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The Canadian Engineer

ESTABLISHED 1893

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Editor—E. A. JAMES, B.A. Sc.

Business Manager—JAMES J. SALMOND.

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

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TORONTO, CANADA, NOVEMBER 20, 1908.

CONTENTS OF THIS ISSUE.

Copies of the Canadian Engineer for October 2nd, 1908, are required. Any subscriber who is not binding his Engineer will have his subscription extended if he will send in a copy.

CANADIAN SOCIETY OF CIVIL ENGINEERS' ANNUAL MEETING.

Remember the dates, Thursday, Friday, and Saturday, January 28th, 29th and 30th, 1909; the place, Toronto—and look out for a live, business-like, progressive gathering. In the meantime plan to be there.

THE TRADE OUTLOOK.

Now that elections are over the business world in Canada and the United States is settling down to work. The activity during the past week has been marked, and is a fair indication that this winter will be at least an average one as far as building and engineering are concerned. When the panic came a year ago many large schemes had been planned for. In many cases designs had been completed. The growth of the last few years taxed the transportation companies, and new lines and heavier equipment were demanded. Terminal facilities were inadequate. Business houses required more floor space, and factories were planning for additions. With the easier conditions in the money market and the return of confidence many of the deferred extensions will be taken up.

The cost of construction has fallen almost 15 per cent. during the past year, due partly to the lowering of prices on raw material and partly to the increased efficiency of the workmen—an efficiency brought about by the lessening of the number of opportunities to secure work. This week in New York orders for structural steel were placed at $4 per ton below the figures of a few months ago, and orders for bridge steel were filled at $6 per ton below the prices that have prevailed. This lowering of prices has increased considerably the volume of business, and this activity will revive many subsiding important industries.

The railroads are ordering new rolling stock, and this will increase the demand for steel plates and shapes, and some of the larger companies are expected to place this month their order for rails for 1909.

A hopeful tone pervades the business world, and a growing improvement in the business conditions is likely to be noticed during the winter months.

ELECTRIFICATION OF THE ST. CLAIR TUNNEL.

It was a historic event, the acceptance on November 12th, 1908, by the St. Clair Tunnel Company of the electric equipment, installed by the Westinghouse Electric Company between the towns of Port Huron, Mich., and Sarnia, Ont.

The St. Clair Tunnel was opened for traffic in 1890 and operated by the St. Clair Tunnel Company, a company organized as a subsidiary company to the Grand Trunk Railway System. So much has been written about this piece of engineering work that little more is required to be said. The total length of tunnel is over 6,000 feet, made up of 2,399 feet on a 2 per cent. grade at the west, 1,000 feet of 0.01 per cent. under the bed of the river, and 1,918 feet of 2 per cent. grade coming up to the Canadian portal. It was not long before the capacity of the tunnel was taxed to the utmost, and about the time

that this congestion was recognized the Canadian Railway Board directed the Tunnel Company to prepare plans for operation under more sanitary conditions.

This, then, was the task given to Bion. J. Arnold, consulting engineer, of Chicago, to increase the possible capacity for handling traffic, and to obviate the danger and inconvenience due to the presence of the locomotive gases in the tunnel. The efficiency and cost of the various available systems were studied, and his report favored the alternating current, using a three-phase system for the distribution of power required for pumping and for shop motors, with a single phase distribution for locomotives and lighting.

The locomotives were designed with sufficient capacity to develop a drawbar pull of 50,000 pounds when operating at a speed of ten miles per hour, and it was estimated that such a locomotive would be able to make the complete trip through the tunnel with a 1,000-ton train in fifteen minutes, and thus provide a capacity three times larger than the actual maximum demands at present. Three locomotives have been provided for this service, each consisting of two half units, each half unit mounted on three pairs of axles driven through gears by three single phase motors, with a nominal rating of 250 horse-power, each making the rating of the unit 1,500 horse-power, with a liberal overloading rating, making it possible to develop 2,000 horse-power.

The power for the plant is steam-generated. The power house is situated on the Port Huron bank of the St. Clair River.

The event, which was celebrated by the presence of a large number of railway and newspaper men, marked an important episode in the history of electric traction. It impressed upon those present the possibilities of electricity. If in twelve miles of yards electricity can be successfully used for shunting, is it too much to expect that in a few years in many of the yards in our large cities we will have electric locomotives? From yard work to main line work will be a short step, and it is being realized that the road which first secures for the traveller a smoke-and-cinder-free train will have a distinct advantage.

THE BROCKVILLE, WESTPORT AND NORTH-WESTERN RAILWAY.

The annual report of the B.W. and N.W.R. for the year ending June 30th, 1908, shows increased earnings. A comparison of the earnings and expenses for the last five years shows:—

	Earnings.	Operating Expenses.
1904	$48,431 25	$30,792 66
1905	54,045 76	30,145 74
1906	59,318 99	29,748 85
1907	62,023 00	27,067 37
1908	62,276 66	30,157 76

The traffic and mileage statistics, etc., were:—

Passengers carried earning revenue	70,418
Tons freight carried earning revenue	24,395
Miles run by passenger trains	29,000
Miles run by freight and mixed trains	28,170
Total miles run by trains	57,170
Gross passenger, mail and express and sundry receipts	$33,154 06
Gross freight receipts	29,122 60
Average receipts per passenger per mile (cents)	.013
Passenger earnings per mile of road	736.75
Passenger earnings per train mile	1.143
Average receipts for freight per ton per mile (cents)	.039
Freight earnings per mile of road	647.168
Freight earnings per train mile	1.089
Gross earnings per mile of road	1,383.92
Operating expenses per mile of road	713.53
Gross earnings per train mile	1.088
Operating expenses per train mile (cents)	.527
Average cost of maintenance of way per mile of road	116.702
Average cost of improvements to roadway per mile of road	172.848

The company's assets are placed at $1,420,628.78. It is equipped with four locomotives, ten passenger, mail and express cars, eighteen box and platform cars, one snow-plough car. Mr. C. Heilshom is general manager, and Mr. W. J. O. Curle superintendent.

CANADIAN SOCIETY OF CIVIL ENGINEERS, MONTREAL.

A paper on "Modern Retort Coke Ovens," with special reference to the practice of the N.S. Steel and Coal Company, was read before a meeting of the mining section of the C.S.C.E., on the evening of the 10th instant, by the author, Mr. C. L. Cantley. Mr. Cantley showed lantern slides illustrating the various types of ovens and their evolution. Ovens of different companies in the United States and Canada, including those of the Dominion Iron and Steel Company, and more especially the Nova Scotia Steel and Coal Company, were shown. The interest of the audience, as shown in the discussion following the lecture, focussed on the comparative advantages of the original bee-hive type and the modern retort oven, and more particularly in the sub-division of the latter into bi-product and non-bi-product ovens.

In the course of the lecture, it was pointed out that the N.S. Steel & Coal Co. installed first the Bernard oven, which was a non bi-product oven, afterwards they adopted the Bauer, a bi-product oven, while, in selecting their last ovens, they returned to the Bernard oven. It was the reason for this change, which aroused the discussion regarding the respective merits of the ovens. Drs. Porter and Stansfield and Mr. Cantley were the principal participants in the discussion, and they essentially agreed with each other in most of the points touched upon.

The opinion was that the main advantage of the bee-hive oven was that it could be installed at a lower cost than the others. It also turned out a more superior coke; but it seemed to be granted that the coke was finer than actually required, and that the modern retort oven produced good enough coke for practical purposes. The advantage of the retort oven was that it could convert more kinds of coal into coke and at a lesser cost, operating expenses being reduced by utilizing, in different ways, the gas produced. The bi-product oven was evidently not yet economical in Canada, the reason for this being that there was not sufficient market for the bi-products, such as ammonia and tar, in the vicinity of the ovens. The heavy freight charges, entailed by the long distances between the producing point and the market for these bi-products, was the reason for this. Doubtless, as these causes were removed by the increase in population, the lowering of freights or the establishing of coke ovens close to the centres of population, the bi-product oven would gain in popularity.

THE CONCRETE ARCH vs. THE CONCRETE GIRDER BRIDGE.

Frank Barber, C.E.*

The efficiency of the concrete bridge, its beauty and its permanency are becoming generally known, and concrete is now often preferred to steel. It will be interesting to compare two reinforced concrete bridges lately constructed for the Township of Markham as to efficiency and cost. They are of the same span, 50 feet in the clear, and are typical of the two main classes of concrete bridges: one at Unionville, opened last December, being a concrete girder bridge, and the other completed last week at Buttonville, being an arch. The bridges were designed by the late James McDougall, York County Engineer.

At Unionville the roadway is only eight feet above low water, and a girder bridge was decided upon as giving maximum waterway, but at Buttonville the roadway is twelve feet above low water, so that the arch constructed there with its ample rise allows sufficient waterway.

The reinforcement used in both bridges was mild steel round rods of ¾-inch diameter. The concrete for abutments was 1 of cement to 3 of sand and 5 of screened gravel, and for the superstructure 1 of cement to 2 of sand and 4 of crushed stone, except that the spandrel walls of the arch were of the former proportions.

The quantities of materials are as follows:—

Girder Bridge at Unionville.

	Cu. Yds.
Concrete: Abutments and wing walls	156
Superstructure	60
	Lbs.
Steel	7,000
Cost	$3,000

Contractor, O. L. Hicks, Humber Bay.

Concrete Arch at Buttonville.

	Cu. Yds.
Concrete: Abutments	190
Spandrel Walls	24
Arch ring	56
	Lbs.
Steel	14,000
Cost	$2,400

Contractors: McLennan and Alexander.

Had the girder bridge been built at Buttonville where the roadway is twelve feet from low water instead of eight feet, as at Unionville, it would have required about forty yards more of concrete; thus, comparing girder and arch if built in similar situations the quantity of concrete is only slightly less in the girder bridge. The steel in the arch is greater in quantity but is more easily placed than in the girder; probably the cost of steel and of placing it is $100 greater in the arch. On the other hand the cost of forms is probably greater in the girder than in the arch. The contract for the arch was let at a very low price. Mr. Hicks, who built the girder bridge complete for $3,000 also bid for the arch at $3,000, and the cost of filling the latter was $120 extra, so that under the same contractor the arch would have been more expensive. However, as noted before, the distance from water to roadway is greater at the arch. Probably under precisely similar conditions there is little difference in cost, if any, between girder bridge and arch of fifty feet span. If the foundations require piling the cost would be greater for the arch.

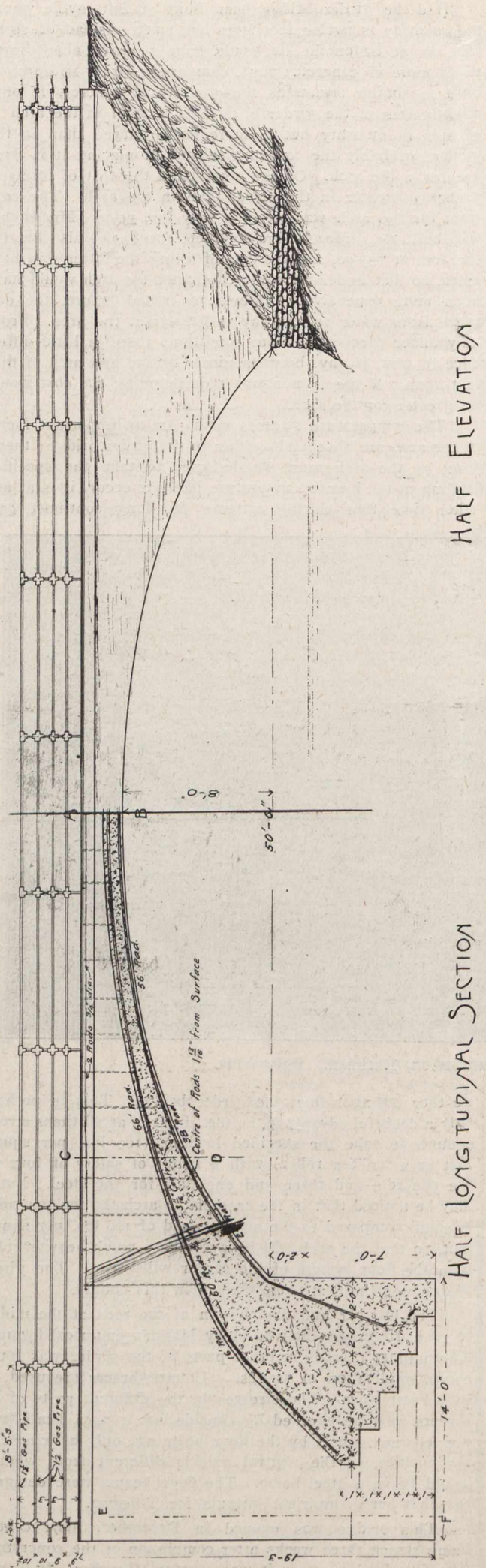
The temperature stresses which are an important factor in the arch are absent altogether in the girder bridge; therefore, as the arch must be designed to take the specified loading at the lowest temperature likely to occur, it is at any other time than during extreme and long continued cold weather stronger than the girder bridge. This is perhaps only a doubtful advantage, as the girder is at all times strong enough to take the specified loading (100 lbs. per square foot or a ten ton roller) with a factor of safety of four for the concrete and three and one half for the steel. But it may be noticed that in the case of the arch the ten ton roller is small compared to the moving load of 100 lbs. per square foot, so that the arch will always take a much heavier roller than the floor system of the girder will stand. The girder bridge was the first to be erected in this county.

Fifty Foot Arch, Lot 13, IVth Concession, Markham, Buttonville.

The number and distribution of the rods at the middle of each girder was arrived at by Marsh's empirical formula. The number of rods in other parts of the girder was found by an application of statics. Counter-braces are used, as in a Pratt truss. The stresses in the different parts of the girders may be checked by considering it as a Pratt truss divided into panels by the floor beaming, only noticing that the position of the neutral axis is different from what it would be in a steel beam. The floor beams were designed by Thatcher's empirical formula for T-beams.

This bridge was opened in December, 1907, centres being struck three weeks after completion of the concreting. The first load to cross it was a steam thresher. It is well known that the first load gives a permanent set to a con-

* Mr. Barber was associated for a number of years with the late Mr. McDougall, and since his death has been acting County Engineer in York.

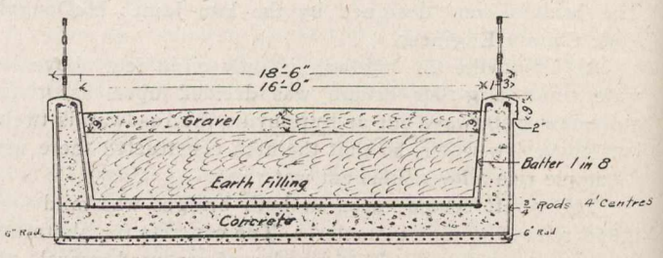


Arch Bridge, Buttonville, Ont.

crete beam. In this case the permanent deflection at the middle of the bridge was 1-100 inch as measured at the time.

We are unable to show detail plans of the Unionville bridge, and we substitute instead a plan of a girder bridge of thirty feet span designed under the same engineer, and now being erected near Weston, which shows the details of design for this form of bridge.

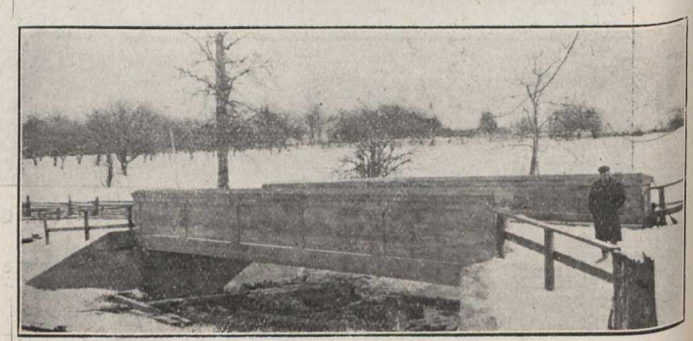
The concrete arch at Buttonville was designed by the method of Professor Cain, founded upon the theory of elasticity. The following tables show the stresses for loading over one half the arch (the worst case) and for temperature stresses. The temperature of the concrete when being placed was taken to be from 45 to 50° Fahrenheit, and it was supposed to be subject to a rise or fall of temperature of



SECTION AT CD

Arch Bridge.

40° F. from this temperature at the time of setting. It will be noticed from the diagrams and tables that the stresses in the concrete, due to the weight of arch and to any possible position of specified load are always compressive, since the arch is so designed that the line of pressures comes always within the "middle third" of any section perpendicular to it, so that if it were not for temperature stresses no reinforcement would be necessary. Moreover, the tensile stresses due to changes of temperature could be eliminated by sufficiently increasing the uniform load, i.e., by increasing the depth of earth filling over the arch, for the stresses due to uniformly distributed load being everywhere compressive tend to counteract the tensile stresses. In the present case it was found cheaper to place steel to take the tensile stresses than to allow the compressive stresses to be thus increased. We see from these considerations why very



Concrete Girder Bridge

heavy masonry arches, if properly designed, have no tensile strains and need no reinforcement. Even a load over one half the arch decreases tensile stress everywhere except in those due to a fall of temperature on the extrados near the skewbacks.

The greatest tensile stresses, at the intrados near the crown and at the entrados near the skewbacks, are produced by a fall of temperature. This is therefore the condition which governs the amount of steel reinforcement to be used and to a large extent the dimensions of the arch ring. This being the case it will be seen that the concrete of the arch ring should not be placed in very warm weather in order that the fall of temperature should be small from the temperature of setting, the point at which no temperature stresses are induced.

The intrados is a five centred curve. It lies between the segment of a circle passing through the springings and the crown, and a semi-ellipse through the same three points, but

it is more nearly segmental than elliptical. Even a slight change from this line will give stresses greater than those shown in the tables:—

Stresses in concrete due to dead load in lbs. per sq in.

	All Compression		
	Extrados		Intrados
a_1	30		72
a_2	96		65
a_3	101		58
a_4	120		71
a_5	110		84
a_6	101		101
a_7	99		108
a_8	91		120
a_9	86		127

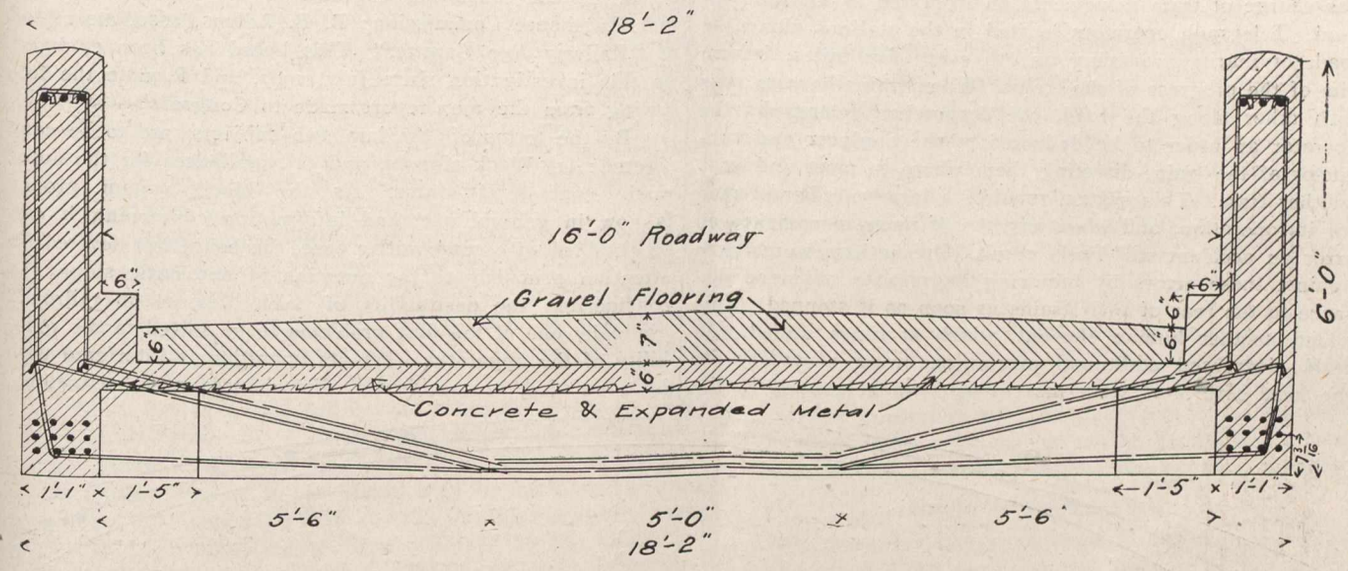
Stresses in concrete due to dead load and a uniform live load of 100 lbs. per sq. ft. over one half the arch.

Combined Temperature and dead load stresses.

	Rise of Temperature of 40° F.		Fall of Temperature of 40° F.	
	Extrados	Intrades	Extrados	Intrados
a_1	+280	—120	—120	+273
a_2	+260	— 18	— 68	+148
a_3	+170	+ 75	+ 42	+ 40
a_4	+120	+157	+118	— 16
a_5	+ 51	+240	+168	— 72
a_6	+ 2	+302	+200	—102
a_7	— 43	+354	+240	—139
a_8	— 67	+388	+250	—146
a_9	—92	+415	+265	—160

Compression denoted by positive sign, tension denoted by negative sign.

If the arch were half loaded the compressive stresses for rise of temperature at $a_1 = 254$ and at $a_9 = 455$, the maximum compression, a safe stress for concrete. If half loaded during a fall of temperature at a_1 the tension would be increased to—160 at the extrados, and everywhere else the tension would be decreased.

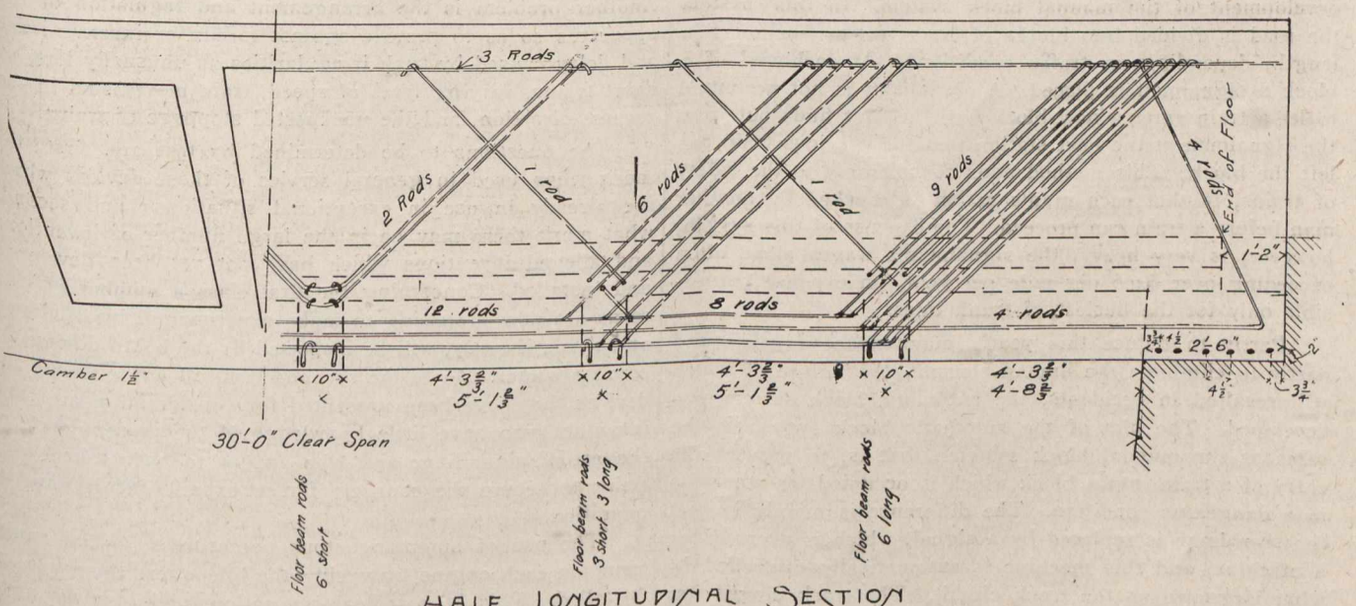


SECTION MIDDLE OF SPAN

SCALE 2 FT. = 1 IN.

Girder Bridge.

	Extrados		Intrados
a_4	60		162
a_9	84		162
a_{15}	161		60



HALF LONGITUDINAL SECTION

THE STATE OF THE ART OF RAILWAY SIGNALLING.

J. P. Simmen.

The subject of my talk this evening will be "Railway Signalling," first giving a general history of the signal art, followed by a general description of a new signal system, known as the Simmen system, which is now being installed on a local railway.

The art of railway signalling includes every imaginable means which aims, first, to prevent accidents to trains; and second, to facilitate the quick movement of trains safely. Signalling became an important study with the operation of the first railroad, which ran more than one train at the same time over its road. As the traffic increased. signalling

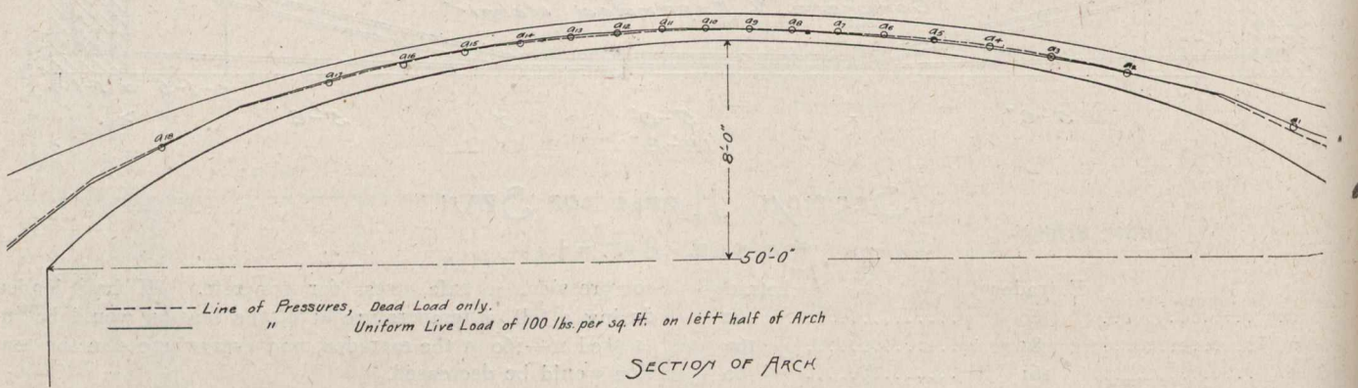
became more important each year, until to-day there is hardly another subject of so great importance to the railway manager. Fundamentally, railway signalling may be divided into two distinct groups. Under the first group come all the devices and means which aim at a general control of train movements over a division of railway, a control such as a despatcher exercises over trains on his entire division. The second group includes all devices and means which aim at a local control of train movements, such as flagmen in the rear of a standing train warning a following train of danger, switch targets, telling of open switches, torpedoes, manual block systems, interlocking plants, automatic block systems, and automatic stops.

Since the invention of the Morse telegraph, practically only one method for the general control of train movements has been in use. which is known as the telegraph train order system. A train despatcher, located at some central office, has charge of train movements on from 100 to 200 miles of road. Telegraph operators located in the stations along the road, ordinarily averaging one to every five miles, inform him of the progress of the trains. When trains have to pass each other along the road, the despatcher telegraphs the operator an order to be delivered to the engineer and conductor of the train, directing them where to meet and pass another train. This system requires a large number of men for its operation, and when any one of these men makes an error an accident will likely result. Precautions were taken against these errors by requiring flagmen to go some distance to the rear of their trains as soon as it stopped. This added another human element, which at times failed. As traffic increased additional precautions were necessary for the local control of train movements, which resulted in the development of the manual block system. In this system the road is divided into blocks of from two to five miles in length, depending on traffic conditions. At each end of a block a signalman is placed. A signalman is not permitted to let a train enter a new block until he first finds out from the signalman at the next station that the previous train has left the block. This method adds considerably to the safety of trains, in that each man's action is checked by another man before a train can proceed. The expense of this system, however, is very heavy, the signalman's wages alone often exceeding over $400 per mile per year, an expense permissible only for the busiest of trunk lines.

Partly to reduce this yearly maintenance expense and partly to eliminate the human element, the failure of which still resulted in accidents, the automatic block system was developed. The aim of the automatic block system is the same as the manual block system; that is, to prevent the entry of a train into a block which is occupied, or otherwise in a dangerous condition. The difference is mainly in that the signalman is replaced by a signal, which is operated by a machine, and this machine is automatically controlled by what is known as the track circuit. The track circuit was invented by Wm. Robinson in 1872, and forms the basis of the modern automatic block system. All the methods mentioned so far for the local control of train movements aim to give the engineer a signal if there is danger ahead of him. It frequently happens, however, that the engineer will not obey such a danger signal for various reasons, and shortly after the introduction of the air-brake numerous inventions were made for automatically applying the air-brakes if an engineer neglected to respond to a stop signal. Nearly five hundred automatic stop patents have been issued in the United States, but only in recent years has any progress been made in this direction. Developments of the last two years, however, indicate that automatic stops will come into use, at least on the more important trunk lines. This question has become of such importance that the Congress of the United States has ordered an investigation of block signals and automatic stops. Congress instructed the Interstate Commerce Commission to investigate and report on the use of and necessity for block signal systems and appliances for an automatic control of railway trains in the United States.

The Commission appointed a special board, known as the Block Signal and Train Control Board, composed of M. E. Cooley, Dean of the Department of Engineering of the University of Michigan; Capt. Hazel Ames, Jr., signal engineer, New York Central and Hudson River Railroad; F. G. Ewald, consulting engineer of the Illinois Railroad and Warehouse Commission; B. B. Adams, associate editor of "Railway Age Gazette." This board has been engaged on this investigation since July, 1907, and I quote the following from the 1907 report made to Congress:—

By the terms of the law two subjects are to be considered: (1) Block signals, and (2) appliances for the automatic control of trains. As the block system proper is now in general use, and information concerning it can be obtained with comparative ease, the board has devoted its attention primarily to the question of automatic stops. In considering the desirability of such devices on railroads generally one of the first problems to be solved is the reliability of the apparatus when its operation is interfered with by snow, ice, or accidental disturbances or obstructions.



SECTION OF ARCH

Another problem is the arrangement and regulation of the apparatus so as to provide against failure or inconvenience and delay caused by such irregularities as unusually long or short trains, varying rates of speed, train movements in the reverse direction, and the unexpected stoppage of trains.

The questions to be determined by test are. first, the merit when used in general service of those devices which are already in use in exceptional situations; and second, what merit there may be in the large number of inventions and alleged inventions which have not yet been developed and installed. Concerning the first class a number of concerns are now proposing to make experimental installations, and these, if ready, will be inspected by the board during the coming winter. As to the second class, all but a few of the devices that have been presented for consideration are from inventors who have little knowledge of the present state of the art of signalling, and who appear to have taken little pains to secure the counsel of men experienced in railroad operation.

The use of automatic stops necessitates special equipment on each engine traversing the line where the stops are installed. This is a radical innovation, and involves questions which must be considered with great care. There are two principal methods of communication with the engine, namely, by mechanical trips and by electrical contacts. The relative desirability and reliability of these methods is one of the first questions to be settled. Under this head it will be desirable to investigate certain cab-signal installations in Europe, some of which are of ten years' standing. Cab signals are not automatic train stops, but they use either the mechanical trip or electrical contact in the same way that

an automatic stop would use it; hence the need of learning the lesson of this European experience through a visit by a member of the board or some other competent person to England and France.

Up to date the board has examined descriptions of 495 devices or systems; 245 of this number have been laid aside as not coming within the terms of the joint resolution. They deal with devices intended to improve the condition of railway tracks, automatic car couplers, automatic steam and air hose couplers, safety cars, and other devices calculated to prevent the telescoping of cars in railway wrecks, and otherwise mitigate the severity of collisions, as well as numerous other devices which in no way pertain to the block-signal system nor to the question of automatic train control. Of the remaining inventions the board has been furnished with descriptions of 175 which relate directly to block signals, cab signals, or automatic train stops; 55 of this number have already been disposed of and 120 are now in the course of examination. In nearly all of the 55 cases which have been passed upon the board has unanimously decided that the alleged inventions have not sufficient merit to warrant further attention. In most of these cases the plans and specifications that have been furnished indicate that the inventors are manifestly unacquainted with the requirements of railroad service, their devices being merely repetitions of what has been previously invented.

The actual signals by which engineers are informed of danger ahead may be divided into two distinct classes: Fixed signals and cab signals. Into the first class belong all signals which are fixed along the roadway, such as semaphore blades, discs, lamps, etc. Cab signals are given direct on the cab of the locomotive.

Much has been said and written about the merits of each type. Cab signals are much less expensive; they are brought much closer to the engineer thus making their unobservance less liable. Further a cab signal may be both visible and audible, thus appealing both to the engineer's vision and hearing. Cab signals have been endorsed by the Board of Trade of England, and have been adopted on some of the largest English roads. It is my belief that cab signals will play a very important part in future signalling on account of their low cost. A cab signal can be installed on a locomotive for $150. An automatic block signal of the fixed signal type costs about $350. In this country there is one locomotive to every five miles of track. The cab signal expense per mile of road is about $30 per mile, plus $40 per mile for contact rails, or about $70 per mile. In the automatic block signal installation the fixed signals average about two signals per mile; therefore you have an initial expense of $70 per mile in one case and $700 per mile in the other. Out of 250,000 miles of railroads only about 10,000 miles have been equipped with automatic block signals, not because they are not desired by railroads, but because they are prohibitive on account of their cost, this cost even running up to as high as $2,000 per mile. It is my conviction that the railroads of this continent, each and every one of them, are badly in need of an improved signal system, and as soon as the cost is reduced to such a point that the railroads can afford the same, they will quickly adopt it. This reduction in cost is only possible by the use of a cab signal. Furthermore, a satisfactory cab signal must be developed to make any progress whatever with an automatic stop, because the fundamental principle of the cab signal and the automatic stop is the same—both must have some means to either mechanically or electrically connect some fixture along the roadway with a fixture on the moving train. Automatic stops and cab signals may be divided into four general classes, based upon the method used in transmitting to the engine or moving train the impulse necessary to operate the automatic stop and give a signal indication in the cab. These, with the various subdivisions, are as follows:—

1. Mechanical trip, overhead and ground.
2. Insulated engine parts.
3. Contact rails, continuous and intermittent.
4. Inductive, alternating current and Hertzian wave.

The committee reporting to the Railway Signal Association say:—

Devices of this type are most generally arranged to transmit to the moving train the operating impulse to apply the automatic stop by means of a hanging arm or weight arranged to strike a valve or handle placed on the top of the cab or car and apply the air, in case the signal should be passed when in the stop position.

These systems must of necessity be arranged for the hanging arm or weight to come within the maximum clearance line, and in such position would be apt to strike, with probably fatal results, a man riding on the top of a car. The absence of the arm will result in a failure to stop a train when a signal which in indicating stop is run by. Up to the present time, as understood by the committee, these devices do not conform to several of what they regard as essential requirements for a safe and reliable automatic stop and cab signal system. These requirements have been given at the end of this report, and the overhead arrangement of mechanical trip automatic stopping devices do not comply with Nos. 1, 2, 3, 4, 6, 7, and 11.

Mechanical Trips—Ground Arrangement.

Devices of this type are arranged with a movable arm or inclined plane, which when in the operating position is made to come in contact with parts suitably located on the moving train and cause the brakes to be applied, when the train runs by a signal that is indicating stop. The difficulty met with in operating devices of this type is that the parts on the ground or those on the engine must extend inside of or beyond the permissable clearance lines, in which position they are likely to be broken or knocked out of place, for the parts placed on the ground and the parts on the train are likely to be hit by objects other than the engaging arm, and the brakes be applied when they should not. Ice and snow seriously interfere with the operation of devices of this kind, and these systems, so far as the committee is aware, do not at present meet requirements Nos. 1, 2, 3, 4 and 7.

Insulated Engine Parts.

With these systems it is usual to insulate one truck from the other of the engine or car, insulate an engine from its tender, or insulate one wheel from the other by means of a split axle or insulated wheel centre. Pressed fibre is the material by which this insulation is most generally accomplished. With any of the above mentioned arrangements it is necessary that the indication be conveyed to the moving train during the interval of time in which the insulated part is passing over a short insulated section of rail or an insulated joint in the track. The operating impulse is, therefore, momentary and is not continuous. The principal difficulty met with in systems of this kind is to properly construct and maintain the insulation of the engine parts and to insure that the parts on the moving train will operate properly in the short interval of time available. These systems, it has been found, do not conform to essential requirements Nos. 1, 2, 3 and 11, as recommended by the committee.

Contact Rails—Continuous Type.

Devices of this type are arranged to conduct the operating signal impulse to the moving train by means of a shoe attached to the train making contact with a third rail placed alongside of the main rail, between the main rails, or above, or on the side of the train. The difficulty experienced with devices of this type is to secure a continuous contact on the third rail, for, unless this is done, the device operates and the brakes are applied when there is an opening in the third rail, irrespective of whether or not the operating conditions make it necessary or desirable that the train brakes be applied. The continuous type of contact rail system, as at present understood by the committee, do not conform to requirements Nos. 1, 2, 3, 4 and 11.

Contact Rails—Intermittent Type.

With these systems the contact is usually of moderate length, and is placed at a point where it is desired to convey the operating signal impulse to the moving train. These points are at the commencement of a block, or where a home or dwarf signal is placed. The indication given on the train is continued from the time a train passes one contact to the passing of the next conact, or to one where the indication

is changed. The principal difficulty to be overcome in the development and use of devices of this type is to insure that the indication will be received on the moving train, and when received will not be improperly changed before the next contact point is reached. These systems, as far as developed, do not fully meet requirements Nos. 1, 2, 3, 4, 7 and 11.

Inductive—Alternating Current Type.

The committee is not aware that apparatus of this type has been tried. As described, the system is quite similar to the intermittent contact rail scheme, except that the operating impulse is conveyed to the moving train by induction, a coil of wire attached to the track acting on a suitably arranged coil placed on the train. The arrangement can be made to keep within the clearance lines, and seems to be capable of successful development, provided the necessary alternating current is available at the many points where same will be required. Requirements Nos. 1 and 2 do not appear to be complied with by systems of this type of which the committee has knowledge.

Inductive—Hertzian Wave Type.

This type of apparatus makes use of a generating device placed on a train or at a fixed point from which the Hertzian waves are sent out, preferably in the direction in which it is desired to give the indication. A collector of suitable form and arrangement is placed on the train or point at which an indication is to be received, and the proper Hertzian waves are supposed to be collected and actuate the apparatus to give an indication. The principal difficulty with apparatus of this type is in selecting the particular train or fixed point which is to receive the intended indication and to provide protection for a train when there is a failure of the wave generating apparatus. It is understood by the committee that these systems do not comply with the following requirements for safe and reliable working: Nos. 1, 2, 3 and 6.

Recommendations.

Up to the present time descriptions and drawings of automatic stop and cab signal devices referred to this committee have not included those which seem to be the best and the most practicable. Your committee is not in a position to, and does not think it advisable. to recommend for trial any type of cab signal or automatic stop device with which they are familiar, believing that demonstrations of the practical workings of these systems should be made by the patentee, the manufacturer, or under the auspices of the Block Signal and Train Control Board of the Interstate Commerce Commission. That those interested in the design and manufacture of automatic stop and cab signal devices for use on surface railroads may know of the operating conditions under which these systems will be used, and the requirements as to safe and reliable working which must be met in order that these devices may have the approval of this Association, your committee submits for adoption the following requisites of installation to which automatic stop and cab signal systems must conform. to be considered safe and reliable in operation:—

Requisites of Installation.

1. Apparatus and circuits so constructed that a failure of any essential part will cause the display of a stop signal indication, and also the working of the automatic stopping device. The apparatus shall if possible, be so arranged that the stop shall not be operative or effective at speeds less than five miles per hour.

Note.—To comply with this requirement, it is practically necessary that circuits be arranged with power supply at one end and controlled relay or operating device at the other end of each circuit.

2. The train control feature must be applicable for use with the absolute or the permissive block system.

With either system the release of the stopping device must be within the control of the engineman or trainman, but only after the speed of the train has been reduced to five miles per hour or less.

3. The automatic stopping device must be operative only in the direction of traffic, except in connection with signals governing reverse movements.

4. The system must be operative under all weather conditions and at any speed in excess of five miles per hour.

5. The system must be adaptable for use with a block system using track circuits.

6. The system where track circuits are used must give protection against a broken rail, the ends of which have separated, or where a rail or section of a rail has been removed from the track.

7. The parts on the moving train must not extend beyond the maximum clearance lines and the parts on the ground must not extend within the maximum clearance lines, except for a space of two (2) feet above the top of the rail, within which distance the parts must clear the maximum equipment line.

8. An overlap equal to the breaking distance for the maximum permissible speed must be provided for an automatic stopping device.

9. Emergency application of the brakes should be made only when a home or dwarf signal has been run by, when indicating stop. If the system is arranged to cause an application of the brakes when a train passes a distant signal that is indicating caution, the application of the brakes must not occur if the home signal is indicating proceed, or if the speed of the train is under such control that the train will be stopped before passing the home signal.

10. The circuits must be arranged to allow two or more engines to be used with one train or to allow one train to push another train without having the automatic stop applied at each home signal, or to require the speed to be reduced to five miles per hour when passing a home signal that is indicating proceed.

11. The automatic stop must be adaptable for use with electric traction systems, using direct or alternating current for train operation.

12. The automatic stop and cab signal should be considered only as adjuncts to a fixed signal system.

Note.—This is on account of the impossibility of properly checking the work of the engineman if a cab signal or automatic stop is used without a fixed signal, and also from the necessity of informing the engineman of the exact commencement of the block and the point at which the indication received in the cab shall become effective.

All of these methods are old, and in developing a cab signal for the Simmen system the intermittent contact rail has been adopted. I will now enter into a general description of the Simmen system:—

As heretofore outlined, signalling may be divided into two distinct groups: one for the general control of train movements over an entire division, the other a local control. Heretofore all signal developments have been principally along the line of automatic local control, and the Simmen system makes a radical departure from this in that it consolidates the general control over a division and the local control from block to block into one system. In all signal developments of the local control type the old telegraph train order system must still be retained, and, therefore, no expense is eliminated by the introduction of the automatic block signal. By reason of this consolidation the telegraph operator, now essential for any system, is entirely eliminated, thus bringing about an initial saving which goes far towards paying the fixed charges, depreciation and maintenance expenses of the new system.

In general outline the Simmen system proposes to accomplish the following results:—

1. The telegraph operator, to-day the most prolific cause of accidents, is entirely dispensed with by the new system.

2. Each train as it passes over the road automatically makes a record (in graphic form) on a sheet in the despatcher's office of the exact time it enters and leaves a block, thus informing the despatcher of the exact location of trains at all times.

3. Signals along the road are under the direct control of the despatcher, who can signal to any engineer direct to stop or to proceed. The signal may be a fixed semaphore signal, a cab signal, or any type of signal now in use. A new cab signal, however, is being developed by the company

which may dispense with semaphore signals, or be used as an auxiliary to same.

4. The despatcher can telephone direct to the engineer in his engine.

5. The electric switches, by which the despatcher controls signals are interlocked in such a manner as to prevent the wrong movement of a switch.

6. By the use of the track circuit a train in the block ahead, a broken rail or an open switch will automatically bring the danger signal into action without the despatcher's assistance.

7. An automatic stop absolutely compels the engineer to observe all stop signals and speed regulations. A danger signal is given on a locomotive travelling at full speed at a point about half a mile before entering a new block or approaching a passing siding, where another train is to be met. If an engineer obeys the danger signal and gradually reduces speed and comes to a stop at the proper point nothing further happens. If, however, the speed of the train at any point within the half mile is greater than that specified for gradual stop the brakes are automatically applied. The apparatus may be so adjusted as to compel a reduction to a speed of, say, five miles an hour, and will permit the forward movement of a train even past a danger signal, provided that the speed is reduced to five miles an hour, or any safe speed, and that speed maintained until a clear signal is passed.

8. If an engineer speeds around any curve faster than that provided by the regulations, the automatic stop apparatus will slow up the train to the proper speed, such proper speed depending upon the sharpness of the curve.

9. A recording device on the locomotive records the speed made in every block, the exact time and place at which a cab signal was given, the kind of signal, whether the engineer slowed down, and how soon, or whether the train was automatically stopped.

The one very important feature in this system is that a complete record is made of important facts, both in the despatcher's office and on the locomotive, which will enable the responsible officer of a road to maintain a much higher discipline among the train crews than has been possible heretofore.

Mr. Simmen then explained from lantern slides the general working features of the system. The principle feature about the system is the record sheet in the despatcher's office. This is a rectangular sheet, divided into time longitudinally, and into sections representing blocks transversely. This sheet is placed on to a table and continuously moved by clock work, so that the correct hour and minute as marked upon the sheet is at all times under a set of perforating needles. Each block has a separate recording needle, recording in a separate column. By the use of the track circuit as a train enters any one block the corresponding needle makes a perforation upon the sheet, thus making a record of train movements in graphical form.

ENGINEERING SOCIETIES.

ARCHITECTURAL INSTITUTE OF CANADA.—President, A. F. Dunlop, R.C.A., Montreal, Que.; Secretary, Alcide Chaussé, P.O. Box 259, Montreal, Que.

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, J. E. Hutcheson, Ottawa; 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. Annual meeting at Toronto Jan. 28, 29 and 30, 1909.

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.

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

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. H. Eisenbeis, Secretary, 1207 Traders Bank Building.

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

SOCIETY NOTES.

Science Undergraduate Society McGill University.

The regular November meeting of the society was held on Wednesday, 11th inst. This meeting was one of considerable interest, and had been looked forward to with a degree of expectancy, inasmuch as J. B. McRae, of Ottawa, known throughout Canada as one of our greatest hydraulic engineers, had been secured by the executive to give an address on the design and construction of the Orillia Dam. The decided favor with which the paper was received was enhanced by the fact that Mr. McRae is a graduate of our Faculty, and expressed pleasure in being able to be of service to his Alma Mater.

His address was one of more than usual interest, being intensely practical and peculiarly fitted for an address before an Undergraduate Society. Mr. McRae outlined the events which lead to his connection with this work as inspector of the Battle Dam, a timber structure built to replace the original concrete dam which had been swept away in 1904 The failure arising from lack of sand in the concrete. Alternative designs for a new dam were prepared by Mr. McRae, drawings of which were exhibited by lantern slides as also the design chosen by the council and built by the contractors.

Incidentally Mr. McRae gave some valuable suggestions to students relative to preparation of drawings for inspection by men who are not engineers by profession, pointing out the value of a picture rather than a working drawing as conveying more information to the ordinary citizen.

The discussion, led by Professor McKay and Brown, on the laying of concrete brought out many points of importance, the students getting much information from these practical and theoretical men.

Steam Engineers.

The stationery engineers of Montreal held a well-attended meeting in the rooms of the Association of United Steam Engineers at the Monument National last night for the purpose

of discussing the act of incorporation which it is proposed to have put through the Quebec Legislature. In order to have this act passed this session, it will be necessary to raise the necessary funds, $1,000, before December 15, as the act will have to be advertised in the "Official Gazette" for one month before the Legislature meets.

The membership now totals about 250, and the association want to get a large increase in numbers. There are 1,500 engineers in the city, and it is intended to organize so as to incorporate one society, working in full activity, instead of the present half dozen or so, who will participate in the special act of provincial incorporation.

Mr. Carroll is president; Mr. Valiquet, secretary; Mr. Veary, treasurer; while the committee consists of Messrs. Arnott, Bryant, Murdock, Smillie, Mitchell, and Noel.

To give the movement every possible assistance the Association of United Steam Engineers' have granted the free use of their hall for meetings.

The American Society of Mechanical Engineers.

The twenty-ninth annual meeting of the Society will be held in the Engineering Societies Building, 29 West 39th Street, New York, December 1-4, 1908. Six professional sessions will be held, two of them simultaneously with other sessions. There are several papers on miscellaneous subjects of pertinent interest, and an entire session will be devoted to the problems and development of gas power; at another session steam and power plant papers will be considered; and machine shop practice and experimental data will each have a separate session. The papers to be presented contain a great deal that is valuable, and the discussions will add much to the contributions, and to the interest of the sessions.

Tuesday, December 1—Opening Session, 8.45 p.m., the President's Address, The Conservation Idea as Applied to The American Society of Mechanical Engineers, M. L. Holman. Wednesday, December 2—Professional Session, 9.30 a.m., Annual business meeting. Reports of the Council, Tellers, and Standing and Special Committees. New business may be presented at this session. Papers—The Engineer and the People, Morris Llewellyn Cooke; Aeronautics, Major George O. Squier, Acting Chief Signal Officer, U.S.A. Wednesday, December 2—Professional Session, 2 p.m. —A Method of Obtaining Ratios of Specific Heat of Vapours, A. R. Dodge; The Total Heat of Saturated Steam, Dr. Harvey N. Davis; Fuel Economy Tests, C. R. Weymouth; An Automatic System for Firing Fuel Oil, C. R. Weymouth. Lecture on Aeronautics at 8.15 p.m. by Lieutenant Frank P. Lahm, of the Signal Corps, U.S.A. Thursday December 3—Professional Session, 9.30 a.m.—Efficiency Tests of Milling Machines and Milling Cutters, A. L. DeLeeuw; Metal Cutting Tools Without Clearance, James Hartness; Interchangeable Involute Gear Tooth System, Ralph E. Flanders; Durability of Gears in Electric Railway Service, Norman Litchfield; Industrial Photography, S. Ashton Hand. 2 p.m.—Articulated Compound Locomotives, C. J. Mellin; Liquid Tachometers, Amasa Trobridge; Training Workmen, H. L. Gantt; An Averaging Instrument for Polar Diagrams, Professor W. F. Durand; Salt Manufacture, B. Willcox. Thursday, December 3—2 p.m.—Business meeting. Reminiscences of a Gas Engine Designer, L. H. Nash; Possibilities of the Gasolene Turbine, Professor F. C. Wagner. Reception at 9 p.m., to be held in the Engineering Societies Building, 29 West 39th Street. Friday, December 4—9.30 a.m.—Physical Properties of Carbonic Acid and the Conditions of its Economic Storage for Transportation, Professor R. T. Stewart; The Slipping Point of Rolled Boiler Tube Joints, O. P. Hood and Professor G. L. Christensen; Tests on Friction Clutches for Power Transmission, Professor Richard G. Dukes.

Canadian Cement and Concrete Association.

From March 1st to 6th, 1909, the Canadian Cement and Concrete Association will hold an exhibition in the St. Lawrence Arena, Toronto. The exhibits shall comprise cement, cement products, cement using machinery, cement testing apparatus, concrete mixers, cement literature, architect's and engineer's plans of structures in which cement is used, exhibits of engineering and technical schools, and other articles related in any way to the cement industry. Mr. R. M. Jaffray, 1 Wellington Street, Toronto, is manager of the exhibition, and every effort is being put forward to make this the first Convention of cement workers successful.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5493—Oct. 22—Temporarily approving Express Classification for Canada, C.R.C. No. 1; the Tables of Graduated Charges for packages weighing less than 100 pounds, C.R.C. No. 2, and Money Classification, C.R.C. No. 3.

5494—Oct. 27—Rescinding Order of the Board No. 4578, 26th December, 1907, authorizing the V.V. and E. Railway and Navigation Co. to take for the diversion of the River Road the additional land required for such purposes in the municipality of Delta, B.C.

5495 to 5498—Oct. 28—Granting leave to the Manitoba Government Telephone Commission to cross with its wires the C.P.R. at four points in the Province of Manitoba.

5499—Oct. 22—Authorizing the C.P.R. to construct, maintain and operate branch line to and into the premises of Hugh Cummings, Township 4, Range 9, west 6th meridian, Province of British Columbia.

5500—June 2—Authorizing the C.P.R. to cross by means of an overhead bridge tracks of G.T.P.R. at mileage 547.1, Pheasant Hills branch.

5501—Oct. 28—Granting leave to J. E. Pratte, of St. Wenceslas, Que., to erect, place, and maintain telephone wires under G.T.R. tracks at public crossing, 8th range of Aston, Que.

5502 to 5505—Oct. 28—Granting leave to the Manitoba Government Telephone Commission to erect, place, and maintain its wires across the C.P.R. at four different points in Manitoba.

5506 and 5507—Oct. 28—Granting leave to the Noisy River Telephone Co. to cross tracks of G.T.R., Township of Nottawasaga, County Simcoe, Ont.

5508—Oct. 28—Granting leave to the Claremont and Ashburn Telephone Association to erect, place, and maintain its wires across G.T.R. at Myrtle, Ont.

5509—Oct. 28—Granting leave to the Manitoba Government Telephone Commission to erect, place, and maintain its wires across the track of the C.P.R. at public crossing at St. Louis, Man.

5510 to 5512—July 14—Granting leave to the Grand Valley R.R. to cross with its tracks the tracks of the G.T.R., the T.H. and B. Ry., and the Brantford and Hamilton Railway at Brantford, Ont.

5513—Oct. 20—Authorizing the Dominion Natural Gas Co. to lay gas pipe under G.T.R. in Lot 7, Concession 3, Township Woodhouse, County Norfolk, Ont.

5514 and 5515—Oct. 29—Granting leave to the B.T. Co. to cross with its wires tracks of the G.T.R. at Renton and Terra Cotta Stations, Ont.

5516—Oct. 29—Granting leave to the C.P.R. to use and operate various bridges on its Mountain and Cascade sections.

5517—Oct. 20—Dismissing application of the P.M.R.R. for Order approving character of work for construction of bridge fifty-two feet in length over drain known as "White-bread Tap Drain" where it crosses land of the P.M.R.R.

5518—Oct. 20—Dismissing application of B.T. Co. for Order directing W.E. and Lk.S.R.R. to bear and pay cost of certain changes of the line of the B.T. Co.

5519 to 5522—Oct. 29—Granting leave to the Manitoba Government Telephone Commission to cross tracks of the C.P.R. at four different points in the Province of Manitoba.

5523—Oct. 29—Granting leave to the Bethesda and Stouffville Telephone Co., Limited, to erect, place, and maintain its wires across track of the G.T.R. in Township of Whitechurch, County York, 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.

New Brunswick.

HAVELOCK.—Tender for Havelock village culvert, will be received at the Department of Public Works, Fredericton, until Monday, 30th day of November, 1908, at noon, for rebuilding Havelock village culvert, Parish of Havelock, King's County, according to plans and specifications to be seen at the Public Works Department, Fredericton, N.B., and at the office of Mr. J. A. Murray, M.P.P., Sussex, N.B., and at the office of Mr. H. A. Keith, Havelock, N.B. John Morrissy, Chief Commissioner, Department of Public Works.

LEPREAU.—Tenders for brickyard cove retaining wall will be received at the Department of Public Works, Fredericton, until Monday, 30th day of November, 1908, at noon, for rebuilding brickyard cove retaining wall on Little Lepreau Road, parish of Lepreau, Charlotte county, N.B., according to plans and specifications to be seen at the Public Works Department, Fredericton, N.B., and at the store of Oscar Hanson, Sr., Little Lepreau, on and after Monday, November 16th, 1908. John Morrissy, Chief Commissioner, Department of Public Works.

LEPREAU.—Sealed tenders, marked "Tender for Mill Pond Bridge," will be received at the Department of Public Works, Fredericton, until Monday, 30th day of November, 1908, at noon, for rebuilding Mill Pond Bridge over Little Lepreau River at Hanson's, parish of Lepreau, Charlotte county, N.B., according to plans and specifications to be seen at the Public Works Department, Fredicton, N.B., and at the store of Oscar Hanson, Sr., Little Lepreau, on and after Monday, November 16th, 1908. John Morrissy, Chief Commissioner, Department of Public Works.

Quebec.

ST. EMELIE.—Tenders for roadway and enlargement of block at St. Emelie will be received at this office until 4.30 p.m. on Monday, November 23rd, 1908, for the construction of a roadway and enlargement of block at Ste. Emelie (Leclercville), Lotbiniere county, Province of Quebec, according to a plan and specification to be seen at the office of A. Decary, Esq., resident engineer, post-office, Quebec, on application to the postmaster at Leclercville, Lotbiniere county, Que., and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works.

Ontario.

BARRIE.—Tenders will be received until November 24th, 1908, for the construction of a steel bridge over the Nottawasaga River by J. T. Simpson, chairman Bridge Committee, Barrie, Ont. C. H. Mitchell, C.E., Traders Bank Building, Toronto, engineer in charge. (Advertised in The Canadian Engineer.)

OTTAWA.—Tenders for residence of Chief Astronomer, Royal Observatory, Ottawa, Ont., will be received at this office until 4 p.m. on Saturday, November 28th, 1908, for residence Chief Astronomer, Royal Observatory, Experimental Farm, Ottawa, Ont. Napoleon Tessier, Secretary, Department of Public Works.

OTTAWA.—Tenders for water supply, Royal Military College, Kingston, and addressed to the Secretary of the Militia Council, Department of Militia and Defence, Ottawa, will be received until noon, November 23rd, for the installation of a new water supply at the Royal Military College, Kingston. E. F. Jarvis, Secretary, Department of Militia and Defence.

OTTAWA.—Tenders for a new hydrographic steamer will be received up to noon of the 10th day of December, 1908, for the construction of a twin screw steel steamer for the hydrographic service on the Atlantic coast, of the following leading dimensions, namely: Length over all, 173½ feet; breadth of beam, moulded, 29 feet; depth, 15½ feet; to be delivered at Sorel, in the Province of Quebec. G. J. Desbarats, Acting Deputy Minister of Marine and Fisheries.

TORONTO.—Tenders will be received until December 15th, 1908, for the construction of Section No. 3 of the high-level intercepting sewer. Joseph Oliver, Mayor. (Advertised in the Canadian Engineer.)

Alberta.

EDMONTON.—Tenders will be received until Dec. 1st, 1908, for the granite for Parliament Building, Edmonton. J. Stocks, Deputy Minister of Public Works. (Advertised in The Canadian Engineer.)

British Columbia.

NELSON.—Tenders will be received up to 12 o'clock noon on Wednesday, November 25th, for the following: Parcel 1—At Goat River Landing—1,459 cedar poles, 8 by 40; 947 cedar poles, 8 by 45; 770 cedar poles, 8 by 50. At Erickson—100 cedar poles, 7 by 35; 24 cedar poles, 8 by 35; 51 cedar poles, 7 by 40; 23 cedar poles, 8 by 40; 20 cedar poles, 8 by 45; 15 cedar poles, 8 by 50. Parcel 2—All cedar timber suitable for telegraph or telephone poles, piling or posts upon 5,000 acres near Creston, being Block 812, except the north 2,000 acres thereof. E. B. McDermid, Assignee, Kinney-Miller Cedar Co.

CONTRACTS AWARDED.

Quebec.

GASPE.—The Mantone and Gaspe Railway, Quebec, has awarded to H. J. Burner Co., 42 Broadway, New York, general contract for all work on the road. Clearing and grading have already been started on the first two miles and track is to be laid this fall, and the substructures are to be built for the bridge over Metis River. The line is to be thirty miles long. It will extend from St. Flarie, a small town on the Intercolonial Railway, eighteen miles below Rimouski, Que., ultimately to Gaspe, 240 miles. R. E. Hunter, Ste. Flarie, Que., is chief engineer and superintendent of construction.

MONTREAL.—The Hill Electric Manufacturing Co. have been awarded the contract for main switchboard and panel-boards for the new Workman Building, McGill University.

Ontario.

HAMILTON.—Tenders for the laying of the sewer line for the sewerage system on the Mountain were opened, and the contract was awarded to G. F. Webb, whose price was $2.29 a foot, or $26,140 for the whole job. M. A. Pigott put in a tender at $3.50 per foot, or $39,990, while the tender of the city engineer was $3.14 per foot, or $35,843. The pipe is to be supplied by the city at an estimated cost of $5,000.

GANANOQUE.—The contract for the new steamer which Capt. Roys purposes to have built has been awarded to a Kingston firm. The vessel is to be built mostly of steel, and will be 120 feet long, with a capacity of 520 on the bay, for 390 on the lake. Owing to previous orders, the boat will not be ready before the spring of 1910. The estimated speed is expected to be between 15 and 16 miles an hour, and the boat will be one of the finest excursion boats.

Manitoba.

WINNIPEG.—The city last week let an important contract in connection with the power plant, when Messrs. R. & D. McLeod, of Winnipeg, were awarded the contract for the construction of a system between Point-du-Bois and Las

Du Bonnett at a cost of $6,000. The distance is approximately twenty-four miles, and the above figure included the supplying and erection of cedar poles and all other material. Work is to commence on the system at once.

WINNIPEG.—The contract has also been let for the erection of an engineer's dwelling at Point du Bois, costing $2,000, the dwelling to be built by the Power Construction Department of the city of Winnipeg.

RAILWAYS—STEAM AND ELECTRIC.

Nova Scotia.

AMHERST.—Engineers Whitman and Tessier, who have been actively engaged in surveying a railway line from Chignecto mines to the Northumberland Straits for the Maritime Railway, Coal and Power Company, have completed the preliminary survey. They report finding a splendid route from Amherst to Northport, but will have to devote some further time on the portion of the road from Amherst to Chignecto. The proposed line of railway is about twenty-six miles long, and it is the purpose of the company to establish a water terminal on the Northumberland Strait to ship coal to the St. Lawrence market. The road when built will open up a fine stretch of country, tapping a number of important undeveloped coal areas.

Quebec.

MONTREAL.—It is reported in local railway circles that the G.T.R. may dispose of its old Canada Atlantic Line, connecting Ottawa and Depot Harbor, to the Canadian Northern Railway, while retaining for itself that part connecting Ottawa and Montreal. As the G.T.R. has been operating the line at a loss, and as the C.N.R had contemplated the construction of a line paralleling the Ottawa-Depot Harbor Line, it is generally considered good policy on the part of the G.T.R. to make the deal.

MONTREAL.—The Smart-Turner Machine Company, Ltd., Hamilton, Ont., are supplying the Grand Trunk Railway system with a 20-ton Gantry crane.

Ontario.

MORRISBURG.—The building of a new line from Morrisburg to a point on the present Ottawa and New York Railway and the adoption of electricity as a motive power on the entire line, which will include about twenty miles of the present O. & N.Y. system is being considered. The intention is to run the line from Morrisburg through Chesterville, across the Canadian Pacific Railway, Toronto line to Morewood, thence to Marvelville, and running to Metcalfe. Leaving Metcalfe the line would be laid in an easterly direction to reach the Ottawa and New York tracks at a point between Russell and Pana stations the route from there would be over the O. & N.Y. line into Ottawa. The total length of the new electrified line would be about 75 miles, 30 of which are already provided by the O. & N.Y. road.

WINDSOR.—Thomas Elliott, of Brantford, is seeking one hundred thousand dollars damages from The Windsor, Essex and Lake Shore Electric Railway. Elliott claims he got the contract for the construction of the road three years ago when the company was controlled by William Newman and A. J. Nelles, of Windsor. The contract, according to his statement, provided for the payment of $100,000 before the work started with additional payments at specified times while the construction work was in progress. After Newman and Nelles sold out their interest the company gave the contract for construction to the Keystone Construction Company.

HAMILTON.—Notice has been given of an application to the next Legislature for an act to incorporate the Desjardins Interurban Railway Company. The route outlined is from Hamilton by Dundas to Galt, and from Hamilton through Burlington Heights, through Waterdown to Campbellville, and then to Guelph. Another proposed line runs to Burlington. The company desires the privilege of issuing bonds or other securities to the extent of $25,000 per mile, and to grant running rights to other companies.

Manitoba.

WINNIPEG.—The Dominion Bridge Company have commenced the erection of the structural steel on the new Fort Garry Depot, and will push the work forward on this large contract as rapidly as possible.

Alberta.

PRINCE ALBERT.—The first span of the C.N.R. rail and traffic bridge is in position, and the second span was started November 10th.

British Columbia.

VANCOUVER.—Mr. James D. Schuyler, the consulting hydraulic engineer from Los Angeles, with whom the officials of the British Columbia Electric Railway Company have been in communication with reference to the proposed improvements at Lake Buntzen, is now here and will pass upon the scheme for the enlargement of the tunnel between Lakes Buntzen and Coquitlam.

VANCOUVER.—An inspection is being made by C.P.R. officials of the route which was last summer surveyed between Coutlee and Penticton, and this is looked upon as being significant of the start of construction on this line during the coming year. R. Marpole, general executive assistant of the C.P.R., H. J. Campbie, consulting engineer, and H. E. Carry, the engineer who directed the survey work this summer, make up the inspection party. The distance covered by this survey is in the neighborhood of 180 miles.

LIGHT, HEAT, AND POWER.

Quebec.

MONTREAL.—The City Council make an offer to the Montreal Light, Heat & Power Company of a ten year contract, to date from January 1 next; on the following terms: $75 per annum per arc lamp; $36 per sixty-five candle-power incandescent lamp, and $24 per thirty-two candle-power incandescent lamp; that nine cents net be paid per kilowatt hour, by meter, for all electric current consumed in the lighting of municipal buildings, etc.

MONTREAL.—The electrification of the Grand Trunk shops, at Point St. Charles, is being undertaken by the company. The power for the operation of the plant will be produced from the company's own turbo-generators from coal that it will transport from the mines. The experience of the company in its shops at Stratford and Battle Creek is such as to justify them in adopting electricity in its larger shops.

MONTREAL.—The electric distributing boards in the Eastern Townships Building is being installed by the Hill Electric Manufacturing Company.

Ontario.

MERRITTON.—The mill buildings, formerly occupied by the Lybster Cotton Mills Company, and which for the last eighteen years have remained idle, are being thoroughly overhauled by the present owners—the Lincoln Paper Mills Company, Ltd., with the view of making an up-to-date paper mill as an auxiliary to their present plant. Preparations are being made for the installation of a complete hydraulic power system of about 1,200 horse-power in four units.

Manitoba.

WINNIPEG.—The Winnipeg Electric Railway have offered to supply the city with 5,000 horse-power at $18.40 per horse-power for the first year, and at the same rate for 10,000 horse-power the second and third years.

Alberta.

EDMONTON.—The municipality are now operating their new gas-producer plant. This plant was purchased from the Loomis-Pettibone Company, of Cudahy, Wis., and cost $100,000. This new plant will double the capacity of the electric plant and also supply power for the municipal street railway.

British Columbia.

VANCOUVER.—The B.C. Electric Company is now running its full motive and lighting power, the recent heavy rains having given the company all the necessary water power for the lighting system which is being run to its fullest capacity.

The steam plant is stilll being operated for the street railway system, but there has been no necessity for the company to fall back upon the emergency plant installed at the Sayward mill, the engine of which was attached to a generator in order that if the water power had failed during the recent shortage additional power might have been secured. The company is now receiving about 8,000,000 gallons of water per day.

SEWERAGE AND WATERWORKS.

Manitoba.

WINNIPEG.—The final test of the Winnipeg high pressure plant made by the Fire Underwriters Association has proved entirely satisfactory, the pumps and engines doing their work perfectly, and keeping up a steady pressure of 300 lbs. to the square inch. The result of this test will likely mean a considerable reduction in insurance rates.

British Columbia.

PRINCE RUPERT.—A gang in charge of a G.T.P. engineer are busily engaged digging trenches from the source of the water supply on Hays Creek, preparatory to placing the water mains underground before the cold weather sets in; and the residents of Knoxville are doing likewise with their pipe-line which is fed from the G.T.P. main.

Alberta.

EDMONTON.—At the last meeting of the City Council that body authorized the compilation of a report by the city commissioners regarding the advisability of installing a new pumping station farther up the river, at an approximate cash outlay of $750,000.

TELEPHONY.

Ontario.

CORNWALL.—The Stormont Telephone Co., with headquarters at Gallingertown, has been organized. They will build from Aultsville to Gallingertown. They expect to start with twenty-five subscribers.

MISCELLANEOUS

Quebec.

MONTREAL.—The iron industrial concerns owned and controlled by the Messrs. Drummond, of this city, it is announced, are to be consolidated into a company, to be known as the Canada Iron Corporation, capitalized at $8,000,000. Thomas J. Drummond will be president.

Ontario.

TORONTO.—The Constructing and Paving Co. have secured permission to use asphaltic cement in the bonding of sub-grade on city streets. They will now be strong competitors of the Warren Company, which have held the right to lay down bitulithic pavements, of which they have constructed some 154,400 square yards for the city.

INGERSOLL.—The formal opening of the Reid Foundry and Machine Co. took place November 12th. The Reid Foundry is capable of producing twelve tons of moulding iron per hour. At present it is employing eighteen men, and this staff will be increased to forty when the establishment is working to its fullest capacity. Yesterday saw the real start into business. Two or three extensive contracts are under way, and the prospects of a continuous and rapidly increasing business are very luminous.

Manitoba.

WINNIPEG.—One by one the various parts of the great work at St. Andrew's Rapids are being finished. Last summer the concrete work of the lock-pit was completed, and a few days ago excavation work on the canal was finished. All the earth from this part of the work has been removed. The final stretches of concrete work on the sustaining walls forming the approaches at either end of the lock-pit are now being laid down, and, if the frost stays away for a few days, all this part of the work will be as good as complete. During the winter the central portion of the dam will be put down and the remaining piers built, when the work will be ready for the contractors who are to put on the steel.

Alberta.

CALGARY.—During 1907 and 1908 Calgary laid several thousand square feet of concrete sidewalk. We give here a comparison of costs for the two years: 1907—59,716.58 square feet at 7 4-5 cents, 61,037.4 square feet at 8 cents, 23 catchbasins at $22, 120 catchbasins at $20. 1908—235,496.1 square feet at 8 cents, 180,540.3 square feet at 7 4-5 cents, 1,980.6 square feet at 7 4-5 cents, 23,135.2 square feet at 8 cents, 3,361.2 square feet at 7 4-5 cents, 12 catchbasins at $22, 6 catchbasins at $20.

British Columbia.

VANCOUVER.—The Government engineers are busily employed in getting out the plans for the new bridge to be built over the Columbia at Revelstoke. The office work is nearly completed, and the work of construction will be commenced at an early date. The bridge will cost in the neighborhood of $40,000.

PERSONAL.

MR. H. H. CHARLES, formerly resident engineer on track for C.P.R. on their Sudbury line, has now charge of work on the Transcontinental Railway at Portage Road, N.B.

MR. W. FRY SCOTT, consulting structural engineer, Aberdeen Chambers, Toronto, has been engaged by the Mutual Fire Insurance Companies to give manufacturers skilled expert advice on matters of construction and protection.

MR. A. S. COOK, C.E., who for several years has been connected with the Cataract Power Co.'s interests and other work in the Niagara peninsula, has been engaged by the Lincoln Paper Mills Co. to install their new hydraulic power system at the old Lybster Cotton Mills, Merritton, Ont.

MARKET CONDITIONS.

Toronto, November 19th, 1908.

In some directions activity can be recorded. Sewer pipes, fire bricks, lime and in small parcels cement, are moving freely. But cement in large quantities is depressed and dull. Bricks continue to move rather more actively than usual at this season; pressed bricks, too, are in request both in Toronto and at outside points. Building paper and roofing felt have been active for weeks, and are now slacking off.

It is possible to chronicle more movement in lumber here since the United States election, and the movement in American lumber in the States is already larger. Local demand is mostly for spruce and hemlock, and the cheaper grades of pine; in the States there is more enquiry for pine, Southern pine is meeting with good sale, but there are signs of overproduction.

Metals exhibit an active movement here in almost all directions. Pig-iron cannot be called active, but is well maintained in price. Copper is higher both here and abroad. Tin active at a slight advance. Zinc stronger and in steady request. Structural steel makers in the States are gradually obtaining more orders, though by no means the rush expected when the election should be over.

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

Antimony.—Price unchanged at 8¾c., with more enquiry.

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

Bar Iron.—$1.95 base, from stock to the wholesale dealer.

Boiler Plates.—¼-inch and heavier, $2.40. No special activity. Boiler heads 25c. per 100 pounds advance on plate.

Boiler Tubes.—Demand limited. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $12.10; 3½-inch, $15.30; 4-inch, $19.45 per 100 feet.

Building Paper.—Plain, 30c per roll; tarred, 40c. per roll. Business no longer brisk, but much fallen off.

Bricks.—Common structural, $9 per thousand, wholesale, and the demand moderately active. Red and buff pressed are worth, delivered, $18; at works, $17.

Cement.—Market still weak; cement can be had in 1,000 barrel lots at $1.70 per barrel, including the bags, which is equal to $1.20 without bags. At this time of year building operations are closing down, demand is therefore naturally limited. The smaller dealers, however, are busy selling small quantities.

Coal Tar.—Season about over, price still $3.50 per barrel.

Copper Ingot.—There is more activity in the States, and better demand here. Prices are higher, at 15 to 15.1-2c.

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

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

Roofing Felt.—Only moderate request. Price $1.80 per 100 pounds.

Fire Bricks.—English and Scotch, $32.50 to $35; American, $28.50 to $35 per 1,000. Demand more active.

Fuses—Electric Blasting.—Double strength, per 100, 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. Bennett's double tape fuse, $6 per 1,000 feet.

Galvanized Sheets—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.05; 12-14-gauge, $3.15; 16, 18, 20, $3.35; 22-24, $3.50; 26, $3.75; 28, $4.20; 20, $4.50; 10¾, $4.50 per 100 pounds. Fleur de Lis—28-gauge, $4.30; 26-gauge, $4.05; 22-24-gauge, $3.50. Queen's Head—28-gauge, $4.50; 26-gauge, $4.25; 22-24-gauge, $3.70. Increased demand of late.

Iron Chain.—¼-inch, $5.75; 5-16-inch, $5.15; ¾-inch, $4.15; 7-16-inch, $3.95; ½-inch, $3.75; 9-16-inch, $3.70; 5⁄8-inch, $3.55; ¾-inch, $3.45; ⅞-inch, $3.40; 1-inch, $3.40.

Iron Pipe.—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch $3.56; 1-inch, $5.11; 1¼-inch, $6.97; 1½-inch, $8.37; 2-inch, $11.16; 2½-inch, $17.82; 3-inch, $23.40; 3½-inch, $29.45; 4-inch, $33.48; 4½-inch, $38, 5-inch, $43.50; 6-inch, $56. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.71; 1-inch, $6.76; 1¼-inch, $9.22; 1½-inch, $11.07; 2-inch, $14.76. Colder weather causes more movement.

Lead.—Active and unchanged at $3.90 to $4.

Lead Wool.—$12 per 100 lbs. f.o.b. factory.

Lime.—In adequate supply and moderate movement. Price for large lots at kilns outside city 22c. per 100 lbs. f.o.b., cars; Toronto retail price 35c. per 100 lbs. f.o.b. car

Lumber.—Dressing pine we quote $32 to $35 per thousand for usual lengths (12, 14, and 16 ft.), and stock sizes of boards, and $38 to $40 for special lengths, common stock boards, as to grade, $24 to $28; Cull stocks, $20; sidings, $17.50. Norway pine is neglected in favor of Southern, which is much stronger in fibre and the price well maintained. Hemlock continues to sell pretty freely, though not in large lots. Spruce flooring is quoted at $25 and plenty moving. The season being practically over for shingles, there is but little movement in them, and prices are weak though unchanged at $3.20 for British Columbia. White pine lath are scarcer, No. 1 especially, we quote $4 for No. 1 and $3.50 for No. 2 firm. A good deal of varied stuff is moving, not so much good pine as cheaper goods, such as hemlock and spruce. But all kinds of Canadian lumber are likely to continue firm, because smaller quantities of logs have been taken out this season.

Nails.—Wire, $2.55 base; cut, $2.70; spikes, $3. There is a fair supply and no especial activity.

Pitch.—An active trade at unaltered prices, at 70c. per 100 pounds.

Pig Iron.—Business is only moderate; pries are decidedly maintained. Clarence quotes at $19.50 for No. 3; Cleveland, $19.50 to $20; in Canadian pig, Hamilton quotes $19.50 to $20.

Plaster of Paris.—Calcined, wholesale, $2; retail, $2.15. Active business.

Putty.— In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.05.

Rope.—Sisal, 9¾c. per lb.; pure Manila, 12½c., Base

Sewer Pipe.—

	4-in.	6-in.	9-in.	10-in.	12-in.	24-in.
Straight pipe per foot	$0.20	$0.30	$0.60	$0.75	$1.00	$3.25
Single junction, 1 or 2 feet long.	.90	1.35	2.70	3.40	4.50	14.63
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	.....

In good demand; price 70 per cent. off list at factory for car-load lots; 60 per cent. off list retail.

Steel Beams and Channels.—Quiet. We quote:—$2.50 to $2.75, according to size and quantity; if cut, $2.75 to $3; 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.

Steel Rails.—80-lb., $35 to $38 per ton. The following are prices per gross ton; Montreal, 12-lb. $45, 16-lb. $44, 25 and 30-lb. $43.

Sheet Steel.—Market steady, with fairly good demand; 10-gauge, $2.50; 12-gauge, $2.55; American Bessemer, 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.

Tool Steel.—Jowett's special pink label, 10½c. Cyclops, 18c.

Tank Plate.—3-16-inch, $2.50.

Tin.—Market very irregular, but active and prices strong at 32 to 33c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.35 per dozen; set up, $22.35. Pan Canadian, navvy, steel tray, steel wheel, per dozen, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each.

Zinc Spelter.—Business fairly active at better prices, $5.25 to $5.50.

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Montreal, November 18th, 1908.

The situation in the United States continues to improve, but this improvement seems, as yet, to be more sentimental than actual. Valley furnaces, however, have higher asking prices and are firm at them, the quotation being on a basis of $15.50 for No. 2 foundry. For delivery first or second quarter of next year, asking prices are higher. Consumption, though larger, is not specially so, though there is much more activity among producers. One of the leading bar mills is now able to operate to full capacity, although independent mills are not so fortunate. Sheets also show an improvement. Steel billets are fairly active, and an order for 25,000 steel axles has just been placed by one of the railways. Philadelphia quotes 25c. more, per ton, on pig-iron, owing to improved trade in finished products. It is hard to say how much of this firmness is due to actual requirements; but there is a feeling that there will shortly be increased consumption.

The Glasgow market is firm. Advices from Germany are not encouraging, and the Belgian outlook has not improved. Cleveland warrants are higher for one month or three months than on spot. East coast producers appear to have plenty of work on hand and are more or less independent at present. Middlesboro reports that the downward movement has been checked, a fair trade having been done during the past few days at rising prices. The improved conditions in America appear to be responsible for the better tone, makers feeling that America is the most sensitive in this matter, the trade revival of some years ago and the subsequent depression having first been felt there. Although the quiet season is now on in England, there is a feeling that after it is past there will be a marked improvement.

The local market shows very little change. Trade is pretty dull at the moment in all lines, but there is a fairly hopeful tone, possibly largely as a reflection of the sentiment in the United States. The metal markets are all firmer, prices of antimony, lead and copper being higher than for some time past. There are very few changes, however, throughout the list. the following being the latest quotations:—

Antimony.—The market is easier, at 9 to 9 1-4c.

Bar Iron and Steel.—Prices are steady all round, and trade is decidedly dull. Bar iron, $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $2.00; sleigh shoe steel, $1.90 for 1 x ⅜-base; tire steel, $1.95 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $2.10.

Boiler Tubes.—The market is steady, quotations being as follows:—2-inch tubes, 8½c.; 2½-inch, 10c.; 3-inch, 11½c.; 3½-inch, 14¾c.; 4-inch, 19c.

Building Paper.—Tar paper, 7, 10, or 16 ounce, $1.60 per 100 pounds; felt paper, $2.40 per 100 pounds; tar sheathing, No. 1, 55c. per roll of 400 square feet; No. 2, 35c.; dry sheathing, No. 1, 45c. per roll of 400 square feet, No. 2, 28c. (See Roofing; also Tar and Pitch).

Cement—Canadian and American.—Canadian cement, $1.65 to $1.75 per barrel, in cotton bags, and $1.90 and $2.05 in wood, weights in both cases 350 pounds. There are four bags of 87½ pounds each, net, to a barrel, and 10 cents must be added to the above prices for each bag. Bags in good condition are purchased at 10 cents each. Where paper bags are wanted instead of cotton, the charge is 2½ cents for each, or 10 cents per barrel weight. American cement, standard brands, f.o.b., mills, $1.85 per 350 pounds; bags extra, 10c. each, and returnable in good condition at 7½c. each.

Cement—English and European.—English cement is steady at $1.70 to $1.90 per barrel in jute sacks of 82½ pounds each, sacks extra, and $2 to $2.20 in wood, per 350 pounds, gross. Belgian cement is quoted at $1.60 to $1.75 per barrel in bags, bags extra, and $1.75 to $1.85 per barrel, in wood.

Chain.—The market is steady as follows:—¼-inch, $5.30; 5-16-inch, $4.05; ⅜-inch, $3.65; 7-16-inch, $3.45; ½-inch, $3.20; 9-16-inch, $3.15; ⅝-inch, $3.05; ¾-inch, $3; ⅞-inch, $2.95; 1 inch, $2.95.

Copper.—The market is firmer at 15 to 15 1-2c. per pound. Demand continues limited.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 18c. 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, $3.50; 6-ft. wires, $4; 8-ft. wires, $4.50; 10-ft. wires, $5. Double strength fuses, 1$ extra, per 100 fuses. Fuses, time, double-tape, $6 per 1,000 feet.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.40; Comet, $4.25; Gorbal's Best, $4.25; Apollo, 10¾ oz., $4.35. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge. American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge.

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

Iron.—Canadian pig iron is offered at $18 for best, down to $17 for lower grades, while imported iron in car lots, on cars, on dock, Montreal, is as follows, for larger lots lower prices would be taken: No. 1 Summerlee, $20.25 to $20.75 per ton; No. 2 selected Summerlee, $19.75 to $20.25; Cleveland, $18.50; and No. 3 Clarence, $18; Carron, special, $20.25 to $20.75; Carron, soft, $19.25 to $19.75.

Laths.—See Lumber, etc.

Lead.—Trail lead is strong and prices are higher, at $3.70 to $3.80 per 100 pounds, ex-store.

Lead Wool—$12 per ton. f.o.b. factory.

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

Nails.—Demand for nails is moderate, but prices are steady at $2.30 per keg for cut, and $2.25 for wire, base prices

Pipe—Cast Iron—The market is strengthening and dealers look for higher prices shortly. Meantime former quotations hold: $33 for 8-inch pipe and larger; $34 for 6-inch pipe; $34 for 5-inch, and $34 for 4-inch at the foundry. Pipe, specials, $3.10 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—The market is quiet and steady at last week's range: 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. The discount on the following is 69 per cent. off for black and 59 per cent. off for galvanized; ½-inch, $8.50; 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

Railway Ties.—See lumber, etc.