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MISSING

The Canadian Engineer

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The Canadian Engineer

ESTABLISHED 1893

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TO OUR READERS.

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

THE INDEPENDENT TELEPHONE.

For many years one of the strongest and most successful industries—Canadian grown and Canadian supported—has been the telephone. With controlled patents, exclusive franchises and a system covering Provinces, one system seemed impregnable. Then, quietly, steadily, and with increasing success the "independent movement" spread. The first journal to assist in this movement was the "Canadian Engineer." The telephone was such a necessity on large works, centering all the departments in one office, keeping headquarters in touch with distant construction, assisting in the rapid delivery of material, that the "Canadian Engineer" recognized it had a duty to perform in assisting such an educational campaign.

Two years ago those interested in independent telephones decided that such an important movement should have a journal devoted exclusively to such interests, and the "Telephone Age" was brought out as a monthly devoted to the furtherance of the independent telephone. During these two years much has been accomplished. Three Canadian Provinces have adopted a system of Government controlled lines. In the other Provinces the "independent line" has strung wires in nearly every district, competing successfully with their great rival.

Because of this change in the situation the "Telephone Age" feels it has served its purpose, and has decided to cease publication. During the period in which the "Telephone Age" looked after the interests of independent 'phone the "Canadian Engineer" devoted but little space to the questions connected with telephone construction and expansion. With this issue we again take up that work. By special arrangement we now take over the complete mailing list of the "Telephone Age." For the first time many readers of the "Age" will receive a copy of the "Engineer," but we hope to make our journal appeal to this new class without in any way neglecting the interests we have provided for in the past.

In our Construction News section we have opened a new department, Telephony. Here items of news interest will be found from time to time, and in our editorial pages there will appear articles describing telephone construction and operation.

As we have become a necessity to the civil engineer and general contractor, so we hope to become a necessity to the telephone engineer and telephone contractor.

THE ENGINEER'S OPPORTUNITY.

Engineering is underrated. It is still hard for some to estimate the value of a trained and experienced engineer. In this country of immense open spaces, unmeasured natural resources and great inland seas and navigable rivers is the engineer's opportunity. But he must be prepared for the test.

Incentive for the engineer to study is great at the present time. No matter to which section of Canada you turn, crude forces and huge stores of natural wealth lie ready to lend themselves to processes that create wealth and concern themselves with the larger movements of

human progress. The results from intelligent study should be just as profitable now as at any time.

During the last few years business was so active, work so plentiful and money so free that waste occurred and curtailment followed. Until recently the engineer felt secure in his calling. Old methods were good enough. His planning, calculating and estimating were mechanical, so much routine, but to-day a change is taking place. Daily greater skill and more thorough knowledge are required. Men with trained minds find study profitable and necessary. They find, too, that their knowledge must be wide in range, general, and yet particular.

But it is not as a student, no matter how alert or clear-eyed he may be, not as a mathematician, accurate and skilled, but as a man of experience, a man who has "done things," that an engineer will rise professionally.

Experience is an engineer's opportunity. Make no mistake—it is necessary to make a good engineer.

COST OF PUMPING TORONTO'S WATER SUPPLY.

Special auditors have been checking up the books in several of the departments of the corporation of Toronto. When they handed in their report of the Water-Works Department they attached a statement, the figures of which are used in the following calculations:—

During 1907, 10,356,547,168 gallons of water was pumped for all purposes. This is an average of 28,374,102 gallons per day, or, on the basis of a population of 272,600, it means Toronto supplied 104.3 gallons per capita per day.

The cost per 1,000 gallons was, ordinary charges, 2.60 cents; sinking fund and interest, 2.47 cents, or a total of 5.07 cents per 1,000 gallons.

The gross receipts per 1,000 gallons was 5.26 cents. From meter users it was 10.60 cents per 1,000 gallons and under the flat rate 3.75 cents.

Of the revenue, 42.44 per cent. came from meter users and 57.56 per cent. from ordinary.

A statement of the revenue account of the Waterworks to December 31st, 1907, is given, the receipts being \$544,466.74, and the expenditure, \$269,640.40, the gross revenue excess being \$274,826.34. Interest on outstanding debentures and provision for sinking fund, 1907, \$255,455, making the apparent net revenue excess \$19,370.93.

The net Waterworks debt is shown to be \$5,535,628.50.

EDITORIAL NOTES.

In Vancouver July proved to be a decidedly active month, the total permits amounting to \$106,080, compared with \$74,010 for June and \$79,195 for May. The great majority of buildings for which permits were issued are dwellings, for which the demand continues unabated.

* * * *

Edmonton, Toronto and Vancouver show an increase in building operations for July, but Montreal report a falling off of 50 per cent. from the records of July, 1907. One thing worthy of note is that the number of permits is about the same, the falling off being in the class of buildings.

* * * *

There has been formed in England a "Concrete Institute," which already numbers 225 members, and has the Earl of Plymouth for president, Sir Henry Tanner, vice-president, Max Clarke, F.R.I.B.A., E. O. Sachs, Mr. Ross, M.I.C.E., and other prominent engineers and architects as members. One of its objects is thorough research work in matters appertaining to concrete and reinforced concrete.

The building permits for Edmonton in July, 1908, exceeded the permits for July, 1907, by \$154,110, reaching a total of \$2,094,810. The good crop outlook has had already the effect of inspiring confidence, and never in the history of the city has there been more moderate-priced substantial dwellings in prospect.

* * * *

The activity of building in the city of Toronto this last month deserves notice. Officials say that the number of new buildings erected in July was 3,562, as compared with only 3,121 in July, 1907; the values in the permits, \$1,219,435, showed only a difference of \$2,000. But the great difference is shown in a comparison of the six months, January 1st to July 3rd. In the first half of 1907 the value of structures erected was \$10,239,330, while this year to end of June it was only \$6,134,245. The change is caused by the altered character of buildings more greatly than by their number.

PRECIPITATION FOR JULY 1908.

The precipitation during July in Canada was very generally less than the average, and this was particularly the case in the Western Provinces, and especially in Southern Saskatchewan, where the total amount was but 26 per cent. of the average. Marked deficiencies also occurred in New Ontario and Northern New Brunswick. Some few localities in Northern Manitoba, Central Ontario and Southern Nova Scotia reported a slight excess, generally due to thunderstorms of a very local character.

The table shows for sixteen stations, included in the report of the Meteorological Office, Toronto, the total precipitation at these stations for the month.

Ten inches of snow is calculated as being the equivalent of one inch of rain.

Station.	Depth in inches.	Departure from the average of twenty years.
Victoria, B.C.	0.1	—0.28
Kamloops, B.C.	0.5	—0.82
Calgary, Alta.	1.7	—1.01
Edmonton, Alta.	2.6	—0.87
Swift Current, Sask.	0.7	—1.87
Qu'Appelle, Sask.	1.40	—1.27
Winnipeg, Man.	1.6	—1.52
Port Stanley, Ont.	3.0	—0.30
Toronto, Ont.	2.93	—0.07
Parry Sound, Ont.	2.3	—0.65
Kingston, Ont.	4.9	+1.85
Ottawa, Ont.	2.6	—0.95
Montreal, Que.	4.4	+0.18
Quebec, Que.	3.3	—0.93
Chatham, N.B.	1.5	—2.53
Halifax, N.S.	5.7	+1.85

RAILROAD EARNINGS.

The following are the latest figures:

	Week ending	1907	1908	Change
C. N. R.	July 31	\$ 296,900	\$ 227,800	—\$ 69,100
C. P. R.	July 31	2,282,000	1,990,000	— 292,000
G. T. R.	July 31	1,307,945	1,112,566	— 195,379
T. & O.	Aug. 1	25,700	27,500	+ 1,800
Montreal St.	Aug. 1	72,740	72,341	— 399
Toronto St.	July 31	65,633	67,074	+ 1,441

JULY TIMBER RETURNS.

The following are the timber returns for the month of July for British Columbia:—Timber licenses west of the Cascades, 682, \$95,600; timber licenses east of the Cascades, 371, \$42,794; coal prospecting licenses, 25, \$2,500; penalties, \$1,050; transfer fees and miscellaneous, \$917.50; total for month, \$142,861.50.

A NEW METHOD OF WET EXCAVATION.

By C. M. Ripley, New York.

Draining, instead of emptying, an excavation.

How vacuum pumps and three hundred well points master the terrors of quicksand better than sump method.

Why ordinary wooden sheeting is sufficient, even though sand is unusually fluid and digging goes three feet below sheeting.

How the 30-foot excavation for a new \$350,000 sewer at Gary, Ind., is kept dry, although 22 feet below water level.

Detailed costs of excavation, pumping, jetting well points, laying brick, shovelling and back-filling.

"The Magic City of Steel," Gary, Indiana, which represents an expenditure of \$75,000,000, has attracted much attention in the world of engineering, owing to the magnitude of the work, the speed of construction and the methods adopted. With a population of fifteen thousand, Gary is scarcely two years old; yet it has above ten miles of paved streets, twenty miles of gas mains, an electric light plant, full telegraph and telephone service, both local and long distance, and now an elaborate system of sewers, about twenty miles in length, is nearing completion. The sewer system will cost about \$350,000, and about half of this contract was let to Green & Sons Company, contractors, of Chicago, Ill.

This article deals with the methods and costs of the contractor in overcoming the difficulties of quicksand, which will flow in from a radius of fifteen feet when an excavation one foot in depth is left unconfined. This sand, when dry, is so impalpable that it is ankle deep. So low is the land, also, as compared with Lake Michigan, that in many places there are surface ponds three and four feet in depth.

The Vacuum Pump Method.

In designating the arrangement of the apparatus the front or foremost end of the sewer trench will be the end being excavated, while the words "first," "second" and "third" pumps will serve to designate their relative position in reference to the front end of the sewer trench.

It will be seen from the illustration that the first vacuum pump (an Emerson No. 3, with 5-inch suction and 4-inch discharge) has to do with draining the excavation immediately adjacent to the scraper bucket excavator. Its suction pipe is connected with a horizontal 4-inch pipe as shown. The 2-inch well points are three feet long, and are connected with 2-inch pipes 13 feet long, which are jetted in a double row near the centre of the trench. This arrangement is made so as to allow the sheeting to be driven on either side. The pump draws water from:—

132 2-inch well points sunk 16 feet below.

1 4-inch well point sunk 16 feet straight below the pump.

1 4-inch suction pipe, with strainer, placed on the front end of the horizontal pipe line, and draining surface water.

Pump Suspension.

The pumps are all hung by chain falls from "A" frames, the first "A" frame being mounted on rollers to facilitate its being moved forward as the excavation progresses. The sheeting prevents the others being so mounted.

Pipe Connections.

The 4-inch horizontal suction pipe mentioned in connection with pump No. 1 is made up of six sections and joined by flanges. As the work progresses 22 feet the rear section is removed and placed in front, and so on. Gate valves at frequent intervals make it possible to do this without shutting down; thus the pump can remain in one position, even though the excavation has been carried forward about 6 x 22, or approximately 120 feet.

The vertical pipes leading down to the well points have ells at the top and a four-foot length of hard, wire-lined rubber suction hose makes the connection to the 4-inch main pipe. Each 22-foot length of this latter pipe has eleven cross valves, with two bushings each, to accommodate the rubber connection.

Sheeting now Driven.

After the draining has been carried on for a couple of hours in the first of the six sections attached to the first pump, 2 x 8 x 12 in. sheeting is driven by mauls on both sides of the sixth section. Then excavation is started by six shovellers, and is carried down about six feet more. It is at this level that the well points attached to pumps No. 2 and No. 3 are jetted down another 16 feet, so that they penetrate below the bottom of the lowest excavation and six feet below the bottom of the sheeting. The entire trench was dry sand, comparatively, and would stand $\frac{1}{2}$ to 1, although if wet it would not stand better than 15 to 1.

Different Arrangement for Other Pumps.

The second and third Emerson pumps have their suction pipes, as the electrical engineer would say, "operating in parallel"; that is, they are both drawing water from the same piping system. The suction pipe of each draws water from:—

One 4-inch suction hose straight below the pump.

One 4-inch rubber hose leading to the right.

One 4-inch rubber hose leading to the left.

This arrangement is accomplished by means of a four-way connection in the suction of each pump, about one foot below the pump. The two 4-inch rubber hose, branching



Bird's Eye View of Gary Sewer, Showing Pumping Plant, Trench, Clamshell, Backfilling and New Steel Plant in Far Distance.

off horizontally from the four-way connection, and at right angles to the trench, are only long enough to connect through a tee with 2-inch iron pipes, also horizontal, which extend along the sides of the trench, just inside the sheeting. It is to these latter pipes that the 1 $\frac{1}{4}$ -inch well points are connected, and jetted down as close to the sheeting as possible so that the excavation can go on without hindrance.

Shifting the Vacuum along the Trench.

Again gate valves at frequent intervals allow of considerable flexibility, so that the pumping can be made stronger in any part of the excavation where specially large quantities of water may be encountered. Thus, the entire combined capacities of the second and third pumps can be concentrated on those well points in the wettest part of the work by closing the gate valves and shutting the vacuum from other points in the trench. This would, of course, be impossible were an ordinary "sump" used. Had the sump method been employed as the work progressed, new sumps would have to be dug, sheeted, and additional pumps hung at considerable expense. The "distributed suction" idea at Gary makes the pumping more efficient than in the old sump method, because the water is only drained from the

exact location of the trench instead of from a circular area mostly outside the limits of the excavation and within a certain radius of the sump.

Jetting down Well Points 16 Feet.

Two men were timed while using a 1-inch pipe for jetting down the well points. The water pressure was about 100 pounds per square inch, and the men sunk four 1¼-inch well points to a depth of sixteen feet in one minute. This obviously does not include time making connections with main pipes through rubber hose.

Comments on Pumping System.

It is a fact worthy of note that the hundreds of connections between flanges, rubber hose, ells and suction pipes cannot be made absolutely air-tight, and that, with the high vacuum inside, a considerable amount of air must find access to the suction of the pumps. This fact does not seem to hinder the working of these pumps, owing probably to the large volume of the chambers in which the condensed steam forms the vacuum. Mr. G. H. Olmstead, of 407 Dearborn Street, Chicago, who furnished most of the pumping equipment, stated in an interview with the writer: "A centrifugal or reciprocating pump could not be used under these conditions without needing frequent priming, owing to the air in the suction. Moreover, the sand which comes in with the water would necessitate a frequent renewal of the valves, brasses, etc., a trouble which we have not experienced, as is proved by an uninterrupted run, night and day, for four months."

Mr. Sargent, representing the consulting engineers for the job, as well as Mr. Green, the contractor, is highly pleased with the novel arrangement and economy in labor which it is effecting. They say that were shut-downs to occur, which will cause a delay of even half an hour, it would make the excavation so wet as to become extremely dangerous to the workmen, and make the costs much higher, owing to the unusual fluidity and fineness of the sand.

In commenting upon the leakage of air into the vacuum pumps, one of the men interested said that the amount of air is possibly augmented by the entrance of air through the well points, for, when the water is drained from any section, the vacuum at that point still being undiminished, would, under certain conditions, be likely to inhale air at that point also.

It is interesting to contrast this vacuum method with its diametrically opposite method—the pneumatic caisson process of penetrating water-bearing strata. In the latter compressed air forces the water downward away from the sand or other soil, and the excavation can frequently be carried down below the edges of the caisson. In this new, or vacuum method, the digging is carried two or three feet below the bottom of the wooden sheeting—and this in very fluid material—showing that the **draining of water from below** is as effective in this case as is the **displacing of the water from above**, as in the pneumatic process.

Disposal of Seepage Pumped and Back-water.

The discharge pipes of the first three pumps empty into a 10-inch tile drain, laid in a small trench by the side of the main excavation. This, in turn, discharges into the completed sewer on the far side of a dam of sand-bags. The amount of water so discharged has not been accurately measured, but it is a rushing stream, two-thirds filling the 10-inch drain pipe, and flowing at a rapid rate, owing to a drop of over twenty feet in two hundred.

The "back-water" in the completed sewer is about four feet in depth, and the seepage through this dam, as well as that which enters the sewer through other channels, is sufficient to keep a fourth Emerson pump working continuously night and day. A temporary manhole was built in the centre of the arch, and in this was suspended an Emerson pump, No 1, with a capacity of about 250 gallons per minute.

Speed in Damp Sand most Rapid, compared with Wet or Dry.

The contractor, in speaking of the new method, said that he has already proved his earlier estimate to be cor-

rect—that the small investment for the pumping plant was more than offset by the remarkable saving in labor and the increased speed of the work. He states that a laborer can handle several times as much sand in a damp state than he could if it were either dry or very wet, as the dry sand falls off the shovel and the wet sand is washed off.

It is claimed by some who have followed the work pretty closely that if completed at the present rate, there will be a saving made of about \$40,000, because the excavating gang is working under the best conditions, though twenty-two feet below water level, and that with ordinary wood sheet piling driven by mauls.

Another advantage of the damp sand is that it can be packed, and thus affords a firm bed for the brick sewer invert.

After the brick work is completed, pumping in that part of the trench is continued for about half an hour to make sure of the proper setting of the cement mortar. To hasten this process half Universal Portland and half Utica hydraulic cements are used.

The lowest trench braces were taken out after the invert was completed and before work was begun on the arch. This was made possible because the sheeting extends one foot below the top of the invert, and is thus held in place.

Industrial Railway.

An industrial railway of 2-foot gauge, with wood ties and 12-pound rails, parallels the sewer route for 2,800 feet. This is of considerable use in carrying materials from the railway switches and distributing along the job. Teams of horses, and then mules, were tried to haul these side-dumping cars on the track, but owing to rapid progress and frequent changes in the track, together with the extreme softness of the sand, it was found that laborers could go where the teams would not.

Summary of Contractor's Plant.

- Piping system as described.
- Three hundred (approximately) well points.
- Two No. 3 Emerson standard vacuum pumps.
- One No. 1 Emerson standard vacuum pump.
- One small duplex force pump for jetting.
- One Lidgerwood pile-driver; boiler used for supplying small Emerson pump.
- Three horizontal 30 horse-power boilers for supplying large Emerson pumps.
- One 2-yard Page & Schnable drag-scraper bucket excavator, 40 horse-power engine.
- One 1-yard Hayward clamshell, for back-filling.
- One engine and derrick for same.
- Two thousand eight hundred feet of industrial railway, with 12 side-dump cars.

Back-filling.

An 8¼ x 10-inch Lidgerwood engine and derrick, with a 1-yard Hayward clamshell bucket, is now working night and day putting in the back-fill. Since the entire coal bill for the job averages \$25 a day for twenty-four hours, and assuming that the four Emerson pumps together, with the small duplex force pump, consume half this fuel, then the clamshell and the bucket excavator will use approximately a total of \$12.50 worth of coal per day, with coal at \$3.60 per ton, delivered. The clamshell and the scraper bucket we will assume equal amounts of fuel, and so the cost of 500 yards, put in in nine hours, figures as follows:—

One engineer	\$ 5 00
One fireman	3 00
Three laborers	6 00
Coal	6 25
Total	\$20 25

which, divided by 500, gives about four cents per cubic yard as the unit cost. But part of the refill is done by shovellers immediately after the arch is finished.

The Drag Scraper Bucket Excavator.

A 2-yard Page & Schnable bucket excavator was used on a 40-foot boom, with the usual cable and chain attachments. Second readings were as follows:—

Time of day.	Began.	Time elapsed for each item in secs.
4:22:05	Hoisting full bucket	5
4:22:10	Swinging to embankment.....	5
4:22:15	Dumping	5
4:22:20	Swinging back	5
4:22:25	Lowering to trench.....	5
4:22:30	Digging	15
4:22:45	Hoisting full bucket.....	5
4:22:50	Swinging to embankment.....	7
4:22:57	Dumping	5
4:23:02	Swinging back	3
4:23:05	Lowering	5
4:23:10	Digging	15
4:23:25	Hoisting full bucket.....	—

Total for two round trips being, seconds.... 80 or 40 per round trip on the average

It is thus seen that 38 per cent. of the entire time of this machine is expended in the "digging" movement. The sand on the job was what might be called "perfectly wet"; that is, the voids were perfectly filled with water. Its weight, therefore, can be taken as about 33 per cent. greater than dry sand, or about 120 pounds per cubic foot; thus the 2-yard bucket when full must contain about 2 x 27 x 120 pounds, or about three tons of sand. This fact will assist us in understanding the slowness of the "digging" operation.

It must be borne in mind that this scraper is only doing the surface or preliminary excavation, running about ten yards per lineal foot. Also, that the material is practically quicksand, and that it would be useless to try to dig lower than the water-level at this stage of the work. It was a matter of considerable interest to note that some of the excavated material was dumped exactly straight ahead in the path of the machine, so the excavator was building its own roadbed over the swamps in front with the material that it excavated behind.

Scraper Bucket Costs.

The cost per day for excavating the 600 yards at the rate of 60 lineal feet per day is as follows:—

One engineer	\$ 5 00
One fireman	3 00
Three laborers	6 00
Coal	6 25
Total	\$20 25

which, divided by 600, gives the cost of this trench excavation at about 3½ cents per cubic yard, not figuring superintendence and depreciation.

The machine, it should be remembered, is not trying to make a record, but it is working fast enough to keep ahead of the deeper excavation and the brick work. Although its average is 60 feet per day, of 600 yards per day, it has excavated 850 yards in one day.

The entire machine is pulled ahead by simply lowering the bucket and letting it get a good "bite" on the ground ahead; then by winding up on the "digging" cable, the whole apparatus will move forward on its rollers. These rollers are then checked behind by pieces of angle iron, so that in the regular process of digging there will be no retrograde movement.

Cost of Work for Daily Progress of Sixty Feet.

Cost of driving and pulling sheeting and setting braces (nine hours):—	
Four men setting braces at \$2.25.....	\$ 9 00
Three men driving sheeting at \$2.50.....	7 50
Four men pulling sheeting at \$2.50.....	10 00
One carpenter	3 00
Total	\$29 50

Cost of pumping and changing piping system, day and night:—

Fuel for twenty-four hours.....	\$10 00
Twelve pipe linemen at \$2.25.....	27 00
Six firemen at \$3.....	18 00
Two superintendents at \$3.....	6 00

Total for three big pumps..... \$61 00

Cost of keeping out back-water, night and day:—

Fuel for twenty-four hours.....	\$ 2 50
Two firemen at \$3.....	6 00

Total

Cost of clearing timber (nine hours):—

Two men at \$2.....	\$ 4 00
---------------------	---------

Total cost of handling earth and trench expense per day:—

Bucket excavator (day only, including fuel)..	\$20 25
Pumping out trench and changing pipes (twenty-four hours)	61 00
One hundred and forty shovellers, day only, at \$2.15	301 00
Back-filling, day only	20 25
Sheeting and bracing, day only.....	29 50
Three water boys at \$1.....	3 00

Total

Cost of laying brick, daily:—

Five men mixing cement mortar at \$2.50....	\$12 50
Five men carrying cement mortar at \$2.50..	12 50
Three men lowering cement mortar at \$2.25.	6 75
Six brick masons (5,000 brick each daily) at \$10	60 00
Three brick tenders at \$3.75.....	11 25
Fifteen brick handlers, average \$2.50.....	37 50
Twenty-six men on industrial railway at \$2..	52 00
Three teamsters at \$2.50.....	7 50
Three teams at \$9.....	27 00
Three form setters at \$3.25.....	9 75
Three water boys at \$1.....	3 00

Total for labor

Thirty thousand brick daily at \$6.50..	\$195 00
Thirty barrels Portland cement at \$1.75	52 50
Thirty barrels Utica hydraulic at \$1..	30 00
Total	277 50

Total cost 30,000 brick daily.....\$517 25

Grand total costs per day (approximate):—

Brick work	\$517 25
Earth handling and trench expense.....	435 00
Pumping out finished sewer	8 50
Clearing timber	4 00
Superintendence and organization	50 00
Repairs, estimated losses and depreciation..	40 00

Grand total

The cost of occasional railroad trestles and unforeseen accidents cannot be included in the above. Credit must be given to the contractor for many low costs under these conditions and for good management of labor, and care to provide against accidents in the treacherous sands bordering Lake Michigan.

The parties engaged are as follows: A P. Melton, city engineer of Gary, Indiana; Alvord & Burdick, consulting engineers and designers; W. F. Sargent, their local representative; E. M. Scheffow, engineer of construction for Green & Sons; R. Shackleton, superintendent.

—Notwithstanding the fact that the steel plant of the Dominion Iron & Steel Company had been closed down for some days in the earlier part of last month, the working month practically commencing on the 6th. During July over 22,000 tons of steel were turned out, the whole of which was converted into rails, wire rods, billets, etc., to fill orders, and the shipments reached the handsome total of 23,332 tons.

ENGINEERING SOCIETIES.

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

CANADIAN STREET RAILWAY ASSOCIATION.—President, E. A. Evans, Quebec; secretary, Acton Burrows, 157 Bay Street, Toronto.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, J. F. Demers, M.D., Levis, Que.; secretary, F. Page Wilson, Toronto.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, J. Galbraith; Secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1908.

QUEBEC BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, E. A. Hoare; Secretary, P. E. Parent, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—96 King Street West, Toronto. Chairman, C. H. Mitchell; Secretary, T. C. Irving, Jr. Traders Bank Building.

MANITOBA BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, H. N. Ruttan; Secretary, E. Brydone Jack. Meets first and third Friday of each month, October to April, in University of Manitoba.

ENGINEERS' CLUB OF TORONTO.—96 King Street West. President, J. G. Sing; secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months.

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

CANADIAN MINING INSTITUTE.—413 Dorchester Street West, Montreal. President, W. G. Miller, Toronto; secretary, H. Mortimer-Lamb, Montreal.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, J. H. Winfield; Secretary, S. Fenn, Bedford Row, Halifax, N.S.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, TORONTO BRANCH.—W. G. Chace, Secretary, Confederation Life Building, Toronto.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, H. L. Holman; secretary, Calvin W. Rice.

SOCIETY NOTES.

The Architectural Institute of Canada.

The annual assembly of the Architectural Institute of Canada will be held in the Public Library, Ottawa, Ont., on 28th September to 1st October, 1908, for the adoption of by-laws, the election of officers and members of the council and for the transaction of any other business that may arise. Every Canadian architect is cordially invited, and is welcome at all sessions and entertainments, whether a member of the Institute or not. The programme of the assembly will be issued early in August. Alcide Chausse, secretary, Box 250, Montreal.

The Concrete Institute.

The first meeting of the council of the newly-formed Concrete Institute was held on July 21st, 1908, at London, Eng., the Earl of Plymouth (the president) presiding. Among those present were Mr. Ernest George, President of the Royal Institute of British Architects; Sir Henry Tanner, I.S.O., of H.M. Office of Works, vice-president; Mr. W. H. Johnson, B.Sc., hon. secretary of the Institute of Metals; Mr. Searles-Wood, F.R.I.B.A., hon. secretary of the Reinforced Concrete Committee; Mr. Max Clarke, F.R.I.B.A., chairman of the Commission on Concrete Aggregates; Mr. Ellis Marsland, hon. secretary of the British Fire Prevention Committee; Mr. Ross, M.Inst.C.E., chief engineer, Great Northern Railway; Mr. Marsh, M.Inst.C.E., Metropolitan Water Board; Mr. Dunn, F.R.I.B.A., Mr. Hatch, chief engi-

neer, Metropolitan Asylums Board; Mr. Colson, M.Inst.C.E., Admiralty; Lieut. Colonel Winn, R.E.; Mr. de Vesian, M.Inst.C.E.; Mr. W. H. Topham, A.Inst.C.E.; Mr. E. P. Well, J.P.; Mr. Bertram Blount, F.I.C.; Mr. Workman, C.E. Mr. Sachs, in an address, dealt with the objects of the Institute and the necessity of thorough research work in matters appertaining to concrete and reinforced concrete. He pointed out that the membership already exceeded 225, of whom the majority were civil engineers and architects, but that co-operation with the representatives of the industries concerned was essential in order to obtain practical results.

Engineers' Club, Toronto.

At a special executive meeting of the Engineers' Club, of Toronto, it was moved and seconded, that the secretary be instructed to memorialize the city authorities of Toronto and Hamilton, protesting against the unnecessary employment of engineers residing in the United States, taking the position that Canadian Engineers are by education and experience, competent to design and carry out the construction of all and every engineering work, of whatever character, required in this country. And to appeal to public opinion through the Press to resist this unfair, disloyal, and unnecessary action on the part of either the Government departments, city authorities, or private companies.

Independent Telephone Association.

The Canadian Independent Telephone Association will hold their Third Annual Convention in the City Hall, Toronto, on Wednesday, September 9th, 1908, not only will there be an interesting programme but there will also be a display of telephone equipment and supplies. Among the papers read will be the following:—

- (1) Bell Connections—Dr. W. Doan.
- (2) Independent Telephones at Railway Stations—C. Skinner.
- (3) Organization of Rural Companies—(a) Mutual vs. Joint Stock Companies—A. R. Walsh. (b) Rural Line Equipment and the Best Way to Serve the Farmers—F. A. Dales.
- (4) Telephone Rates—(a) Rates to be Charged, and the Best Form of Collecting—A. Hoover. (b) To what extent should Free Service be given?—A. D. Bruce.
- (5) Division of Territory between Telephone Companies—Levi Moyer.
- (6) Toll Line Connections: How best Effected—Alex. Neilson and Henry Sneath.
- (7) Western Situation and its Future—F. Dagger.
- (8) Our Interests in Towns and Cities—M. Gee.
- (9) The Independent Movement in Towns and Rural Communities—T. R. Mayberry, M.L.A.
- (10) Exclusive Franchises and Government Regulation—Dr. A. Ochs.

Besides the papers on set subjects given in the programme a number of prominent gentlemen interested in the Independent Telephone movement are expected to be present. The list includes Hon. Richard Turner, Hon. Jules Allard, Hon. Adele Turgeon, and Sir E. B. Garneau, of Quebec; Mr. J. H. Shoemaker, President of the Iowa Independent Telephone Association, and J. B. Ware, Secretary of the International Independent Telephone Association. Mr. F. Page Wilson, 405 Confederation Life Building, is secretary.

A new machine shop and foundry is under construction for the Goldschmidt Thermit Company, 90 West Street, New York City. The building occupies a site 34 x 90 feet in size, just back of their present factory in Jersey City, and is to be fitted up for the purpose of handling to better advantage the extensive repair work which is now being carried on at these works. Travelling cranes will be provided, and no expense will be spared to make the building the most complete Thermit repair shop in the country. Special attention will be paid to the rapid execution of the repairs to electric motor cases, truck-frames, cast-steel gear wheels, crank shafts, and, in fact, any wrought iron and steel sections not exceeding 2,000 pounds in weight.

A Page of Costs

ACTUAL, ESTIMATED, AND CONTRACTED.

COST OF TRACING DRAWINGS.

The cost of making tracings will depend largely upon the amount of details each drawing attempts to show.

Below is given the cost of making a tracing of a set of plans showing four elevations, four floors, four sections and one plan of details.

In all these was 50 square feet of drawings on a scale $\frac{1}{4}$ -in. = 1 ft. and the cost was: 211 hours work at 20 cents an hour, \$42.20, or about 84 cents a square foot.

To make tracings covering four elevations, two sections, and three plans of a house, in all 10 square feet, it took 50 hours or at the same rate as above it would cost as follows: 50 hours at 20 cents per hour, \$10; thus making the cost \$1 per square foot.

In this case the scale was also $\frac{1}{4}$ -in. = 1 foot.

COST OF RIVETING.

When estimating one frequently neglects to estimate high enough on the extras, those items of construction which in themselves are small and which require special workmen.

Rivetting when done by hand is at best expensive, when the men working at it have not worked long together it cost much more than experienced men working together.

On a \$5,000 contract there was some special steel work that required 420 $\frac{7}{8}$ -in. rivets.

A crew of four was made up, two expert riveters and two helpers. To heat the rivets a machinist's forge with a 21 in. x 27 in. hearth was used. No staging was required.

The cost was as follows:

5 hours at 17½ cents per hour.....	\$ 87
110 hours at 30 cents	33 00
115 hours at 50 cents	57 50

Total \$91 37

That was the crew, in 57½ working hours drove 420 rivets or an average of 7.3 per hour.

The cost of driving 420 rivets was \$91.37, or 21.7 cents per hundred.

Even for hand-riveting this cost is high, yet it is such "extras" as this one has to provide for in estimates.

COST OF SURVEYS.

Between January, 1906, and April, 1907, the Dominion Government placed in the field some thirty surveyors. The work was done by "day-work." Some of the costs were as follows:

Miles of sec. lines.	Miles of outline.	Miles of traverse.	Miles of re-survey.	Total miles.	Cost per mile.
...	...	...	239	239	\$29 88
...	...	...	484	484	13 84
87	12	...	70	169	35 81
...	120	...	...	120	62 74
...	...	142	339	481	14 19
201	32	20	651	904	7 77
68	12	27	3	110	53 60
14	6	11	...	31	90 84
212	19	1	...	232	34 58
12	...	...	217	229	33 38
103	16	104	28	251	30 70
...	133	6	13	152	110 29

The scale of wages allowed on this work was as follows:

Chief of party	\$ 7 50	per day
Assistant to chief	3 25	"
Picket man	1 25	"
Two chainmen each	1 00	"
4 mouders and axemen, each.....	1 25	"

In addition to this the chief of party was allowed 50 cents per day per man for rations and 22 cents per day for himself and 6 cents per day for other men of party for camp equipment.

COST OF EXCAVATING EARTH WITH AN ELECTRICALLY EQUIPPED SHOVEL.

The Brantford and Hamilton Electric Railway Company, of Hamilton, Canada, has installed a Thew shovel, operated by electrical power, to work on the construction of an extension of its lines. Mr. C. K. Green, manager of the railway company gives in the Engineering-Contracting records of the shovel's operation:—

The shovel is a No. 1 type, manufactured by the Thew Automatic Shovel Company, Lorain, Ohio. It weighs 25 tons, and has a radius of cutting at a height of 9 feet of about 24 feet. This style of shovel, mounted on a railroad truck, has a full circle swing. The hoisting, swinging and crowding motions are controlled by separate engines. It was equipped with a 35 horse-power shunt wound direct current motor furnished by the Canadian Westinghouse Company. The current is received through the truck by wire cables as plainly shown in the photograph, and is transmitted to the motor above through copper rings on the truck frame and carbon brushes suspended from the swinging turn-table above. Either direct or alternating current motors can be used on these shovels. A one cubic yard dipper was used on the shovel. Two men were used on the shovel, one for operating and the other for tripping, the men changing places frequently.

The conditions under which this shovel was worked were most favorable. It worked in a gravel pit, the depth of the cutting being about 14 feet. The material was very easy to handle. The pit was very long, so the shovel did not need to be shifted often, and inasmuch as it makes a complete swing, the time of shifting was very short. A special trolley wire was used for the motor in the shovel, so that the current was constant. This is an important feature of an electrical installation. No time was lost in moving the shovel ahead, as the two men working in the pit would clean out a space directly in front of the shovel, when the machine would pick up a section of track in the rear and place it in the newly-cleaned space. While the two pitmen were fixing this piece of track the shovel would take gravel from the side, so that not more than a minute was required to move the shovel ahead.

The company had an ample supply of flat cars on which were loaded 14 cubic yards loose measurement. There were also plenty of motors to haul the trains away, six cars making up a train. One motor car was used to spot the cars continuously, and a man was employed as a signalman to assist in spotting cars. The shovel worked a ten-hour shift, and any repairing and overhauling was done at night by another crew. Operating in this manner, as a rule, the shovel was loading the maximum time, there being but little time lost in placing cars under the dipper and moving ahead. With the electrical current no time was lost in taking supplies of water and fuel.

The trains that carried the gravel away were operated by a motorman and one other man. A plow, pulled by the motor car, was used to unload the cars, and two men were kept on the dump to handle the cable of the plow and to attend to other details.

Owing to the large supply of cars and motors, to the favorable conditions in the pit and the method of operating, the output of the shovel per day did not vary much. A great many days 100 flat cars were loaded each day and hauled

away. This meant an output of 1,400 cubic yards loose measurement, or 1,500 cubic yards place measurement.

With the following wage:—

Superintendent	\$4.00
Shovelmen	3.00
Pitmen	1.50
Motormen	3.00
Trainmen	1.50
Dumpmen	1.50

We have a labor cost for operating per day as follows:—

Superintendent	\$4.00
Shovel crew:—	
Two shovelmen	6.00
Two pitmen	3.00
Spotting cars:—	
One motorman	3.00
One signalman	1.50
Transporting (two trains):—	
Two motormen	6.00
Two trainmen	3.00
Dump:—	
Two men	3.00

Total

To this must be added charge for power, plant charges, repairs and track work. When the haul increased in length additional trains were added, so that the shovel was still kept busy loading the cars.

On some days the output fell to eighty carloads or less. With this output, namely, 800 cubic yards place measurement per day, the unit labor cost was:—

Superintendence	\$0.005
Loading	0.017
Transporting	0.011
Dumping	0.004

Total

The above show low records of cost for steam shovel work, but they make evident the economical features of excavating with a shovel of this type, as small and inexpensive crews are employed, and a comparatively large output can be obtained by using the best methods of operating.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5067—July 22—Authorizing the C.P.R. to change the line of its railway—Regina, Saskatoon and North Saskatchewan branch.

5068—July 22—Granting leave to the Bell Telephone Co. to erect, place, and maintain its wires across the P.M.R.R. at public crossing three quarters mile south of Oldcastle Station, Ont.

5069—July 22—Authorizing the C.P.R. location of station at Rapide de l'Original, P.Q.

5070—July 22—Authorizing the C.P.R. to open for the carriage of traffic that portion of the double tracks of the Smith's Falls Section of its line of railway between St Anne's and Vaudreuil, a distance of 3.06 miles, and that portion from Kemptville Junction to Smith's Falls.

5071—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 117.68 on the White River Section of its line of railway.

5072—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 40.8 on the Newport Section of its line of railway.

5073—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 24.56 on the Chapleau Section of its line of railway.

5074—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 31.2, Emory Creek, on the Cascade Section of its line of railway.

5075—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 55.86 on the Chapleau Section of its line of railway.

5076—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 51.54 on the Nipigon Section of its line of railway.

5077—July 23—Authorizing the C.P.R. to reconstruct Bridge No. 15.6, Yamaska River, on the Newport Section of its line of railway.

5078—July 23—Granting leave to the Central Telephone Association to erect, place, and maintain its wires across the track of the C.P.R. at three different points in Ont.

5079—July 17—Ordering the G.T.R. to agree on joint freight tariffs with O. & N.Y.R. between stations on its line of railway and the G.T.R.

5080—July 24—Rescinding order of the Board of the 15th of July, 1908, granting leave to the N.B. Tel. Co. to erect, place, and maintain its wires across the tracks of the C.P.R. near McAdam Junction, N.B.

5081—July 24—Granting leave to the Bell Telephone Co. to erect, place, and maintain its wires across the track of the C.N.O.R. at public crossing $1\frac{1}{4}$ miles north-west of James Bay Junction, Ont.

5082—July 21—Granting leave to T. N. McFadden, Pickering, Ont., to erect, place, and maintain a telephone wire across the land and tracks of the G.T.R. at Rosebank, Ont.

5083—July 24—Granting leave to the N. B. Telephone Company to erect, place and maintain its aerial wires across the tracks of the C.P.R. between stations Edmunston, N.B.

5084—July 24—Authorizing the Temiscouata Railway Company to construct a deck plate girder span, structure No. 10, at mileage 21 $\frac{3}{4}$, where its railway crosses highway in the Province of Quebec.

5085—July 24—Granting leave to the Leeds & Grenville Independent Telephone Company to erect, place and maintain its aerial wires across the G.T.R. tracks at road leading from Algonquin to Brockville, between 6 and 7th Concessions, Township of Elizabethtown, Ont.

5086—July 24—Authorizing the C.P.R. to construct, maintain and operate a branch line or spur from point on centre line of the main line of the said branch to the premises of Thomas Abriel, Nakusp, B.C.

5087—July 22—Authorizing the G.T.R. to construct the Midland branch of its line of railway across two highways in the town of Lindsay, Township of Ops, Ont.

5088—July 23—Authorizing the C.P.R. to construct branch line or spur to the premises of Dr. Wyman, in the parish of Kent, County of Carleton, N.B.

5089—July 24—Authorizing the G.T.R. to operate their trains across drawbridge between Hamilton and Niagara Falls, Ont., without being brought to a stop.

5090—July 28—Authorizing the G.T.R. to construct, maintain and operate a spur to the premises of the Gurney Foundry Company, Limited, in the County of York, Ont.

5091—July 28—Authorizing the C.N.Q. Ry. to construct spur to the works of the Lakefield Portland Cement Company, parish of Pointe aux Trembles, County of Hochelaga, P.Q.

5092—July 30—Authorizing the Malahide and Bayham Telephone Co-operative Association to cross tracks of G.T.R. between Lots 15 and 16, 11th Concession, Township of Bayham, County of Elgin, Ont.

5093—July 28—Authorizing the C.P.R. to construct, maintain and operate a spur across a portion of the 6th St., 5th St., and a lane in block 25, in the town of Grand Forks, B.C.

5094—July 28—Amending Order No. 4766, dated the 27th day of May, A.D., 1908, ordering the C.P.R. to install bell at the crossing where its line of railway crosses Dorchester Street, Quebec, P.Q., extending time until July 31st, 1908.

5095—July 28—Directing the C.N.R. to erect and maintain such fences, gates and cattle guards along the portion of its line of railway, between Roblin and Togo and Togo and Runnymede, which shall be suitable and sufficient to prevent cattle and other animals from getting upon its railway.

5096—July 28—Granting leave to the G.T.P. Railway Company to operate that portion of its line from a point opposite Saskatoon, Sask., to Scott, Sask., a distance of about 115 miles.

5097—July 28—Authorizing James S. Warren and F. M. Holland of the Kettle River Valley Railway Company to prepare and issue tariffs of tolls to be charged on traffic carried by that line.

5098—July 29—Authorizing the Chatham, Wallaceburg & Lake Erie Railway Company to operate its trains over the crossing of the G.T.R. at William Street, Chatham, Ont.

5099—July 28—Authorizing the C.P.R. to lay its tracks for a siding across Denison Avenue in the village of Weston, Ont.

5100—July 14—Authorizing the G.T.R. to construct, maintain and operate a branch line or siding from a point on Lot No. 1, west of Bond Street, in the city of Brantford, Ont., upon and along Pearl Street and Lot. No. 1, east of McMurray Street, to the premises of Schultz Brothers.

5101—July 29—Authorizing the municipality of Notre Dame du Perpetuel Secours de Charny to construct a public highway across the tracks of the G.T.P. on the property of Pierre Pontaine.

5102—July 29—Authorizing the G.T.R. to cross the tracks of the Owen Sound section of the C.P.R. at a point east of Weston, Road, Toronto Junction, Ont.

5103—July 30—Directing the railway companies subject to the jurisdiction of the Board during the months of May, June, July, August, September and October of each year, to provide, place and keep a watchman, track-walker, fire alarm signals, ballast flooring, or fire-proof paint, for the purpose of protecting the said trestles from fire and thereby preventing trains from being burned, derailed or otherwise damaged at or on such trestles, each such company being allowed the option of adopting any one of the said methods of protection.

5104—July 29—Revised location of the G.T.P. Ry. from Section 23, Township 51, Range 20, to Section 1, Township 52, Range 21, west of 4th meridian, North Alberta.

5105—July 29—Approving revised location of the G.T.P. Ry. station in Section 35, Township 53, Range 25, west of 4th meridian, Alberta.

5106—July 29—Rescinding Order No. 1174, dated December 4th, 1906, approving rates of 10½c. per 100 pounds, on balanced ration otherwise compressed food or fodder in carloads, from Montreal and points within the Montreal terminal group of stations to Boston, Mass.

5107—July 28—Directing the G.T.R. to install an electric bell with automatic cut-out at the crossing of the public highway in the Township of Cornwall, northerly from Pitt Street, Cornwall, Ont., being the highway immediately west of the company's station at Cornwall.

5108—July 30—Authorizing the C.N.R. to open for the carriage of traffic that portion of its line of railway from a point in Lot 29, Section 21, Township of McIrvine, to a point on the International Boundary, near Pither's Point, and forming a proposed connection between the C.N.R. and the Duluth, Rainy Lake and Winnipeg Railway, a distance of 1.51 miles.

5109—July 30—Authorizing the C.P.R. to construct, maintain and operate a branch line or spur to the parish of St. Andrews, Man., from a point on its Winnipeg Beach branch.

5110—July 29—Authorizing the city of Hull, Que., to construct a highway across the tracks of the C.P.R. at a point near Mountain Road.

5111—July 30—Authorizing the Edmonton, Yukon and Pacific Railway Company to construct, maintain and operate a spur to the city power house and Exhibition Grounds, Edmonton, Alta., and crossing Calgary and McLeod Avenues.

5112—July 29—Authorizing the C.N.O. Ry. for a period of 90 days from July 29th, 1908, to use the crossing with the G.T.R. at a point in the town of Hawkesbury for construction purposes.

5113—July 29—Authorizing the Toronto and York Radial Railway Company to cross the tracks of the G.T.R. at Sutton, Ont.

5114—July 21—Dismissing application of the G.T.R. for authority to construct a branch line of railway or spur along Neebing Avenue, from Montreal Street to Kaministiquia River, Fort William, Ont.

PORTAGE LA PRAIRIE PUBLIC UTILITIES.

The Canadian Engineer Western representative recently paid a visit to Portage la Prairie in the interests of the journal, and in company with Mr. Herbert W. Baker, the publicity agent of this progressive city, gathered some information regarding the water and sewer works of the town. As Portage la Prairie is situated on a very level part of Manitoba, there is little fall for the natural flow of sewage, and the city found it necessary some two years ago to install a system of sewage ejection. The system adopted was the Shone, and the sewage is forced through the main by compressed air. The plant is an automatic one, and has not required any attention since it was installed. There are three small stations built in which the machinery that operates the works is located.

With regard to the water supply, the Portage water works are now undergoing extensive changes, as the present supply, which is drawn from wells, is becoming inadequate, and the city finds it necessary to bring a supply from the Assiniboine River. They have now under construction a filtering basin, which will thoroughly filter the water before it is pumped into the mains. The city is building an auxiliary pumping station some three miles up the river, and will install one of the latest filtering systems known. It may be mentioned that the Shone sewage plant now in use in Portage la Prairie is the second one of the kind to be introduced and operated in Canada. In conversation with Mr. Ed. Brown, the mayor, he expressed himself as well pleased with the Shone system for sewage ejection, and stated that it has given every satisfaction. The new water supply from the Assiniboine River will be ample for the city's requirements for all time, and they have made contracts with the three lines of railway to supply them with water for their engines, as well as for other purposes.

Mr. Alec. Taylor, C.E., is at present engaged in making a new survey of the city of Portage la Prairie. Much of the success which has been attained hitherto in drawing attention to the possibilities of Portage la Prairie is due to the exertions of Mr. Herbert W. Baker, who is now at work on a booklet, which when published will be one of the most attractively got up ever issued by any of our municipalities, and will be profusely illustrated.

C. P. R. STRIKE—FORT GARRY DEPOT.

Canadian Engineer Office.

Winnipeg, August 12, 1908.

The chief topic of interest among mechanical engineers, and, in fact, among all classes, at the present time, is the strike of the C.P.R. mechanics, which is now on. The men in the great shops at Winnipeg all dropped their tools at 10 o'clock on Wednesday, August 5th, and walked out in a body. No disturbances have so far occurred, and the men are quiet and orderly. There is no telling when the strike will end.

* * * *

The driving of the concrete piles at the Fort Garry depot has been resumed, the new core, the absence of which was delaying the work, having come to hand. The first car of steel arrived on the ground last week, and the Dominion Bridge Company state that it will be rushed in here now as rapidly as possible.

* * * *

The new building of the Government telephone exchange is being rapidly proceeded with, and when completed will be a handsome structure.

* * * *

The Canadian Engineer expects to give some interesting information next week of a new company which has been organized in Winnipeg to take up the manufacture of coal briquettes.

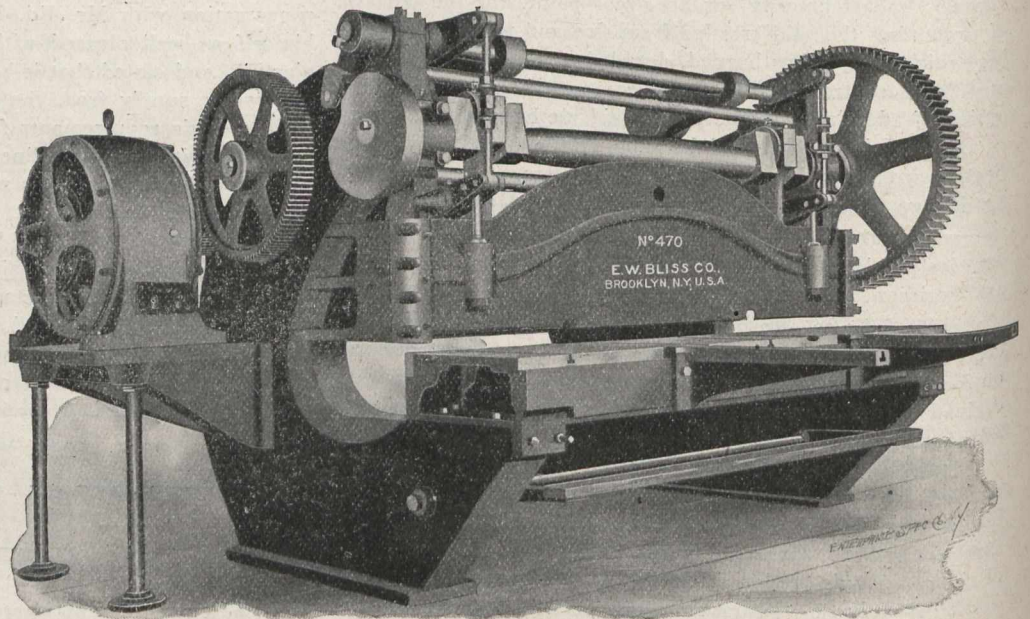
* * * *

Work on the Edmonton-Strathcona Street Railway has started and is being pushed forward vigorously by Charles Taylor, who has been appointed superintendent of construction.

MOTOR-DRIVEN TRIMMING AND SQUARING SHEAR.

In the accompanying illustration is shown a large shear, motor-driven. This shear is adapted for shearing and squaring sheet iron and steel in single sheets or packs up to 3/8-inch in thickness and 11 feet 4 inches in length. The blades are each made of a single piece of solid tool steel with two cutting edges, and are carefully hardened and ground. There is an 18-inch gap in the housings so that a plate or pack of a greater length than the blades may be trimmed by moving it along and taking successive cuts, the gauges being so arranged that the continued cut will be straight and in line with the first, or a plate or pack 36-inch wide may be sheared lengthwise through the middle. An automatic cam-actuated clamping bar directly in front of the upper blade descends in advance of the blade, accurately clamping and holding the pack until the cut is completed. It releases automatically as soon as the cut is made. The clamping device is operated from a cam on the end of the main shaft, which imparts motion to a rock shaft across the top of the machine. The two connections on the rock shaft give motion to the clamping-bar by means of two connections arranged with suitable adjusting screws to regulate the pressure of the work. The main shaft is of hammered steel, 6 1/2 inches in diameter, with two cranks for operating the cutter-bar, forged and slotted out.

The shear is driven by a 5-foot gear, to which a powerful automatic friction clutch is attached, operated by foot treadle. The crank shaft is at a standstill until the treadle is depressed, when it makes one revolution performing its work, and stops with the crank at the highest point. The shear is driven by a 40 horse power motor making 910 revolutions per minute. The driving shaft on shear makes 150 revolutions per minute. The proportion of the main shaft gearing is 7 1/2 : 1, giving 20 strokes per minute to the cutter-bar. Width between housings is 8 feet 7 inches. The total weight of the machine shown is approximately 38,000 pounds. The machine is built by the E. W. Bliss Co., 21 Adams Street, Brooklyn, N.Y.



Motor-driven Trimming and Squaring Shear.

DEVASTATION OF FOREST FIRES.

Only by seeing a forest fire can one realize its horrors. A terrible sight is the progress of flame through a mass of dry trees. The danger to human life and farm property is not readily conceived by those who do not live on the verge of forest lands.

Serious accounts come from New Brunswick and Quebec as to the havoc made by forest fires there. The counties of King and Charlotte, in the south of the former province, where no rain fell for many weeks, have suffered from fires in the forest, which was dry as tinder. One about Spruce Lake, quite close to St. John, has covered seven square miles of territory and threatened the city. In the north, along the Intercolonial Railway, a lumberman has lost one of his camps besides great quantities of trees and timber.

In the Province of Quebec, too, forest fires have made havoc this month. A village in the Lake St. John region has been destroyed by one. Two of the Intercolonial Railway stations, not far from Quebec city, have been burned, and \$50,000 worth of freight cars destroyed. It is fortunate that none of the bridges or culverts of the road were burned. Different estimates place the loss of the I.C.R. this month from fires in the bush along its route at \$75,000 and \$100,000 respectively. The efforts of the usual fire wardens have not sufficed at this unusual time to contend with the flames; and fire-fighters have been engaged at various points to divert the advancing fire from hamlets and towns in these Eastern provinces.

That such losses as these may be lessened, in addition to other benefits gained for the country, is proved by the

DEVASTATION OF THE KOOTENAY VALLEY.

Fernie and Hosmer Destroyed by Fire

Towns destroyed or damaged:—Fernie, B.C., population, 3,500; Hosmer, population, 50; Ferguson's Creek.

Estimated Loss of Property.....	\$5,000,000
Fernie's Losses	2,000,000
Crow's Nest Coal Company's Loss.....	200,000
C.P.R.'s Loss	200,000
Great Northern Railway's Loss.....	250,000
Lumber Companies' Losses	1,000,000
Estimated Insurance	1,057,616
Canadian Companies involved.....	Ten
British Companies involved.....	Twelve
United States Companies involved.....	Several
Area Burned	30 miles long 2 to ten wide
Cause	Bush fires

results of recent systematic forestry. If, says a recent writer, the forest service had done no more than keep down the fire losses in the United States their work would not have been in vain. In 1901 the total area burned over in the government forests equalled two and three quarter acres in every thousand, while in 1907 the burned area was only nine-tenths of an acre in every thousand.

With an area of forest almost twice as great to protect and control, the service is able to show in 1907 a reduction of loss by forest fire by two thirds in three years. While no record is published of the money value of forests burned over in earlier years, the estimate is made that such losses reached many millions.

ANNUAL MEETINGS.

Company.	Day.	Time.	Place.
St. Mary's & Western			
Ontario Railway	Sept. 1	10 a.m.	St. Mary's, Ont.
Klondyke Mines Ry	Sept. 7	4 p.m.	Ottawa, Ont.
St. Lawrence &			
Adirondack Railway ..	Sept. 2	11 a.m.	Montreal, Que.
Bay of Quinte Ry.....	Sept. 14	3 p.m.	Deseronto, Ont.
Kootenay Central Ry. . .	Sept. 7	10 a.m.	Cranbrook, B. C.
Huron & Ont. Ry. Co...	Sept. 7	3 p.m.	Toronto, Ont.
Grand Valley Ry. Co...	Sept. 2	2 p.m.	Brantford, Ont.

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc.

Printed forms for the purpose will be furnished upon application.

TENDERS.

Quebec.

LIMOILLOU.—Tenders for the construction of the sewerage system of the town of Limoilou, Que., will be received up to 8 p.m. August the 25th, 1908. J. E. Chapleau, secretary-treasurer, town of Limoilou. Ouimet & Le Sage, chief engineers, 21 St. James Street, Montreal.

QUEBEC.—The Ha Ha Bay Railway Company, incorporated last session, is about to give out a contract for the construction of a railway line between Jonquieres and Bagotville, on the Saguenay River, where there is a deep sea harbor. The line will be about 20 miles in length, but it is the intention of the company to extend to St. Catharines Bay, at the mouth of the Saguenay, there to join the Quebec and Saguenay Railway, which later will be a connection of the Montmorency division of the Q.R.L. & P. Company.

Ontario.

BRANTFORD.—Tenders will be received until August 17th, 1908, for sewer extension and cast iron pipe in the city of Brantford. T. Harry Jones, city engineer. (Advertised in The Canadian Engineer.)

OTTAWA.—Tender for steel rails and tender for rail fastenings, respectively, will be received at the office of the Commissioners of the Transcontinental Railway at Ottawa, until 12 o'clock, noon, of the 1st day of September, 1908, for 44,447 gross tons of 80-pound steel rails (open hearth or Bessemer, at the option of the Commissioners) and the necessary fastenings, in strict accordance with the specifications of the Commissioners. P. E. Ryan, secretary, the Commissioners of the Transcontinental Railway.

JORDAN.—Tenders will be received by the undersigned for the construction of a concrete arch on the travelled road between the fourth and fifth Concessions of the Township of Louth, at lot five; also for the construction of concrete walls for a bridge a short distance east of said arch; also for the construction of concrete walls for a bridge on the middle road, up to and including Saturday, August 22nd, 1908. M. A. Ball, Clerk Township of Louth, Jordan P.O.

TORONTO.—Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on Tuesday, August 25th, 1908, for the laying of 16-inch and 20-inch cast iron water mains. Joseph Oliver, Mayor, Chairman, Board of Control.

TORONTO.—Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on Tuesday, August 18th, 1908, for the construction of a sea wall in Humber Bay, Toronto. Joseph Oliver, Mayor, Chairman Board of Control.

TORONTO.—Tenders on forms which will be supplied will be received up to 12 o'clock, noon, of Tuesday, August 18th, for the purchase of the plant of the Canadian Shipbuilding Company, Toronto branch, amounting as per inventory to \$60,891; general stores, steel, rivets, bar iron, electrical goods, lumber, etc., \$21,000. E. R. C. Clarkson & Sons, 32 Scott Street, Toronto.

WINDSOR.—Tenders will be received by the undersigned up to Monday, August 17th, 1908, for the crushing of about 350 cords of cobble stone varying in size from 4 inches to 15 inches and consisting of granite, diorite, diabase, quartzite, etc. The contractor to supply his own crushing plant. George S. Hanes, city engineer.

TORONTO.—Tenders will be called for until noon Tuesday, August 18th, for the following work: Asphalt pavements, six sections; bitulithic pavements, two sections; asphalt block, two sections; concrete pavement, one section; con-

crete curbs, three sections; concrete walks, twenty-three sections; sewers, one section. Joseph Oliver, Chairman, Board of Control.

Manitoba.

BALDUR.—Tenders for telephone line, will be received up to noon of the twenty-first day of August, 1908, for the building of such telephone lines and the installation of such telephones as will be required in the telephone system in the rural municipality of Argyle. Plans and specifications may be seen at the office of the Municipal Secretary-Treasurer at Baldur, or at the office of the Chief Engineer of Telephones and Telegraphs, 62 Scott Block, Winnipeg. John Harrower, Secretary-Treasurer, Baldur, August 6th, 1908.

HAMIOTA.—Tenders for telephone lines, will be received up to noon of the 20th day of August, 1908, for the building of such telephones and the installation of such telephones as may be required in the telephone system in rural municipality of Hamiota. Joseph Andrew, Secretary-Treasurer.

WINNIPEG.—The city of Winnipeg will receive tenders until August 31st, for the supply of 50,000 carbons for arc lamps. Magnus Peterson, Secretary Board of Control.

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

CONTRACTS AWARDED.

Quebec.

DELORIMIER.—At a meeting of the Town Council of Delorimier, the contract for the completion of sewers in the streets of that municipality was given to Mr. J. D. Latour. The work is to be done between now and the month of December.

QUEBEC.—The Matane and Gaspé Railway Company, of which Senator Choquette is president, has given out the contracts for the building of 35 miles, with sidings, of the line, from St. Flavie to Matane, which work was commenced yesterday by the contracting firm of H. J. Beemer and Co.

Ontario.

LEAMINGTON.—The contracts for the Pelee Island Big Marsh Drainage System Improvement has been awarded. The dredging, stone blasting and bridges was given to Gillmore Bros., Toledo, Ohio. Park Bros., of Chatham, Ont., were awarded the contract for furnishing pumps, boilers and placing same, also the concrete work at the north pumping station.

OTTAWA.—The contract for the construction of two breakwaters in Cobourg harbor has been awarded by the Public Works Department to the Randolph Macdonald Company, of Toronto, the contract price being in the neighborhood of \$140,000. W. J. Walsh, of Hamilton, has received the contract for the heating apparatus in the Hamilton Armory.

OTTAWA.—The contract for the construction of a dam above the Chaudiere Falls, the object of which is to increase the water-power, has been let to Quinlan & Robertson, contractors, of Montreal, for \$250,000. The construction of this dam will mark the close of long and expensive litigation between the power interests on the Quebec and Ontario sides of the Ottawa River.

WATERLOO.—The tender of the Waterous Engine Co. for an oil tank was accepted at the price of \$426.50, dimension

of tank to be 108 x 24 inches, shell of $1\frac{1}{4}$ inches and $\frac{3}{8}$ -inch end.

Manitoba.

WASKADA.—The contract for the building of telephone lines and installing of telephones for the municipality of Brenda, Man., was awarded to Sampson and Craig, Virden, Man., at \$10,495.85. J. M. Sutler, Winnipeg, tendered at \$10,500.

WINNIPEG.—The contract for the new branch line of the Canadian Northern, known as the Rapid City extension, sixty miles in length, from Holboro to a point forty miles west of Rapid City, has been awarded to the Northern Construction Company, of which A. R. Mann and A. C. McKenzie are the controlling shareholders. They will proceed at once to carry out the work.

WINNIPEG.—The Board of Control awarded the contract for the supply of meters as follows: 200 half-inch Keystone meters, 200 of the Lambert meter, half-inch, 200 of the Nash, half-inch, and 200 of the Badger, half-inch, and the balance of the number called for, 5,550, from the Canadian Fairbanks Co., of the Empire pattern as heretofore used by the city, provided they are equal in quality, workmanship and material, to the Empire meter now in use.

These Fairbank meters are to be manufactured in Canada. The prices are to be: For the half-inch meters, \$10; for the one-inch, \$23; and for the two-inch, \$75. Six thousand three hundred and fifty half-inch meters are called for. The purchase of the 200 meters each from the four companies named is for the purpose of testing, the city having none of the Keystone of the Badger, and only a few of the Lambert pattern hitherto in use.

The tender of the Fairbanks Company is \$1.75 per meter, and \$11,000 for the whole quantity less than that of the National Meter Co., of whose Empire meter the city has had 10,000 in use.

Alberta.

EDMONTON.—The contract for construction of the sub-structure of the Grand Trunk Pacific bridge across the Pembina River has been let to John Gunn & Sons, of Winnipeg. The contract price has not yet been ascertained. Work will probably not be started on the bridge until the steel is laid out to the Pembina, which will doubtless be this fall. The Pembina River bridge will be the highest bridge on the G.T.P. It will be 230 feet high and 1,000 feet in length.

British Columbia.

NELSON.—Tenders for concrete sidewalks were not satisfactory and the municipality are doing the work by day labor.

Foreign.

The biggest contract ever let for steel cars is now being closed with the Pressed Steel Car Company, of Pittsburg, by the Gould-Harriman interests. It is for about 10,000 steel cars to supply every one of the Gould lines, and the price will be about \$10,000,000. The contract will cover three, perhaps five, years' delivery and will give employment to about 1,000 men for that length of time.

SEATTLE, WASH.—Contract has been awarded to T. Ryan, of Seattle, Washington, for laying about 11,200 feet of 55-inch and 1,500 feet of 48-inch continuous wood stave pipe in the vicinity of Sunnyside, Washington, in connection with the Sunnyside irrigation project. The contract amounts to \$66,701.80.

LIGHT, HEAT, AND POWER.

Ontario.

BRANTFORD.—An offer was received from the Western Counties Electric Company by the Power Committee of the Council to supply power for local use. It is generally understood that the company offers to supply electric energy for power purposes at a cost guaranteed to be 10 per cent. less than that for which the Hydro-electric Commission will supply power to places similarly situated. An offer for street lighting at \$52.50 per arc light was submitted, being a reduction on the present price paid, which is \$55 per arc light per

annum. In regard to street lighting it is also understood the local company will supply light at a cost guaranteed 10 per cent. less than the prices paid either in London or Toronto.

BRANTFORD.—The Cataract Power Company has made an offer to the local power committee for the supply of electric energy to this city. The offer is, in brief, to supply current for power purposes at a cost guaranteed to be 10 per cent. less than the hydro-electric prices. The offer for street lighting is \$52.50 per arc light per annum, a reduction only of \$2.50 per light on the present contract price. The company also offers to supply current for incandescent lighting at rates guaranteed to be 10 per cent. less than those charged in Toronto or London.

HAMILTON.—Mayor Stewart on August 8th signed the Cataract Power agreement. It is not expected that the suit to test the legality of the by-law will be decided until the fall.

ST. CATHARINES.—The City Council has passed a by-law cancelling the franchise of the Falls Power Company. There is a cash deposit of \$1,500 as a guarantee that the street lighting would begin August 1st. The Council also adopted a recommendation to call for new tenders for street lighting, returnable August 22nd, the contract to begin on November 1st next. It is expected that tenders will be confined to the Hydro-electric Commission.

TORONTO.—No appointment has yet been made to the position of city electrical expert. A number of names are before the Board of Control.

TORONTO.—At the time of going to press the matter of awarding the contract for the Hydro-electric Power line was still unsettled. It is reported that the Commission will recommend that the bulk tender of Mr. F. H. McGuigan at a stated figure per mile be recommended, it being the lowest. In all 27 tenders were submitted and the total amount of the marked cheques which accompanied them was \$490,000. This amount is made up of 15 tenders for towers \$300,000; 5 for wire, \$100,000; 5 for erection, \$20,000; and bulk \$70,000. The contract, if let, will be a large one, as the total length of line would be 293 miles, with 1,149 miles of cable; total weight of which would be 994,800 pounds; 3,100 steel towers will be required.

RAILWAYS—STEAM AND ELECTRIC.

New Brunswick.

ST. JOHN.—Chief Engineer Foss, of the Grand Trunk Pacific, says there are four thousand two hundred men at work on the line in this province, and the work is being rapidly pushed on all sections. The employment thus provided offsets somewhat the great dullness in the lumber industry in New Brunswick.

ST. JOHN.—The ultimate object of the I.C.R. management is to double-track the whole system. Surveys will be completed between Moncton and Halifax as soon as possible. The great increase in the traffic on that section of the road renders double-tracking a necessity. A survey has been made for some distance between Moncton and Truro and will be concluded in the course of a few weeks.

Ontario.

BAYSVILLE.—The Reeve of the municipality of McLean and Ridout called a meeting for August 13th, at Baysville, to discuss the importance of building the short line railway of $15\frac{1}{4}$ miles between Baysville and Bracebridge. The surveys have all been made for the line, and there is \$96,000 in bonuses voted by the Dominion and local Governments to help this undertaking.

OTTAWA.—At the last session of Parliament \$100,000 was placed in the estimates for the Hudson Bay Railway survey. Mr. John Armstrong, C.E., has been given charge of this work and will at once place four parties in the field, and it is hoped that before January 1909 he will be ready to report. Two routes will be tried, one by the Churchill River and one by the Nelson, both, however, connecting with the C.N.R. at the Pas.

STRATFORD.—The Grand Trunk Railway System have placed an order for a 10-ton hand-power travelling crane with

the Smart-Turner Machine Company, Limited, to be used in their shops here.

SAULT STE. MARIE.—It is stated that the negotiations which have been going on for some time for the purchase of the Algoma Central by the C.P.R. have definitely fallen through, owing to a disproportion between the price demanded and the possible benefits which the Transcontinental road could see through the acquisition of the smaller line.

TORONTO.—At the request of Mr. M. K. Cowan, solicitor for the G.T.R., the Board of Control extended the time for the commencement of the erection of the new Union Station three months. The time expires on August 22nd, and Mr. Cowan asked for a year's extension.

Manitoba.

WINNIPEG.—The J. D. McArthur Company has received instructions to proceed at once with the erection of the new roundhouse and turn-table for the National Transcontinental, in the yards on the Springfield Road, and expect to have a large gang of men at work in the course of a week. The first portion of the roundhouse to be erected will consist of only eighteen stalls, which is one quarter of the circle which will eventually be required, and this structure will be built of brick. It is to be situated near the centre of the yards.

Foreign.

DUNKIRK, N.Y.—The Brooks plant of the American Locomotive Company received an order for fifty locomotives from the Argentina railway. An increase in the working force of the plant will be necessary to take care of this order from South America and other business in sight.

LA PAZ, BOLIVIA.—The new railroad between Oruro, Bolivia, and Viacha, fifteen miles southwest of La Paz, is completed. The event marks an era of rapid progress in Bolivia.

TELEPHONY.

Manitoba.

CRANDALL.—At a council meeting, of Miniota, nearly all preliminaries were decided on for the new telephone system, and work will commence soon. The price as settled on for subscribers per year is \$18. When the vote was taken, it was to be \$12, but it got up to \$15 and then \$18, and may still go higher.

Saskatchewan.

REGINA.—The Province of Saskatchewan has taken steps to construct the following long distance lines: (1) A line running from Lumsden to Prince Albert, connecting with the towns along the C.N.R.; (2) a line to serve the towns and villages along the Arcola and Estevan branches of the C.P.R.; (3) branch lines east and west from Warman to the boundaries of the province and following the C.N.R.; (4) branch lines paralleling the Wolseley-Reston, Pheasant Hills, Weyburn and Stoughton railways; (5) a line eastward from Prince Albert, connecting Kinistino, Melfort, Star City, Tisdale, and other towns and villages; (6) a line crossing the province from north to south and connecting Alameda, Carlyle, Wapella, Yorkton and Saltcoats. Town and rural lines are to be built by local companies and many of these have already been organized.

REGINA.—The first indication of the telephone rates that will be secured under the Scott Government's policy to have local companies construct the lines for rural and town services to connect with the long distance lines to be built by the Government, comes from the town of Maple Creek. Under an agreement with the town, the Maple Creek Telephone Company agrees to the following rates: Business connections, \$2 per month; residences, \$1.25 per month. Maple Creek has granted the local company the use of the streets and alleys for twenty-one years for the erection of a telephone system. The cost of the system will be about \$6,000. No expense is being spared to install the telephones and a central equipment of the highest electrical efficiency in view of the fact that Maple Creek will be the most important Western terminal of the Scott Government's proposed long distance telephone system. The Maple Creek Company has

already 76 subscribers and it is anticipated that it will have 100 before the system is in operation. The Lumsden Radial Telephone Company is to install a service in the town of Lumsden to connect with the Government's long distances lines. The rates in Lumsden will be \$2 per month for business concerns and \$1.50 for residents. Both the Lumsden and Maple Creek systems will be connected after completion with rural systems to be constructed under the Scott Rural Telephone Act. The Government is furnishing the necessary poles free of cost.

Foreign.

SCRANTON, PA.—After a week's trial the Lackawanna Railroad has decided that the system of despatching trains by telephone instead of by the telegraph has proved entirely satisfactory. Trainmaster McCann said that although there were some misgivings at first the experiment has succeeded in every way. At present the telephones are operated by the telegraphers, but it is probable that after the system is in thorough working order there will be a considerable reduction in the number of operators.

MISCELLANEOUS.

New Brunswick.

ST. JOHN.—Mr. H. M. Davy, of the Public Works Department, is now ready and will at once begin the boring operations at Courtenay Bar.

Ontario.

ORILLIA.—Four surveyors in the employ of the Geological Survey Department at Ottawa are camped at Atherley, while engaged in working on the typographical map of the Lake Simcoe district. The map is expected to be ready in three years. The party will shortly move to Barrie to make that their headquarters. Last year they moved up the southern shore as far as Beaverton.

OMEMEE.—Plans have been completed for the most extensive drainage system ever undertaken in this part of the province. It has been found necessary by the Council of Ops Township in order to drain low-lying farm lands in the valley of Stony Creek. One cut, of nearly 800 feet, at the outlet, has an average depth of nearly eight feet, and a bottom width of twelve feet. The total cost of the outlet cuttings run up to over \$5,000. The scheme is calculated to give a good drainage outlet to 3,800 acres at a total cost of \$30,000.

ST. CATHARINES.—The city of St. Catharines has granted ten years exemption to the Whitman Barnes Manufacturing Company, manufacturers of the "Railroad Special" wrench. Ever since the company's Canadian plant, located in this city, was destroyed by fire last April many municipalities have been offering inducements to secure the plant.

SAULT STE. MARIE.—From semi-official source it was learned that the bidding in of the stocks and bonds of the Lake Superior Corporation at Philadelphia, July 28th, by which control passed from New York to the latter city, means that within a few days the plant of the Algoma Steel Company at the Canadian Soo, a subsidiary corporation of Lake Superior, will pass into control of the steel trust. Representatives of the Ontario Government, which guaranteed a loan of \$2,000,000 when Clergue's old Consolidated Lake Superior Co. collapsed, endeavored to have the sale postponed.

WOODSTOCK.—A great flow of natural gas has been struck at Innerkip by the Oxford Oil and Gas Company, who have been prospecting there, and in a few months the company say they will be supplying Woodstock, Ingersoll, London and other places to an unlimited extent. At a depth of a thousand feet, a flow was struck that will exceed one million feet of gas per day.

Manitoba.

BRANDON.—A special meeting of the City Council will be held shortly to reconsider the matter of the construction of the First Street bridge. It had been decided to build it of reinforced concrete, but the C.P.R., who are building the half over their own tracks, have decided their part shall be of steel, and there is a feeling now in the council that the city had better follow suit and build the remaining half over the river of the same material.

Alberta.

EDMONTON.—Municipal ownership in Edmonton is paying. Reports of the waterworks and telephone departments for the last six months show a surplus of \$10,168.24 and \$5,315.76 respectively. The water and electric light rates were reduced recently, and a new telephone system installed. The city now propose to construct and operate a street railway in Edmonton and Strathcona, and it is believed it can be made to pay. The line will be in operation by November 1st.

Foreign.

DETROIT, MICH.—Max. J. L. Towler, formerly general manager of the Detroit Bridge & Iron Works, and afterwards its manager when it became the Detroit plant of the American Bridge & Iron Co., has purchased a site beside the freight distribution yards of the Michigan Central Railway in River Rouge and plans to erect a new bridge and structural steel plant in the near future. The site for the plant comprises seven and one-half acres.

PERSONAL.

MR. FRANK A. BROWN, formerly engaged with Ross & Holgate, Montreal, is now at Ailsa, Largs, Scotland.

MR. A. T. SMITH has been appointed superintendent of the Electric Street Lighting plant of the town of Merritton.

MR. J. C. GARDNER, B.A. Sc., has opened an office as consulting engineer in the Hobson Block, Queen Street, Niagara Falls, Ont.

MR. FREDERICK F. KNIGHT, who for the past two years has superintended the shops of the Canadian Northern in Edmonton has been transferred to Port Arthur.

MR. M. J. BUTLER, Deputy Minister of Railways, has returned to Ottawa from Nova Scotia and resumed work at his office after an absence of two months. He has completely recovered from the illness from which he suffered last May.

MR. GORDON B. JOHNSON, son of W. Johnson, M.L.A., of Belleville, has arrived home from China, after an absence of six years. He is an R.M.C. graduate and has been engaged on the construction of the Shanghai-Nankin Railway.

MR. F. H. COGSWELL, chief of the Tariff Bureau of the Canadian Pacific Railway, has resigned for the purpose of accepting a position in the freight department of the New York Central at Detroit. Mr. Cogswell came from Detroit in January, 1907.

MR. WILLIAM PERRY has opened an office as a consulting and hydraulic engineer at Maplewood Avenue, Cote des Neiges, Montreal. For 57 years Mr. Perry has been connected with the design and installation of pumping machinery and is now prepared to give special attention to building waterwork systems, and, in fact, any work in connection with water supply, and as consulting engineer in hydraulic matters, and having arranged with the Deane Steam Pump Co. for the sale of their steam and triplex, and other pumping machinery, can guarantee a first-class plant.

STEEL-WORK FOR NEW LANSDOWNE AVENUE SUBWAY, TORONTO.

The Toronto Corporation recently have received delivery from the Cleveland Bridge & Engineering Company, Limited, of Darlington, of the steel-work required for the bridge carrying the Grand Trunk and Canadian Pacific Railways over the Lansdowne suway, Toronto.

This steel-work, supplied to the designs and specifications of Mr. C. H. Rust, the city engineer, Toronto, consists of two double-track spans for the Grand Trunk lines, and one three-track span and a single-track span for the Canadian Pacific lines.

The spans for the Grand Trunk consist of three girders, 71 ft. 6 ins. long x 9 ft. deep for the double-track span; two girders 74 ft. 6 ins. long and one 7 ft. deep and the other 9 ft. deep, together with a girder 101 ft. 6 ins. long x 10 ft. deep

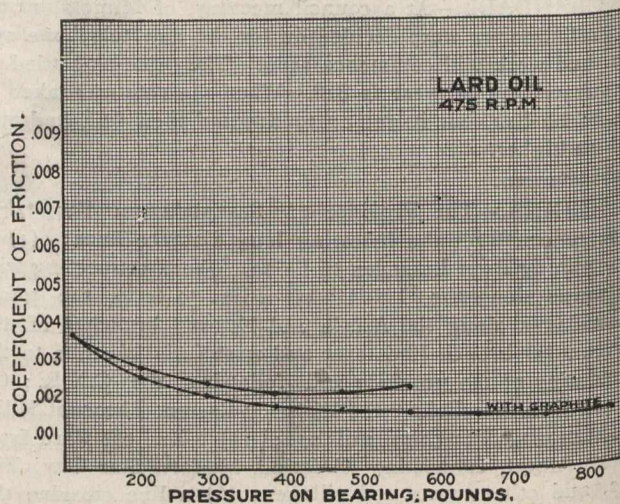
for the remaining double-track span. This work consists of ordinary plate girders, and cross girders 11 ft. centres and 2 ft. deep. The intermediate stringers between the cross girders consist of 15 ins. x 5 ins. and 9 ins. x 4 ins. joists. There are no floor plates. The three-track span for the Canadian Pacific lines consists of four girders, each 70 ft 6 ins. long x 7 ft. deep and the single track span consists of two girders 72 ft. 6 ins. long x 7 ft. deep. These spans consist of ordinary plate girders, the ends of the top flanges at the abutments being curved.

The flooring consists of 18-in. rolled steel joists, 18-in. centres, covered with 5-16th flat floor plates. The steel-work for the Grand Trunk spans has a weight of 216 tons and that for the Canadian Pacific spans 220 tons. In addition, there is about 1,300 lineal feet of ornamental handrailing, 3 ft 10 in. high, and cast iron intermediate and end pillars, and there is also ornamental handrailing on the staircase leading down into the Lansdowne Avenue subway.

TESTS OF GRAPHITE ON BALL BEARINGS.

There have from time to time appeared articles in the various papers condemning the use of graphite as a lubricant for ball bearings. The reason these articles have appeared, we presume, is because some users have had unpleasant experiences with inferior grades of graphite. Professor Goss has made some extensive tests with Dixon's Ticonderoga Flake Graphite as a lubricant for ball bearings combined with kerosene oil, lard oil and vaseline, and found that friction losses were very much reduced and the bearings made to carry a heavier load when Dixon's Ticonderoga Flake Graphite was used. The following are extracts from Professor Goss' report:

It has been shown by previous experimentation that graphite can be efficiently applied as a lubricant when mixed in small quantities with oil or grease. Following this practice, six series of tests were run; the lubricant employed upon the test ball bearing being, respectively, kerosene, a mixture



by weight of 96 per cent. kerosene and 4 per cent. graphite; lard oil, a mixture by weight of 96 per cent. lard oil and 4 per cent. graphite; vaseline, a mixture by weight of 96 per cent. vaseline and 4 per cent. graphite; the graphite in all cases was Dixon's Ticonderoga Flake Graphite. Figure 1 shows graphically the results obtained. Where the curve is not labelled, the result is without graphite.

As the result of these tests Professor Goss says in part that the following general conclusions may be drawn:

"A combination of graphite and lard oil makes up a lubricating mixture which, when applied to ball bearings, will accomplish everything which lard oil alone will do and which at the same time will give a lower frictional resistance of the bearing and permit a large increase in the load which it may be made to carry.

"An oil as light as kerosene, when intermixed with graphite, will be converted into an effective lubricant for ball bearings when operated under light or medium heavy pressure.