. Plans for a new water system for Gravenhurst were approved.

NORTH TORONTO.—The Board of Health have recommended the town council to take up the question of a sewerage system immediately.

Manitoba

WINNIPEG.—The Board of Control, which has been experimenting with ventilators and Webb lamps as a means of deodorizing sewer air, have decided to install the ventilators as cheaper and more efficient. About four hundred will be required for the city, compared to 800 lamps, and the cost will be about \$20,000, compared with \$200,000 for the lamps.

WINNIPEG.—The Winnipeg Electric Railway company has submitted a plan to the board of control showing a conduit to be constructed in Portage avenue east from the cor-

ner of Main and Portage to its Mill street substation to carry return feed wires. This proposal is in line with the recommendation of Prof. L. A. Herdt, of McGill University, Montreal, who has been looking into the danger of damage to city water mains by electrolysis.

Alberta.

HIGH RIVER.—Mr. P. Turner-Bone, of Calgary, Alta., has outlined plans in connection with sewerage and water-works of High River.

British Columbia

VICTORIA.—The council have finally decided to submit to the ratepayers, at the forthcoming elections, a by-law to authorize the expenditure of \$1,500,000 on the work of developing Sooke Lake as a permanent source of water supply.

VICTORIA.—On January 13th Victoria will vote on a by-law to raise \$1,500,000 to bring water from Sooke Lake, a distance of 25 miles. Many are opposed to the measure. The Esquimalt Waterworks Company is getting ready to supply water to Victoria by the gallon from Goldstream, as the present service will have been exhausted before the Sooke scheme can be completed.

RAILWAYS—STEAM AND ELECTRIC.

Quebec

MONTREAL.—Work is proceeding favorably with the excavation for the foundations for the big extension to the Canadian Pacific Railway Station on Windsor Street. The contractors, the Foundation Company, of New York and the Bishop Construction Company, of Montreal, have a big plant at work.

MONTREAL.—In order to provide increased terminal facilities for its expanding business, in the east end of the city, the Grand Trunk has, through the Lachine, Jacques Cartier and Maisonneuve Railway (a subsidiary line) made application to the City Council for permission to extend the line of the L. J. C. & M. Railway through the north and east end of the city, to a terminal station which will, for the present, be used primarily for freight business.

MONTREAL.—The work of construction of the extension of the Quebec Central Railway from St. George, Beauce, to St. Justine, a distance of thirty miles, has practically been completed. Twenty-eight miles of track are now laid to St. Justine, and it is expected that the line will be opened to regular train service after the first of January next. The Quebec Government engineer, Mr. L. A. Vallee, made his inspection of the first twenty miles in the early part of this month, and expressed himself as well pleased with the line.

Ontario

LONDON.—The Grand Valley Railway and the Cataract Power Company are said to be preparing to purchase the Southwestern Traction Company and the London Electric Company. The plan also includes the extension of the radial railway line now connecting Brantford and Hamilton through to Woodstock and Ingersoll to this city, thence connecting with a steamship service to Port Stanley; and also to transmit Niagara power for general consumption along the route.

LONDON.—The Canadian Pacific Railway is considering the construction of a new roundhouse here next spring, among other improvements and extensions, which include the enlargement of the yards.

Manitoba.

WINNIPEG.—Three new branches of the C.P.R. are now being opened for passenger traffic. These include the extension of the Lacombe branch, from Stettler to Castor; the opening of the Weyburn to Forward line, and the opening of a new line from Lethbridge to Carmingay. The line running east from Stettler will eventually pass through to Outlook and constitute a main line between Moose Jaw and Edmonton.

Alberta

EDMONTON.—The C.N.R. line will be extended to Athabasca Landing, thirty-six miles from Morinville, the present terminus.

EDMONTON.—Mr. W. R. Clarke, president of the Alberta & Great Waterways Railway, recently intimated that construction work would commence as early as possible in the spring. Four survey parties are out and it is expected that two hundred miles will be graded next season.

EDMONTON.—The Canadian Northern Railway have given assurance to the provincial government that it is their intention to extend next year their Morinville line to Athabasca Landing, and to put the extension into operation. There are but thirty-six miles to complete to reach the Landing. Contracts totalling many thousands of dollars for the supply of ties, bridge timber, culvert timber, and fence posts for the construction of the first 100 miles of the Alberta and Great Waterways Railway were awarded this week to McInnis Lumber Co., of Edmonton. Similar contracts covering fifty miles of right of way were awarded to James Walingker, of Fort Saskatchewan. The combined contracts will cover all timber necessary for construction of entire line as far north as Lac La Biche. The contracts awarded to the McInnis Company will require employment of at least 400 men to rush the work through before spring. Work has already been commenced and the first gang was despatched on December 21st, to the first camp thirty-five miles north of the city. The McInnis contracts call for the supply of 340,000 ties, 500,000 feet of bridge timber, 150,000 feet of culvert timber and 140,000 fence posts.

British Columbia

NEW WESTMINSTER.—The inclement weather has somewhat delayed construction on the New Westminster-Chilliwack line; but the line of steel, which will connect the two places, has been advanced past the 25-mile post, while contractors' gangs are busy on the other side building the roadbed. It is reported that some slight engineering difficulties have been encountered at Matsqui slough some thirty miles from here.

VANCOUVER.—Construction of the coast section of the V. V. & E. Railway, which will cross Hope mountains via the Coquehalla divide and join the Similkameen extension of the road from Princeton, will commence next spring. This is the opinion of the contractors who returned to Vancouver this week, after having looked over the route of the proposed line prior to submitting tenders for the work. Those who made the journey were A. Jellett of Spokane, representing the contracting firm of P. Welch & Company, and Charles Folliot, representing Guthrie & Company, contractors of St. Paul. A representative of the Vancouver contracting firm of Ironside, Rannie and Campbell also went over the ground. The party was piloted by J. H. Kennedy, chief engineer of the Hill railway. The entire Coquehalla river, was thoroughly covered, the party traversing it over the old Yale road, which in its general trend follows the route to be taken by the line. No serious construction difficulties were encountered. It is understood that tenders will be acted upon early in the new year and that construction will be in full swing by spring. Determination of the manner in which the Hope range will be crossed has not yet been made. It is reported that this question is now occupying the attention of the engineers.

LIGHT, HEAT, AND POWER

New Brunswick

MONCTON.—New Brunswick Wire Fence Company at a recent annual meeting elected Mr. A. C. Chapman, secretary and manager, and decided to install their own power plant.

British Columbia

KAMLOOPS.—This city is making additions to its lighting plant, which will be one of the largest and most complete in interior British Columbia.

FINANCING PUBLIC WORKS.

Debentures were sold as follows during the past few days:—

- Newmarket, Ont.**—\$20,000, permanent improvements.
- Georgetown, Ont.**—\$3,150, local improvements.
- Pictou, N.S.**—\$0,000, paving.
- Miniota, Man.**—\$12,000.
- Pipestone, Man.**—\$25,000.
- Claresholm S.D., Alta.**—\$7,000.
- Lacombe, Alta.**—\$25,000.
- Halbrite, Sask.**—\$3,000, permanent improvements.

New Westminster, B.C.—\$400,000 waterworks, etc.
Richmond, B.C.—No tender was accepted for \$350,000 debentures.

Quebec

JONQUIERES, CHICOUTIMI COUNTY.—This municipality offers for sale \$12,000 waterworks debentures.

Ontario

HALTON COUNTY.—M. C. Smith of Burlington, Ont., offers for sale until January 5th, debentures amounting to \$16,000 issued by this municipality.

MEAFORD.—The ratepayers will vote on a \$30,000 new public school by-law.

ARNPRIOR.—The ratepayers will vote on a \$7,117 local improvement by-law, and a by-law for the construction of granolithic walks, macadam roads and sewers.

Manitoba

BRANDON.—Ratepayers have sanctioned the by-law to authorize the issue of \$10,000 bonds for improving streets leading to the city.

KILLARNEY.—A by-law to complete the town hall at a cost of \$10,000 has been carried.

STONEWALL.—The \$10,000 by-law and the parks by-law were carried.

WINNIPEG.—Of the three by-laws recently submitted to the ratepayers the \$50,000 art gallery was defeated. The \$150,000 for underground conduits, etc., and the \$50,000 for municipal baths, were carried.

ST. BONIFACE.—The electric light, gas and parks by-laws were all defeated.

Alberta

WETASKIWIN.—Both the hospital by-law, \$30,000 and the parks by-law, \$2,000 were defeated.

British Columbia

NANAIMO.—A by-law to authorize the borrowing of \$100,000 for the installation of a sewerage system will be submitted on January 13th.

CURRENT NEWS.

Nova Scotia

HALIFAX.—At a meeting of the Board of City Works the estimates of the department for 1910-11 were adopted. They include: Cleaning paved streets, \$5,500; streets, \$25,000; internal health, \$17,000; lighting streets, \$23,800.

New Brunswick

MONCTON.—The New Brunswick Petroleum Company have discovered natural gas in large quantities twelve miles from here, and it is proposed to lay pipes to Moncton.

Ontario

HAMILTON.—Plans for building a bridge over Lottridge Inlet, at an estimated cost of \$2,000 have been approved. Andrew F. Macallum, city engineer.

TORONTO.—Under the name of the Canada Bolt and Nut Company, Ltd., the Toronto Bolt & Forging Company, Swansea; the Brantford Screw Company, Brantford; the Gananogue Bolt Company, Ltd., Gananogue, and a rolling mill at Belleville have been amalgamated. The president of the amalgamated companies is Mr. Lloyd Harris, M.P., Brantford. The Swansea works are likely to be enlarged.

OTTAWA.—The New Wellington Street viaduct was formally declared open for traffic last week.

Municipal Water Commissioners for 1910 have been elected by acclamation as follows:—

Stratford, Ont.—J. D. Barnett.

Galt, Ont.—A. J. Oliver.

Listowel, Ont.—Jacob Bray.

Peterborough, Ont.—W. H. Moore (three years).

Petrolia, Ont.—G. S. Pitkin.

Dunnville, Ont.—Mr. O. E. Wilson.

MISCELLANEOUS.

New Brunswick

ST. JOHN.—The construction of the Navy Island bridge at an estimated cost of \$749,577 will probably be considered at the January meeting of the city council.

Quebec

MONTREAL.—The Montreal Street Railway is asking for permission to extend its lines.

MONTREAL.—The by-law asking whether the corporation should establish a municipal electric lighting plant at a cost of two million dollars was carried.

MONTREAL.—Tenants of the block at the corner of St. James and St. Francois Xavier Street and the lessees of St. Lawrence Hall Hotel, which is owned by the Canadian Pacific Railway Company, have been served with vacation notices, which become effective on March 1st next, when the demolition of the present buildings will begin, and arrangements will be made for its replacement by a new ten-storey modern fireproof structure.

SHERBROOKE.—The council have been asked by the ratepayers of the East Ward to replace the old Alymer bridge with an up-to-date structure.

THREE RIVERS.—Canada Iron Corporation have decided to rebuild their iron pipe foundry which was destroyed by fire several weeks ago.

Ontario.

BRAMPTON.—On January 3rd, ratepayers here will probably sanction a by-law to raise \$40,000 for the installation of a plant to distribute Hydro-electric power.

OTTAWA.—The tenders recently submitted for the removal of the wreckage of the Quebec Bridge have been found unsatisfactory, and an endeavor will be made to make a contract privately. A fair estimate of what the work should cost is placed at \$50,000. Several of the bids, however, were much in excess of this figure, and others had conditions attached to them which could not be entertained.

TORONTO.—City Engineer Rust has recommended the construction of a new bridge on the Weston Road at West Toronto.

TORONTO.—A quantity of standing timber on Rondeau Provincial Park, County of Kent, Ont., is offered for sale by public tender on Monday, 3rd January, consisting of basswood, ash, elm, beech, maple, oak, hickory, and other kinds of mature timber or timber requiring to be cut and removed in the proper management of the forest. Mr. F. Cochrane, Minister of Lands, Forests and Mines.

TORONTO.—The new provincial wagon road between Elk Lake and Gow Ganda, 27 miles, has been completed and is now open. The new road save five miles on the winter road and can be used both winter and summer.

TORONTO.—A British manufacturer of brass and iron goods generally requires a Canadian agent. Write Box 56, Canadian Engineer office for further particulars.

Manitoba.

KILLARNEY.—The installation of a heating plant in the town hall, to cost about \$3,000 is being considered. G. B. Monteith, town clerk.

WINNIPEG.—By-laws for baths and conduits have been sanctioned.

Alberta

EDMONTON.—Surveys are completed for the construction of a proposed hydro-electric power plant on the Saskatchewan River, developing 20,000 horse-power, at an initial cost of \$1,500,000. Mr. Charles Tupper, B.Sc., and Mr. Charles H. Colgrove, M.E., have outlined plans.

British Columbia.

VICTORIA.—The Provincial Government has declined to advance \$75,000 for the installation of an electric light plant and equipment at Prince Rupert.

PERSONAL NOTES.

MR. C. H. B. TOPP, city engineer of Victoria, B.C., has resigned to accept another position.

MR. GEORGE E. GRAHAM, superintendent of Canadian Pacific Railway terminals at Fort William, Ont., has been transferred to Vancouver, B.C., where he will assume the office of District Superintendent.

MR. ARTHUR E. FREEMAN has opened an office at 514 Continental Life Building, Toronto, Ontario, for the practice of Consulting Engineering along the lines of Heating, Ventilating, Sanitary Plumbing, Mechanical, Electrical and Illuminating Engineering.

DR. HENRY T. BOVEY, F.R.S., tendered his resignation as rector of the Imperial College of Science and Technology at a recent meeting. It is understood that this step has been taken owing to the condition of Dr. Bovey's health. The resignation, which came as a great surprise, was accepted with the deepest regret, and reference was made to the rector's great devotion to, and keen interest in, the im-

portant work which he had so recently undertaken, and to his unflinching courtesy and consideration in his dealings with all. Dr. Bovey, who was appointed rector in May of last year, is well known to all Canadians and Anglo-Canadians, having previously been Dean of the Faculty of Applied Science at McGill University. Dr. Bovey came to Canada in 1877, on his appointment as Professor of Civil Engineering and Applied Mechanics at McGill. At that time the engineering courses in the University were managed as a branch of the Faculty of Arts, and were without buildings or equipment. The following year, however, a department of applied science was constituted, with Professor Bovey as dean, and to his management and advice the science department owes its development. He was one of the founders of the Canadian Society of Civil Engineers. Dr. Bovey married the youngest daughter of the late Mr. John Redpath, of Montreal. Among his publications are "Applied Mechanics," "Theory of Structures and Strength of Materials," and "Hydraulics."

MARKET CONDITIONS.

Montreal, December 29th, 1909.

There has been practically no change in the American pig-iron situation, save that the past few days has witnessed a disposition towards a fresh buying movement. There are no longer claims of a heavy tonnage being turned over, but it is stated that enquiries are better than they have been for some time past. Many well informed people are looking forward to a buying movement after the new year, and these would not be surprised to see some advances in price. There is quite a little activity in structural steel material for building purposes, and good orders were recently reported for locomotives and steel cars. In reality the general situation has been but little altered by all this, and the general tone of trade is quiet as compared with the previous activity. The belief in Montreal seems to be that the trade need not look forward to any special activity for some weeks yet.

Trade in Great Britain has shown an unexpected and decided improvement, during the past week. All grades of pig-iron have advanced to some extent and low phosphorous metals, suitable for steel making purposes, have risen 5s. to 6s. per ton, foundry grades having gone up about 3s. per ton. The upward movement is due to the fact that orders have recently been placed for the construction of several large ships, involving the use of considerable tonnage of structural material, steel plates, etc. In addition to this, there is a better feeling, generally. Raw material has continued to advance and British users of low phosphorous ores, who have, for several months, been withholding the placing of orders, in the hope of securing new supplies for 1910 at 1909 prices, now recognize that they must pay the advance not only in ore but in coke. They are, therefore, advancing their ideas regarding pig-iron to correspond with enhanced cost of production. Billets and all semi-finished material have advanced in practically the same ratio as pig-iron, and it is expected that finished goods will take a correspondingly high level. The German and Belgian markets are in better condition than they have been for several months past, prices of all classes of iron and steel material having shown advances; there is still a disposition on the part of makers to decline to quote for deliveries extending into the future. In a general way, the conditions of the iron and steel trade throughout the world are now in better shape than they have been for two years past.

So far as Canada is concerned, the volume of business is good. Prices are being well maintained, stocks are very low and orders received are sufficient to keep plants operating to the fullest extent. The outlook for the future is bright. It is thought, in Montreal, that, while there may be set-backs, they will be of but a temporary nature and will be followed by increased activity.

At the present time, trade in finished and semi-finished goods is anything but active and the market, throughout, appears to be absolutely steady, so far as prices are concerned. The feeling, however, is that early in 1910 there will be a readjustment, upwards.

Antimony.—The market is steady at 8 to 8½c.

Bar Iron and Steel.—The market promises to advance shortly. Bar iron, \$1.85 per 100 pounds; best refined horseshoe, \$2.10; forged iron, \$2; mild steel, \$1.85; sleigh shoe steel, \$1.85 for 1 x ¾-base; tire steel, \$1.00 for 1 x ¾-base; toe calk steel, \$2.35; machine steel, iron finish, \$1.90; imported, \$2.20.

Building Paper.—Tar paper, 7, 10, or 16 ounces, \$1.80 per 100 pounds; felt paper, \$2.75 per 100 pounds; tar sheathing, 40c. per roll of 400 square feet; dry sheathing, No. 1, 30 to 40c. 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:—\$1.30 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 2½c. extra, or 10c. per bbl. weight.

Chain.—Prices are as follows per 100 lbs.:—¼-inch, \$4.00; 5-16-inch, \$4.40; ¾-inch, \$3.70; 7-16-inch, \$3.50; ½-inch, \$3.25; 9-16-inch, \$3.20; ¾-inch, \$3.15; 1-inch, \$3.10; ¾-inch, \$3.05; 1-inch, \$3.05.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, \$6.75 per ton, net; furnace coal, \$6.50, net. Bituminous or soft coal: Run of mine, Nova Scotia coal, carload lots, basis, Montreal, \$3.85 to \$4 per ton; cannal coal, \$9 per ton; coke, single ton, \$5; large lots, special rates, approximately \$4 f.o.b., cars, Montreal.

Copper.—Prices are strong at 14 to 14½c.

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 10,000, 75c. per 100; broken lots, \$1; electric blasting apparatus:—Batteries, 1 to 10 holes, \$15; 1 to 20 holes, \$25; 1 to

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