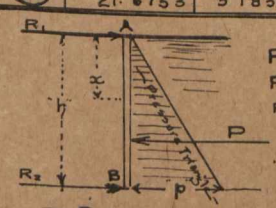
PAGES

MISSING

WATER PRESSURES.

"h" Depth in Feet.	"p" Pressure in lbs per Sq In.	"p" Pressure in lbs per Sq Ft.	"P" Total Pressure in Pounds for 1 Ft. Width.	"B.M max" Max. B.M. in Foot-Pounds for 1 Foot Width.	"B.M max" Max B.M. in Inch-Pounds for 1 Foot Width.	"R_1" Reaction at Top for 1 Foot Width. $\frac{1}{3}P$	"R_2" Reaction at Bottom for 1 Foot Width. $\frac{2}{3}P$	Miscellaneous — Notes and Formulæ.
1	0.4335	62.425	31.21	4	48	10	21	Pressure in lbs per Sq In
2	0.8670	124.850	124.85	32	384	42	83	= 0.433507 x head in ft.
3	1.3003	187.275	280.9	108	1296	94	187	Pressure in lbs per Sq Ft
4	1.7340	249.700	499.4	256	3072	166	333	= 62.425 x head in feet.
5	2.1675	312.125	780.3	500	6000	260	520	Total Pressure in Pounds
6	2.6010	374.550	1124	864	10,368	375	750	= 31.2125 x (depth in ft)^2
7	3.0345	436.975	1529	1372	16464	510	1019	Water at its maximum
8	3.4681	499.400	1998	2048	24576	666	1332	density. 62.425 lbs per
9	3.9016	561.825	2528	2916	34992	843	1686	Cubic foot = 1 gram per
(10)	4.3351	624.250	3121	4000	48,000	1047	2094	cubic centimetre.
11	4.7685	686.675	3777	5324	63,888	1259	2518	corresponding to a Temp.
12	5.2021	749.100	4495	6912	82,944	1498	2997	of 4° Cent = 39.2° Fahr.
13	5.6356	811.525	5275	8788	105,456	1758	3517	HEAD IN INCHES / PRESSURE IN lbs per Sq. Ft.
14	6.0691	873.960	6118	10976	131,712	2039	4079	
15	6.5026	936.375	7023	13500	162,000	2341	4682	1" 5.202083
16	6.9361	998.800	7990	16384	196,608	2663	5327	2" 10.404167
17	7.3696	1061.225	9020	19652	235,824	3007	6013	3" 15.606250
18	7.8031	1123.650	10113	23328	279,936	3371	6742	4" 20.808333
19	8.2366	1186.075	11268	27436	329,232	3756	7512	5" 26.010417
(20)	8.6701	1248.500	12485	32000	384,000	4162	8323	6" 31.212500
21	9.1036	1310.925	13765	37044	444,528	4588	9177	7" 36.414583
22	9.5372	1373.350	15107	42592	511,104	5036	10071	8" 41.616667
23	9.9707	1435.775	16511	48668	584,016	5503	11008	9" 46.818750
24	10.4042	1498.200	17978	55296	663,552	5993	11986	10" 52.020833
25	10.8377	1560.625	19508	62500	750,000	6503	13005	11" 57.222917
26	11.2712	1623.050	21100	70304	843,648	7033	14067	12" 62.425000
27	11.7047	1685.475	22754	78732	944,784	7584	15160	HEAD IN INCHES / PRESSURE IN lbs per Sq. In
28	12.1382	1747.900	24471	87808	1,053,696	8157	16314	
29	12.5717	1810.325	26250	97556	1,170,672	8750	17500	1 0.036126
(30)	13.0052	1872.750	28091	108,000	1,296,000	9364	18727	2 0.072251
31	13.4387	1935.175	29995	119,164	1,429,968	9998	19997	3 0.108377
32	13.8722	1997.600	31962	130,072	1,560,864	10654	21308	4 0.144502
33	14.3057	2060.025	33990	143,748	1,724,976	11330	22660	5 0.180628
34	14.7392	2122.450	36082	157,216	1,886,592	12027	24055	6 0.216753
35	15.1727	2184.875	38236	171,500	2,058,000	12746	25490	7 0.252879
36	15.6063	2247.300	40451	186,624	2,239,488	13484	26967	8 0.289005
37	16.0398	2309.725	42730	202,612	2,431,354	14243	28487	9 0.325130
38	16.4733	2372.150	45071	219,488	2,633,856	15024	30048	10 0.361256
39	16.9068	2434.575	47474	237,276	2,847,312	15824	31650	11 0.397381
(40)	17.3403	2497.000	49940	256,000	3,072,000	16647	33293	12 0.433507
41	17.7738	2559.425	52468	275,684	3,307,208	17489	34979	Thickness of Standard Joists
42	18.2078	2621.850	55059	296,352	3,556,224	18353	36706	h = depth of water in feet
43	18.6408	2684.275	57712	318,028	3,816,336	19237	38475	t = thickness in inches
44	19.0743	2746.700	60427	340,736	4,088,832	20142	40285	s = span in Feet
45	19.5078	2809.125	63205	364,500	4,374,000	21068	42137	F = extreme fibre stress in Plank
46	19.9413	2871.550	66046	389,344	4,672,128	22015	44031	$t = s\sqrt{\frac{4.25 R}{F}}$ (1)
47	20.3748	2933.975	68948	415,292	4,983,504	22983	45965	Hardwood F = 1200
48	20.8083	3058.825	71914	442,368	5,308,416	23971	47943	$t = \frac{s}{503}\sqrt{R}$ (2)
49	21.2418	3121.250	74941	470,596	5,647,152	24980	49961	Soft wood F = 800
(50)	21.6753	3183.675	78031	500,000	6,000,000	26010	52021	$t = \frac{s}{427}\sqrt{R}$ (3)



Pressure varies from 0 at Top to a maximum = "p" at depth "h" (bottom.)

$P = \frac{1}{2} \times 62.5 \times h^2$ lbs $\quad R_1 = \frac{1}{3}P = \frac{62.5}{6}h^2 \quad R_2 = \frac{62.5}{6}h^2$.

B.M. at distance "x" below $A = R_1 x - \frac{62.5}{6}x^3 = \frac{62.5}{6}\left(\frac{1}{3}h^3 x - x^3\right)$

A maximum for "x" $= h\sqrt{\frac{1}{3}} = .58h$

∴ Maximum Bending Moment $= .064 \times 62.5 h^3$

$= 4h^3$ when units are feet & lbs.

Douglas L. McLean.
Ottawa-1909-

The Canadian Engineer

WEEKLY

ESTABLISHED 1893

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The Canadian Engineer

ESTABLISHED 1893.

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NOTICE TO ADVERTISERS.

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TORONTO, CANADA, MARCH 4th, 1910.

CONTENTS OF THIS ISSUE.

THE COMMISSION OF CONSERVATION.

The Canadian Conservation Commission are now organized and watching closely every new development or exploitation of our public wealth.

Their views and the stand they are likely to take on water-power development is well set out in a resolution passed at a meeting held in January. This resolution is of considerable interest to engineers, and we give it in full:—

> That in future no unconditional titles to water-powers should be given but that every grant or lease of powers should be subject, among others, to the following conditions:—
> (1) Development within a specified time.
> (2) Public control of rates.
> (3) A rental with the power to revise same at a later period.

It is unfortunate that governmental commissions are required to protect people against themselves, for every restriction placed upon the individual lessens his individuality and initiative and is not good either for society or commerce.

Following up the general principles enunciated as to water-powers in general, the Commission have taken up a particular situation, and in reference to the dam across the St Lawrence River and the export of power at Fort Frances they have adopted the following resolutions:—

> 1. That a memorial be prepared and submitted expressing the opposition of the Commission to the proposition to dam the St. Lawrence at the Long Sault, or to any similar proposition involving the construction of a dam across the St. Lawrence.
> 2. That the meeting records its opposition to the export of power at Fort Frances being authorized by the Government.

Canada is to-day taking advantage of her natural resources, but it should be remembered that we will not develop by hoarding up.

UNITED STATES STEEL RAIL OUTPUT IN 1909.

The output of all kinds of rails in the United States in 1909 amounted to 3,062,582 tons aganist 1,921,611 tons in 1908, or an increase of over 59 per cent. In 1907 the production was 3,633,654 tons.

The output of 1909 would indicate a busy year, and is a fair forecast of the activity that may be expected in 1910. An active year in the United States means a busy year in Canada. Despite the tariff wall, business conditions in one country affect the other.

The production of Bessemer rails in 1909 amounted to 1,806,621 tons; in 1908 it was 1,354,236 tons.

Of open-hearth steel rails in 1909 there were 1,255,961 tons rolled, in 1908 567,304 tons.

The following table gives the production of all kinds of rails in 1909, according to the weight of rails per yard. Street and trolley rails are included. Kinds of rails in gross tons:—

	Under 45 lbs.	45 lbs. and less than 85.	85 lbs. and over.
Bessemer rails	223,568	735,500	847,553
Open-hearth rails....	32,290	305,684	917,987
Total in 1909.....	255,858	1,041,184	1,765,540
Total in 1908.....	183,869	688,198	1,049,544
Total in 1907.....	295,838	1,569,985	1,767,831

THE PLANNING OF A TOWN.

Canadian towns and cities have "just growed." Far too little attention has been given to topography, architectural considerations or engineering features. In our commercial haste and desires, we have given but little consideration to esthetic matters.

When the town becomes a city we form guilds of civic art, committees on street widening and improvement and committees on public parks. These public bodies outline plans and suggest improvements which cost so many thousands of dollars that the taxpayer hesitates in voting the money. Had the first town plan contained such provisions the cost would have been very small.

No extensions of a town should be undertaken except with the guidance of a plan prepared to provide for the probable needs of the next twenty-five years marking off the land needed for roads, streets, lanes, public squares and parks.

If the plan can divide the district into residential, business and manufacturing sections, so much the better. Care must be exercised so that the future transportation problem may be easily met. Quick transportation is the cry of the age. Like shuttles we are shot back and forth. Let us at the beginning provide for this.

Whether you follow the regular right-angle north- and south plan, so common in this country, or the more irregular and informal plan followed by those anxious for the "city beautiful," one can always provide for the matters suggested, and we do not think any municipal council should take over new areas, new streets, unless they are planned according to a suitable general scheme.

Roads were primarily avenues for traffic; their secondary purpose is to afford building sites. They must, therefore, be considered in relation to both these functions in order of their importance.

Streets should provide easy and direct routes for traffic, and any change in direction should be made gradually so as not to impede traffic.

GOOD ROADS ASSOCIATION.

This week there is meeting in Toronto the Ontario Good Roads Association.

A country has no better asset than a system of well-designed, well-constructed, properly maintained roads, and because this association has as their object the producing of good roads they are worthy of the heartiest support.

The meetings were addressed by experts in road-making from various points in Canada and the United States. Their addresses will be widely distributed, and the result will surely be an improvement in road-building throughout Canada.

EDITORIAL NOTES.

Railway building in China has been taken up anew. Ten years ago the Chinese Government bought out the railways and tore them up, but in a time of peace the railways crept in again, and to-day China has 6,300 miles of railway in operation, with 1,700 more under construction.

* * * *

An important meeting of the members of the Engineers' Club, Toronto, will be held on Saturday, March 5th. New conditions have arisen, and it is very necessary that the present situation should be fairly met. Toronto is to-day the centre of large engineering problems and interests, and the profession should be prepared to do their share.

The Engineers' Club of Toronto

96 KING STREET WEST TELEPHONE MAIN 4977

Programme for March, 1910

THURSDAY, 3rd, 8 p.m.

"Economizers and Mechanical Draft."

Illustrated Address by Mr. C. F. Hodges, Buffalo Representative of the B. F. Sturtevant Co.

THURSDAY, 10th, 8 p.m.

"The Economical Design of Reinforced Concrete Structures."

Address by Mr. Clarence W. Noble, Consulting Engineer, Toronto.

THURSDAY, 17th, 8 p.m.

Address by Dr. J. A. Amyot, Provincial Bacteriologist. Subject to be announced later.

THURSDAY, 24th, 8 p.m.

"Railway Development in Canada."

Address by Mr. R. A. Baldwin, Engineer, Canadian Northern Railway.

THURSDAY, 31st, 8 p.m.

Meeting of the Toronto Branch of the Canadian Society of Civil Engineers.

THE EXECUTIVE MEETS EVERY THURSDAY AT 7.30 P.M.

C. M. CANNIFF, President, Fraser Ave. L. J. STREET, Treasurer, 209 Stair Building.

R. B. WOLSEY, Secretary, 25 Lowther Ave.

NEW INCORPORATIONS.

Haileybury, Ont.—Quantz Lake Silver Mining Company. $500,000; W. A. Gordon, F. A. Day, C. H. Day,

British Columbia.—International Mining Company, $1,000,000. Manquam Falls Power Company, $100,000.

Halifax, N.S.—Robin, Jones, Whitman, Limited, $1,750,000; W. H. Fulton, J. B. Kenny, R. W. Maclellan.

Clarksburg, Ont.—Beaver Valley Woollen Mills, $50,000; H. Y. Telfer, Collingwood, J. M. Steel, P. Haines, Clarksburg.

Montreal.—Central Canada Power Company, $5,000,000; J. C. Hickson, S. B. Hammond, V. M. Rury. Atlantic Sugar Refining Company, $4,500,000; A. C. Casgrain, J. W. Weldon, E. M. Casgrain. J. Cooper Company, $20,000; Misses E. L. A. Browne, F. Graddon, M. Hoolahan. Holland Varnish Company, $100,000; C. G. Greenshields, E. E. Parkins, J. M. Montle. Metal-Bound Box Company of Canada, $700,000; R. C. McMichael, R. O. McMurty, W. R. L. Shanks.

DESCRIPTION OF THE NEW DAM AND PUMPING STATION BUILT BY THE CITY OF PETERBOROUGH, ONT.

A. W. Ellson Fawkes.*

One of the most important public works undertaken by the city of Peterborough in recent years, is the construction of the new waterworks dam and pumping station. This work has advanced so rapidly that the installation of the machinery is in progress. Nearly a year ago a by-law was submitted by the city council to the ratepayers, giving the Water Commissioners authority to expend $120,000 in the erection of a new concrete dam, and equipping a pumping station with the machinery necessary to force the water into the mains for the city's use. The by-law received the approval of the ratepayers, and the Commissioners proceeded with the work of construction by letting the contract to the Bishop Construction Company, of Montreal, Que., who made a start on June 30th, 1909, with Mr. G. Morrison in charge of the work for the contractors.

The work was divided into two sections, the West portion started first, Fig. 1, taken on July 9th, shows the construction of the coffer dam. Constructed of 6 x 6 in. timbers, 6 ft. wide, and sheeted on the upstream side with 2-in jointed lumber, thus making a good watertight job of the cofferdam part of the work. This was a more expensive way of cofferdam than is usually adopted, but it more than paid for itself by reducing the leakage to a minimum, and making excavations more expedient. Two pumps, a 12-in. and 6-in., were used to lift out the water from within the cofferdam at the rate of 5,000 gallons per minute. Fig. No. 2, 20th July, 1909, shows a start to drill the rock and to excavate on the most westerly section; when the excavation was in full blast we were taking out about 300 cubic yards per day; this work proceeded till the 28th August, 1909, when a start was made to put in the first layer of concrete (Fig. No. 3) to the west portion of the work. Owing to the poor nature of the rock at the depth required it was deemed necessary to put a layer of concrete the whole way across 1 foot 6 inches thick, to guard against the water scouring out the rock at the base of the walls to the wheel pits. This precaution was not wasted, as when the connecting of the east cofferdam had been in place only a few weeks a pike pole was put down along the face of sheeting, and a space of several inches was found between the ends of the sheeting and the rock. The rock had scoured out at this particular place; of course the flow of water was greater at this place as the whole of the river practically was turned through this sluiceway. The concrete was examined and was perfect in every way. The concrete at this part of the work was put into the following: Mix 1 part by measure of Portland cement, 3 parts by measure sand, 5 parts by measure gravel, same not to exceed 2 inches in diameter, with a 20 per cent. allowance for fillers. The concrete was mixed by a mixer of an approved type, putting in concrete at the rate of 150 cubic yards on a full working day.

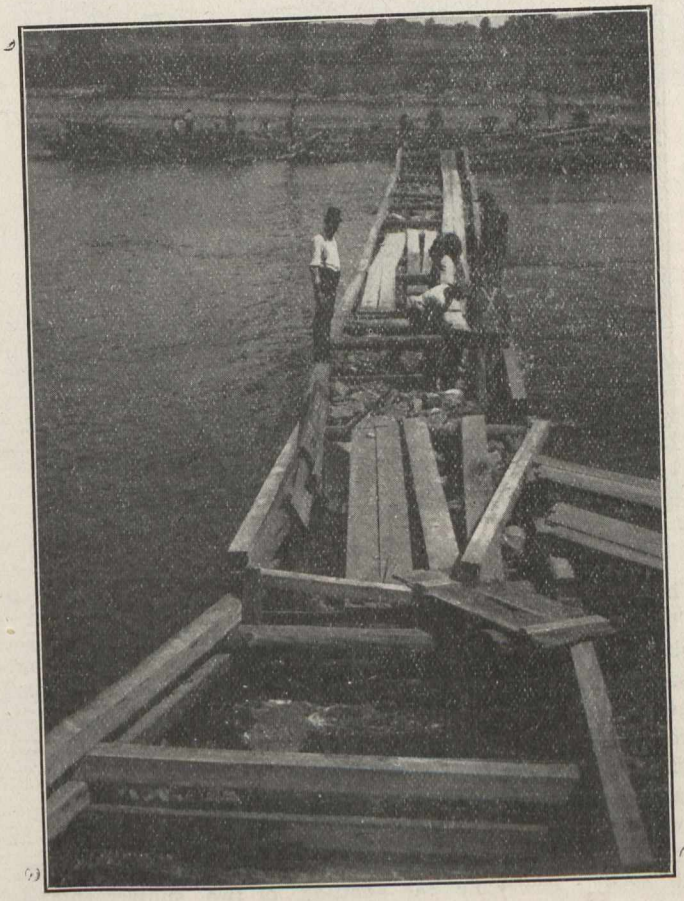


Fig. No. 1.

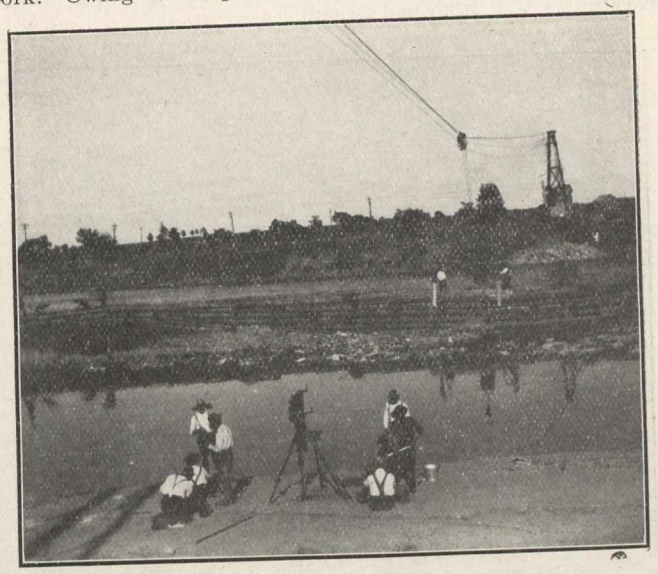


Fig. No. 2.

The following tests of the cement may prove interesting.

Specific gravity, 3.123.
Blowing good.
Color. Good
Residue on Sieves, 100.2.4 per cent. 200.19.2 per cent.
Set. Initial 2.25 hours. Final, 4.00 hours.
Water used. Neat 21.7 per cent. Mortar, 8.7 per cent.
Tensile strength, 24 hrs. 440. 3 days. 557. 7. days. 645. 28 days. 735.

Fig. No. 3, 24th September, 1909, shows the progress of the work now up above water, also the method adopted to place concrete into forms, by means of a cableway from west to east, with a bucket of 1 cubic yard capacity. Up to this time over 2,300 cubic yards of concrete were deposited. At the same time as the concrete was being deposited, progress was being made on the erection of the steel-work to the racks amounting to 150,000, as shown in Fig. No. 4, 14 Sept., 1909. By the 27th September, 1909, the work had so far advanced to warrant the removal of the cofferdam to the west section of

*Resident Engineer, Peterborough Waterworks Improvement.

the work, divert the river through to completed part of the work, and so make a start to put in the cofferdam to the eastern section, that constitutes the dam. Owing to the rapid progress of the work on the west section, and that now being up to the grade required, a start was made on the superstructure or pumping station to the following dimensions (inside) 39 feet wide, 110 feet long, 28 feet high, with a 10-ton travelling crane from end to end.

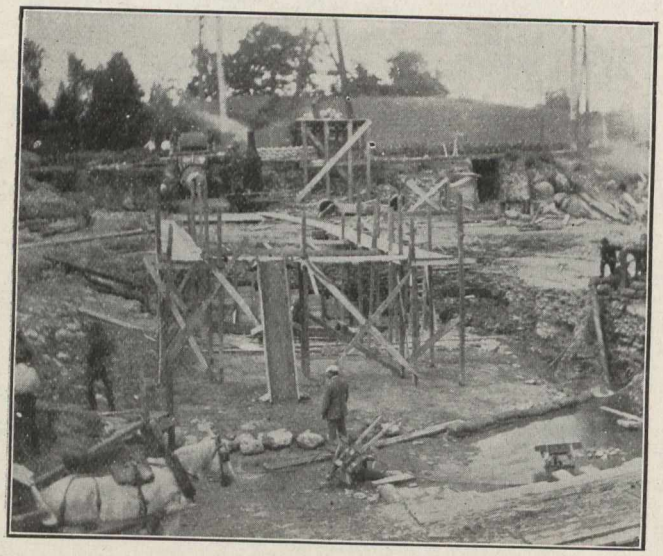


Fig. No. 3.

The superstructure is a series of concrete pillars, intervening space filled in with windows and brickwork, with a concrete belt course above the windows.

The roof is of concrete supported on 12-inch I-beams. The top portion of the concrete roof is boarded with match lumber with an air space between the concrete and the lumber, thus reducing the condensation to the ceiling to a minimum, a roofing felt of an approved quality is laid on the boarding, thus making a good even watertight roof. Fig. No. 5, 27th November, 1909, shows the forms removed from the

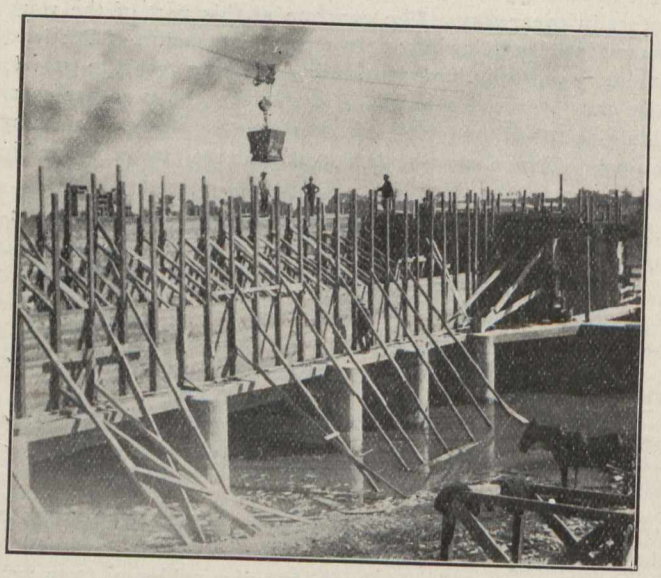


Fig. No. 4.

concrete, some of the windows in place, and a start made on the brickwork, which is Milton red pressed on the outside, and Milton buff on the inside.

A start has been made to install the machinery which consists of two 62-inch Samson wheels, two 68-inch Samson wheels, one McDougall pump, with a pumping capacity of 3,000,000 gallons of water per day, one Wm. Hamilton pump, with a pumping capacity of 3,000,000 gallons per day, and the two pumps from the existing power house with a pumping capacity of 2,500,000 gallons per day, thus giving the city a pumping capacity of 10,500,000 gallons per day in their new development; the following figures give the approximate efficiency of the wheels:—

62.12 ft. head, 323 horse-power water cub. ft., 17.574 speed, 91 revolutions per minute, 68.12 ft. head, 388 horse-power water cub. ft., 21.138 speed, 83 revolutions per minute. The building is heated by a 30 horse-power tubular boiler, connected to a series of radiators along the north and south sides of the building with a radiation of 1.460 sq. feet.

Passing from the building of the pumping station we find that the eastern section of the work that constitutes the dam made good progress as on November 12th, 1909, we commenced to erect forms for the lower dam or apron, the same quality of concrete was put into this work as on the west section, the construction being a series of piers and sluices.

Fig. No. 5.

The grade at base of piers 57.06; grade at bridge floor, 83.00. The piers are 4 ft. thick, sluices 20 ft., with a log slide 6 ft. wide. The bridge floor is 15 in. thick of concrete with reinforcement longitudinal and cross way of floor, the whole of the stop-log channels are connected together by channels that cross the sluices and bolted to the stop-log channels in a continuous line as shown on Fig. 6, 29th November, 1909; this also shows the work nearing completion, and within a few feet of the required level 83.00. In constructing this development provisions have also been made for future development for electric power by the addition of two supplementary sluices 20 ft. wide by 60 ft. long, with a capacity of developing about 1,200 horse-power.

The situation of the new dam being about 800 feet lower down the river than the old dam, and the water having to be raised to a level of 81.60, it was necessary to build a watertight embankment along the west river bank with a concrete core wall running the whole length of the embankment 800 ft. also to divert a creek that emptied into the river just below the old dam, the diversion of this creek was a tedious matter owing to the waterway having to have an outlet, and the ex-

cavations being through rock 7 ft. deep, and along the side of the roadway under the power lines of Canadian General and the Bell Telephone Co. The water was carried through a 3 ft. concrete pipe for 300 ft. and empties into the river below the new dam. The total cost of this culvert diversion comp'ete with its inconveniences came out at an average price of $5 per foot run of 300 ft.

The contract time for this work is not up till September, 1910, and owing to the poor nature of the rock at the river bed

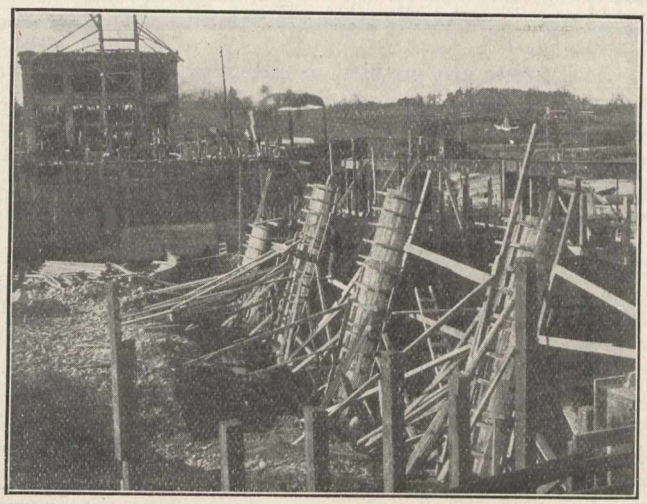


Fig. No. 6.

it entailed extra excavations, more concrete by about 1,000 yards besides the usual extra work that usually follows in this class of work, and to have accomplished the whole of this work in the short space of 24 weeks, thus being nine months ahead of contract time, it can readily be assumed that no time was lost. The work was always set out well ahead of the contractors and they took full advantage of every

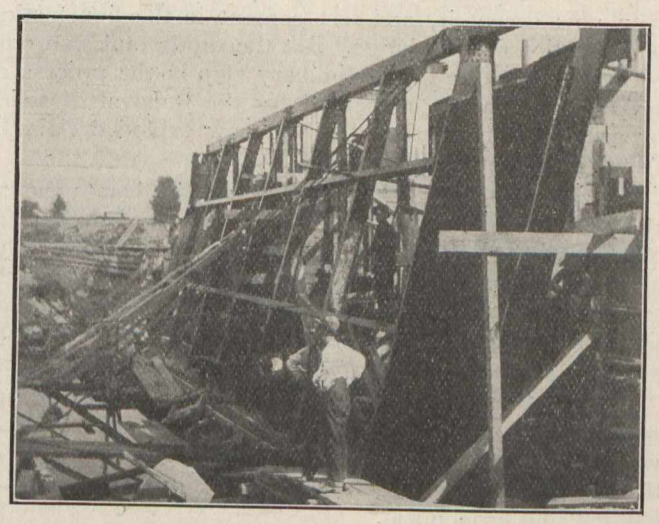


Fig. No. 7.

facility held out to them with the inevitable result of a quick and speedy structure.

The following quantities will be interesting:—

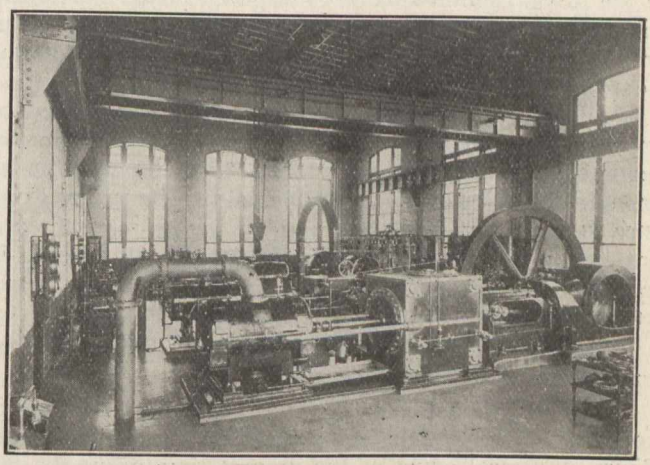
Earth excavation, 4,600 cubic yards.
Rock excavation, 3,500 cubic yards.
Concrete, 7,000 cubic yards.
Steelwork, 317,907 pounds.
Cofferdam, 3,000 cubic yards.
The total length of dam between abutments, 327 feet.

The commissioners decided to secure the services of one of the best authorities, and they considered themselves very fortunate in obtaining the services of an engineer of the experience and ability of Mr. Wm. Kennedy, Jr., Consulting Engineer of Montreal, by whom the plans and specifications were prepared. The whole of the work was set out and supervised by Mr. A. W. Ellson Fawkes, C.E., Mr. Kennedy's resident engineer on the works. From general observations and remarks the Water Commissioners and ratepayers are highly satisfied with the results of the expenditure of their money, and are contemplating further developments along the same basis at an early date.

THE WATER SUPPLY SYSTEM FOR THE CENTRAL OF GEORGIA RAILWAY'S MACON SHOPS.

Among the advantages peculiar to electric pumping there is the possibility of locating the delivery apparatus, practically unattended, directly at the intake site, and at any reasonable distance from the source of power, the control station and the point of delivery.

A good example of such flexibility in disposing the links of a small water supply system is the motor-driven pumping equipment for the locomotive and freight car repair shop of the Central of Georgia Railway at Macon. The installation of this plant has resulted in assuring a generous supply of water at all times for general use and fire protection service,



Interior of Power Plant of the Central of Georgia Railroad Company's Macon Shops—Pumping Motor Control Board.

besides substantially reducing the cost of each thousand gallons compared with the price when the supply was purchased.

The present private water supply system of the Macon shops comprises a motor-driven pumping station on the bank of the Ocmulgee River, nearly a mile from the shops and power plant, from which it derives its power supply, and to which in return it delivers 600,000 gallons of water per twenty-four hours against a head of 55 feet. No attendant is maintained at the pump-house, the machinery being controlled from the power plant in the shop group of buildings in accordance with automatic indicating and recording devices.

The duty required of the pumping plant is the supply of water for general use about the shops and property, fire protection for the buildings, condensing water for the power plant boilers and water for the locomotives, all aggregating about 600,000 gallons daily. Chemically, the water of the Ocmulgee River is quite good from a boiler standpoint, but

(Continued on page 205).

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

APROPOS OF SEPTIC TANK ACTION.

We publish in this issue a paper by C. E. Lawton, F.I.S.E., on the bacterial treatment of sewage. The author has some interesting and pointed remarks to make with reference to septic action in sedimentation tanks. We find the oft, of late, reiterated statement: "Such a tank will be found to produce an effluent containing a great quantity, and at times more solids in fine suspension than the liquid entering the tank, to the detriment of the subsequent operation of filtration." And, again: "A large percentage of the solids in suspension (generally estimated at 75 per cent.) are undigested by this treatment. The removal of the same must take place by some means."

Shall we again repeat the now well-known finding of the Royal Commission on Sewage Disposal? "It must, therefore, be said that some of the more important claims which were originally advanced in favor of septic tank treatment have not stood the test of experience."

In spite of the most emphatic statements, based on experimental and practical data, that the chief claim for septic tank treatment, viz.: **"The total liquefaction of organic solids" can no longer be said to have any existence in fact,** we, however, even up to the present date, are being confronted with articles and statements in technical journals which take no cognizance of the newer knowledge regarding so-called septic action.

The mills of the gods grind slow, and our pet theories are writ in almost indelible ink.

Can any sanitarian, having regard to the newer knowledge anent septic action, say that the United States Court of Appeal could at the present time grant the five statements of claims which they did in the well-known Saratoga Springs decision?

Let us again examine the wording of the five claims allowed.

No. 1. "The process of purifying sewage, which consists in subjecting the sewage under exclusion of air, of light, and of agitation to the action of anaërobic bacteria until the whole mass of solid organic matter contained therein becomes liquefied." Here we have a distinct claim made, an advantage and benefit alleged, and legally allowed, inasmuch as "the whole mass of solid organic matter contained" is said to dissolve into liquid. Yet, we have the Royal Commission's statement: "From careful observations, extending over two years, which we made at Exeter (the original septic tank) and Ilford, we found that, without allowing a correction for colloidal matters, the digestion at Exeter was about 25 per cent. and at Ilford about 30 per cent."

If this decision of the Royal Commission stood absolutely alone, which, however, it by no means does, could it now be held that such claim as the above would be seriously considered in any court of law?

We surely are justified in assuming that, if a patent process is based upon obtaining certain defined results, and it is clearly shown that these results are not obtainable, then just as the claims are worthless, so is the patent. But, of course, we have heard somewhere that "the law is a hass," and we do not pretend to interpret the law in these columns.

Take the other four claims allowed. They all commence with the words: "The process of liquefying the solid matter contained in sewage . . . until the solid matter contained in the flowing sewage is dissolved." And yet, we now have Lawton saying: "The tank will be found to produce an effluent containing a great quantity, and at times more solids in fine suspension than the liquid entering the tank." Not only Lawton, but the Royal Commission actually give figures showing the increase of solids in the flowing sewage at Burnley, Huddersfield and Leeds. At Huddersfield, after eleven months, there were four times more solids in the flowing liquid than to commence with.

Now, who are we to believe? Shall we take, what is the concensus of modern sanitary conclusions, or shall we continue to accept claims made several years ago?

If the septic tank was the "end all," or the "final step" in the process of sewage purification, we might even now accept it, and rest content in the liquefaction of a fraction of the sludge. But the septic tank can only be looked upon as the preliminary step in the process of sewage purification, a method for the removal of solids by sedimentation, stripped of the now exploded claim of "sludge elimination."

Even as a preliminary step, grave disadvantages are alleged. It is stated, and has been shown, that the act of passing the flowing sewage over a rotting bed of filth allows the absorption of properties creating greater difficulty in final oxidation or purification of the sewage liquid. What, then, are some of us fighting for? Apparently the ghost of a rotting corpse, and little more.

The above may require some modification, for we read in the Royal Commission report: "At the same time, we think that in certain circumstances the adoption of this method of treatment, as a preliminary process, is efficient and economical."

"Certain circumstances." What are they? Only where a plant is so small, or an authority operating the tank so poor, making it either of little importance or financially impossible to do anything else but neglect the tank, and so allow the sludge to form a putrefactive base for the flowing liquid.

Even, however, when it is determined to neglect the sludge and allow septic action, certain modifications in the form of the tanks are now shown to be desirable.

Faith in septic action determined certain factors in construction. Want of faith has upset these factors.

For example, septic tanks were not constructed primarily with reference to velocity of flow, but to rate of flow or total capacity. It is known that with ordinary domestic sewage a flow velocity of one-tenth of an inch per second with a rate of flow or tank capacity of one and a half hours is sufficient to remove from the sewage about 70 per cent. of the solids. The removal of the solids was not the primary object of the septic tank, The liquefaction, both of the settled solids and the solids suspended in the flowing sewage were the features aimed at. Hence, we have septic tanks built to the enormous capacity of thirty-six, twenty-four, twelve, and sometimes eight hours' flow, in order that the flowing liquid may have a sufficiently long period of contact with the rotting sludge.

If we have lost faith in this system of retaining the liquid sewage in contact with the sludge it is evident, even if we intend to let the sludge remain, we had better hurry the liquid over it in as short a space of time as practicable.

Let us take an example. A daily discharge of 57,600 cubic feet of sewage, in order to give a tank capacity of twenty-four hours, would require four tanks working together 60 by 30 by 8 feet deep. On the other hand, with three hours' capacity, which is ample for purposes of sedimentation only, a tank 60 by 20 by 6 feet average depth would just give the required size. If the longitudinal section of the tank (the 60-foot length) be at right angles to the flow of the sewage, the velocity of flow would be one thirty-second of an inch per second (one-tenth of an inch per second is ample for sedimentation in one hour and a half), a sufficient margin or safety factor is thus provided.

The above simply means that in order to enjoy the now exploded claim of benefit to the sewage liquor having contact with the sludge, we require tankage of eight times the capacity necessary for sedimentation, pure and simple.

We have the example of Toronto, proposing at first to install septic tanks, and Herring & Watson (consulting engineers) advising a form of German tank in which all septic action is avoided. Their recommendations have been accepted by the city.

In view of the above consideration, and of the fact that a number of types of improved sedimentation tanks have been recently adopted, and are giving efficient results, why all this bother and serious consideration still given to septic treatment by authorities and certain engineers, who appear to feel that they are losing their birthright in losing the right to install septic tanks without payment of fees?

If, in spite of all that has been declared by sewage commissions, experimenters, both British, American and European, the adherents of septic action can prove that the process claims upon which the patents are based are good and of real value, then let everyone enjoying these patented claims pay. If the adherents of septic action cannot make good these claims against the weight of evidence, then **why pay for nothing?**

THE BACTERIAL TREAMENT OF SEWAGE.*

By C. E. Lawton (Fellow).

It has been taken for granted by the author that this essay should be written from the standpoint of the Sanitary Engineer as distinguished from that of the chemist or biologist, but even then to deal comprehensively with the subject within the limits of an ordinary paper is impossible. Bearing these restrictions in mind the author has omitted any reference to the history of the subject, contenting himself with the statements that the processes to which sewage is now generally subjected, and which are popularly known as the "bacterial treatment," are of quite recent adoption, although it must not be forgotten that the proper application of sewage to suitable land is a bacterial treatment which has been practised for a longer period.

It is perhaps necessary to state that sewage is a compound of solids and liquids, of a complex and varying nature; varying not only with the locality owing to the habits and industries of the community, but varying at every hour of the day and night, both in composition and volume. When it is realized that this instability is increased by every fall of rain, the difficulty of dealing scientifically with sewage must be apparent. Sewage arriving at the outfall works is largely composed of the waste products of the animal system, together with other matters such as grease from culinary operations, soap from ablutions, vegetable fibre from paper, etc., and in many cases trade wastes of an acid or alkaline nature, mineral matter from roads, yards and roofs; the vehicle of the whole being a comparatively large volume of water, with which a great portion of the impurities have chemically combined. Sewage being largely of organic origin, a natural process of decomposition generally commences on its passage through the sewers, owing to the activity of the micro-organisms or bacteria present, and various stable and unstable chemical changes are produced; the degree of such changes varying with the length of time occupied in reaching the outfall, the temperature of the liquid, the subjection or otherwise to violent mechanical operations such as pumping, and sometimes to the retarding or antiseptic action of trade refuse present.

The water-carriage system of sewerage is undoubtedly the best known system of easily removing most of the waste products of civilization as are inimical to the health of the community, but it must be remembered that the water utilized to convey these matters has chemically combined with them, and the problem at the outfall works is to separate and release this water and to purify by the agency of bacteria the impurities conveyed by it, and especially to separate from it the solids in suspension. It is comparatively easy to oxydize within certain limits of efficiency the solids in solution by such means as streaming filters, if only the solids in suspension can first be subtracted; and the failure to find an efficient and economical method of performing this operation, is responsible for the sludge problem.

The primary steps in the treatment of sewage at the outfall works are designed to partially effect this separation of the solids in suspension by: (1) Roughly screening the sewage with a view of retaining and removing the bulkier solids by hand or mechanical screens and disposing of the screenings by burying or ploughing into soil, or burning in a furnace; (2) settling the heavier solids by gravitation in tanks or pits, and retaining the floating solids by scum boards. The extracted detritus may be dealt with in several ways, varying with local exigencies, and as follows: (1) By spreading on arable land and ploughing into the soil in rural situations; (2) by mechanically pressing out the moisture present and using the resultant cake as manure or by burning the cake with fuel in a furnace; (3) by burying in bulk in the ground; (4) by barging out to sea. Upon leaving the detritus tanks or pits, it is usual to provide an overflow weir

* Read at a Sessional Meeting of the Institute of Sanitary Engineers, February 2nd, 1910.

arranged to come into operation when the flow of liquid is over three times the ordinary dry-weather flow, the water so diverted being treated in a separate manner by storm-water filters or beds or on land specially laid out and set apart for its use. Owing to the fact that storm-water filters are only in use at uncertain periods they cannot sustain the bacterial and other low animal life upon which their efficiency depends, and their action is therefore a mechanical one only. Arranged as contact beds they give better results than as percolating filters, as efficient means of distributing the liquid upon the surface are not usually provided, it being considered that the weak character of the liquid to be treated does not call for such expensive and special appparatus. The author has found it a good plan to fill one storm contact bed per day in dry weather with weak early morning sewage, by which means the beds are kept " alive."

In the Fifth Report of the Royal Commission on Sewage Disposal, the use of separate storm-water filters or beds is not approved; but in their place special stand-by tanks having a capacity equal to about one-quarter of the dry-weather flow are recommended.

The sewage being settled and free from the heavier solids and floating matter, is usually again subjected to treatment in tanks of much larger capacity, with a view to further reducing the solids in suspension, and in the case of the septic treatment, to liquefy a portion of the solids. The onward progress of the liquid in these tanks is slow, owing to their capacity, and affords an opportunity for the sedimentation of solids of lighter specific gravity, and also tends to greater uniformity in the composition of the tank effluent liquor by reason of the mixing which takes place.

Septic Tanks.—Taking the case of tanks worked on what is known as the septic principle first, i.e., those in which no chemicals are used, and which are emptied at rare intervals, the decomposition which takes place in the sewage on its way to the outfall works before mentioned, is here continued and amplified by the action of anaerobic organisms cultivated by these conditions and resulting in the liquefaction of a portion of the solids in suspension and the production of gas. As a large percentage of the solids in suspension (generally estimated at 75 per cent.) are undigested by this treatment, the removal of the same must take place by some means, or the tank would soon be full of solids. Those which have gravitated to the bottom of the tank require periodical removal, as although the deposit may not increase largely in bulk, with an extended use of the tank, they will interfere with and prevent the fulfilment of one of the objects aimed at, by their liability to be carried up into the body of the liquid, by the bubbles of gas produced under them in the process of decomposition of organic matter. If they reach the surface of the liquid they form a scum which it is necessary to retain in the tank, and which until recently was supposed to be of great value in excluding light from the liquid, or if released of the gas by which they were erupted, they commence to descend again, and a tank so neglected will be found to be producing an effluent containing a great quantity, and at times more solids in fine suspension than the liquid entering the tank, to the detriment of the subsequent operation of filtration.

The contents of such a tank are continually disturbed as in a greater degree boiling water is disturbed by the action of heat. To prevent this ejection of solids in suspension, ordinary rectangular tanks having flat bottoms require emptying when the condition of the effluent demands it, to effect the removal of the sediment; but improved forms of tanks such as the so-called " Dortmund type, or cylindrical tanks fitted with mechanical scrapers, allow of the removal of the sediment—in a very liquid form—without the necessity of emptying. This is to be preferred, as when a tank is emptied some considerable time elapses before the septic action is in full operation again, and to avoid this a portion of the septic liquor from an adjoining tank is sometimes run into the empty tank. The capacity of septic tanks required to give the best results varies considerably with the nature of the liquid to be treated, and may range from half to one day's dry weather flow.

Where there is danger of nuisance from the gas emitted by septic tanks they are generally roofed, but precautions are necessary to avoid the explosion of the gas so confined, and no advantage in treatment can be claimed. An ingenious constructional method of greatly preventing the ejection of solids in suspension is known as the hydrolitic tank, designed by Dr. Owen Travis, where a separate chamber is allocated to the sedimentary solids and their accompanying gasifying action, whilst the liquid, comparatively free from these solids, passes forward to the outlet.

Another method of treating sewage in tanks is by sedimentation only, and this may be effected by allowing the liquid to flow continuously through the tanks or by quiescent settlement for a period of a few hours before drawing off the supernatant water. To allow treatment by the latter method there must be a difference of level between the tanks and filters equal to the depth of the water decanted, which cannot in many cases be obtained. The contents of sedimentation tanks are frequently emptied and the deposited solids removed.

An essay on the Bacterial Treatment of Sewage would not be complete without mention of tank treatment by chemical precipitation, although the result is not accomplished by the action of bacteria. It is, nevertheless, often employed to abstract solids in suspension preparatory to the bacterial treatment of the tank liquor. In this case a chemical compound of a flocculent nature is added to the sewage, which in the presence of water forms a heavy precipitant, and the gravitation of which takes the solids in suspension with it to the bottom of the tank. The objections to this process are the large amount of sludge to be dealt with (which comprises not only the solids of the sewage, but the added precipitant), and the cost of the chemical. On the other hand, the tank liquor is so free of suspended solids that a much larger volume per unit of filter may be successfully treated, with a corresponding reduction of filter capacity. The presence of large quantities of certain trade wastes in sewage make it imperative to subject the liquid to chemical precipitation.

The efficient and economical disposal of the sediment from tanks is the most difficult problem in the whole of the operations to be performed at the sewage disposal works. It is largely a question of the best means of separating the 90 per cent. of water from the 10 per cent. of solids, which comprises what is known as sewage sludge. In rural situations where suitable land is available it may be run into shallow grips cut into the soil, and afterwards covered over with the excavated mould from the furrow, the object being to remove the liquid portion of the sludge by percolation into the soil of the adjoining ridges, allowing the bacteria of the soil to oxidize the organic matter. The mould thrown over the grips prevents the exposure of the sludge to the direct evaporating action of the sun. As may be supposed, this method is much more efficient in dry, warm weather than in wet and cold weather, and a light soil is essential. On the drying of the sludge the ridges may be " split "into furrows or grips and the operation renewed, and on the subsequent drying the whole site may be ploughed and cropped until in a fair state to again receive similar treatment, another site being meanwhile utilized for this purpose. Sewage sludge is sometimes run in bulk into shallow lagoons cut into the ground, and if possible underdrained to draw off the liquid; when sufficiently

stiff the remaining matter is dug out, removed, and used as manure on arable land. Lagooning is a very slow process in winter time, and the liquid drained from the sludge requires efficient treatment, as it is of a concentrated nature. Where land is not available for the treatment of sludge as described, it is usually pressed into cake to remove the bulk of the liquid, and disposed of as manure if possible, or cremated in a destructor with house refuse. Sludge from septic tanks is more difficult to press than that produced by chemical precipitation.

As an alternative to tank treatment, the sewage, after being screened and relieved of its grit, may be run into primary contact beds, which consist of tanks containing large gauge media (say, of not less than 3-inch gauge), each bed being rapidly filled; its contents are then allowed to lie quiescent to deposit the sediment upon the media and afterwards drawn off. This treatment is an oxidizing one, the organic deposit on the media being attacked by aerobic bacteria in the presence of the oxygen of the air, which enters the bed as the liquid is withdrawn, the bed standing empty for this purpose for a definite period. The matters in solution also undergo changes during the stay of the liquid in the bed. A great feature of this process is undoubtedly the absence of the amount and objectionable character of the sludge produced as compared with any tank treatment, but there remains in the bed the finely divided inorganic solids, colloidal matter, and the humus which is a product of the oxidization of the organic matter, and as a small portion only of these is carried away with the liquid on its release the capacity of the beds gradually diminishes until the removal, cleansing, and reinstatment of the media become necessary. This is an expensive operation, and to avoid this drawback Mr. Dibdin introduced his slate bed. This is a contact bed having horizontal layers of slates, which are kept a few inches apart by strips of the same material, in lieu of the ordinary media. On the emptying of the liquid contents the major portion of the inorganic solids and humus from previous operations flow out with the liquid, and means are provided for removing, when necessary, any such solids which remain, by flushing the layers of slate. The amount of fall required to work such beds, compared with that for continuous tank treatment, is undoubtedly a factor to be reckoned with at most works, but the system appears to offer a great advantage in the prevention of a large percentage of the foul sludge usually produced under ordinary tank treatment.

The next processes to be considered are those intended to effect the oxidization of the organic matters present in the liquid—mostly in solution—and comprise filtration, either in contact or percolating beds.

THE HYGIENIC INFLUENCE OF HUMIDITY.

The body temperature is largely regulated by evaporation from the skin and lungs.

If the atmospheric relative humidity be high, skin evaporation will be retarded; that is why heat with moisture is more unbearable than the same heat with a low humidity.

In cold moist climates, bronchitis and rheumatic conditions are prevalent.

It was at one time thought that malaria, plague, etc., were influenced by climate, but we now know better.

Consumption is rare in dry desert climates, the reason why there are many tubercular patients on the prairies, is due to the fact that people go there in order to effect, if possible, a cure.

ECONOMICS AND PRINCIPLES OF MACADAM CONSTRUCTION FOR TOWNS.

D. T. Black, C.E.*

Good streets are necessary in the advancement and development of all progressive towns. Attention to facilitate traffic and to reduce expense of haulage are sure signs of progress in any town. Good streets encourage industries; industries make towns important and build them up; therefore build good streets; but good streets are expensive improvements; therefore economize in every possible way.

Road building dates back to the Romans, and still is a very important question to-day. The day is coming rapidly when every town, and even village, in Canada will be demanding something better than the muddy earth roads with deep and dangerous ditches.

To-day many varieties of paving are used. One class may be preferable to another on a special thoroughfare to reduce the noise, or to increase the load for the same motive power, or to guarantee longer wear for heavy traffic. Mr. W. A. Clement, City Engineer, and a committee of Vancouver Council, after an extended visit through the States, in their report said "A perfect pavement has not yet been found—no one paving material combining in itself all the desired qualities." The question then arises, what will be chosen. A town may desire its main street paved in wood block or some other modern material, but one street in a town will not satisfy the people of this country in the next few years. The feeders to the main street and residential streets must also receive attention. From an economical view a town on such a transformation scheme as permanently constructed thoroughfares and residential streets should consider well its natural resources of supply in such construction; imported material generally increases the cost. Macadam still makes a serviceable street and many cities still put down miles of it annually. Motor and heavy traffic in cities may call for materials with a harder wearing surface, but such traffic is not seriously met in towns at the present day. Macadam, being low in first cost, having a hard, unyielding surface over which great loads can be drawn in all kinds of weather, makes it a good material to the street improvement schemes of a young growing town. Many engineers exaggerate the cost of maintenance of macadam, which is due to the fact that statistics were taken from the roads of macadam construction without recognizing the changes wrought by the steam roller and crusher. The broken stone road of to-day is quite a different structure from the type of road built by Macadam, who used hand broken stone that was practically uniform in size, laid on an unrolled base, without the addition of a binder, and left to be compacted by passing wheels; the results were the wheels cut ruts in the loose stone until the soil worked up from below, and the wheels powdered and broke some of the stone until the voids were filled. The surface soon gave way owing to a defective sub-base, and the continuous system of repair became necessary, employing a large staff of road men, which accounts for the heavy cost of maintenance. In the then Macadam process it took 18 inches of loose stone to make 12 inches of Macadam surface; some text books therefore state that the steam roller will compress loose stone one-third, which is an error. Rolled as roads now are no such compression as this is possible, although in some cases where the stone is placed upon improperly rolled sub-grades some stone is driven into the earth and lost, which has led many engineers to believe that the roller has compressed the stone one-

*Town Engineer, Campbellton, N.B.

third or more. This is but one of the errors commonly accepted as truth and accounts for too high estimates of broken stone required in road construction. Macadam was the first to economize by utilizing from 6 to 12 inches of broken stone. The stone crusher has further modified the cost in road construction when the fines are used as a binder and void filler, and now 6 inches and even 4 inches of metal give excellent resul.s.

In modern Macadam four important factors enter into its construction:—

(1). Proper drainage and rolling of earth foundation.

(2). The use of machine broken and screened stone with the screenings to fill the void and as a binder.

(3). Well sprinkling but not overflooding with water.

(4). Thorough consolidation with a steam roller.

In small cities and towns the actual width of roadway is usually much greater than is required for the traffic, therefore all streets should be carefully studied and full statistics of the amount and character of the traffic taken with a view to reducing the area to be paved by widening sidewalks and laying out grassy bermes. Having determined the proper widths of roadway of the various streets then grades should be most closely studied in order to get the best results with the least change of existing grades. The use of machinery for grading should be carefully considered. Contractors of the present day are well aware of the great economy attending the use of scrapers and graders, but the cross sections designed are usually such that the use of these machines is practically impossible. Before grading any streets there should be in place a complete system of sewers, pipes for gas or water with service branches to every lot, manholes and catch basins so arranged to take the water readily and rapidly and constructed to prevent silt and street waste from entering the sewers. Select a profile with a minimum grade of ½ per cent., and a maximum of 3 per cent. if it can be obtained at a nominal cost, but some streets require steeper grades naturally while others up to 5 per cent. or even 8 per cent. are necessary to avoid expensive excavations or refills, for the tractive power of a horse is not a constant quantity and is greater than most authorities state. The base or cross section of the sub-soil requires most careful consideration. The thorough drainage of such streets as have been naturally muddy in spring or in fall must be provided for before any method of surfacing is considered. Mud underneath the road is more destructive than mud on the surface, so that without a well drained sub-soil the best surface must prove a failure. If there are depressions in a clay surface below the stones, water will find its way and lie there, soften the soil, undermine the Macadam and weak spots will develop in the road. The natural earth is the real road bed and it can only support the pavement by being kept dry. In most towns a portion of the streets have good grades and will drain naturally if rightly formed. Design a rather flat arch for the road surface, with a crown or drop of ½ inch in 12 inches on ordinary grades, thus it will be possible to do the grading by horse instead of man power.

For any method of road making or paving which may be adopted a steam roller is requisite in order to compact the earth road bed so that it will sustain the wheels which will pass over it. The roller should not exceed 15 tons actual weight when loaded, so proportioned as to distribute the weight on wheels which cover and compass the full width of its track.

Curbs and gutters are also essential to complete the streets of a city or town. The combined curb and gutter made of concrete cast in place, in lengths preferably 5 feet long, fulfills its duty well, looks neat and is economical in construction. It is a usual custom to specify that no stone in a broken stone road shall be over 2½ inches in diameter, because it is claimed that if larger it will work to the surface. If a mass of loose stone of various sizes is passed over by wheels there is no doubt the larger stones will tilt up when the weight comes upon one end of them and the smaller stones will roll down into the place made vacant; but it does not follow that in a broken stone road, rolled with a steam roller and bound together with the addition of fines, that a stone will work to the surface if it is 2 inches below the surface to begin with. In fact the mass is so perfectly bound together that it is impossible for tilting to take place, therefore larger stones than 2½ inches can be used in road construction, especially for the lower course.

The introduction of the crusher transformed the construction of Macadam roads, but called forth a better understanding of their construction. When stones are broken by hand there are no fines or dust of any consequence, but when crushed we have 16 per cent. ½-inch and fine, 24 per cent. 1¼-inch, and 60 per cent. 2½-inch. The saving by use of crushed stone is not therefore so very great unless the dust and fine can be utilized. Macadam in his later years showed that broken stone possessed the property of knitting together, or becoming cemented under the rolling action of passing wheels. In Scotland some years before the steam roller was introduced, when wheel traffic still did the binding, it was the custom to spread a very thin covering of road scrapings over the stones to assist the binding. After the roller and crushed stone were introduced the same custom was adhered to, but the scrapings were not added until the rolling was almost completed and large piles of fines lay at the quarry sides or were used for sidewalks. This has also changed and all go now to make the rolled macadam road. It is often asked what holds macadam roads together, and only too often receives for an answer "that the roller, by shaking and pounding the mass of loose stone placed on a road finally compresses the stones together until they are almost, if not quite, as compact as solid rock." In the first place the roller does not compress the stone to its original volume, that is, it does not reduce the voids to zero. Secondly, a road is never bound when the rolling is finished unless a binder has been added. It is well-known that the voids in loose machine broken stone are about 40 per cent., and in order to reduce these voids to zero, 6 inches of loose macadam would have to be rolled to 3.6 inches. Upon a firm foundation where no stone can be lost in the sub-grade 6 inches of hard broken stone has never been rolled to 4 inches, or a reduction of the voids to much less than 20 per cent. These voids must be filled and what could be better than to utilize the screening for such a purpose. Trap rock should always, if possible, be used for surface work, while sand, stone, or slate may be used for bottom course. Most text books give the different stones with coefficients of wear and from it can be determined wether the locality can supply the desired material to make good and satisfactory work. Atmospheric influence has a great effect upon the durability of a stone, for a rock that readily absorbs water, as does loose grained sand stone or slate will quickly go to pieces under the action of frost. Although sand stone or slate are not so desirable for surface, yet it is not to be assumed they are not suitable for the bottom course, surfaced with 2 or 3 inches of trap rock, and this is usually good practice because trap will outwear limestone or any other soft rock several times over

In quarrying it is most essential, if cost is to be considered, to open where considerable depth of face can be obtained, and where little stripping is required. Drilling ought always to be done with power drills, and it is well to remember

the cost of quarrying increases rapidly as the depth of hole decreases; therefore it is desirable to make the hole not less than six feet deep. The cost of dynamite also varies as the depth of hole, decreasing per cubic yard excavated as the depth of hole increases. The crushing is more a question of the mileage of road to be constructed, and where a very large plant can be used the cost can be reduced considerably.

A good serviceable crusher, having a 9" x 15" opening, should in 10 hours average an output of 60 cubic yards. The use of a rotary screen is necessary, having three sizes of circular openings, ½-inch, 1¼-inch, and 1½-inch, as the screenings are required, kept separate to ensure the even distribution of the binder throughout the road. Bins should always be created to receive the broken stone and avoid rehandling.

Some specifications under the heading of spreading compel dumping on boards, as it is claimed that dumping a load in one spot results in undue consolidation at that place, but if the spreader knows his business and tip-bottom wagons are used he will not allow the load to fall all in one place, but dump in several small heaps, since to do otherwise would make more work for himself. When the output of several crushers are daily placed on the road, a Stuart grader may be used to advantage as the blade will level on an average 500 cubic yards per day, thereby saving at least one cent per cubic yard over hand labor. The screenings should not be dumped directly upon the broken stone, but placed in piles at convenient places along the side and spread with shovels after the rolling has been nearly completed. It is necessary that the metal be well rolled before the screenings are added. If an excess of binder and water are put on before the course stones are consolidated there is no doubt that macadam can be compacted in a shorter time, but it will be difficult to properly bind the stones if any filler gets between the fragments of stones while they are loose. Careful rolling is essential in completing the street or road but excessive rolling will injure the road, especially if there has been too much wetting, or if the stone is either soft or brittle.

Sprinkling is a variable item usually of little expense in a town where hydrants are conveniently placed. It takes about 4 cubic feet of water per cubic yard of macadam to puddle the screenings, and an equal amount to keep the subsoil in compact condition, although in very sandy soil twice as much may be required.

Telford pavement consists of a bottoming of large stones usually not less than 6 inches or not more than 12 inches deep set on edge and supporting a layer of macadam. Telford is more adapted to wet soils not easily drained and is preferable in a town where the sub-soil drainage has not been properly constructed or where the traffic is heavy. It is often stated that Telford or Macadam are not economical pavements for a town or city because the maintenance is so costly. If such were the case very many cities must err in judgment by constructing such roads and yet cities after having years of experience in this class of pavement are still annually constructing miles of it. It is true many Macadam pavements have gone to pieces under heavy traffic, but the same can be said of wood block, asphalt and other pavements where improper construction, or where poor materials have been used.

(Continued from page 199).

during flood seasons it carries large quantities of sediment and sand, which must be allowed to precipitate out before the fluid can be employed industrially. The presence of this foreign matter in the intake water during certain seasons of the year dictated the selection of impeller pumps for this installation, and the operation under these severe conditions has been entirely satisfactory.

The river water is first lifted into a reservoir at the shop site, from which it is distributed by gravity flow to its several destinations. From the reservoir the raw water is used in the power station condenser, and that portion of the condenser overflow which is needed is then filtered and treated for boilers' use.

The pump-house on the bank of the Ocmulgee River, 4,200 feet distant from the shop, is a circular structure containing three motor-driven, horizontal shaft, single-stage turbine pumps, each having a capacity of 1,200 gallons per minute. Each pump is direct connected to a 40 horse-power, 2,000 volt, three-phase, 60-cycle Westinghouse induction motor running at 1,120 r.p.m. The pumps are fitted with bronze impellers and bronze diffusion veins, securing improved durability and efficiency. The suction line is led in from a screened intake well, while the pumps discharge into a 16-inch main leading to the reservoir at the shop, whose level is 55 feet above the normal stage of the river.

The pump motors are controlled from the power-house, independent supply circuits being provided for each machine. This arrangement was found to be simpler and very little more expensive than the schemes of installing automatic starters at the pumping station, with control circuits to the power-house. The starting panels for the motors are equipped with ammeters, indicating the current consumed by each unit, while in the main circuit there is included a Westinghouse graphic recording wattmeter, which registers the total power consumed. As a rough but constant relation obtains between the water discharged by the turbine pump and the power taken to drive it, the graphic meter record thus affords a convenient means of totalling the amount of water pumped by the plant. The starting panels carry a graphic gauge showing the water level in the reservoir, and by watching this the power-house attendant is able to regulate the delivery of the pumps to the supply rate required.

A motor-driven valve in the main entering the reservoir is also operated from a controller at the power station, completing the concentration of control of the entire pumping system at these panels.

In the power plant the circulation pumps draw from the reservoir directly, and the overflow from the condensers is then taken, as needed, through filtration equipment supplying water for the engine terminal and shops. In the settling basin the water is treated with sulphate of alumina, precipitating the supended matter.

The general service pumps comprise a duplex simple steam pump, with capacity for delivering 700 gallons a minute, and a turbine pump, direct-connected to a direct current motor, having the same rated delivery. The steam pump is pressed into service when its exhaust can be employed to advantage in heating water for the plant boilers or for filling the locomotives. When this exhaust steam cannot be thus fully utilized, it is found, of course, more economical and convenient to run the electric pump. The control of this equipment is all automatic.

The electrical engineer for the Central of Georgia Railway Company is Mr. E. M. Rhett, under whose direction the electrical and pumping equipment of the Macon Shops was installed.

RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	RAILWAY EARNINGS. Date from	Date to	1910	1909	STOCK QUOTATIONS TORONTO Price Feb. 18 '09	Price Feb. 10 '10	Price Feb. 17 '10	Sales Week End'd Feb. 17
Canadian Pacific Railway...	10,048	$150,000	$100	Jan. 1	Feb. 14	$8,895.000	$7,104.000	172½	179⅞ 179½	181½	208
Canadian Northern Rail'y.	3,180	.....	.....	"	Feb. 21	1,245.600	897.200	.....	.....	.....	.....
*Grand Trunk Railway	3,536	226,000	100	"	Feb. 14	4.982.550	3,879,636	*1st. pref. 103½, 3rd pref. 50½, ord'y 20¾.			
T. & N. O.....	264.74	(Gov. Road)	.....	"	Feb. 14	187,355	110,975	.....	.....	.....	.....
†Montreal Street Railway...	141.79	18,000	100	"	Feb. 19	524,425	502,340	209 208½	222 221	222½ 221	685
Toronto Street Railway,...	114	8.000	100	"	Jan. 2.	298,612	263,513	119¼	125 124	125 124	45
Halifax Electric	13.3	1,400	100	"	Feb. 14	22,370	20,371	108½ 108	124 120	124 120	.....

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

WEEKLY EARNINGS

NAME OF COMPANY	TRAFFIC RETURNS Week Ending	1910	Previous Week	1909
Canadian Pacific Railway.	Feb. 21	$1,450,000	$1,450,000	$1,157 000
Canadian Northern Rail'y..	Feb. 28	175,400	165,500	132,600
Grand Trunk Railway	Feb. 14	719.889	729.257	631,692
T. & N O.....	"	28,048	27,953	20,044
Montreal Street Railway...	Feb 26	74 025	75.270	69,502
Toronto Street Railway....	"	76,141	74,015	65,844
Haliax Electric.	Feb. 21	3 566	3,437	3,223
†London Street Railway....	"	18,063	.....	17,454

†For month of January—31 days.

The gross earnings of the Port Arthur and Fort William Street Railway for January 1910 amounted to $7,635.35, and the net earnings to $2,235.90.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

9565—February 15—Authorizing the G.T.R. to construct a spur to the premises of the E. Long Manufacturing Company, Limited, Orillia, Ont.

9566—February 3—Approving revised location of the N. St. C. & T. Railway through Lot 27, Con. 6, and Lots 26 and 27, Con. 7, Tp. of Crowland, between mileage 11.53, and mileage 13; also authorizing the Railway Company to cross highways on the north and south sides of the Canal Feeder, at stations 307.83 and 314.22, the public road at mileage 11.97 on the north side of the Government Raceway, and the Town Line between Lot 27, in Township of Humberstone, and Lot 27 in the Township of Crowland.—further—granting permission to cross with its tracks the tracks of the Canada Southern and the T. H. & B. Railway Companies.

9567—February 11—Authorizing the Canada Atlantic Railway Company to construct a bridge over the St. Lawrence River at Coteau, Quebec.

9568—February 14—Authorizing the C.N.O.R. to divert and cross the Montreal and Ottawa Road.

9569—February 15—Authorizing the C.N.O.R. to carry its lines and tracks across the public road between Lots 16 and 17, Con. 3, Tp. Clarke, at Station 1077.80.

9570—February 12—Authorizing the C.P.R. to use and operate two bridges on its Drummondville Branch.

9571—February 14—Authorizing the C.P.R. and C.N.O.R. to use and operate for the carriage of traffic portions of their respective railways known as "Branch Lines" in the town of Parry Sound, Ont.

9572—February 14—Authorizing the C.P.R. to construct a spur line from a point on its main line near Norman, Ontario, to the saw-mill of E. F. Kendall.

9573—February 15—Authorizing the C.P.R. to construct a spur to the premises of the J. I. Case Threshing Machine Company, Regina, Sask.

9574—February 15—Authorizing the C.P.R. to construct a spur for the Sidney Brick and Tile Company, Limited, in Section 6, Tp. 11, R. 12, west principal Meridian at Sidney, Manitoba.

9575—February 16—Authorizing the C.N.O.R. to carry its telegraph wires across the tracks of the C.P.R., Ottawa and Prescott Branch, at Station 2990.17, mileage 56.6, west from Hawkesbury, at that point.

9576-77-78-79—February 16—Authorizing the C.N.O.R. to carry joint tracks of the C.P.R. and its own tracks under the wires of the Bell Telephone Company at Station 52.74, town of Parry Sound, Township McDougall, mileage 1.00; at mileage 1.06 from junction with the C.N.O.R.; mileage 0.4 from junction with the C.N.O.R., Parry Sound; mileage 0.76 from the junction with the C.N.O.R., Parry Sound.

9580-81—February 16—Authorizing the Chinguacousy Municipal Telephone system to carry their wires across the tracks of the C.P.R. at road allowance between the 1st and 2nd Concessions West Chinguacousy, mileage 15.3; Orangeville Branch; on 27 side road, 2nd Concession, West Chinguacousy, mileage 16.06, Orangeville Branch.

9582—February 16—Authorizing the Manitoba Government Telephones to carry its wires across the track of the Canadian Pacific Railway at Keewatin St., south of Vopni Avenue, Winnipeg, Man.

9583—February 16—Authorizing the Bell Telephone Company to carry its aerial wires and cables across the track of the C.N.O.R. at siding, public highway crossing, Main Street, Hawkesbury, Ont.

9584—February 16—Authorizing the Bell Telephone Company to carry its aerial wires across the telegraph lines and tracks of the Ottawa and New York Railway at public highway crossing 100 yards north of Embrun Station, Ont.

9585—February 16—Authorizing the Nipissing Power Company, Limited, to carry its transmission lines across the wires and lines of the Bell Telephone Company at M. Patenaude's, at Callander.

9586—February 16—Authorizing the Hull Electric Company to carry its electric wires across the track of the C.P.R. at mile post 6.18, Waltham Branch.

9587—February 7—Dismissing application of the Montreal Terminal Railway for an Order granting leave to appeal to the Supreme Court of Canada from the Order of the Board No. 9237, dated the 4th of January, 1910.

9588—February 12—Authorizing the Hydro-Electric Power Commission of Ontario to erect, place and maintain its power transmission wires across the telegraph wires of the C.P.R. at Lot 30, Con. 1, Tp. of Ancaster.

9589-90-91—February 17—Authorizing the C.N.O.R. to carry its line of railway across the public road between Lots 24 and 25, Con. A, at Station 103.07; at public road between Lots 26 and 27, Con. A, at Station 132.61; at public road between Con. 1, and Con. A, at Station 174.60, all in the Tp. of Hamilton, Ontario.

9592—February 17—Authorizing the C.N.O.R. to construct its lines and tracks across the public road between the Tps. of Garson and Caprool, Dist. of Nipissing, at Station 783.00, Ontario.

9583—February 16—Authorizing the C.N.O.R. to construct a bridge over the Don River, on the Toronto-Ottawa Division of its line of railway.

9594—February 14.—Authorizing Charles Whitney Carman, of Carmangay, Alberta, to erect, place, and maintain his elctric light wires across the tracks of the C.P.R. at Carman St., Carmangay.

9595 to 9598 Inc.—February 16—Authorizing the Nipissing Power Company to carry its transmission wires across the wires and lines of the Bell Telephone Company at four different points.

9599 to 9609 Inc.—February 17—Authorizing the Seymour Power and Electric Company, Limited, to carry its electric transmission lines across the wires of the North American Telegraph Company, at eleven different points.

9610—February 17—Authorizing the C.P.R. and the Ottawa and New York Railway to operate their trains over the crossing at Finch, Ont., without their being first brought to a stop.

9611—February 17—Authorizing the C.N.O.R. to divert the Kingston Road and Side Road, Lots 4 and 5, Concessions A and B, in the Township of Hamilton, and to cross the same by means of an overhead crossing.

9612—February 17—Amending Order No. 8575, dated October 27th, 1909, which authorizes the V. V. & E. Railway to join its tracks with the tracks of the British Columbia Electric Railway over Front and Columbia Streets, Vancouver, B.C., by striking out the words "B. C. Electric Railway Company," and substituting the words, "Vaucouver, & Lulu Island Railway Company."

9613—February 7—Adding as parties to the question of protection to be provided at G.T.R. Crossing, Lachine Road, Rockfield, Quebec, the Montreal Park & Island Railway Company, and the town of St. Pierre, the Parish of Lachine, and the Turnpike Trust.

9614—February 17—Authorizing the G.T.R. to construct, maintain and operate certain branch lines of railway or sidings to the premises of the Northumberland Paper & Electric Co., Limited, and the Northumberland Pulp Company, Limited, Campbellford, Ont.

9615—February 7—Dismissing the application of Wilfrid Duquette, of Mile End, Quebec, alleging failure of the C.P.R. to remove the snow from the private sidings at Mile End, Que.

9616—February 7—Directing that the crossing of the G.T.R. at Eighteenth Street, Lachine, be protected by a Whyte-Signal Bell, to be installed and thereafter maintained by the G.T.R.; twenty per cent. to be paid out of the Railway Grade Crossing Fund and the balance by the Railway Company.

9617—February 7—Refusing application of Telesphore Laferriere, of the Parish of St. Cuthbert, Quebec, for an Order directing the C.P.R. Company to furnish and construct a suitable farm crossing at Lot Cadastral, No. 188, of the Parish of St. Cuthbert, Quebec.

9618—February 7—Prohibiting, on the application of the town of Maisonneuve, Quebec, for an Order regulating the use of steam whistle by the C.N.Q.R., all unreasonable and unnecessary whistling by those or any of those in charge of any locomotive steam engine operating within the said town; and any person or persons that offend against these regulations shall be liable to a penalty of fifty dollars.

9619—February 7—Authorizing the Saraguay Electric and Water Company to erect, place and maintain an underground cable under the tracks of the Montreal Terminal Railway Company at Rue St. Pierre, Tetreaultville, Parish of Pointe Aux Trembles, Quebec.

(Continued on page 211.)

CONSTRUCTION NEWS SECTION

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

TENDERS PENDING.

In addition to those in this issue.

Fuller information may be found in the issues of the Canadian Engineer referred to.

Place and Work.	Tenders close.	Issue of.	Page.
Winnipeg, Man., bridge	Mar. 7.	Feb. 11.	136
Edmonton, Alta., bridge	Mar. 12.	Feb. 11.	136
Moncton, N.B., railway	Mar. 15.	Feb. 18.	160
Ottawa, Ont., pine timber	Mar. 16.	Feb. 18.	160
Orillia, Ont., pumping machinery	Mar. 7.	Feb. 18.	160
St. Thomas, Ont., bridge	Mar. 5.	Feb. 25.	48
Saskatoon, Alta., cast iron, etc.	Mar. 14.	Feb. 25.	48
Sault Ste. Marie, Ont., railway	Apr. 15.	Feb. 25.	48
Toronto, Ont., rubber sleeves	Mar. 8.	Feb. 25.	50
Ottawa, Ont., railway	Mar. 15.	Feb. 25.	50
Toronto, Ont., sewers	Mar. 8.	Feb. 25.	186
Waterford, Ont., street lighting	Mar. 7.	Feb. 25.	186

TENDERS.

Caspe Basin, Que.—Tenders will be received until Friday, March 18th, for the construction of a landing pier, with approach. Plans, specification and form of contract may be seen at the office of J. G. Sing, District Engineer, Confederation Life Building, Toronto; A. R. Decary, District Engineer, Postoffice, Quebec; J. L. Michaud, District Engineer, Merchants Bank Building, St. James St., Montreal, on application to the Postmaster at Gaspe, Que., and at the Department of Public Works, Ottawa. An accepted cheque for $25,000 must accompany each tender. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

Hamilton, Ont.—Tenders will be received up till Saturday, March 12th, for the various trades required in the erection of a school at Fruitland, Saltfleet Township, County of Wentworth. Plans and specifications may be seen at the office of the architects, Munro & Mead, Hamilton, Ont.

New Dublin, Ont.—Tenders will be received up to Monday, 7th March, for crushing 1,000 cords of stone for the Township of Elizabethtown. J. B. Barry, Township Clerk.

Ottawa, Ont.—Tenders for restoration of and additional story to Military Stores Building, will be received until Monday, March 7th. Napoleon Tessier, Secretary, Department of Public Works.

Ottawa, Ont.—Tenders will be received until Tuesday, March 15th, for civic supplies, including broken stone, brick, stone curb, stone setts, cement, plank and cedar, sand, vitrified clay pipe and asphalt. Newton J. Ker, City Engineer.

Ottawa, Ont.—Tenders will be received at the Department of the Interior, Ottawa, up to noon, March 15th, for 150 cast-iron monuments for use in marking the international boundary. Specifications may be seen at the office of the Chief Astronomer, Dominion Observatory. W. W. Cory.

Fort William, Ont.—Until April 1st proposals are invited in connection with the letting of a gas franchise, including construction of plant, mains, and operation. John Wilson, Assistant City Engineer. (Advertisement in the Canadian Engineer).

Ottawa, Ont.—Tenders for additional storey to Military Stores Building, Ottawa will be received until March 7. Plans can be seen, etc., at this department. Napoleon Tessier, secretary, Department of Public Works.

Ottawa, Ont.—Tenders will be received until Tuesday, March 15th, for waterworks supplies, including brasswork, castings, cast-iron pipe, hydrants and valves, lead pipe and pig lead, oils and grease. Newton J. Ker, City Engineer.

Ottawa, Ont.—Tenders will be received until March 15th for the construction and erection complete before July 1st of a pump-house in connection with the locomotive shops of the Transcontinental Railway. Tenders are also desired for the necessary plant, which is to be installed before August 1st. Plans and specifications may be obtained at the office of the chief engineer, and also at the office of the district engineer at St. Boniface, Manitoba. P. E. Ryan, secretary, Commissioners of Transcontinental Railway.

Ottawa, Ont.—Tenders will be received until 15th March for the construction and erection complete of a two-million-gallon reservoir adjoining the locomotive shops of the N.T.R. Commissioners, east of Winnipeg, Man. Plans and specifications may be obtained at the office of the chief engineer at Ottawa, and also at the office of the district engineer at St. Boniface, Manitoba. P. E. Ryan, secretary, Commissioners of Transcontinental Railway.

Leamington, Ont.—Tenders for heating apparatus, Public Building, will be received until Thursday, March 10th. Plans to be seen on application to Samuel O. Roach, Clerk of Works, Leamington, and at the Department of Public Works, Ottawa. Napoleon Tessier, Secretary

Winnipeg, Man.—Tenders will be received up to 11th March, by Robert Houston, secretary-treasurer Starbuck Consolidated School District No. 1150, for the erection of a brick school building. E. D. Tuttle, architect, Winnipeg.

Winnipeg, Man.—Tenders for the supply of coal and fuel wood required to heat the military buildings at Winnipeg and Brandon, Man., for the year ending March 31st, 1911, will be received up to Monday, March 7th. Particulars may be obtained from the Secretary, Militia Council, Ottawa, or at office of District Officer Commanding, Winnipeg.

Winnipeg, Man.—Tenders will be received up to Monday, April, 4, for supply of quantity of cast iron water pipe, valves and hydrants, for extension of the waterworks system. Specifications may be obtained from Colonel H. N. Ruttan, city engineer. M. Peterson, secretary, Board of Control Office.

Winnipeg, Man.—Tenders will be received until March 5th, for the construction of a bridge across Long Lake between Sections 15 and 22, Township 13, Range 4 west. Plans and specifications may be seen at the clerk's office, Woodlands, or at the office of the Department of Public Works, Winnipeg, or at the residence of R. G. Jervison, Poplar Point. R. G. Jervison, Commissioner for Ward 4, Poplar Point. Maj. J. Proctor, Clerk, Woodlands P.O.

Sterling, Man.—Tenders will be received until March 12th for the erection of a school. Plans, etc., obtainable from A. Smith, Sperling, Man., or Frank R. Evans, 506 Somerset Building, Winnipeg.

Yorkton, Sask.—Proposals will be received by W. E. Pinkerton, secretary-treasurer Yorkton Collegiate Institute, until March 15th, for the construction of a collegiate institute, including excavation, mason work, carpenter work, painting iron work, galvanized iron work, heating, ventilation and plumbing work, in accordance with the drawings and specifications, which may be seen at the Builders' Exchange, Winnipeg, or at the office of the secretary-treasurer, or at the office of W. W. La Chance, Architect, Saskatoon.

Saskatoon, Sask.—Tenders will be received until March 21st, for the erection of a collegiate building, students' residence power house, live stock pavilion, agricultural engineering building on the University grounds. David R. Brown, and Hugh Vallance, architects, Canada Life Building, Montreal. Further particulars advertised in the Canadian Engineer.

Vancouver, B.C.—Tenders will be invited for two motor wagons for the scavenging department, to cost approximately $11,000. W. A. Clement, city engineer.

Vancouver, B.C.—Tenders will be invited for the construction of five miles of concrete walks. W. A. Clement, city engineer.

Vancouver, B.C.—Tenders, are invited for two scows. W. A. Clement, city engineer.

Victoria, B.C.—Tenders will be received up to Monday, 7th March, for the following: Copper-coated carbons; high-grade carbons for enclosed lamps; the installation of arc lighting system for James Bay Causeway and Belleville Street. Wm. W. Northcott, purchasing agent.

CONTRACTS AWARDED.

Toronto, Ont.—Mr. Samuel Young has been awarded the contract and making alterations and additions to the post office.

Toronto, Ont.—McColl Brothers were awarded a contract for engine oil required by the city at 24 cents per imperial gallon, while the Ontario Soap & Oil Company received the contract for cylinder oil at 40 cents.

Toronto, Ont.—The Canada Foundry Company, of Toronto, have been awarded a contract for cast iron pipe, a list of the tenders and particulars of which were printed on page 187 of our issue last week. The order was orginally given to D. T. Stewart & Company, a Glasgow firm, who sent in the lowest tender by $270.

Toronto, Ont.—The Canadian General Electric Company's tender for a transformer at $8,800 was accepted. The Canadian Westinghouse Company secured two contracts for transformers, one at $5,436 and the other at $3,130. Allis-Chalmers-Bullock, Limited, were given contracts for transformers at $12,676 and $10,550. K. L. Aitken, electrical engineer.

Toronto, Ont.—The Board of Control awarded to the Stanley Coal and Iron Company, Ltd., the contract for cast iron pipe and specials for the main drainage works at $17,642.

Toronto, Ont.—The contract for constructing the new Logan Avenue school was given to Lucas Bros., for $25,837, while Hanna and Nelson received the plastering tender for $3,815. It was decided to call for tenders for the enlarging of Kimberley Avenue school, while $20,000 was placed in the estimates to build an addition of four rooms to Pape Avenue school.

Kingston, Ont.—The County of Frontenac awarded the contract for cement to W. B. Dalton & Sons, of Kingston, at $1.75 per bbl. Other tenders were:—

J. K. Spooner, Glenburnie, sand, at 80c. per c. yd. on sleighs and $1.00 on wagon. Accepted.

A. Tait, Collinsby, crushed stone, at $1.15 per c. yd. Accepted.

S. Anglin & Co., cement, at $1.90 per bbl. Rejected.

McKelvey & Birch, cement, at $1.75 per bbl. Rejected.

W. J. McKendy, sand, at 95c. per yd. Rejected.

Lindsay, Ont.—The following tenders were received for the construction of an overhead bridge at 20th Street:—

Algoma Steel Bridge Company	$14,500
A. J. Randall	14,750
James Priel	15,000

Contract was not awarded.

St. Thomas, Ont.—The tender of the Canadian Westinghouse Company to supply and install complete hydro-electric equipmnt at $18,170 was accepted. Only three companies tendered for the full equipment. These were: Canadian General Electric, $19,050; Lancashire Dynamo and Motor Co., $18,447 and the Canadian Westinghouse Co., $18,170.

Vancouver, B.C.—Tenders for wood block paving were opened as follows,—Westminster Avenue, Ninth to Sixteenth—Ironsides, Rannie & Campbell, $56,833; Palmer Bros. & Henning, $42,900; M. P. Cotton, $46,282; T. R. Nickson & Company, $47,832. Harris Street—Carl W. Campbell; Ironsides, Rannie & Campbell, $28,851; Palmer Bros. & Henning, $22,900; M. P. Cotton, $25,076; T. R. Nickson & Company, $26,013. Seymour Street, Georgia to Robson—Ironsides, Rannie & Campbell, $8,709; Palmer Bros. & Henning, $8,000; M. P. Cotton, $8,158; T. R. Nickson & Company, $8,291. Howe Street, Georgia to Robson—Ironsides, Rannie & Campbell, $6,001; Palmer Bros. & Henning, $5,625; M. P. Cotton, $5,992; T. R. Nickson & Company, $5,642. Dunsmuir Street, Granville to Howe—Ironsides, Rannie & Campbell, $4,279; Palmer Bros. & Henning, $4,000; M. P. Cotton, $3,940; T. R. Nickson & Company, $3,777. T. R. Nickson & Company got the Dunsmuir Street work and Palmer Bros. & Henning the balance of the contracts. On the clearing and rough grading of streets M. P. Cotton bid $1 per lineal foot on the entire job. Other tenders were as follows: S. Becker, streets in Ward 5, 76 cents per foot; Romana & Pinto, street in Ward 5, 75 cents; in north end of Ward 6, 95 cents; south end of Ward 6, 89 cents. The award was recommended for Romana & Pinto. Mr. P. Cotton will do the extra grading on Hastings Street at $13,379, plus $1 per square yard for new blocks.

Ottawa, Ont.—The following tenders were received for the supply of 3,000 lineal feet of 42-inch steel intake pipe:—

International Marine Signal Co., Ottawa	$17,290 00
East Jersey Pipe Co., Lockbar (Laurin & Leitch)	29,760 00
Marsh & Henthorn, Belleville	21,400 00
Toronto Iron Works, Limited, Toronto	22,683 00
Canada Foundry Co., Toronto	21,500 00
Wm. Hamilton Co., Peterborough	19,815 00
Laurin & Leitch, Montreal	30,660 00
Chaudiere Machine Co., Ottawa	31,657 00
Gerald Lomer, Montreal	25,000 00
T. S. Kirby Co., Ottawa	19,998 00
Jenckes Machine Co., St. Catharines	31,500 00
W. Beverley Robinson, Montreal	19,953 33
Hyde & Webster, Montreal	20,497 40
John Inglis & Co., Toronto	23,900 00
Western Bridge and Equipment Co., Chatham, Ont.	21,965 00
Power & Co., Ottawa	19,492 00
J. Coates & Co., Ottawa	21,000 00

The contract was awarded to the International Marine and Signal Co., of Ottawa, at $17,290.

Regina, Sask.—Messrs Wilson & Wilson, of Regina, were awarded the contract for the new public school at $68,750. Other tenders were: Smith Bros. & Wilson, $69,000; Saskatchewan Building and Construction Co., $76,549; S. Brown, Winnipeg, $78,000; McKay Construction Co., $79,270.

RAILWAYS.

Welland, Ont.—George H. Pettit is solicitor for a company organized to build an electric railway from Queenston to Niagara. The length of the railway will be seven miles and will cost about $50,000. Previously mentioned.

Winnipeg, Man.—The Canadian Northern will do a large amount of work next season in the filling up of their roadbed between here and Port Arthur. Orders are now out for the filling of all the bridges. There will also be a number of new bridges erected along the line. Owing to the increased traffic in the Lake Superior division of the Canadian Northern, the company will put the line in the best of shape.

Winnipeg, Man.—It is officially announced that the contract for the extension of the Tofield-Calgary line of the Grand Trunk Pacific from Camrose south to Calgary, has been awarded to J. D. McArthur, Ltd., and the work of connecting Calgary with the main line will be rushed the moment the frost leaves the ground. The completion of this line will provide an additional road between Calgary and Edmonton, the chief cities of the south and north of Alberta.

Moose Jaw, Sask.—Steps are being taken for the organization of a street railway. The council is now considering the several offers for a twenty-year franchise.

Vancouver, B.C.—It is reported that the Canadian Pacific Railway will begin this spring the construction of a line over the Hope Mountains. Surveys have been completed and it is understood that a maximum grade of 2.2 per cent. going west has been secured, the proposed lines crossing the mountains at a high elevation. Going east a maximum grade of 1 per cent. has been secured all the way to Penticton, a distance of 130 miles. The Fraser River will be bridged and connection made with the main line near Hope.

Construction work on the V.V. & E. Railway west of Princeton was commenced this week and a start will probably be made next week on the section between Abbotsford and Hope. Both contracts, of 18 and 51 miles respectively, were awarded to J. W. Stewart & Company.

LIGHT, HEAT, AND POWER

Nelson, B.C.—The council have decided that they will have to meter the electric light service or purchase new transformers.

Montreal, Que.—The Bergmann Electrical Works, of Berlin, Germany, and with works in Austria and France, are introducing their Tungsten lamp into the Canadian market through their representative, Dr. C. Rossner. Dr. Rossner, who, before taking his present position, was for a time assistant secretary of the Montreal Trust Co., states that if the business of the company shows sufficient growth branch works for the manufacture of the Bergmann Tungsten lamp will be established in Canada. The recent alterations in the tariff arrangements between Canada and Germany means that these lamps will enter Canada from that country at an average duty of about 30 per cent. instead of 40 per cent. as formerly.

Toronto, Ont.—It is reported that the Ontario Electrical Development Co, will increase the capacity of their plant from 50,000 to 85,000 horse-power.

Toronto, Ont.—Included in the supplementary estimates of the Provincial Treasurer are the following items: Electric plant, Hamilton Asylum, $12,000; electric plant, London Asylum, $25,000; electric plant, Ontario Agricultural College, Guelph, $15,000; new wing at Osgoode Hall, $50,000; colonization roads, $464,000; other public works, $37,940.

Camrose, Alta.—The town of Camrose is open to receive propositions from companies or individuals for the installation of an electric light and power plant on a ten-year franchise basis. Offers received until April 15th. O. B. Olson, secretary-treasurer.

SEWERS, SEWAGE AND WATERWORKS.

Calgary, Alta.—City Engineer Childs has prepared plans for a trunk sewer and septic tanks to cost $800,000. (Previously mentioned.)

High River, Alta.—This municipality will apply to the Provincial Government for power to borrow $125,000, required for the construction of waterworks and sewerage systems. Mayor Short.

FINANCING PUBLIC WORKS.

The following municipalities recently sold debentures:—

Coaticook, Que.—$14,000.
Midland, Ont.—$7,500.
Oshawa, Ont.—$10,000, local improvements.
Osgoode Township, Ont.—$6,278, drainage.
Carberry, Man.—$3,000 sidewalks.
Alberta School Districts.—$5,000.
Battleford, Sask.—$10,000, local improvements.

Coaticook, Que.—Ratepayers will shortly vote on a $123,000 by-law.

Brampton, Ont.—The County of Peel have passed a by-law to spend $100,000 on road construction.

Berlin, Ont.—Ratepayers will vote on a $5,000 hospital by-law.

Collingwood, Ont.—Council is considering a $10,000 bridge by-law.

Toronto, Ont.—The ratepayers will vote on a $200,000 hospital grant by-law, and a $50,000 land purchase by-law.

Boissevain, Man.—On March 14th, the ratepayers will vote on a by-law to issue $5,000 debentures for sidewalks, and $12,000 for a town hall. G. C. Smith, Clerk.

Kildonan, Man.—The council have passed by-laws providing for the issue of $3,036.97 sidewalk debentures. G. F. Munroe, Clerk.

Moose Jaw, Sask.—Will borrow $50,000 for public works.

Regina, Sask.—On March 24th by-laws will be voted on here as follows:—Albert Street subway, $41,000; sewerage and waterworks extensions, $10,000; exhibition buildings, $25,000; market house, $16,000.

Saskatoon, Sask.—The ratepayers will on the 9th March vote on the following by-laws: $100,000 Hospital; $9,000 Collegiate Institute; $21,000 for completing civic hospital and buildings for fair purposes.

Burnaby, B.C.—The council is considering a $16,165 by-law for various purposes.

Point Grey, B.C.—This municipality offers for sale debentures issued for the construction of roads, $300,000 and sidewalks $25,000.

Davidson, Sask.—Ratepayers have carried by-laws amounting to $17,000 for town hall and fire hall.

MISCELLANEOUS.

Fredericton, N.B.—Tenders have been called by the public works department for the construction of a number of bridges, while a new structure is now being planned for Sunbury County.

Halifax, N.S.—W. L. Brown invites tenders from persons disposed to loan the city $20,000 for the construction of sewers.

Sherbrooke, Que.—On March 25th ratepayers here will vote on a by-law connected with street railway extensions. A new company, which will probably be known as the Sherbrooke Electric Railway & Power Company, head office, Montreal, have asked the right to sell power and they have practically agreed with the city council to expend $500,000 on the installation of a plant.

Sherbrooke, Que.—It is reported that the St. George Electric Company will build a concrete dam and electric plant on the Chaudiere River, at an estimated cost of $75,000. J. W. Gregoire, Secretary-treasurer.

Berlin Ont.—Mr. W. M. Davis, C.E., in his annual report recommends the construction of pavements and the purchase of a cement testing machine.

London, Ont.—The Middlesex County Council are considering the installation of a $7,000 steam heating system at the court house. Mr. Talbot is County Engineer.

Hamilton, Ont.—Architects have been invited to submit plans and specifications for a new public library building here. Plans are to be delivered by April 16th. Adam Hunter, Secretary Library Board.

Port Arthur, Ont.—The Western Dry Dock & Shipbuilding Company has filed plans for the construction of docks and plant at a cost of $1,500,000.

Port Arthur, Ont.—The corporation is prepared to consider propositions for the installation of a gas plant with a view to granting a fifteen-year franchise and buying the plant at the end of that time as a going concern. N. G. Neill, Industrial Commissioner.

Toronto, Ont.—The city clerk has given notice of the city's intention to construct a number of sewers, pavements, concrete side walks and other local improvement works.

Guelph, Ont.—Council are considering paving work.

Eganville, Ont.—J. R. Campbell invites architects to submit competitive plans for an eight-room school to cost $10,000 or $12,000.

Hamilton, Ont.—A. F. Macallum, city engineer, has outlined plans for a sewer system in the east end annex to cost $160,000.

Hamilton, Ont.—Board of Control granted $321,000 of $356,000 necessary expenditure estimated by City Engineer Macallum in his department.

Brandon, Man.—City Engineer Speakman has prepared plans for a pasteurizing plant estimated to cost $12,000.

Brandon, Man.—The Municipal Light, Heat & Power Company, with head offices in Hamiota are opening a warehouse and manufacturing plant on the Great Northern Railway right-of-way just east of Eighteenth Street. It is their intention to erect a warehouse and factory building. The company now have two plants in operation installed during the past year, at Hamiota and at Carnduff, Sask., and G. Edgar Knetchell, the manager is negotiating with several towns for the installation of lighting plants during the present year.

Lethbridge, Alta.—Applications will be received until the 7th March for the position of city electrician for the City of Lethbridge at a salary of $1,200 per annum. George W. Robinson, secretary-treasurer.

Camrose, Alta.—The town of Camrose is open to receive propositions from companies or individuals for the installation of an electric light and power plant on a ten-year franchise basis. Offers received until April 15th. O. B. Olson, Secretary-Treasurer.

Arcola, Sask.—The municipal council are having plans prepared for extensions to the water supply by siphoning from the present source to the town.

New Westminster, B.C.—Annacis Island residents have voted $15,000 towards the construction of a steel drawbridge connecting that island and Lulu Island. Estimated cost of bridge $30,000 to $50,000.

Williamsport, Pa.—The Williamsport Gas Engine Works have reopened the plant of the Williamsport Gas Engine Company and will continue the entire line of gas and gasoline engines formerly manufactured by the old company.

PERSONAL.

Mr. E. A. James, B.A.Sc., has been appointed city engineer of North Toronto (Eglinton P.O., Ontario).

Mr. James A. Bell, C.E., has resigned his position as city engineer of St. Thomas, Ont., to devote the whole of his time to consulting work.

O. L. S. EXAMS.

The Board of Examiners for Ontario Land Surveyors, have just concluded their Annual Session.

The following gentlemen passed the examination entitling them to certificates to practise as Ontario Land Surveyors:—

M. Pequegnat, Toronto; N. D. Wilson, Toronto; W. A. M. Cook, J. Van Nostrand, Toronto; E. P. D. Phillips, W. J. Johnston, R. M. Lee, A. S. Campbell, T. A. Byrne, O. Dempster, I. D. N. Stewart, H. T. Peckover, F. J. Anderson. The following gentlemen passed the Preliminary Examination:—J. K. Benner, M. Hellferth, R. F. Dynes, J. C. Wilde, W. S. Jardine.

COMING MEETINGS.

Ontario Good Roads Association, annual meeting at Toronto, Wednesday-Friday, March 2-4. J. E. Farewell, secretary, Whitby, Ont.

Canadian Cement and Concrete Association.—Annual Convention and Exhibition at London, Ont., on March 29th, April 1st. R. E. W. Hagarty, secretary, Engineering Building, Toronto University, Toronto.

Canadian Mining Institute.—Twelfth annual meeting at Toronto. March 2, 3, 4. H. Mortimer Lamb, secretary, Windsor Hotel, Montreal, Que.

Dominion Land Surveyors Association.—Annual meeting at Ottawa, March 1st and 2nd. Secretary, T. Nash, Topographical Survey Department, Ottawa.

Ontario Land Surveyors Association.—Annual meeting at Toronto, March 8, 9 and 10th. Captain Killaly Gamble, secretary, Toronto.

SOCIETY NOTES.

Canadian Society of Civil Engineers.—Mr. C. R. Coutlee, M. Can. Soc. C.E., delivered an address on "The Conservation Problem as Applied to Canada," at a meeting of the above society, held at Montreal, on Thursday, March 3rd.

Astronomical Society of Saskatchewan.—At a meeting held last week the organization of the Astronomical Society of Saskatchewan was effected, and the following officers were elected:—Hon. president, William Trant; hon. vice-president, P. McAra, jr.; president, N. McMurchy; vice-president, H. Lang; second vice-president, J. F. Bryant; secretary, Mr. McClung; treasurer, J. F. Bryant; auditor, William Logan; executive, C. B. Keenleyside (chairman), and J. E. Doerr.

Winnipeg Builders' Banquet.—The Builders' Exchange, of Winnipeg, held their annual banquet last week, at which Mayor Evans, T. R. Deacon, C.E., and Prof. E. Brydon-Jack, head of the Engineering Department of Manitoba University, delivered addresses. Mayor Evans, replying to the toast of "The City," stated that he had no idea that the Builders' Exchange had reached the magnitude and importance it has until he came to the meeting. It all goes, he said, to prove that people are finding out that there is more in association than division, more in coming together than in being apart. It is up to the Builders' Exchange to show the people that it is not a combination to restrain competition, but an association to increase knowledge and give better facilities. He hoped that all citizens of Winnipeg would combine in trying to build a great and beautiful city, and the people looked for a $15,000,000 building year in Winnipeg in 1910.

In replying to the toast of "The Builders' Exchange," T. R. Deacon, president of the Manitoba Bridge and Iron Works, said: The Builders' Exchange a year ago had but sixty members; to-day it has 350. It is now one of the largest and most influential commercial institutions in Canada. There is no need to canvass for members now. From the head of the lakes to the Rocky Mountains it embraces all the important builders and contractors among its members. Mr. Deacon went on to say that there seems to prevail among the general public mistaken ideas as to the character of a contractor's business. A contractor always makes a huge profit and always dishonestly. Such is not my experience. I know of no more honorable and capable set of men than the members of the Winnipeg Builders' Exchange.

The Exchange has had struggles and difficulties, and I regret to say that they have not always had that sympathy from the press and the public which they might have expected. They have had unreasonable demands made upon them often in the midst of the building season, and have been much hampered and suffered heavy losses, although really fighting the battle of the general public. Consequently, they have seriously thought of conceding all asked by the labor organizations and charging the increased cost of building to the public.

Prof. Brydon-Jack replied to the toast, "Our Guests." He desired to pay tribute to the builders of Winnipeg. The opportunities of builders in the West were vast and momentous, not only the builders of edifices, but the builders of laws and public ethics had wonderful opportunities."

About 450 guests sat down to the banquet.

NEW INCORPORATIONS.

Edmonton, Alta.—Great West Development Company.

Montreal, Que.—Montreal Electric Company, $40,000; W. B. Shaw, E. J. Gunn, F. A. Newbury. Bawo & Dotter, $1,000,000; E. R. Lynch, A. D. Warden, S. W. Gooderham. Shawinigan Knitting Company, $49,000; A. C. Calder, E. R. Parkins, E. Languedoc. B. J. Coghlin Company, $200,000; B. W. P. Coghlin, G. R. Coghlin, N. J. Dawes.

Streetsville, Ont.—Oriental Textile Company, $50,000; S. Lovell, W. Bain, R. Gowans, Toronto.

Ottawa, Ont.—M. & H. Mining & Development Company, $500,000; O. E. Culbert, W. Gays, R. T. Porter. Real Estate & Investors, 100,000; W. W. Cory, C. A. Douglas, D. M. Finnie. Mark-Brock Enterprises, $10,000; S. W. Jacobs, A. R. Hall, G. S. McLeish.

Toronto, Ont.—Alliance Securities Company, $100,000; S. Johnston, R. Holland, H. L. Enman. Pinder Exploration Company, $100,000; N. Pinder, Thessalon; J. C. A. Bromley, W. H. Garvey, Toronto. Porcupine Centre Townsite Company, $40,000; R. W. Hart, O. H. King, T. S. Webb. J. W. Norcross & Company, $25,000; J. W. Norcross, R. M. Wolvin, W. E. Burke. Hart Manufacturing Company, $40,000; M. H. Hart, W. Blakeley, A. G. Robertson. Rice, Knight, $100,000; H. W. Knight, H. A. Rice, E. H. Scammell. Merger Mines, $3,000,000; J. G. Shaw, J. Montgomery, W. R. Williams. International Securities, $100,000; T. Urquhart, D. Urquhart, H. W. Page. John Dawson, Ltd., $90,000; J. J. Dawson, H. C. Sharp, E. Newton. Fisher Fuel Economizer, $100,000; L. A. David, H. J. Elliott, J. J. Robson.

Quebec, Que.—Standard Fishing and Trading Company, $50,000; T. O. Lyall, F. W. Hibbard, J. Ogilvy.

MACHINERY WANTED.

Second-Hand Portable Cable-Rigged water well machine, with tools and equipment, for 4 to 6 inch holes. John H. Patterson, Smithville, Ontario.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

(Continud from page 206).

9620—February 7—Adding the Montreal Terminal Railway Company as a party to the application of the residents of Pointe Aux Trembles, Quebec, for an Order directing the C.N.Q.R. to stop its trains at Pointe Aux Trembles for the accommodation of the travelling public.

9621—February 7—Directing the C.N.Q.R. to raise its tracks between First Avenue and Bennett Avenue to the grade of the railway at the said streets,—the work to be complete by June 1st, 1910.

9622—February 7—Dismissing complaint of Leon Lamontagne of St. Malachie, in the Province of Quebec, that the Transcontinental Railway have taken 100 feet of this land and that in order to cross the said property the Railway Company made a cut at right angles instead of putting in an over-head bridge, thereby allowing snow to accumulate, causing damage to his land.

9623—February 7—Dismissing the complaint of Walter Ryan of the city of Montreal, complaint of the rate charged by the Bell Telephone Company for a house' phone.

9624—February 18—Authorizing the C.P.R. to use and operate bridge No. 51.3 on the Montreal and Ottawa Section, of its line of railway.

9625—February 18—Authorizing the C.N.O.R. to construct its line across the public road between Lots 30 and 31, Con. 1, Township of Hamilton.

9626—February 17—Extending until the 1st of April, 1910, the time within which the semaphores required under Order No. 8850, dated December 2nd, 1909, shall be installed, at the crossing of the G.T.R., and the Galt, Preston and Hespeler Railway.

9627 to 9629 Inc.—February 18—Authorizing the Hydro-Electric Power Commission of Ontario, to carry its transmission wires across the Canadian Pacific Railway at three different points.

9630 to 9632 Inc.—February 18—Authorizing the Sidney Bell Telephone Association to carry its wires across the G.T.R. tracks at three different points in the Province of Quebec.

9633—February 18—Authorizing the Walkerville Light and Power Company, Limited, to carry three electric wires across the Pere Marquette Railway at Walkerville, Ont.

9634-9635—February 18—Authorizing the town of Penetanguishene to lay steel pipe under tracks of the G.T.R. at the foot of Queen Street, and at the foot of Main Street.

9636—February 17—Authorizing the C.N.O.R. to place the joint tracks of the C.N.O.R. and C.P.R. under the wires of the Bell Telephone Company at mile 0.5, from junction C.N.O.R. Company's line to station, Parry Sound, Ont.

9637—February 19—Authorizing the Government of Alberta to carry its telephone lines across the tracks of the G.T.P. Railway, 1¼ miles east of Stony Plain, Alberta, Section 36, Tp. 52, R. 27, West 4th Meridian.

9638 to 9643 Inc.—February 19—Authorizing the C.N.O.R. to construct its lines and tracks across six different highways in the Townships of Hope, Hamilton, and Clarke, Ontario.

9644—February 7—Declaring that T. J. O'Neill, of Montreal, Que., is entitled to be assessed for the Bell Telephone Company's instrument in use by him upon the private house rate, and not upon the business rate.

9645—February 17—Authorizing the C.N.O.R. to take the portions of the south half of Lot 28, Con. D, the north twenty-five acres of Lot 28, Con. D, and the south part of the north half of Lot 28, Con. C, Tp. of Scarboro, for the purpose of diverting two highways, and for the convenient accommodation of the public.

9646—February 17—Authorizing the G.T.R. to install, maintain and operate the full interlocking plant where it crosses the tracks of the N. St. C. & T. Railway, between Clifton Junction and Stamford, Ontario.

9647—February 21—Authorizing the C.P.R. to construct its Wetaskiwin East Branch across the road allowances and other highways in the Province of Alberta.

9648—February 17—Extending until 15th of May, 1910, the time within which the C.P.R. may complete work required to be done under Order No. 9067, dated December 28th, 1909.

9649—February 21—Recommending to the Governor-in-Council for the sanction of a lease of the Orford Mountain Railway Company to the C.P.R. for a term of 999 years.

9650—February 7—Directing the G.T.R. to install gates at King Street Crossing, Sherbrooke, Quebec, and to reduce the shunting across the street to a minimum.

9651—February 16—Approving Standard Freight Mileage Tariff C.R.C. No. 1, and Standard Passenger Tariff No. 1, of the Atlantic, Quebec, and Western Railway Company, subject to certain conditions.

9652—February 21—Authorizing the C.N.O.R. to carry its tracks across public road between Lots 2 and 3, Con. 4, Tp. Clarke, Ont.,—at Station 875.49.

9653-54—February 21—Temporarily approving, pending final determination by the Board, of the tariffs of tolls which the Bell Telephone Company shall be authorized to charge; agreements entered into by the Bell Telephone Company with the Municipality of the Township of Laird, on December 13th, 1909, and the Mount Albert Telephone Company on December 2nd, 1909, for the interchange of telephone messages or service passing to or from their respective telephone systems and lines.

9655—February 21—Authorizing the Hamilton Cataract Power, Light and Traction Company to carry its wires across the tracks of the T. H. & B. Railway at Lot 2, Concession 4, Township of Barton, Ont.

0656-57—February 21—Authorizing the Hydro-Electric Power Commission of Ontario to carry its transmission lines across the tracks of the Toronto, Hamilton & Buffalo Railway at Lot 22, Con. 5, Tp. of Gainsboro, Ontario; and at Lot 30 Con 1, Tp. of Ancaster, Ont.

9658—February 21—Authorizing the Oak Bank Telephone Company, of Manitoba, to carry its wires across the tracks of the C.P.R. between Sections 21 and 28, Tp. 11, R. 5, East.

9659-60—February 22—Authorizing the Bell Telephone Company to carry its wires across the telegraph lines and tracks of the Pere Marquette Railway Company at public crossing, Division Street, one-quarter mile west of Kingsville Station, Ontario, and across the telegraph lines and tracks of the St. Lawrence and Adirondack Railway Company just west of the public crossing at Woodlands Station, Quebec.

9661 to 9663 Inc.—February 21—Authorizing the C.N.O.R. to carry its tracks across three different highways in the Township of Clarke, Ont.

9664—February 22—Authorizing the C.N.O.R. to carry its tracks across the public road between Lots 2 and 3, Con. 4, at Station 2661, Tp. of Scarboro, Ont.

9665-66—February 21—Authorizing the C.N.O.R. to carry its tracks across two different highways in the Township of Hope, Ontario.

9667 to 9673 Inc.—February 22—Authorizing the C.N.O.R. to carry its lines and tracks across seven public roads in the Township of Pickering, Ont.

9674—February 21—Authorizing the G.T.R. to construct a branch or connecting line of railway between the main line east of Port Hope Viaduct and a point on the Northern Division north of Ontario Street, town of Port Hope, Ontario, and directing that Jacob's Ladder, so-called, be placed underneath the tracks of the G.T.R. to be at least six feet wide and seven feet high; to be operated by and at the expense of the town.

9675—February 21—Directing that, in connection with the protection of the G.T.R. crossing at John Street, town of Port Hope, the G.T.R. have the option either of (a) installing an electric bell at the crossing; or (b) limiting to ten miles an hour the rate of speed at which trains shall operate.

9676—February 22—Approving plan of the C.N.O.R. showing bridge to be constructed over Goforth's Creek, on the Toronto-Ottawa Division of its line of railway.

9677 to 9679 Inc.—February 22—Authorizing the Manitoba Government Telephones to carry wires over the tracks of the C.N.R. and C.P.R. at three different points in the Province of Manitoba.

9680 to 9682 Inc.—February 22—Authorizing W. Y. Cannon, of Sharbot Lake, Ont., to erect telephone wires across the tracks of the Kingston & Pembroke Railway at Clarendon Station, Oso Station, and at Sharbot Lake Junction, Ont.

9683-84—February 22—Authorizing the Bell Telephone Company to carry its wires across the tracks of the G.T.R. at Main Street, Richmond, Quebec, and at Richmond Yard to G.T.R. shops, Richmond, Quebec.

9685—February 22—Authorizing the People's Telephone Company to erect wires across the tracks of the G.T.R. in Con. 12, Tp. of Blympton.

9686—February 22—Authorizing the C.N.O.R. to carry its tracks across the public road, at Lot 21, Con. 3, at Station 1670.58, Tp. of Darlington, Ontario.

9687—February 22—Authorizing the C.N.O.R. to construct a bridge over Gages Creek, at Station 238.50, Lots 33 and 34, Con. 1, Tp. of Hamilton, Ont.

9688—February 24—Authorizing the C.N.O.R. to construct its lines and tracks across the public road between Lots 5 and 6, Con. 3, and Lot 4, Con. 3, Tp. of East Whitby, Ontario.

9689—February 24—Rescinding Order No. 9591, dated February 17th, 1910, which authorizes the C.N.O.R. to carry its tracks across the public road between Con. 1, and Con. "A," Tp. of Hamilton, at Station 174.60, Ontario.

9690—February 21—Directing the G.T.R., pending disposition of the matter by public hearing, to provide and maintain a watchman at crossings of public highways just east of its station in the village of Beachville, Ontario; the said watchman to be on duty daily between the hours of seven o'clock a.m., and 8 o'clock p.m.

9691—February 23—Amending Order No. 9613, dated February 7th, 1910, in connection with the G.T.R. crossing at Lachine Road at Rockfield, Quebec, by substituting the word "Montreal" for the word "Ottawa" where it occurs in the said Order, and the words "overhead bridge" for the word "subway" in the sixth line of the operative part of said Order.

9692—February 23—Authorizing the C.P.R. to construct a spur for the Hamilton Powder Company near Barnett Station, in Lot 217, New Westminster District, B.C.

9693-4—February 23—Authorizing the C.N.O.R. to carry its tracks and telegraph wires under the wires of the G.N.W. Telegraph Company at station 2991.67 and 2990.17, west from Hawkesbury, Ontario.

9695—February 23—Authorizing the Bell Telephone Company to carry its wires across the telegraph lines of the G.T.R. at Main Street, to Grand Trunk Station, Richmond, Quebec.

9696—February 23—Authorizing the Rural Municipality of Pipestone to carry its wires across the C.P.R. at public crossing one-quarter mile west of Reston Station, Manitoba.

9697—February 23—Authorizing the Lincoln Electric Light and Power Company to carry its power and light wires across the track of the G.T.R. at Niagara Street, St. Catharines, Ontario.

9698—February 23—Authorizing the Seymour Power and Electric Company, Limited, to carry an electric transmission line across the G.T.R. at Madoc, Ontario.

9699—February 23—Authorizing the Consumers' Gas Company, of Toronto, to lay a gas main under the track of the G.T.R. at Woodbine Avenue, Toronto, Ont.

9700—February 23—Approving location of C.N.R. through Tps. 53-52, and R. 15, west 5th Meridian, and unsurveyed Tps. 51-45, and Rs. 15-18, west 5th Meridian, mile 0.00 to mile 60.45, reckoned from junction with main line at mile 124.48, Province of Alberta.

9701—February 24—Authorizing the C.A.R. to construct proposed bridge over St. Lawrence River at Coteau, Quebec.

9702—February 22—Approving rules and regulations of the G.N.R. in so far as they govern the operation of trains of the said company in Canada.

9703—February 23—Authorizing the King Independent Telephone Company to carry its telephone wires across the track of the G.T.R. north of King Station, Province of Ontario.

CONTRACTS AWARDED.

For Electrical Equipment at Toronto and London.

(Also see page 208.)

London, Ont.—On Saturday afternon, the light and power commissioners met, and awarded contracts as follows:

Division 1—Ten oil insulated water-cooled Transformers, Central Electric and School Supply Company	$12,000
2—One 40-k.w. automatic voltage regulator, Ferranti, Limited	2,250
3—Three 20 kw. automatic voltage regulators, Canadian General Electric Company	4,600
4—All lightning protective apparatus for both stations, Canadian General Electric Company	1,800
5—Complete switchboard, instruments and wiring connections between all apparatus, Canadian General Electric Company	10,100
6—Complete set portable instruments as specified, Ferranti, Limited	1,375
7—Constant direct current arc light transformer and rectifier, and,	
8—Sixty arc lamps with absolute cut-outs, Canadian General Electric Company	4,300
9—Eight constant current transformers for street series, incandescent lighting, Ferranti, Limited	2,425
10—1,550 street fixtures, as specified, Wheeler Reflector Company	6,286
11—2,000 series 6.6 ampere 75 or 80 watt lamps, Sunbeam Incandescent Lamp Company	2,500
Total	$47,636

Toronto, Ont.—The city of Toronto received the following tenders for approximately 8,000 k.w. of 13,200 volt transformers required in connection with the distribution of hydro-electric power:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
1	$12,840	$11,610	$ 9,200	$ 7,800	$ 7,800	$ 5,650
2	13,500	12,750	9,000	7,125	6,750	6,250
3a	14,100	13,050	8,800	7,050	6,510	6,150
3b	16,860	13,050	10,770	8,400	7,380	7,530
4	11,430	10,470	9,606	7,227	6,576	6,192
5	13,170	11,532	8,820	7,740	7,110	5,430

	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.
1	$15,680	$12,670	$10,550	$ 3,270	$ 3,060
2	16,625	15,750	11,715	3,675	3,425
3a	16,100	13,930	10,250	3,330	3,070
3b	16,800	13,930	10,250	3,740	3,370
4	15,239	14,175	10,395	3,424	3,190
5	15,260	15,365	12,400	3,130	3,240

The tender submitted by No. 2 is from an American firm and does not include duty. In his report to the Board of Control relative to these tenders, K. L. Aitken, electrical engineer, says that items 1, 2 and 3 are alternative. We wish to accept item 3, and recommend the acceptance of tender No. 3a, of the Canadian General Electric Company, $8,800, this being the lowest.

Items 4, 5 and 6 are alternative. We wish to accept item 6, and recommend the acceptance of tender No. 5, of the Canadian Westinghouse Company, $5,430, the lowest.

Items 7 and 8 are alternative. We wish to accept item 8, and recommend the acceptance of tender No. 1, of the Allis-Chalmers-Bullock, Ltd., $12,670, this tender being the lowest.

Item 9. We recommend the acceptance of tender No. 1, of Allis-Chalmers-Bullock, Ltd., $10,550. This tender is the only one for this section which covers apparatus of a size suitable for our purpose and, while not the lowest, is very close to being the lowest. Tenders Nos. 3a and 3b ($10,250) are lower, but do not cover apparatus as called for in our specifications. Tender No. 4 ($10,395) is lower, and covers apparatus made in England. We think tender No. 1, acceptance of which we recommend, is most desirable from every standpoint.

Items 10 and 11. These items are alternative. We wish to accept item 10, and recommend the acceptance of tender No. 5, of the Canadian Westinghouse Company, Ltd., $3,130, this tender being the lowest.

ENGINEERING SOCIETIES.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, Col. H. N. Ruttan; Secretary, Professor C. H. McLeod.

Chairman, L. A. Vallee; Secretary, Hugh O'Donnell, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH—

96 King Street West, Toronto. Chairman, A. W. Campbell; Secretary, P. Gillespie, Engineering Building, Toronto University, Toronto. Meets last Thursday of the month.

MANITOBA BRANCH—

Chairman, H. N. Ruttan; Secretary, E. Brydone Jack. Meets first and third Fridays of each month, October to April, in University of Manitoba, Winnipeg.

VANCOUVER BRANCH—

Chairman, Geo. H. Webster; Secretary, H. K. Dutcher, 40-41 Flack Block, Vancouver. Meets in Engineering Department, University

OTTAWA BRANCH—

Chairman, W. J. Stewart, Ottawa; S. J. Chapleau, Resident Engineer's Office, Department of Public Works.

MUNICIPAL ASSOCIATIONS.

ONTARIO MUNICIPAL ASSOCIATION.—President, Mr. George Geddes, Mayor, St. Thomas, Ont.; Secretary-Treasurer, Mr. K. W. McKay, County Clerk, St. Thomas, Ontario.

UNION OF ALBERTA MUNICIPALITIES.—President, H. H. Gaetz, Red Deer, Alta.; Secretary-Treasurer, John T. Hall, Medicine Hat, Alta.

UNION OF NOVA SCOTIA MUNICIPALITIES.—President, Mr. A. E. McMahon, Warden, King's Co., Kentville, N.S.; Secretary, A. Roberts, Bridgewater, N.S.

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ALBERTA ASSOCIATION OF ARCHITECTS.—President, R. Percy Barnes, Edmonton; Secretary, H. M. Widdington, Strathcona, Alberta.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.—President, Charles Kelly, Chatham, Ont.; Secretary, W. A. Crockett, Mount Hamilton, Ont.

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Vice-President, Gustave Kahn, Toronto; Secretary-Treasurer, Alfred E. Uren, 62 Church Street, Toronto.

CANADIAN ELECTRICAL ASSOCIATION.—President, N. W. Ryerson, Niagara Falls; Secretary, T. S. Young, Canadian Electrical News, Toronto.

CANADIAN FORESTRY ASSOCIATION.—President, Thomas Southworth, Toronto; Secretary, James Lawler, 11 Queen's Park, Toronto.

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, W. G. Miller, Toronto; Secretary, H. Mortimer-Lamb, Montreal.

CANADIAN RAILWAY CLUB.—President, H. H. Vaughan; Secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

CANADIAN STREET RAILWAY ASSOCIATION.—President, D. McDonald, Manager, Montreal Street Railway; Secretary, Acton Burrows, 157 Bay Street, Toronto.

CANADIAN SOCIETY OF FOREST ENGINEERS.—President, Dr. Fernow, Toronto; Secretary, F. W. H. Jacombe, Ottawa.

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto, President, J. Duguid; Secretary, C. L. Worth, 409 Union Station. Meets third Tuesday each month except June, July, August.

DOMINION LAND SURVEYORS.—Ottawa, Ont. Secretary, T. Nash.

MARKET CONDITIONS.

Following the quotations of the various articles listed in the markets will be found in brackets numbers, thus (10). These numbers refer to the list number of advertisers on page 3 of this issue and will assist the reader to quickly find the name and address of a firm handling any particular article. Buyers not able to secure articles from these firms at the prices mentioned will confer a favor by letting us know.

Montreal, March 3rd, 1910.

It would seem that the production of pig-iron, in Canada, during 1909, was not only largely in excess of that of 1908, but was a record for Canada. This was, of course, generally expected, so that the confirmation by the American Iron and Steel Association caused no surprise. The figures are interesting:—Pig-iron produced in Canada, in 1907, 581,146 tons; in 1908, 563,672 tons; in 1909, 677,090 tons.

It will be seen that the production increased 113,418 tons, in 1909, or over 20.1 per cent., a very satisfactory condition of affairs.

The production during the first half of the year was slightly in excess of that of the second half, being 349,641 tons, against 327,449, the second half. Of the entire production in 1909, some 660,856 tons were made with coke and the balance, 16,234 tons, with charcoal and electricity.

The following shows the quantities of basic and Bessemer produced:—

Basic pig-iron, 1908, 335,410 tons; 1909, 357,965 tons.

Bessemer pig, 1908, 112,811 tons; 1909, 169,545 tons.

Four companies, owning nine coke furnaces, made all the basic iron, and the two companies, owning three coke furnaces, produced all the Bessemer. Both basic and Bessemer were entirely produced with coke.

On the last day of the year, there were sixteen furnaces completed in

Canada, and three more were under construction. Of the sixteen completed furnaces, eleven were in blast and the remaining five were idle at the end of the year. Of the total, twelve usually use coke and four charcoal.

The Canadian furnaces, during 1909, consumed 1,311,796 tons of iron ore and 53,731 tons of mill cinder, scale, etc., in the manufacture of pig-iron, while, for fluxing purposes, they consumed about 470,080 tons of limestone.

The entire market is quiet. Neither from the United States nor Great Britain have reports been received of an exciting nature, and from all that can be seen the United States is even less enthusiastic than the phlegmatic Briton. The latter reports a very fair home demand and some enquiry for export account. The continent is feeling fairly hopeful and is likely to make fair purchases during the next few months. In the United States, however, there has been very little demand from any source and, while prices are rather easy than otherwise, holders are not disposed to make sacrifices, their belief being that ere long buying will begin again and the whole market will brace up immediately.

In the local market, the utmost confidence is being shown in the situation, according to all that can be seen. Makers and dealers declare that the tendency is upwards rather than downwards, and that the buyers are not disposed to defer making their purchases, being of the opinion that prices will not be much more advantageous than they are at present.

Finished and semi-finished products are holding steady, and neither the advances nor the declines which have been anticipated from time to time have as yet taken place. The trade no longer looks for any alterations of consequence to take place before the opening of navigation, after which time the opinion seems to be that the increase in the trade of the country will occasion some advances in price.

The market is as follows:—

Antimony.—The market is steady at 8 to 8¼c. (111).

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 ⅜-base; tire steel, $1.00 for 1 x ⅜-base; toe calk steel, $2.35; machine steel, iron finish, $1.90; imported, $2.20. (111, 119)

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). (164).

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 2½ cents extra, or 10c. per bbl. weight. (26, 86, 164).

Chain.—Prices are as follows per 100 lbs.:—¼-inch, $4.90; 5-16-inch, $4.40; ⅜-inch, $3.70; 7-16-inch, $3.50; ½-inch, $3.25; 9-16-inch, $3.20; ⅝-inch, $3.15; ¾-inch, $3.10; ⅞-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; cannel 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 14¼c.

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 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.10; Colborne Crown, $3.85; Apollo, 10¾ oz., $4.05. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge, American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge. (111).

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

Iron.—The outlook is strong. The following prices are for carload quantities and over, ex-store, Montreal, prompt delivery; No. 1 Summerlee, $21.50 to $22 per ton; selected Summerlee, $21 to $21.50; soft Summerlee, $20.50 to $21; Clarence, $19.50 to $20; Carron, No. 1, $21.50 to $22, and Carron special, $21 to $21.50. (111).

Laths.—See Lumber, etc.

Lead.—Prices are about steady at $3.55 to $3.65.

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

Lumber, Etc.—Prices on lumber are for car lots, to contractors, at mill points, carrying a freight of $1.50. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $16 to $17. Spruce, 1-in. by 4-in. and up, $15 to $17 per 1,000 ft.; mill culls, $12 to $14. Hemlock, log run, culls out, $13 to $15. Railway Ties; Standard Railway Ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal Laths: Quotations per 1,000 laths, at points carring $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X, $1.50; XX, 2.50; XXX, $3. (112)

Nails.—Demand for nails is better and prices are firmer, $2.40 per keg for cut, and $2.35 for wire, base prices. Wire roofing nails, 5c. lb.

Paints.—Roof, barn and fence paint, 90c. per gallon; girder, bridge, and structural paint for steel or iron—shop or field—$1.20 per gallon, in barrels; liquid red lead in gallon cans, $1.75 per gallon.

Pipe.Cast Iron.—The market shows a steady tone although demand is on the dull side. Prices are firm, and approximately as follows:—$32 for 6 and 8-inch pipe and larger; $33 for 3-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above. (74, 188).

Pipe.—Wrought and Galvanized.—Demand is about the same, and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black and 44 per cent. off for galvanized; ½-inch, $8.50, with 60 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 71¼ per cent. off for black, and 61¼ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch. $95; 4-inch, $108.

Plates and Sheets.—Steel.—The market is steady. Quotations are: $2.20 for 3-16; $2.30 for ⅛, and $2.10 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10. (111).

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of $30.50 to $31 is given for 60-lb. and 70-lb.; 80-lb. and heavier, being $30; rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location. (73).

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 70c. per roll; three-ply, 95c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. (See Building Paper; Tar and Pitch; Nails, Roofing). (164).

Rope.—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steel, six-strands, nineteen wires; ¼-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $5.25; ⅝, $6.25; ¾, $8; ⅞, $10; 1-in., $12 per 100 feet. (132).

Spikes.—Railway spikes are firmer at $2.45 per 100 pounds, base of 5⅝ x 9-16. Ship spikes are steady at $2.85 per 100 pounds, base of ⅝ x 10-inch, and ⅝ x 12-inch. (132).

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

Telegraph Poles.—See lumber, etc.

Tar and Pitch.—Coal tar, $3.50 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, 70c. per 100 pounds; and No. 2, 55c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; refined coal tar, $4.50 per barrel; pine pitch, $4 per barrel of 180 to 200 pounds. (See building paper; also roofing).

Tin.—Prices are unchanged, at 32½ to 33c.

Zinc.—The tone is steady, at 6 to 6¼c.

CAMP SUPPLIES.

Beans.—Prime pea beans, $1.85 per bushel. (38).

Butter.—September and October creamery, 26c.; dairy, 22 to 23c.

Canned Goods.—Per Dozen.—Corn, 80 to 85; peas, $1.05 to $1.15; beans, 75 to 80c.; tomatoes, 82½ to 90c.; peaches, 2s, $1.65, and 3s, $2.65; pears, 2s, $1.60, and 3s, $2.30; salmon, best brands, 1-lb. talls, $1.87½, and flats, $2.02½; cheaper grades, 95c. to $1.65.

Cheese.—Late makes, 11¼ to 11¾c.; finest makes, ½c. more.

Coffee.—Mocha, 20 to 25c.; Santos, 15 to 18c.; Rio, 10 to 12c. (38).

Dried Fruits.—Currants, Filiatras, 5¾ to 6½c.; choice, 8 to 9c.; dates, 4 to 5c.; raisins, Valentias, 5 to 6c.; California, seeded, 7½ to 9c.; Sultana, 8 to 10c. Evaporated apples, prime, 9¼ to 9¾c.

Eggs.—No. 1 candled, 26c.; selects, 29 to 30c.; new laid, 35c.

Flour.—Manitoba, 1st patents, $5.70 per barrel; 2nd patents, $5.20; strong bakers, $5.

Molasses and Syrup.—Molasses, New Orleans, 27 to 28c.; Barbadoes, 40 to 50c.; Porto Rico, 40 to 45c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, $2.50 per case.

Potatoes.—Per 90 lbs., good quality, 50 to 60c.

Rice and Tapioca.—Rice, grade B., in 100-lb. bags, $2.95 to $3; C.C., $2.90. Tapioca, medium pearl, 4½ to 4¾c.

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

Tea.—Japans, 20 to 38c.; Ceylons, 20 to 40c.; Ceylon, greens, 19 to 25c.; China, greens, 25 to 50c.; low-grades, down to 15c.

Fish.—Salted.—Medium cod, $7 per bbl.; herring, $5.25 per bbl.; salmon, $15.50 per bbl., for red, and $14 for pink. Smoked fish.—Bloaters, $1.10 per large box; haddies, 7½c. per lb.; kippered herring, per box, $1.20 to $1.25.

Provisions.—Salt Pork.—$30 to $32 per bbl.; beef, $15 per bbl.; smoked hams and bacon, 15 to 18c. per lb.; lard, 17c. for pure and 12c. for compound. (38).

* * * *

Toronto, March 3rd, 1910.

In what is usually a dull season of the year there is a good deal of stuff moving, especially in iron and steel heavy goods, at prices well maintained. Cement and brick though not moving largely are firm. Lumber fairly active. Soft coal and slack, which have been scarce by reason of insufficient means of transportation, will shortly be in better supply.

Among camp supplies the prominent feature is the further rise in pork products. Dressed hogs have reached the unprecedented price of $9. There has been a scarcity of them all season, and the packing houses could not at any time get more than one-fourth to one-half their capacity. Lard also is in small supply, and commands a slight advance. Grocery items are generally unchanged; canned goods and dried fruits steady, cheese higher.

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

Antimony.—Demand quiet at 9c. per 100 lbs. (111).

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

Bar Iron.—$2.00 to $2.10, base, per 100 lbs., from stock to wholesale dealer. Market supply limited. (111).

Bar Mild Steel.—Per 100 lbs., $2.10 to $2.20.

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

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per 10 foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $11 to $11.50; 3½-inch, $18 to $18.50 per 100 feet.

Building Paper.—Plain, 27c. per roll; tarred, 35c. per roll. Demand is good for spring requirements.

Bricks.—Prospects excellent for business in 1910. Price at some yards $9 to $9.50, at others, $9.50 to $10 for common. Don Valley pressed brick are in request. Red and buff pressed are worth $18 delivered and $17 at works per 1,000.

Broken Stone—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 75c. until further notice, per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. Not much doing. Broken granite is selling at $3 per ton for good Oshawa. (164).

Cement.—Car lots, $1.60 per barrel, without bags. In smaller parcels $1.70 is asked by city dealers, plus bags, (26, 86, 169).

Coal.—Retail price for Pennsylvania hard, $7.25 net, steady. This

price applies to grate, eggs, stove, and chestnut; only pea coal is cheaper, namely, $6.00. These are all cash, and the quantity purchased does not affect the price. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote. Youghiogheny lump coal on cars here, $3.70 to $3.80; mine run, $3.60 to $3.75; slack, 2.65 to $2.85; lump coal from other districts, $3.40 to $3.70; mine run 10c. less; slack, 2.50 to $2.70; cannel coal plentiful at $7.50 per ton; coke, Solvey foundry, which is largely used here, quotes at from $5.75 to $6.00; Reynoldsville, $4.90 to $5.00; Connellsville, 72-hour coke, $5.50. Soft coal and slack are slowly growing less scarce.

Copper Ingot.—The consumption is larger than ever, but production may be said to beat the record. Such conditions afford play for the speculators. Price here, 14½c. per lb., and the demand active.

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

Dynamite, per pound, 21 to 25c., as to quantity. (83.)

Felt Roofing.—A good prospect for spring trade at an unchanged price, which is $1.80 per 100 lbs.

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

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

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

Iron Pipe.—A steady request at former prices:—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch, $3.28; 1-inch, $4.70; 1¼-inch, $6.41; 1½-inch, $7.70; 2-inch, $10.26; 2½-inch, $16.39; 3-inch, $21.52; 3½-inch, 27.08; 4-inch, $30.78; 4½-inch, $35.75; 5-inch, $39.85; 6-inch, $51.70. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.43; 1-inch, $6.35; 1¼-inch, $8.66; 1½-inch, $10.40; 2-inch, $13.86, per 100 feet. (74, 188).

Pig Iron.—There is great activity and prices are maintained. Clarence quotes at $21 for No. 3; Cleveland, $20.50 to $21, Summerlee, for winter delivery, $22.50 in Canadian pig, Hamilton quotes $19.50 to $20 per ton. Producing plants are everywhere busy, and there is considerable business in prospect for 1910.

Lead.—An active demand at previous prices, which are $3.75 to $3.85 per 100 lbs.

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

Lumber.—Prices are generally firm, especially in pine. We quote dressing pine $32.00 to $35.00 per M; common stock boards, $26 to $30; cull stocks, $20; cull sidings, $17.50; Southern pine dimension timber from $30 to $45, according to size and grade; finished Southern pine according to thickness and width, $30 to $40. Hemlock in car lots, $16.50 to $17; spruce flooring in car lots, $22 to $24; shingles, British Columbia, are higher, we quote $3.10, lath growing scarce and stiffening, No. 1, $4.40, white pine, 48-inch; No. 2, $3.75; for 32-inch, $1.60.

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

Pitch and Tar.—Pitch, unchanged at 70c. per 100 lbs. Coal tar dull at $3.50 per barrel. This is the dead season.

Putty.—In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.10. Plasterer's, $2.15 per barrel of three bushels.

Ready Roofing.—Little doing; prices are as per catalogue.

Roofing Slate.—Most of the slate used in Canada comes now from Pennsylvania or Maine, the Canadian supply being slender and mostly from the Rockland quarries of the Eastern Townships in Quebec. There is a great variety of sizes and qualities, so that it is difficult to indicate prices. But No. 1 Bangor slate 10 x 16 may be quoted at $7 per square of 100 square feet, f.o.b., cars, Toronto; seconds, 50c. less. Mottled, $7.25; green, $7.

Plaster of Paris.—Calcined, New Brunswick, hammer brand, car lots, $1.95; retail, $2.15 per barrel of 200 lbs.

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

Sewer Pipe.—

	4-in.	6-in.	9-in.	10-in.	12-in.	24-in.
Straight pipe per foot	$0.20	$0.30	$0.65	$0.75	$1.00	$3.25
Single junction, 1 or 2 ft. long	.90	1.35	2.70	3.40	4.50	14.65
Double junctions	1.50	2.50	5.00	....	8.50	.....
Increasers and reducers		1.50	2.50	....	4.00	.....
P. traps		2.00	3.50	7.50	....	15.00 .....
H. H. traps		2.50	4.00	8.00	....	15.00 .....

Business moderate; price, 73 per cent. off list at factory for car-load lots; 65 per cent. off list retail. (52, 84, 138).

Steel Beams and Channels.—Quiet.—We quote:—$2.50 to $2.75 per 100 lbs., according to size and quantity; if cut, $2.75 to $3 per 100 lbs.; angles, 1¼ by 3-16 and larger, $2.50; tees, $2.80 to $3 per 100 pounds. Extra for smaller sizes of angles and tees. (30, 41, 50, 4, 176, 127, 132, 145, 118, 119).

Steel Rails.—80-lb., $35 to $36 per ton. The following are prices per gross ton, for 500 tons or over; Montreal, 12-lb. $45, 16-lb. $44, 25 and 30-lb. $43.

Sheet Steel.—The market continues steady; American Bessemer, 10-gauge, $2.50; 12-gauge, $2.55; 14-gauge, $2.35; 17, 18, and 20-gauge, $2.45; 22 and 24-gauge, $2.50; 26-gauge, $2.65; 28-gauge, $2.85. Quite a good demand exists, and there is prospect of higher prices.

Sheets Galvanized.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $2.90; 12-14-gauge, $3.00; 16, 18, 20, $3.10; 22-24, $3.25; 26, $3.40; 28, $3.85; 29, $4.15; 10¾, $4.15 per 100 lbs. Fleur de Lis—28-gauge, $4; 26, $3.80 per 100 lbs. A very large tonnage of all sorts has been booked The feeling is toward an advance. (111).

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

Tool Steel.—Jowett's special pink label, 10½c. Cammel-Laird, 16c. "H.R.D." high speed tool steel, 65c. (4).

Tin.—There has been much speculation in London, but the recent level of prices has shown some disturbance. Quotations here, 34½ to 35c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.60 per dozen; set up, $22.60. Pan Canadian, navvy, steel tray, steel wheel, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each. (132).

Zinc Spelter.—A very active movement continues, and a large business is being done. Price as before, $5.75 to $6 per 100 lbs.

CAMP SUPPLIES.

Butter.—Dairy prints, 23 to 24c.; creamery prints, 29c. per lb.

Canned Goods.—Peas, $1.10 to $1.50; tomatoes, 3s, 85c. to 95c.; pumpkins, 3s, 80 to 85c.; corn, 80 to 85c.; peaches, 2s, white, $1.50 to $1.60; yellow, $1.90 to $1.95; strawberries, 2s, heavy syrup, $1.50 to $1.85; raspberries, 2s, $1.50 to $1.95. (38).

Cheese.—Advanced this week ¼c.; large, 13c.; twins, 13¼c.

Coffee.—Rio, green, 11 to 12½c.; Mocha, 21 to 23c.; Java, 20 to 31c.; Santos, 11 to 15c.

Dried Fruits.—Raisins, Valencia, 5½ to 6¼c.; seeded, 1-lb. packets, fancy, 7½ to 8c.; 10-oz. packets, choice, 7 to 7½c.; 12-oz. packets, choice, 7c.; Sultanas, good, 5 to 6c.; fine, 6 to 7c.; choice, 7 to 8c.; fancy, 8 to 9c.; Filiatras currants, 6½ to 7c.; Vostizzas, 8½ to 9c.; uncleaned currants, ¼c. lower than cleaned. California Dried Fruits,—Evaporated apricots, 15 to 16c. per lb.; prunes, 60s to 70s, 7 to 7½c.; 90s to 100s, 6½c.; evaporated apples, 8c. (38).

Eggs.—Cold-storage in market; new laid, scarce, at 30 to 32c. per dozen, in case lots.

Flour.—Manitoba Flour.—Quotations at Toronto are:—First patents, $5.60; second patents, $5.10; strong bakers', $4.90; 90 per cents., Glasgow freights, 28s. 6d. Ontario Flour.—Winter wheat patents, for export, $4.20 to $4.25, in buyers' sacks outside.

Lard.—In small supply. Tierces, 15¾c.; tubs, 16c.; pails, 16¼c.

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

Pork.—Market uncertain. Short cut, $29 per barrel; mess, $27. Light stocks and not much doing.

Rice.—B. grade, 3½c. per lb.; Patna, 5 to 5¾c.; Japan, 5 to 6c.

Salmon.—Fraser River, talls, $2; flats, $2; River Inlet, $1.55 to $1.75.

Smoked and Dry Salt Meats.—Long clear bacon, 14¾ to 15c. per lb., tons and cases; hams, large, 14½c.; small, 16c.; rolls, 14½ to 14¾c.; breakfast bacon, 18½c.; backs (plain), 19c.; backs (peameal), 19 to 20c.; shoulder hams, 13c.; green meats out of pickle, 1c. less than smoked. Market very firm.

Spices.—Allspice, 16 to 19c.; nutmegs, 30 to 75c.; cream tartar, 22 to 25c.; compound, 15 to 20c.; pepper, black, pure Singapore, 14 to 17c.; pepper, white, 20 to 30c

Sugar.—Granulated, $4.95 per 100 lbs. in barrels; Acadia, 4.85; yellow, $4.55; bags, 5c. lower.

Syrup.—Corn syrup, special bright, 3½c. per lb.

Teas.—Japans, 20 to 35c. per lb.; Young Hysons, 16 to 35c.; Ceylons, medium, 10 to 45c.

Vegetables.—Beans, hand-picked, $2.25; prime, $2.15; stocks light, market firm; beets, 85c. a bag; carrots, 60 and 65c. a bag; onions, $1.25 a bag; potatoes, best, 65 and 70c. a bag; turnips, 45c. a bag. (38).

TORONTO HORSE MARKET.

There are over 400 head on hand at present, mostly heavy drafts, which are going out at $250 to $275 for toppers with good ones, bringing $180 to $225. General purpose horses are selling at $140 to $190, wagon horses at $140 to $220, and drivers at $100 to $200. Serviceably sound are bringing $35 to $80 each.

AMERICAN HORSE MARKET, NEW YORK.

The demand in Chicago, says the Breeders' Gazette, is for horses with good mouths, weighing 1,200 lbs. or more, while plugs, and aged and blemished stuff have no place on the market. Desirable drafters weighing 1,700 lbs. and over are going all the way from $275 to $500, while 1,550 to 1,650 drafters are bringing $250 to $325, and delivery horses of 1,000 to 1,250 lbs., are fetching $165 to $250.

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Winnipeg, March 1st.

The Winnipeg market continues to be somewhat dull but very extensive preparations are being made for work during the coming season. Large orders are also being placed for spring delivery, and the prospects for the heaviest building year the West has ever seen are exceptionally good. Very cold weather has been experienced during the past three weeks, which has made business with the coal and wood dealers very active. There is, however, a plentiful supply of coal and wood on this market, and prices remain steady. There has been no settlement yet nor new arrangements made for the handling of cement in the Western field, and dealers are getting anxious to know what quotations will be. Very little cement is on hand here at the present time. Extensive preparations are being made by the railways for work during this year, and the railway supply houses are looking forward to the best year they have ever seen.

Winnipeg quotations are steady and remain unchanged.

Anvils.—Per pound, 10 to 12½c.; Buckworth anvils, 80 lbs., and up, 10¾c.; anvil and vice combined, each, $5.50 (111, 132).

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

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

Bar Iron.—$2.50 to $2.60.

Bars.—Crow, $4 per 100 pounds. (119.)

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

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

Bricks.—$10, $11, $12 per M. three grades.

Building Paper.—4¼ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No 2 tarred, 62½c.; plain, 56c.

(Continued on page 42.)