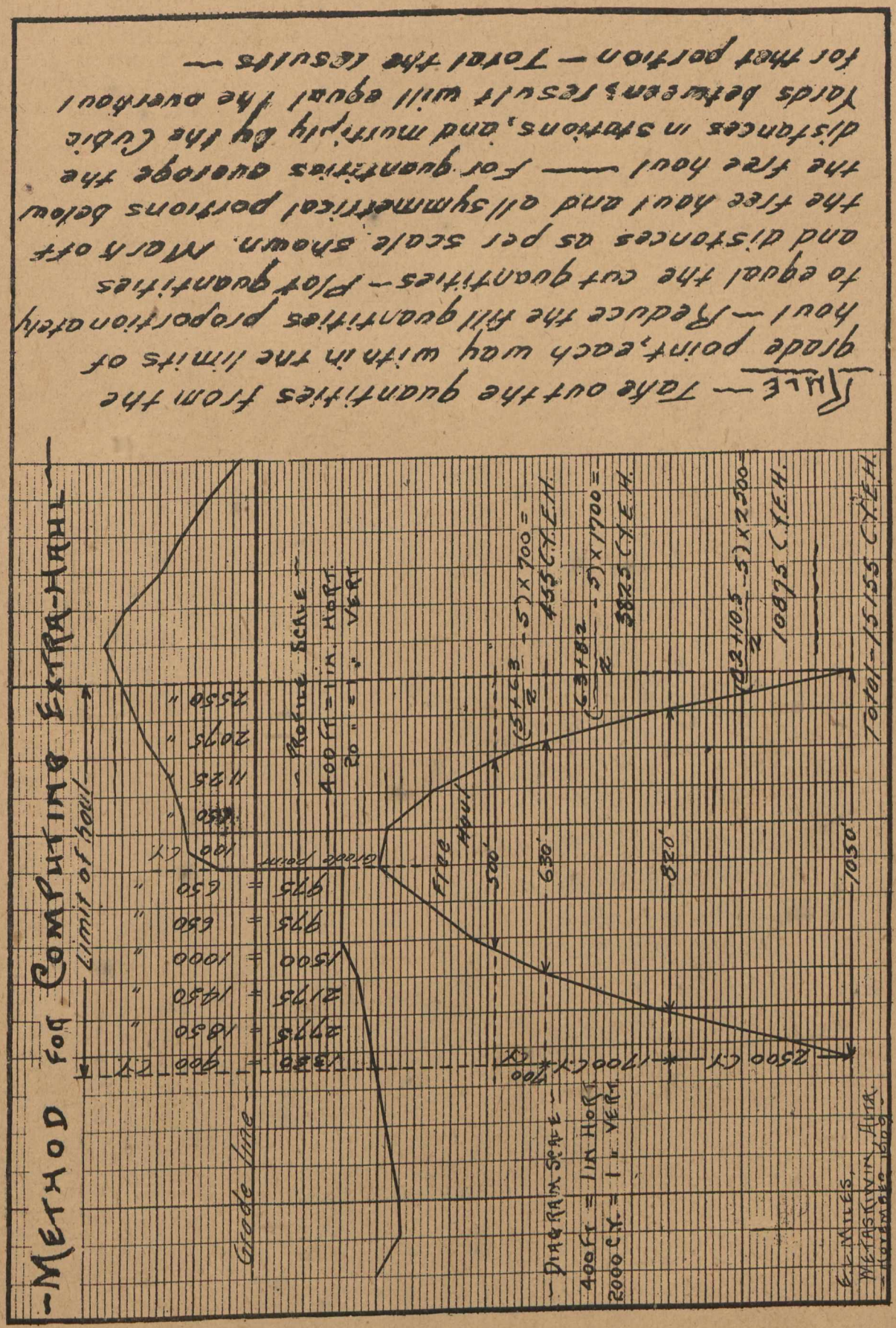
PAGES

MISSING



Supplement to The Canadian Engineer, December 3, 1909.

A SIMPLE AND ACCURATE METHOD OF CALCULATING OVERHAUL BY THE AID OF PROFILE PAPER AND DIAGRAMS.

The Canadian Engineer

WEEKLY

ESTABLISHED 1893

VOL. 17. TORONTO, CANADA, DECEMBER 3rd, 1909. No. 22

The Canadian Engineer

ESTABLISHED 1893.

Issued Weekly in the interests of the

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

Editor—E. A. JAMES, B.A. Sc.

Business Manager—JAMES J. SALMOND

Present Terms of Subscription, payable in advance:

Canada and Great Britain:		United States and other Countries:	
One Year	$3.00	One Year	$3.50
Six Months	1.75	Six Months	2.00
Three Months	1.00	Three Months	1.25

Copies Antedating This Issue by Two Months or More, 25 Cents.

ADVERTISEMENT RATES ON APPLICATION.

HEAD OFFICE: 62 Church Street, and Court Street, Toronto
TELEPHONE, Main 7404 and 7405, branch exchange connecting all departments

Montreal Office: B33, Board Trade Building. T. C. Allum, Editorial Representative, Phone M 1001.

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

London Office: 225 Outer Temple, Strand, T. R. Clougher Business and Editorial Representative, Telephone 527 Central

Address all communications to the Company and not to individuals.

Everything affecting the editorial department should be directed to the Editor.

NOTICE TO ADVERTISERS

Changes of advertisement copy should reach the Head Office by 10 a. m. Monday preceding the date of publication, except the first issue of the month for which changes of copy should be received at least two weeks prior to publication date.

PRINTED AT THE OFFICE OF THE MONETARY TIMES PRINTING CO., LIMITED, TORONTO, CANADA.

TORONTO, CANADA, DECEMBER 3, 1909.

CONTENTS OF THIS ISSUE.

PARLIAMENT AND THE CEMENT MERGER.

Of the many recent mergers, the Canada Cement Company appears to be attracting the greatest attention. The product of the cement plant has come into such general use that all classes are interested in the quality, quantity and price of its output, and when anything is done that has the appearance of affecting the output or its price there is a general interest expressed. Just now that interest is taking the shape of appeals to Parliament.

These appeals are worth considering. It will be noticed that it is not complained that the quality of Canadian cement will be injuriously affected; in fact, it may be expected that consolidation will improve the output, as all mills will have the opportunity of availing themselves of the best practices of the best mills in the syndicate.

Nor do they suggest that the output will be diminished. It is first and last with those now opposing the new order of things a question of price.

Few mills in Canada have produced cement at much less than seventy cents per barrel. In most mills the cost has been above that. Seventy cents to manufacture, twenty-five cents for management, another twenty cents for the middleman, and, say, twenty-five more for freight rates, and this will give cement to the consumer at one dollar and forty cents per barrel. Not an excessive price.

For the last year prices of cement have been below that figure—thirty and forty per cent. below, but it was well known that in some cases it was being sold below cost. Should such an uncertain market price continue, one of two things must result—mills close down or an inferior brand of cement turned out. Either would demoralize construction work. Neither will now occur—the merger will guarantee a good cement, the consolidation will mean a uniform price, a price at which cement can be well made; for it is just as necessary that the manufacturer be protected by a fair price for his product as for the workman to be protected by a fair wage clause in contracts.

The price of cement is not likely to advance very much. Cement was imported into Canada during the 1909 season when prices were low and uncertain, and if it came in when prices were low the American producer will not allow prices to go very high before he will come after Canadian business so strong that prices will remain around the dollar thirty mark.

CURRENTS IN LAKE ONTARIO.

We publish in this issue a very interesting paper by Mr. F. Walter Thorold, B.A.Sc., on "Lake Currents Near Toronto." This question has been long discussed, and has been the subject of much theorizing. It is refreshing to receive some definite information.

As a local problem it is a matter of considerable interest, but the method of dealing with the question, the making and placing of floats, the system of recording position of floats, and the general deductions are of interest to those having similar conditions to investigate.

THE ENGINEER A GOOD GUESSER.

The number of disasters, failures and law suits that have grown out of the phrase, "I guess," are legion, and yet the engineer must be a good guesser, must train the faculty of guessing, and frequently use it.

There are times when the public demand too much from the engineer in the way of a guess. Sometimes they expect him to view the location and then give an estimate. Clients write an incomplete letter, believing they can get an estimate by return mail. All this may be very absurd, yet the engineer requires to be a good guesser.

He may prepare his plans, his detail drawings, write specifications in detail, and complete his bills of material. For his estimate he must guess.

Sometimes the guess is a good one. Recently in a large public work the estimate was $450,000. The contract price was $442,750—a pretty good guess. We also know of work where the estimate was $150,000 and the contract price about $46,000. The guess was not so good. On a $50,000 bridge the tenders ranged from 20 per cent. below to 20 per cent. above the estimate. All this goes to show that the engineer requires to be a good estimator, but that at best he is frequently only a guesser—sometimes good, sometimes not so good.

It is not enough that the engineer be skilled in design and specification writing. He must be able to estimate with a reasonable degree of accuracy, and to do this he must study the contractor's methods and view the work from his point of view. He may take the average of a dozen similar works, and yet fail to consider the one item that may put this particular work in a class by itself. Erratic estimating makes it difficult for the contractor and difficult for the engineer. In view of this, we would say to the engineer: "Train yourself to be a good estimator, a good guesser."

Among the innumerable subjects, from steel under stress to the extermination of mosquitoes, with which the engineer is supposed to be familiar, dependable guesswork should not be neglected.

EDITORIAL NOTES.

The twenty-fourth annual meeting of the Canadian Society of Civil Engineers will be held at Ottawa, Ont., on Wednesday, Thursday and Friday, January 27th, 28th and 29th, 1910. We hope to be able to say more about the details of this meeting in the near future.

* * * *

Christmas time has many special calls. The columns of this journal are devoted exclusively to engineering problems, but once a year we remind you of the suffering little ones in the Hospital for Sick Children, Toronto. Mr. J. Ross Robertson, chairman of the Executive, will be very glad if you will co-operate with the hospital authorities to help in making life brighter and easier to bear for the thousand and more unfortunate little ones who come to them for help and healing.

* * * *

The question of scientific forestry is again receiving much attention in Canada. Two of the largest Canadian Provinces are actively enquiring into the forestry problem and its solution. British Columbia have a commission of three, who are engaged in gathering information as to administration and conservation of forest wealth, and Quebec expects that at the coming meeting of the Legislature provision will be made for a School of Forestry in that Province.

COMING MEETINGS.

American Society of Refrigerating Engineers.—December 6. Annual meeting in New York City. Secretary, Wm. H. Ross, 154 Nassau Street, New York City.

Montana Society of Engineers.—January 6-8. Annual meeting at Butte, Mont. Secretary, Clinton, H. Moore, Butte.

American Institute of Chemical Engineers.—December 8-10. Annual meeting at Philadelphia, Pa. Secretary, J. C. Olsen, Polytechnic Institute, Brooklyn, N.Y.

American Association for the Advancement of Science.—December 27. Annual meeting at Boston, Mass. Secretary, L. O. Howard, Smithsonian Institution, Washington, D.C.

American Society of Agricultural Engineers.—December 28-29. Annual meeting at Ames, Iowa. Secretary, L. W. Chase, University of Nebraska, Lincoln, Neb.

Association of American Portland Cement Manufacturers.—December 14-15. Annual meeting at New York City. Secretary, Percy H. Wilson, Land Title Building, Philadelphia, Pa.

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

IS PURIFICATION OF WATER BY STERILIZATION A DREAM?

Mr. Allen Hazen, of New York, the other week at a meeting of the Canadian Society of Civil Engineers at Toronto, in answer to a question referring to ozonization of water, made answer that, to his mind, the question of sterilizing water was a dream.

He admitted that he had no experience with ozone treatment in practice, although he was conversant with a few experiments.

He stated that a "man" called at his office lately in connection with some work he had in hand for a client and offered to purify water by ozone, giving almost any kind of guarantee. Being curious as to the exact kind of guarantee, he asked for a definition, and was informed that the guarantee consisted of "killing all the pathogenic germs in the water." Mr. Hazen, believing that there were no pathogenic germs in the water, refused the guarantee.

If ozonization of water or sterilization meant dealing with a water whose only impurity lay in the presence of pathogenic germs, one could understand the value of any such guarantee. But, as a matter of fact, purification of water generally means the removal of many things from the water which are not germs, and which are possibly sterile to commence with.

At the time when the above statement was made by Mr. Hazen, Dr. Sheard, Medical Health Officer of Toronto, stated that he had now been examining Lake Ontario water for many years, and had never yet succeeded in discovering any pathogenic germs in the water.

Now it occurs to us that if we have men who are willing to offer guarantees of the above nature, it will be as well to have a definition of pathogenic germs. Turning to Gilbert E. Brooke's "Essentials of Sanitary Science," we note a definition on page 186: "Bacteria which cause disease in the higher animals or man are dubbed "pathogenic." The pathogenic germ which is most feared in our water or wilk supply is certainly the "typhoid bacillus"; and this bacillus is seldom, and one may say, never found in water, no matter how intense the examination may be.

Rickards in the "Quarterly Bulletin, Ohio State Board of Health" for July-September, this year, states:—

"During the last few months, when typhoid has been very prevalent, especially in the rural districts, the hygienic laboratories have been called upon to make more examinations of private water supplies than ever before. Perhaps a third or more of the requests for examinations of water from private sources because of typhoid in the family or neighborhood have been, not requests for sanitary water analyses, but for an examination for the typhoid bacillus itself. As all bacteriologists are unanimously of the opinion that such examinations are useless, we have invariably refused to make them, and have instead, where the circumstances warranted it, made chemical and bacteriological examinations. The former tests show the amount of organic matter present; the latter show us the total number of bacteria of all kinds, and a further test is made for the presence of bacillus coli, a normal inhabitant of the intestines of man and animals. This organism, which is always found in countless numbers in all human and animal feces, is almost invariably confounded by the newspapers with the typhoid bacillus, and this may account for the widespread impression that we examine for the latter."

If, then, it is next to useless to examine water for pathogenic germs, we must agree with Mr. Hazen that the guarantee offered was of little value.

Is ozonization a dream? Well, if it is, we must confess that there are a lot of very eminent scientific men in the world at present walking in their sleep. Whether it be possible or not to discover pathogenic germs in water, we know that there are occasions when they are present, and we know that there are waters which are so contaminated with sewage that the risk of their presence is constant. The bacillus coli may only be an index to sewage contamination, but we know that the typhoid infection is carried by sewage, and that water is infected thereby. We know that filtration, if properly worked, will remove 99 per cent. of the bacteria in the raw water, and we, therefore, know that for every hundred bacteria in the raw water, we may be left with one. Therefore, we know that water containing 500,000 bacteria per c.c., as some waters do, when filtered will still contain 5,000 bacteria per c.c.

Now, in some places this is the only possible water that people can get to drink, water which contains 50 times more bacteria than is allowed for by the German standard of purity. What are these people to do?

It is all very well to say that sterilization is a dream. But is it? If it can be shown that with waters such as above a further reduction after filtration of another 99 per cent. can be made, leaving 50 bacteria per c.c., then sterilization will prove a most useful adjunct to filtration, more especially for such waters which are known to be sewage contaminated, and contain an abnormal high bacterial count to begin with.

The fact that large sums of money are being spent in Europe in adding sterilizing plants to the present filtration systems proves that the problem has become more real than any dream, and it cannot be dismissed from the question of water purification by any such offhand statement.

CHEMISTRY AND SEWAGE PURIFICATION.

In this issue we publish a paper read before the British Society of Engineers upon the above subject. Dr. Sommerville, the author, is lecturer in King's College, and is an authority upon whom we may depend for any chemical explanations of the various processes which sewage undergoes in its transformation from the organic to the inorganic.

It is interesting to note that his conclusions are in general agreement with those of the German chemists. He holds and agrees with Dr. Dunbar, of Hamburg, that the fermentation processes which occur in sewage are mainly due to enzymes. Some of Dr. Sommerville's practical conclusions will be read with interest by engineers, especially those dealing with so-called anaerobic action or septic treatment. He considers that "aerobic action has the best of it all the way round." "It was possible to construct a septic tank installation on a small scale where all might go well for a number of years, but large installations without exception failed."

We cannot agree with the author's remark, that "sewage purification was from first to last a matter of biological chemistry committed to the **tender mercies of the engineer.**" After all, the engineer has been the pioneer in this particular work, and although his attempts may have rested upon empirical bases, the bacteriologist has simply come along and explained and defined results. Sewage disposal and especially the question of removal of solids is largely a question of mechanics and hydraulics. The flow of liquid, its distribution by sprinklers or other mechanical methods ae entirely engineering questions. We are content that the chemist and bacteriologist take their part in the problem, and are sure that much is to be learned by the engineer from their collaboration; but, we are not content that the chemist shall claim that the whole question is entirely one of chemistry.

CHEMISTRY AND BACTERIOLOGY OF SEWAGE PURIFICATION.

At a meeting of the Society of Engineers held on Friday at Caxton Hall, Dr. David Sommerville, of King's College, lectured on the above subject.

Dr. Sommerville prefaced his paper by saying that in no field of applied science is the need of research more pressing than in that of the purification of sewage. Sewage purification was from first to last a matter of biological chemistry committed to the tender mercies of the engineer. In this work chemistry and bacteriology could not be separated. The intention of the paper was to refer engineers to some fundamental principles connected with the purification of sewage. The author showed that bacterial action was effected through enzymes. The cell consists of colloids and crystalloids in common solution in water, and all cellular reactions are reactions in solution, and based on laws governing their velocities and the conditions of equilibrium. The living cell was an energy transformer, and in all its activities conforms to the requirements of the doctrines of the conservation of matter and of energy.

Enzymes were catalysts, and under their influence it could be shown that for a single substance α undergoing conversion into two substances β and γ, the common type of action of enzymes,

$$\frac{dx}{dt} = k_1 (\alpha - x) - k_2 (\beta + x) (\gamma + x)$$

where α is the molecular concentration of the single substance, β and γ molecular concentrations of the two into which it is converted, and x the change in concentration in time t. Enzymes, unlike inorganic catalysts, were rendered inactive by rise of temperature. Enzymes were colloids, and as such subject to the laws governing the phenomena known as "absorption." Enzymes were capable of reversible action, and consequently effected syntheses as well as dissociations. Sewage was composed of a watery mixture of proteins, carbo hydrates, fats, and various inorganic matters. The organic matters existed in solution and in particulate form. Colloidal solutions were constantly encountered. Sewage was charged with bacteria and enzymes and when of domestic type contained, in addition to air, water, and soil organisms, dominant types indigenous to the human intestine.

Where population was sparse the disposal of human excreta was a matter of little difficulty, for the soil received them and dealt with them effectively. In point of efficiency, no artificial method could compare with this natural one, and all that was required was to commit the materials to earth at a safe distance from the dwelling and from watercourses. Sewage carried the organisms and enzymes of its own putrefaction. The chemical reactions of the putrefactive stage were closely analogous to those which effected the digestion of food-stuffs in animals. Protein dissociation occurred in two secondary—amino acids. Dr. Sommerville referred to the constitutional structure of a few of the more commonly occurring amino acids, and said the hydrolysis of carbohydrates and fats was simple when compared with that of proteins. Most species of bacteria in sewage and soil were capable of forming ammonia from organic matter. Free nitrogen was liberated by some sewage bacteria and atmospheric nitrogen fixed by others. Certain bacteria reduced nitrates to nitrites and ammonia; others reduced nitrates and nitrites to NO and N_2O. Where unlimited oxygen was supplied nitrification predominated, but where oxygen was limited denitrification appeared. In certain cases it might be advantageous to transform as much as possible of the nitrates and ammonia into free nitrogen. The presence of humus in soil added to its nitrifying power, and beds performing nitrification poorly might have their activity increased by the addition of humus from other beds working normally. Experiments carried out at Kingston-on-Thames in 1907 of seeding nitrifying beds doing poor work with humus from other beds working normally, showed that the purification was in all cases increased. From these results it would appear that there are conditions in which increased nitrification went hard with land with increased ammonia formation, and one must be careful not to dogmatize or draw a priori conclusions as to what might or might not take place in the as yet unknown complexities of the sewage bed. Inasmuch as it required weeks or months to transform dead proteins in the soil into nitric acid it was useless to conclude that in a filter bed of whatever type wherein the opportunities of nitrification were often no better than, if as good as, that in the soil, masses of particulate nitrogenous matter were dissociated and completely oxidised in a few hours. In the nature of things this could not be. It was true that the effluent for such a bed was in physical characters very different from the sewage that entered the bed, but it was not true even in the case of the most efficient bed that the matters with which the effluent had parted had been fully or even partially oxidised. It was possible in five minutes to transform the foulest sewage into a passable effluent by two or three filtrations through animal charcoal, but the charcoal at the end of a month would still contain undissociated proteins, which at the end of the second month would not have reached the stage of nitrification. In phasic enzymic action, where it was desired to maintain activity continuously, it was import-

ant that the products of the end reactions be removed as rapidly as they were formed. Otherwise the equilibrium point must sooner or later be reached, and the date at which it was reached would depend mainly on the rate of their removal. This was the rock on which all artificial filters split—some sooner, some later. In anaërobic tanks certain foul-smelling gases were needlessly set free. In the presence of oxygen entirely different types of cleavage products were formed whose sulphur was ultimately oxidised in the most unobjectionable manner. There was no necessity to use noxious methods of protein cleavage when innocuous methods were at hand, and he considered that the aërobic method of treating sewage had the best of it all the way round. It was possible to construct a septic tank installation on a small scale where all might go well for a number of years, but large installations without exception failed. The time for these to reach the equilibrium point was only a detail. Proceeding to discuss the question of what was a safe sewage effluent and how it was to be produced, Dr. Sommerville said the Royal Commission had been considering those questions for eleven years and he might be pardoned if, like those gentlemen, he hesitated to make a categorical reply. No standard would ever be possible if all cases of each effluent must be produced with direct reference to the conditions of its district. Into streams from which drinking water was drawn no effluent which contained bacteria capable of producing disease should be allowed to enter. In the light of present knowledge it would seem that biological chemistry now afforded sufficient machinery in the form of methods to carry many problems of sewage purification several steps nearer solution, such as the determination of (1) the action on bacteria of intermediate and late products of dissociation of proteins, (2) the origin and methods of isolation of those enzymes which most rapidly and completely disintegrate proteins, carbohydrates, and fats, (3) the amount of absorption effected by different types of filtering material encountering different types of sewage, (4) the concentration of the substrata in the filtering medium which admits of the greatest enzymic change, (5) the influence of temperature on the dissociation and nitrifying processes (6) the duration in point of time of both sets of processes and of their individual phases, and (7) the. exact chemical and physical conditions which sustain the life and produce the death of the pathogenic bacteria of sewage and of sewage effluents. Here was work for another Sewage Commission.

THE PURIFICATION OF SEWAGE.*

Interesting Results have been obtained at the Sanitary Research Laboratory in Co-operation with the United States Geological Survey.

The problem of purifying sewage so that it no longer transforms the rivers into which it is discharged into open sewers has been so far solved that these streams need no longer be disgusting to the senses and dangerous to the health of people living along them. The task of destroying the disease-breeding bacteria in the sewage and once more making the rivers available for drinking water has not yet been worked out on a practical basis, but investigations recently made by the United States Geological Survey in co-operation with the Sanitary Research Laboratory of the Massachusetts Institute of Technology and local authorities at Boston, at Baltimore, and at Red Bank, N.J., show that this end, too, may be attained at a reasonable cost.

A recent bulletin of the United States Geological Survey says that the essential agents of sewage purification are provided and employed by nature, and sewage purification as practised to-day is but the intensive application of these natural processes. The improvements that have been made have not involved the discovery or application of new principles, but have merely increased the working efficiency of the natural agencies. From the old-time sewage irrigation field, with its maximum capacity of possibly 10,000 gallons an acre in twenty-four hours, to the present-day trickling filter capable of dealing with 2,000,000 or 3,000,000 gallons an acre a day, improvement has been steady.

The old-time methods, however, really destroyed the polluting substances, while the modern sewage filter does not. The liquid flowing from these filters looks to the untrained eye like the original sewage. There is almost as much organic matter in it as in the raw sewage, and sometimes more. Its nature, however, has been changed; the organic matter, though not burned up, has been charred or partly oxidized, and this charring has been sufficient to rob it of its foulness. In other words, its chemical composition has been so altered that it can no longer undergo rapid putrefaction and cause a nuisance.

The water, however, still needs filtration to make it fit to drink. Moreover, it may, and in many cases does, contaminate oyster beds, thus spreading disease and tending to ruin a great industry.

It has not yet been decided upon whom the responsibility rests for keeping the rivers clean, but the consensus of competent opinion requires that, if sewage is discharged within the region of important shellfish beds or into a stream which is used as a source of domestic water supply without filtration, such sewage shall at least be free from disease-breeding germs.

The Geological Survey experiments, which are set forth by Earle B. Phelps ('99), in Water-supply Paper 229, just issued, show that the application of a small amount of available chlorine in the form of bleaching powder to the customary "purified" sewage effects satisfactory disinfection. The removal of bacteria by this means averages over 95 per cent., making the removal for the whole purification process 98 to 99 per cent. of the number in the crude sewage. The cost of disinfection ranges from $1 to $1.50 per million gallons of sewage, depending chiefly on the size of the plant. Five parts per million of chlorine probably represents the maximum amount required for the treatment of trickling-filter effluents of poorer quality. The results obtained with the amounts of disinfectant specified do not, of course, amount to complete sterilization, but they may reasonably be called "practical disinfection." Considerable additional cost is required to improve them but slightly.

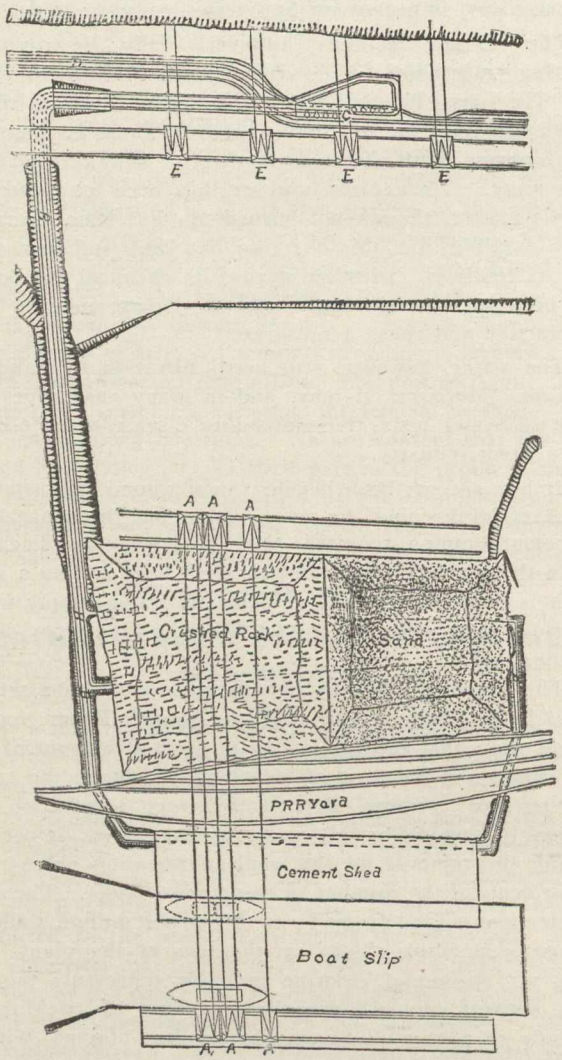
*From the Technology Review.

THE LAST STAGE IN THE CONSTRUCTION OF THE PANAMA CANAL.

The building of the Panama Canal is now in its fourth and final stage. The first stage was the sanitation of the canal zone; the second, the re-building of the Panama Railroad so as to supply facilities for transporting the spoil from the excavations to the dumps; the third, the excavation of the canal, the fourth, and last stage, the building of the Gatun dam and locks, and the locks at Miraflores and San Miguel. On August 1st of this year, the excavation (182,000-

000 cubic yards, of which 40,000,000 cubic yards available had been done by the French) had advanced to a point where only 101,000,000 cubic yards remained to be done, which, as officially stated by Col. Goethals, can be finished by August 1st, 1911. The remaining excavation is proceeding at the rate of about 3,000,000 cubic yards per month.

Keeping pace with the speed of excavation are the construction operations in connection with the Gatun dam and locks. A most important part of the mechanical equipment are the 13 Lidgerwood high speed cableways which were especially designed and installed for building the Gatun locks. Upon 5 of these, known as the unloader cableways,



Plan of the cableways showing their relationship to the branch of the old French Canal where the barges arrive, the cement shed, the storage yard, and the automatic railways.

will fall the brunt of the work, and upon the ability of these 5 to handle the amount guaranteed, or more, must depend the question of whether the canal will be finished and in operation on January 1st, 1915, or earlier. These cableways have exceeded their guaranteed capacity by such a large percentage that the engineers in charge of this section of the work are confident that it can be finished at a much earlier date. They are recognized unofficially by Col. Goethals as "that 1913 crowd."

The work of these 5 cableways is to handle the broken stone and sand which will be required for the walls and floors of the locks. There are 6 locks, each 1,000 feet long in the clear of 110 feet wide. They lie side by side in flights of three, making a total length of more than 3,000 feet. Together they provide a total lift of 85 feet with some to spare for changes in the initial water level. In these locks there will be used 2,000,000 cubic yards of broken stone, 1,000,000 cubic yards of sand, and 2,200,000 barrels of cement. The stone and sand arrive in barges on a branch of the old French Canal. The unloader cableway takes it out of the barges with great grab buckets and delivers it 600 feet or more away in heaps in the storage yard. From here it is taken by the cars of an automatically operated electric railway to the mixers and from the mixers the concrete is taken in other electric cars to where the second set of 8 cableways can put it in place in the forms for the walls and floor. Four cableways arranged in pairs on two sets of towers, handle the broken stone and a single cableway with independent towers unloads the sand from the barges and deposits it on a storage pile. Each cableway has a span of 800 feet. In the duplex cableways the cables are 18 feet apart. This corresponds with the distance apart of the transverse bulkheads in the barges. The cableways are all mounted on steel towers 85 feet high. The towers are mounted on trucks and travel on tracks, so that each cableway performs the function of a travelling crane. The unloader cableways travel the length of the storage yard. Those for building the locks travel more than 3,000 feet. They are all moved electrically, each pair in unison. From the carriage of each of the 5 unloader cableways there is suspended an improved special 70 cubic foot iron-ore type of excavating bucket. Each bucket grabs an average load of 54 cubic feet. The load is hoisted 85 feet, conveyed about 600 feet, dumped on the storage pile, and the carriage and bucket returned. This round trip has been made in 1 minute and 8 seconds. The cableways were guaranteed to handle 50 cubic yards an hour each. They have carried 90 cubic yards in an hour and the average operation up-to-date is 60 cubic yards per hour. This ought to be materially increased with practice. The present record is declared to be double that of any cableway previously employed anywhere.

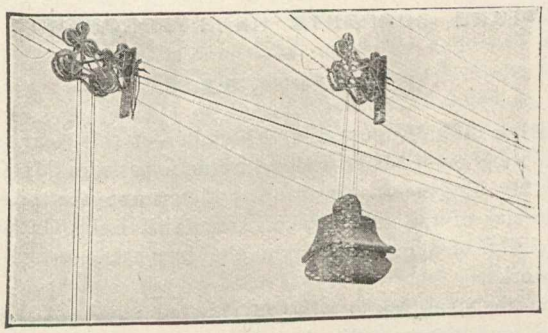
The high speed and consequent increase in the capacity of the cableways is due to the ease with which the operation of the cableways is controlled; the rope-lead that simultaneously raises and traverses the bucket; the high-speed shock-absorber with which the fall-rope carrier is equipped, and a new type of button-stop.

The hoisting and conveying machinery in the head tower is controlled by an operator in the tall tower stationed on an elevated platform commanding a clear view of the bucket at all times and in all positions. He controls two 150-h.p. motors by master controllers of the New York Subway type, and the air brakes by two levers operating magnet valves 800 feet away. The physical effort of operation is so easy that the operator can comfortably maintain the high speed. In all previous cableways this effort was so fatiguing that, although it was possible to attain a speed of 35 round trips per hour with mechanical levers, this could not be sustained for any length of time.

The rope-lead which simultaneously hoists and traverses the bucket causes the latter to move in a curved line corresponding somewhat to the hypothenuse of a triangle, instead of moving on the vertical and horizontal sides. Considerable increase of speed and diminution of travel is thereby effected. The high-speed shock-absorber with which the fall rope carrier is equipped is the invention of Spencer Miller. It permits the carriage to travel at the unusual speed of 2,500 feet per minute, more than double the speed of any previous

cableway. The button-stop employed has been successfully tested experimentally with a fall-rope carrier running at the speed of 3,000 feet per minute.

On account of the ease of operation of these cableways, considerable difficulty has been experienced in restraining the operators from racing with each other. The cableways have frequently been operated at a speed of 3,000 feet per minute, which, being at present too severe for the fall-rope carriers, is now limited to 2,500 feet per minute. Some of the

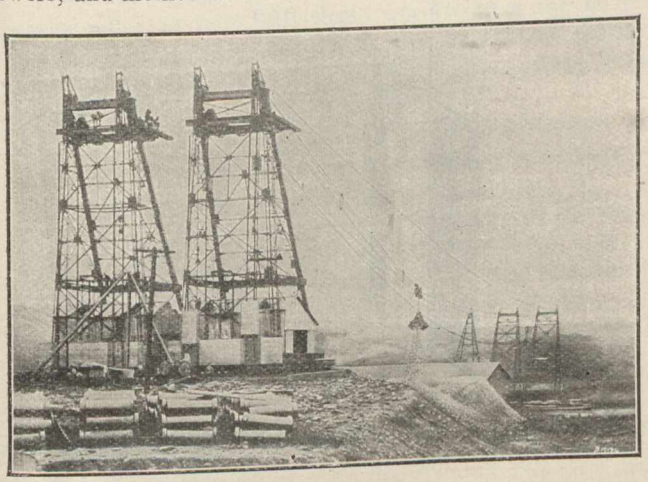


Another view of the carriage and buckets, showing also the fall-rope carriers.

small pieces forming the heads of the fall-rope carriers are being replaced with heavier pieces which, it is believed, will admit of even the higher speed.

Another feature of these cableways which is new is that the bucket is counter-balanced like a passage elevator. Thus only the net load has to be hoisted and only enough power is required to do this and overcome friction and inertia.

The eight cableways used for putting the materials in place in the lock walls are similar in span, height, style of towers, and method of control to those for unloading the ma-



The five high-speed Lidgerwood cableways which are handling, from barges to the storage heaps, the 2,000,000 cu. yards of broken stone and 1,000,000 cu. yards of sand required to build the Gatun locks.

terials, but they will never be called upon for such rapid work. While they will handle the entire amount of concrete, and besides this, the wooden forms and the many tons of old rails which are to be put into the concrete for reinforcement, there are eight of them as against five of the others, and each will have much less to do. This is necessary as the placing of the concrete requires care and deliberation. The immense quantity of concrete material for the Gatun locks will perhaps be better appreciated if one remembers that handled separately it amounts to more than 3,300,000 cubic yards.

SOCIETY NOTES.

Canadian Society of Civil Engineers, Toronto Branch.—The Toronto members of the Canadian Society of Civil Engineers held their regular monthly meeting on Thursday, November 25th, at the Engineers' Club rooms. Thirty-five members were present, and Mr. C. R. Young, B.A.Sc., introduced a lengthy discussion on "Impact Stresses," a paper by Professor E. A. Stone, Dean of Engineering in the University of New Brunswick at Fredericton. Included in those contributing were Dr. Galbraith, J. G. G. Kerry, F. L. Somerville, Peter Gillespie, Frank Barber, and E. H. Darling, assistant engineer of the Hamilton Bridge Works, whose contribution was read by Mr. Gillespie. Following the discussion, Mr. A. C. D. Blanchard, assistant city engineer, Toronto, presented some interesting views of progress work on the construction of the high level intercepting sewer now being built in Toronto. Mr. J. G. G. Kerry, C.E., presided.

McGill Applied Science Undergraduates.—The regular November meeting of the McGill Applied Science Undergraduates Society was held on November 24th, when a most interesting and profitable address was delivered by Mr. M. J. Butler, Deputy Minister of Railways and Canals, who chose as his topic "The Training of an Engineer and the Outlook for an Engineer in the Development of his Country." Mr. Butler emphasized the importance to the student of knowing the elementary mathematical subjects such as arithmetic, geometry, algebra, and trigonometry, and advised them to master principles, not details. In discussing the outlook for an engineer the speaker referred to the possibilities of the Hudson's Bay Railway. The surveys, he said, had been completed, and showed that a splendid line of railway could be secured from The Pas to the Hudson's Bay with a good, low gradient. The line would not be an expensive one to build. In connection with water transportation, Mr. Butler dwelt at some length on the Georgian Bay Canal, and pointed out the difficulties which he thought would be encountered by ocean boats in going through the canal. Dean Adams and other members of the teaching staff, who were present, briefly expressed their appreciation of Mr. Butler's address.

Union of Manitoba Municipalities.—The sixth annual convention of the above society was held on Tuesday, Wednesday and Thursday, November 23rd, 24th and 25th at Portage la Prairie. Mr. J. C. Menlove, of Virden, presided, and nearly 200 delegates were present. Resolutions were passed and papers read, including two on Waterworks and Sewage Disposal Systems, by Dr. A. J. Douglas, of Winnipeg, and Mayor Harvey, of Dauphin. Mr. C. H. Dancer read an instructive paper on "Good Roads." The Good Roads Association of Manitoba recommended the appointment of a Government Highway Commissioner. The election of officers resulted as follows: President, Sec.-Treas. Menlove of Virden (re-elected); vice-president, Reeve Forke of Pipestone; sec.-treas., Coun. Cardale of Blanchard; executive committee, Reeve Thomson of Assiniboia; Mayor Harvey of Dauphin; Reeve Allan of Odonah; Reeve Willis, Morton; Reeve Poole of Archie; Coun. Thomson of Portage; Cont. Waugh of Winnipeg; solicitor, Mayor Adolph of Brandon.

American Society Engineering Contractors. — The first monthly meeting of the above society will be held in the United Engineering Society Building, 25 West 39th Street, New York City, on Wednesday, December 14, 1909, at 8.30 p.m. A paper by Halbert P. Gillette, entitled "The Science of Management Engineering," will be read and discussed.

RAILWAY ORDERS.

(Continued from Page 623)

8657—November 16th—Granting leave to the East Middlesex Telephone Company, Limited, to erect, place, and maintain its wires across the track of the Grand Trunk Railway on the 6th Concession, Township of Missouri, County of St. Mary's, on its London and St. Mary's branch.

8658 to 8660 Inc.—November 16th—Granting leave to the Bell Telephone to erect, place, and maintain its wires across the track of the Grand Trunk Railway at P. C., ½ mile south of Port Robinson Station, Ontario, at P. C. Waterloo Street, New Hamburg, Ontario, and the C. N. Q. Railway, at a point three miles south of Joliette, P. Q.

8661—November 16th—Granting leave to the Bell Telephone Company to erect, place, and maintain its wires across the track of the C. N. Q. Railway, at a point two miles south of Joliette, P. Q.

8662—November 16th—Authorizing the Canadian Pacific Railway to construct, maintain, and operate industrial spur for the Imperial Oil Company, at Red Deer, Alberta.

8663—November 16th—Granting leave to the C. N. Q. Railway to construct its lines and tracks across the public road on Lot 134, Parish of Cap Rouge, east of Cap Rouge River, County of Quebec, mileage 12.08 west from Quebec bridge.

8664—November 16th—Granting leave to the C. N. Q. Railway to construct its lines and tracks across the public road at Cap Rouge Station, on Lot 46, Parish of Cap Rouge, County, Quebec, P. Q., mileage 12.77 west from Quebec bridge.

8665—November 16th—Granting leave to the Board of Light and Heat Commissioners of the city of Guelph, Ont., to erect, place, and maintain electric wires across the track of the Grand Trunk Railway, at Norwich Street, Guelph, Ontario.

8666—November 16th—Authorizing the Canadian Pacific Railway to construct, maintain, and operate an extension of industrial spur at present constructed to the Brandon Brewing Company's plant in the city of Brandon, Manitoba.

8667—November 17th—Approving and sanctioning location of a portion of the Canadian Pacific Railway Company's Langdon branch from mileage 80 to mileage 106.96.

8688—November 17th—Granting leave to the C. N. Q. Railway, to construct its lines and tracks across Little River Road, in Parish of St. Sauveur, County Quebec, P. Q.

8669—November 17th—Authorizing the Brandon, Saskatchewan & Hudson's Bay Railway, to construct, maintain, and operate branch line of railway or spur within city of Brandon, Manitoba, upon 15th Street.

8670—November 17th—Granting leave to the village of Brussels, to erect, place, and maintain its wires across the track of the Grand Trunk Railway, on its London, Huron & Bruce Division, at intersection of Concession line between 5th and 6th Division, Township of Morris, Province Ontario.

8671—November 17th—Granting leave to the village of Brussels, Ontario, to erect, place, and maintain its wires across the track of the Grand Trunk Railway in the Township of Grey, at Ethel Station, at mileage 21.87, from Palmerston, Ontario.

8672 & 8673—November 17th—Granting leave to the Horton & McNab Telephone Company, to erect, place, and maintain its wires across the track of the Grand Trunk Railway, at a point on Lot 22, 7th Concession, Township of McNab, County Renfrew, one mile west of Glasgow Station, Ontario, also at Lot 19, 8th Concession, Township of McNab, County Renfrew, Province Ontario.

8674 to 8676 Inc.—November 17th—Granting leave to the Manitoba Government Telephones to erect, place, and maintain its wires across the track of the Grand Trunk Pacific Railway, at point three miles west of Portage la Prairie, Manitoba; the Canadian Northern Railway, 100 yds. east of Rapid City Station, Manitoba, and the Canadian Northern Railway three miles west of Portage la Prairie, Man.

8677 & 8678—November 17th—Granting leave to the Saskatchewan Government Telephones to erect, place, and maintain its wires across the track of the Canadian Northern Railway Company, one sixth of a mile north of Dundurn Station, Saskatchewan, and at Disley, Saskatchewan.

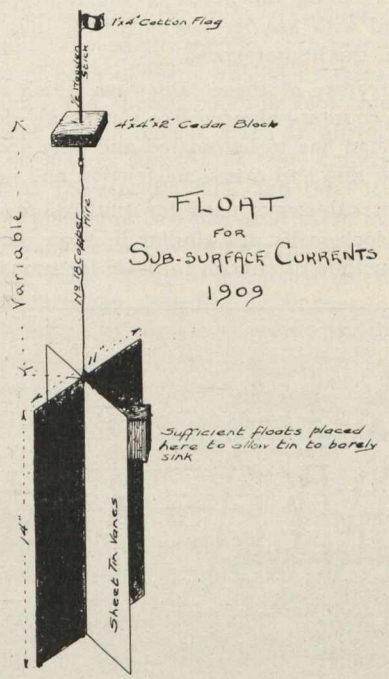
LAKE CURRENTS NEAR TORONTO.

F. W. Thorold, B.A.Sc.*

During July, August and September of this year observations were made daily under instructions from Mr C. H. Rust, City Engineer, Toronto, to determine the direction and velocity of the sub-surface currents of Lake Ontario in the vicinity of the outlet from the proposed sewage disposal works.

The disposal works will be situated south of Eastern Avenue, and between Woodward Avenue and the Woodbine race track.

The outlet will be about on the line of Lockwood Road produced south, and 5,200 feet from the tanks, or a distance



of about 3,500 feet out in the lake, in a south-easterly direction from the sandbar.

A number of floats of different shapes and sizes were tried before permanent records were made and the float, if such it may be called, shown was finally adopted.

This float was found to be very satisfactory. Sufficient wood blocks, previously painted, were attached to the tin vane, so that it would barely sink. A small block was put near the surface, and the flag on a small stick at the surface. No observations were taken at a less depth than five feet.

These floats were placed at the proposed end of the sewer outlet each morning from July 19th to September 16th, 1909. The velocity of the wind was taken about four

* Assistant Engineer, Toronto, Ont.

feet above the water with an accurate, tested anemometer, and the direction of the wind with a pocket compass. The wind was taken three times a day. The floats were located at night by means of a sextant. The vanes on the floats were placed 5, 7½, 10, 15, 17½, 20, 25, 27½ and 30 feet from the surface. The place where each float was found was then plotted on a plan and a general study made of the velocity and direction of the wind and the location of the float. With this information on hand it was possible to arrive at some definite conclusions.

From the study of our observations I am satisfied that if Lake Ontario had no inlet or outlet and was placed so that no wind would ever touch its surface, there would be no current outside of that caused by changes in temperature, and our floats would remain where they were placed.

If, however, an inlet and an outlet were introduced, the general movement of the water would be towards the outlet. There might, of course, be slight back currents along the sides and bottom caused by projections, etc.

We found that in Lake Ontario, at the end of the sewer outlet, when htere was no wind and the previous day had been calm, our floats were invariably carried east.

On July 19th the wind blew from the north and north-west from 5 to 20 miles an hour. On July 20th it blew from 0 to 4.9 miles an hour from the south-west and south, and on the 21st it blew from 2 to 6.5 miles from the east. On the night of the 21st, with an east wind blowing, our floats were found east of the buoy (sewer outlet). This would show that either the current was naturally to the east, or that the winds on the 19th and 20th had caused the current to be easterly.

On the 20th, with the south-west wind, our floats were found east of the buoy, where we would expect to find them, whether there was a natural easterly current or not.

On the 22nd, with an east and south-east wind, about seven miles an hour, our floats were west of the buoy.

In each case the deep float was nearest the buoy, and the shallow float furthest away, with the others between these.

On the 24th the wind was from the north-west at 17 miles an hour; still the floats went slightly west (400 feet), caused by the wind of the three days previous.

It should be stated here that we very seldom found a float grounded. If the wind was towards shore, our floats tended to go parallel with the shore. This will be mentioned later.

A 4-mile south-west wind on the 26th took the 17½-foot float 4,600 feet and the 5-foot float 8,300 feet east of the buoy.

On August 4th the wind was from the south and east, 5 to 7 miles, and on the 5th, 3 to 11 miles from the east, while on the 6th it was 4 to 7 from the south-west; still, our deep floats on the 6th went west and south again, showing that the wind of the previous days had created a sub-surface current to the west. The shallow floats went due south on this day.

On August 5th, with a 3 to 11-mile east wind, and the south and east wind of the 4th, the floats were west of the buoy, the 27½ feet being closest and the shallowest float furthest away. This again shows wind of previous days and August 4th drove all floats west .

A 7-mile south-west wind on the 8th, with an 8 to 18 west wind on the 9th, sent the floats east, the 7½-foot float being 8,000 feet and the 22½-foot float 1,200 feet from the buoy. West winds of August 9th and 10th took the deep floats of the 11th a mile east, although there was a 10-mile south-east wind blowing. In this case the 7½-foot float, which went north-west, was acted on by the wind, and the 26-foot float by the current caused by the previous three days' west winds.

On August 10th, with a 10-mile west wind (shifting to a 15-mile north-east wind) and three days' previous west wind, the 5-foot float followed the north-east wind 10,600 feet out into the lake, while the 27½-foot float went only 4,900 feet from the buoy, and south-south-west. Evidently the 27½-foot float was caught where the two currents met, and as a consequence was carried south.

The wind on the 11th, 12th, 13th, and 14th, was from the east, 7 to 23.7 miles per hour, and the floats of the 14th all kept within 300 feet of each other, and went south-west from the buoy 3,800 feet. The floats on this day were 5, 7½, 15, 17½, 25 and 27½ feet deep, so that the current was practically equal at all depths this day. A straight east wind (and the wind was such) should have driven them to shore, but they went south-west, or tended to run parallel with the shore.

On the 13th, with two days' continuous due east wind, the shallow floats went west, while the deeper floats went south of south-west. On this day the 27½-foot float went further than the shallower floats. A distinct distance was noticeable between the 5 to 12-foot floats and the 15 to 27½-foot floats. The former apparently went with the wind, while the latter went out into the lake. This day the 27½-foot float went 7,500 feet south-west, and was about on the line of Leslie Street produced.

On September 1st, with an 18-mile north-west wind, the floats went 8,700 feet south-south-east of the buoy and out in the lake on the line of Woodbine Avenue produced. The wind on August 30th was 8 to 11 miles south, and on the 31st, 3 to 14 miles south-west.

On September 2nd the wind blew from a westerly direction, 10 to 12 miles an hour, and our floats were found about 5 miles east and ½ mile from shore, opposite Scarboro' Bluffs.

Numerous other examples might be given, but space will not permit.

By making a study of all the data the following conclusions have been drawn:—

(1) With no wind there is a gradual movement of the water towards the east.

(2) There is practically no regular current in Lake Ontario in any particular direction.

(3) Currents are formed in the vicinity of the outlet by the action of the wind only, and their velocity increases inversely as the depth.

(4) The surface water moves in the direction of the wind, but when within two or three thousand feet of shore it tends to run parallel with the shore in either direction, depending entirely on the direction of the wind at the time; but this current has not sufficient velocity to transport sand.

(5) The sub-surface water is not affected as rapidly as the surface, and may continue to move in one direction for hours after the wind has blown in that direction and at the same time as the surface water is moving in the opposite direction.

There is a current along shore caused by the wind directly, and indirectly by the wind through the waves, the direction of this current depending upon the direction of the wind.

The one prominent point of these conclusions is that the wind governs the current.

The writer does not like the word "current" to describe the gradual easterly movement of the water in calm weather

There is, however, a noticeable current during storms or winds.

Before discussing the velocity of the wind and currents a short description of the sewer outlet might be here given.

The end of the outlet from the sewage disposal tanks will be 3,500 feet from the lake shore and at about right angles to the shore. The pipe will be of steel, 60 inches in diameter, having the last 500 feet (outer end) tapered from 60 inches to 24 inches diameter. This tapered end will have 120 holes, 4 inches diameter, spaced about 4 ft. 2 in. apart, so that it will be in the form of a huge submerged spray. The effluent will have a velocity of from 2 to 7 feet per second in the pipe, depending on the elevation of the surface of the water of the lake.

During low water the velocity in the pipe will be greatest, so that the effluent will be spread out over a large area, while during high water, while there is less velocity in the pipe, the discharge takes place in deeper water.

The outlet will be in 29 feet of water at average lake level, and the holes are on each side of the pipe and end.

The specific gravity of the effluent will be about 1.002. The velocity of the sewage in the tanks will be so reduced that practically no solids will reach the outlet.

During calm weather this large body of greatly diluted effluent will be carried east. During continued winds from any direction it will be carried in that direction. It will keep rising to the surface, and constantly be changing its velocity and direction, thus becoming more diluted. It will be tossed about by the waves and oxidized; if there are no waves, and necessarily no wind, it will drift east. If it is washed into shore to the west of the outlet, it will be because of east winds and on account of the great sweep of these winds up the lake. The greatest waves are from the east, so that the greatest oxidation will take place during these winds.

However, a large part of the diluted effluent may remain below the influence of the waves and be carried by the current.

The greatest current we found from the east was at a depth of 5 feet, and was the rate of 0.35 miles per hour. At the same time as we had this current at a depth of 5 feet we found only 0.12 miles per hour at a depth of 27 feet. This was caused by a blow of four days' duration from the east. The greatest current in any direction that we found at a depth of 27 feet was at the rate of 0.28 miles per hour towards the east.

The accompanying table gives a record of the winds as recorded at the Toronto Observatory from June 1st, 1908, to September 31st, 1909.

When a wind is given as east or west it is understood to be from an easterly or westerly direction.

The only winds which would cause the current to pass from the sewer outlet to the waterworks intake would be from the east or north-east, but as we have not separated these we will assume all easterly winds blow towards the intake.

We find there were 31.1 per cent. of the winds from this direction in 485 days, while 69.9 per cent. of the winds were from other directions.

On account of the nature of the outlet; the variable winds and variable currents caused by them; the fact that the wind does not blow in any one direction for any great length of time; and of the further fact that the general movement of the whole mass of water is to the east, I am forced to believe that the effluent will be perfectly diffused and carried away without harm to the city of Toronto or any neighboring towns further east.

Before concluding, I would like to make a few remarks about the "theories" of Lake Ontario currents we so often hear or read about.

It is a settled fact in the minds of a number of people that the waters of the Niagara River run straight for Toronto, and maintain their velocity throughout the thirty-four miles. For some reason this current is split up and causes shore currents, one of which runs from east to west from near the proposed sewer outlet towards the waterworks intake. I have been unable to find from what source this information has been gathered, because no observations of such a current have been made.

The waters of the Niagara River entering Lake Ontario at Niagara would have about as much influence on the lake current at Toronto as a garden hose discharging into Toronto Bay at Yonge Street would have on the current of the water at Centre Island.

The mean velocity of the Niagara at Lewiston is 3.12 feet per second, and less at Niagara. At a distance of 2.8 miles from the mouth of the Niagara shoals are formed, because the current has been so diminished that it cannot transport sand. This means that in a distance of, say, three miles, the current has been reduced to about one foot per second, so that the remaining velocity would be lost completely in another half mile. The slightest wind blowing continuously for three or four days would produce a current more than the Niagara at a distance of three miles from shore. I am, therefore, at a loss to see how the Niagara can affect the current of the lake at Toronto.

One convincing proof often given of this westerly "current" at Toronto is the fact that more sand, clay, gravel, and even **boulders,** are always found on the easterly side of all the piers and jetties in the lake near Toronto than on the westerly side. Even Scarboro' Bluffs are being eroded and transported to the west by this "current."

It is a fact that this material is being moved westerly, but it is not caused by the currents produced by Niagara. Toronto is near the westerly end of Lake Ontario. A due east wind sweeps up the entire lake towards Toronto, and it is on account of this long sweep of the wind, and consequently the large waves, that local currents are produced.

1909

JAN.				FEB.				MAR.				APRIL				MAY			
N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.
7	2	4	18	3	0	5	18	11	1	6	11	4	2	11	8	1	2	12	11
				2 Variable				2 Variable				3 Variable				5 Variable			

JUNE				JULY				AUG.				SEPT.				OCT.			
N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.
0	0	10	16	1	0	10	18	1	0	12	15	1	0	11	13				
4 Variable				2 Variable				3 Variable				3 Variable							

RECORDS OF WINDS OBTAINED FROM THE OBSERVATORY

1908

JUNE				JULY				AUG.				SEPT.				OCT.				NOV.				DEC.			
N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.	N.	S.	E.	W.
2	12	15	1	0	1	11	19	2	0	10	16	0	0	14	13	1	0	12	15	0	0	6	24	3	0	2	19
								2 Variable				2 Variable				3 Variable								6 Not registered 1 Variable.			

SUMMARY.

Out of 485 Days 7.6 per cent. of Winds were from North.
" " " " 4.1 " " " " " South.
" " " " 31.1 " " " " " East.
" " " " 50.5 " " " " " West.
" " " " 6.7 " " " " " Variable.

along the shore, and the material, even boulders, are moved in a zigzag path towards the west. We never get waves from the west which are nearly as high as those from the east, consequently the net result of the wave action is a movement of solid material along the shore towards the west. The influence of this current is not noticeable, as far as its sand-transporting power is concerned, for more than a few hundred feet from shore.

Nothing has been said about the opinion of the fishermen along the shores, but it has been repeatedly noticed that the nets are set to suit an easterly movement of the water. As a matter of fact, all the fishermen say there generally is a current towards the east.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

(Continued from Page 617)

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

8616—November 8—Authorizing the C.P.R. to construct, maintain and operate an additional line of railway across Park Avenue, town of St. Louis, P.Q.

8617—November 5—Authorizing the C.P.R. to construct, maintain and operate an industrial spur for the Massey-Harris Company, Ltd., for the Turpin Fur Company in City of Lethbridge, Alta.

8618—November 11—Granting leave to the C.N.Q. Ry. to construct its lines and tracks across public road in R. 3, Par. Ste. Julienne, P.Q.

8619—November 11—Granting leave to the C.N.Q. Ry. to construct its lines and tracks across P.C. in Parish St. Jacques, P.Q.

8620—November 8—Dismissing complaint of Louis Vallee, Ernest Belisle, and Cotave Courchesne, of La Baie du Febvre, P.Q., against condition of railway crossings of Province of Quebec, Montreal and So. Ry.

8621—November 8th—Dismissing application of the C. N. Q. Railway, for leave to construct its railway across highways in the Parish of Beauport, Co. of Quebec, P. Q.

8622—November 10th—Granting leave to the Tilbury Telephone Company, Limited, to erect, place, and maintain its wires across the track of the M.C.R.R. at P. C., 2½ miles easy of Tilbury, Station, Ontario.

8623—November 10th—Granting leave to the Government of the Province of Alberta, to erect, place, and maintain its wires across the track of the C. P. Railway, between Sections 3 and 4, Township 46, R. 18, west 4th Meridian, near Bawlf Station, Alberta.

8624—November 3rd—Granting leave to the C. N. Q. Railway, to open for the carriage of traffic portion of its line of railway from St. Jacques to the junction with its line of railway near Dugas, P. Q.

8625—November 8th—Dismissing complaint of Ernest Lyster, of Gore Station, P. Q., complaining of the unsatisfactory and dangerous train service furnished by the G. T. Railway, at Gore, P. Q.

8626—November 8th—Dismissing complaint of the Dominion Park Co., Ltd., Montreal, alleging excessive rates charged by the Bell Telephone Company for the use of telephones at Dominion Park, Montreal.

8627—October 21st—Authorizing the G. T. Railway to expropriate certain lands in the city of Guelph, Ontario, upon which to provide a proper passenger station.

8628—November 5th—Authorizing the town of Palmerston, Ontario, to construct a drain or ditch, under the tracks of the G. T. Railway, at one mile post on its Kincardine branch.

8629—November 10th—Authorizing the C. P. Railway, to construct, maintain, and operate branch line of railway for Lombard Bros. & Marshall, near Milan Station, P. Q.

8630—November 11th—Granting leave to the Saskatchewan Government to erect, place, and maintain its wires across the track of the C. P. Railway, at Estevan, Sask.

8631—November 10th—Ordering that the Grand Trunk Railway shall not be entitled to make any extra charge for the switching performed by it at the spur to the premises of Christie-Henderson & Company, at Hespeler and the city of Guelph, Ontario.

8632—November 15th—Authorizing the Municipal Corporation of the town of Hanover, Ontario, to lay and thereafter maintain an extension of its present water main from Proctor Street, across portion of the yard of the Grand Trunk Railway, to connect with the present main running across said yard.

8633—November 15th—Authorizing the Corporation of the city of Toronto, Ontario, to construct a sewer on Davenport Road, under tracks of Canadian Pacific Railway, said city.

8634—November 15th—Authorizing Henri Cauchon, of Beauport, P. Q., to construct and thereafter maintain drain pipe and water pipe across the property of the Quebec Railway Light & Power Company, at Beauport, P. Q.

8635—November 15th—Granting leave to the Board of Light and Heat Commissioners of Guelph, Ontario, to erect, place, and maintain its electric wires across the track of the Grand Trunk Raiway, where the same intersects the roadway known as Duke Street, in said city.

8636—November 11th—Directing the Grand Trunk Railway to provide and construct a suitable interswitching in the town of Brampton, Ontario.

8637—November 12th—Approving interlocking plant of the Michigan Central Railway, to be installed at the east end of its Windsor Yard, Windsor, Ontario.

8638—November 12th—Granting leave to the Grand Trunk Railway to connect its line of railway with the tracks of the Niagara Peninsula Railway Company, in Lot 31, Concession 1, Township of Humberstone, County of Welland, Ontario.

8639—November 12th—Granting leave to the Grand Trunk Railway, to join its tracks with the tracks of the C. N. Q. Railway, in the town of Hawkesbury, Ontario.

8640—November 12th—Authorizing the Grand Trunk Railway to construct an iron foot-bridge for pedestrians over its railway, where the same crosses Metcalfe Street, Guelph, Ontario.

8641—November 15th—Authorizing Cie Fenciere Suburbaine de Montreal, P. Q., to construct and thereafter maintain sewer under the track of the Canadian Northern Quebec Railway, at Long Point, County Hochelaga, P. Q.

8642—November 16th—Granting leave to the Board of Light and Heat Commissioners of Guelph, Ontario, to erect, place, and maintain its electric light wires across the track of the Grand Trunk Railway, where the same intersects the roadway known as Huskisson Street, Guelph, Ontario.

8643—November 16th—Approving and sanctioning location of the Canadian Northern Railway Company's line of railway through Township 5, R. 6, west of the 2nd Meridian, Province Saskatchewan, mileage 65.16 to 70.29.

8644—November 16th—Granting leave to the Canadian Pacific Railway, to divert the road allowance between S. W. ¼ of Section 23, and S. E. ¼ of Section 22, near Exshaw Station, Alberta.

PROBLEMS IN APPLIED STATICS.

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

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

Fig. 81 represents an ordinary bell crank.

If a force P of 100 pounds be exerted at the joint of the upper arm as indicated, what force S must be exerted at the joint of the other arm in order to preserve equilibrium?

Consider the crank as the body acted upon. The forces acting on this body are P, S, and the reaction Q of the pin on the crank, and for this problem P and S will be considered as acting perpendicularly to the arms of the crank. Since these forces are in equilibrium, their

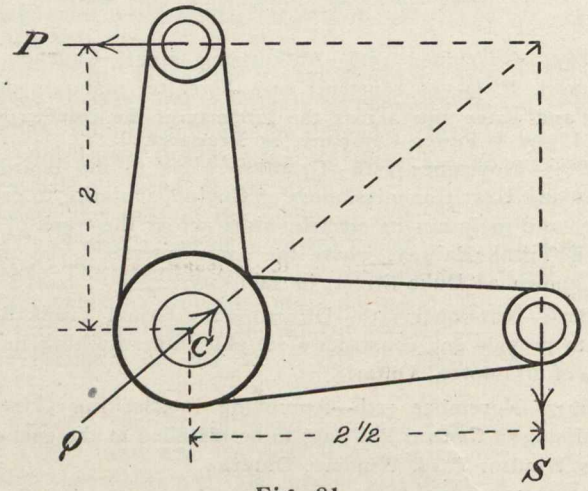


Fig. 81.

lines of action must intersect at a common point as indicated. (Three forces in equilibrium must act at a point.) These forces being in equilibrium, $\Sigma M = 0$.

Take moments about the point C, the centre of rotation of the crank.

$$\Sigma M = M_P + M_Q + M_S = 0.$$
$$-P.\,2 + Q.\,0 + S.\,2\tfrac{1}{2} = 0.$$

Putting in the value of P = 100, we get:

$$-100 \times 2 + 0 + 2\tfrac{1}{2}.\,S = 0.$$
$$S = 80.$$

The positive result shows that the Ms about C is positive; i.e., S acts as indicted on the diagram.

Now, although S is the force which must act with P and Q to give equilibrium, it must be clearly understood that if a force P be exerted at one end of the crank as shown, that **the crank** will exert at the other end a force **equal but opposite to S** on any body to which it may be fastened. The body in resisting this will exert the force S as shown.

To Find the Reaction Q:—

Apply either the equation $\Sigma X = 0$ or $\Sigma Y = 0$ to the set of forces P, Q, and S. The value of the sine or cosine of the angle of inclination of Q may be found from the given distances of P and S from C, these distances forming the sides of a right angled triangle, one angle of which is the required inclination. If the hypotenuse of this triangle be calculated, the required sine or cosine may be obtained.

King Post Truss.

Fig. 82 represents a simple form of roof or bridge truss, known as a King Post Truss. It must be clearly understood, however, that the ordinary forms of roof bracing, consisting of the rafters and scantling tie-rods, which resemble the above truss in outline, do not really present the same problem as will be herein discussed. Usually, the rafters have the roof sheeting, shingles, etc., lying directly on them over their entire length. In

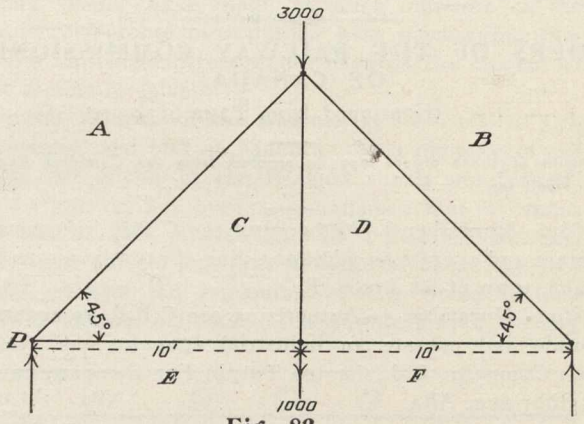


Fig. 82.

this case, these rafters are inclined beams supporting a distributed load, and the stress in them will not be simple Compression, but a combination of both Tension and Compression due to bending. If, however, stringers or purlins be laid from truss to truss on the roofing system so as to lie at the joints of the trusses, or nearly so, and if the rafters and roofing be built on these stringers, the load will then be transferred to the truss merely at the joints, and the case may then be worked out by the methods taken up so far. Fig. 82 A

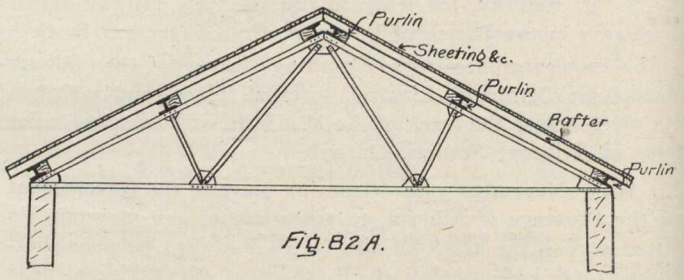


Fig. 82 A.

illustrates, for another form of roof truss, the method of laying down purlins and building on them.

There is also a form of bridge truss very commonly met with on country roads which is sometimes called a King Post Truss. The structure referred to has a heavy timber beam laid between the abutments, and the trussing above merely serves to stiffen this beam. In this case, the beam, which seemingly corresponds to the horizontal tie-rod of the ordinary King Post Truss, is not in simple Tension, but has both Tension and Compression existing in it, and these stresses cannot be found by elementary methods.

Required to find the stress in the members of the truss (Fig. 82).

Analytical Solution:—

The whole truss is a body acted upon by a set of outside forces. These forces, the two loads AB and EF,

and the two abutment reactions BF and EA, are in equilibrium; therefore, $\Sigma X = 0$; $\Sigma Y = 0$; $\Sigma M = 0$.

Take moments about a point in the line of action of one of the abutment reactions, say, the point P.

$$\Sigma M = M_{AB} + M_{EF} + M_{BF} + M_{EA} = 0.$$

Since BF is unknown, assume M_{BF} positive.

$$3{,}000 \times 10 + 1{,}000 \times 10 + BF \times 20 + EA \times 0 = 0.$$

$$BF = -2{,}000.$$

From the negative sign of the result, it is seen that M_{BF} about P is negative; i.e., BF acts upward.

$$\Sigma Y = Y_{AB} + Y_{EF} + Y_{BF} + Y_{EA} = 0.$$

$$-3{,}000 - 1{,}000 + 2{,}000 + EA = 0.$$

$$EA = 2{,}000.$$

From the positive result we infer that Y_{EA} is positice; i.e., EA acts upward.

Consider the forces acting on the pin at the point EAC. The known and unknown forces are represented in the Statical Diagram (Fig. 83).

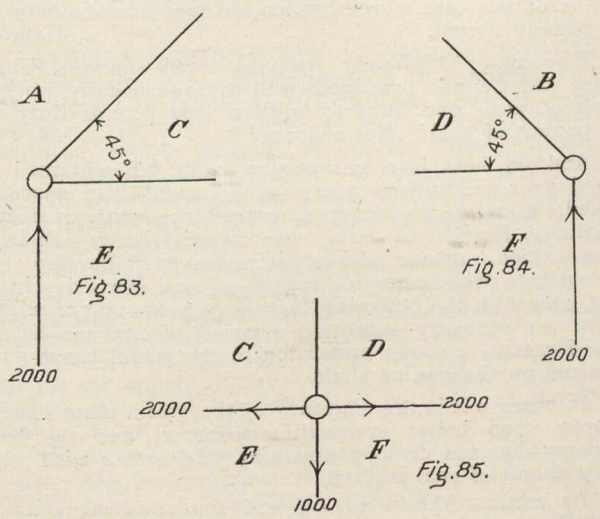
$$\Sigma Y = Y_{EA} + Y_{AC} + Y_{CE} = 0.$$

$$EA + AC \sin 45^\circ + 0 = 0.$$

$$2{,}000 + AC \cdot \frac{1}{\sqrt{2}} + 0 = 0.$$

$$AC = -2{,}000 \cdot \sqrt{2}.$$

Because of the negative result, the Y_{AC} is evidently



negative. AC, therefore, acts against the pin; i.e., the member AC is in compression 2,000 $\sqrt{2}$ pounds.

$$\Sigma X = X_{EA} + X_{AC} + X_{CE} = 0.$$

$$0 - AC \sin 45^\circ + CE = 0.$$

$$0 - 2{,}000 \cdot \sqrt{2} \cdot \frac{1}{\sqrt{2}} + CE = 0.$$

$$CE = 2{,}000.$$

The positive result shows that X_{CE} is positive. CE, therefore, acts away from the pin; i.e., the member CE is in tension 2,000 pounds.

Consider the point BFD. The forces acting on the pin are indicated in the Statical Diagram (Fig. 84).

$$\Sigma Y = Y_{BF} + Y_{FD} + Y_{DB} = 0.$$

$$BF + 0 + DB \sin 45^\circ = 0.$$

$$2{,}000 + 0 + DB \cdot \frac{1}{\sqrt{2}} = 0.$$

$$DB = -2{,}000 \cdot \sqrt{2}.$$

From the negative result, the Y_{DB} is seen to be negative. DB, therefore, acts against the pin; i.e., the member DB is in compression 2,000. $\sqrt{2}$ pounds.

$$\Sigma X = Y_{BF} + Y_{FD} + Y_{DB} = 0.$$

$$0 + FD + DB \cos 45^\circ = 0.$$

$$0 + FD + 2{,}000 \cdot \sqrt{2} \cdot \frac{1}{\sqrt{2}} = 0.$$

$$FD = -2{,}000.$$

The X_{FD} is evidently negative. FD, therefore, acts away from the pin; i.e., the member FD is in tension 2,000 pounds.

(The solution for the point EFDC will be given next week.)

RAILWAY ORDERS.

(Continued from page 621.)

8645—November 16th—Granting leave to the Corporation of the city of Winnipeg, Manitoba, to erect, place, and maintain its electric light wires across the track of the Canadian Pacific Railway, where the same crosses Grey Street, Winnipeg, Manitoba.

8646—November 16th—Granting leave to the St. Maurice Valley Railway Company, to divert slightly the present highway at Station 239-03, and to construct and undergrade crossing at said station at Grand Mere, P. Q.

8647—November 16th—Granting leave to the Nipissing Power Company, to erect, place, and maintain its transmission lines across the track of the Grand Trunk Railway, at highway, at Callander, Ontario.

8648—November 16th—Approving and sanctioning proposed deviation of the Canadian Pacific Railway of its line of railway from mileage 54 to mileage 54.22, Woodstock section.

8649—November 16th—Approving location and detail plans of the Canadian Pacific Railway Company's station, at Midale, Saskatchewan.

8650 to 8652 Inc.—November 16th—Granting leave to the Bell Telephone Company, to erect, place, and maintain its wires across the track of the Canadian Pacific Railway Company's tracks at a point one mile east of Islington Station, Ontario, at P. C. 25 yards east of Islington Station, Ontario, and at Dufferin Street, Toronto, Ontario.

8653—November 16th—Granting leave to the Theodore, Springside and Beaverdale Rural Telephone Company, to erect, place, and maintain its wires across the track of the Canadian Pacific Railway, at Springside, Saskatchewan.

8654—November 16th—Granting leave to the Saskatchewan Government Telephone to erect, place, and maintain its wires across the track of the Canadian Pacific Railway at Richardson, Saskatchewan.

8655 & 8656—November 11th—Authorizing the town of Penetanguishene, Ontario, to lay and thereafter maintain a steel pipe, to replace defective culvert or ditch, under track of the Grand Trunk Railway, at the foot of Queen Street, town of Penetanguishene, Ontario, also to place a sewer pipe under the tracks of the Grand Trunk Railway, at Burke St., said town.

GAS ENGINE PUMPING vs. HIGH DUTY STEAM PUMPS—By L. G. Read, M.E., A., Mem. C.S.C.E.,

It is now very generally conceded by the engineering fraternity that gas engines have come to stay: indeed, in no branch of applied science has anything like a corresponding advance been made during so short a space of time as in the design and efficiency of the prime mover.

*Chief Engineer of The Colonial Engeering Co., Ltd., 222 St. James Street, Montreal.

A few years ago the internal combustion engine occupied a small field consisting of small units—doing work of small importance, and was not even considered eligible to take the place of an ordinary non-condensing simple steam engine in driving an ordinary ten-hour-per-day factory load. To-day the ten-hour factory load is among the least of its marvellous accomplishments. To-day there is no kind of duty so sensitive, so irregular, or so large that it does not successfully perform.

In paper mills, textile mills, cement mills and central generating stations it has not only proved its own reliability but has maintained its unchallenged superiority over the best performances of steam engines in points of fuel consumption per b.h.p. hour, and now it has entered the field of pumping—the field in which steam engines have attained their most brilliant results, It enters this important field too, not to compete for honors merely against the direct-acting non-fly-wheel make of steam pump, but against the steam pump's "Champion" unit—the high duty type.

With perhaps less than a dozen exceptions, there is not a pumping unit on this continent which is averaging, under ordinary daily working conditions, more than one hundred millions of foot pounds duty per hundred pounds of coal, and it is safe to say that the average foot pound duty—among the municipal pumping plants: that is to say, taking the best average—will fall far below seventy-five millions.

Without going into the reasons—the inherent inefficiencies of a steam plant, whether it be pumping or any other duty, the universally conceded difficulty of maintaining the efficiency of a steam plant under ordinary daily working conditions, etc.—let us compare the showing which a suction gas-engine pump is prepared to make, against a high-duty steam pump.

To begin with—it must be remembered that the results obtained with the steam pump under expert test and the results shown under daily working conditions are vastly different—for the reason that its overall economy depends mainly upon its boiler evaporative efficiency and it is needless to dwell upon the fact that whereas, under expert handling, with all surfaces clean and with proper draft pressure, an evaporation of ten pounds of water per pound of coal may be obtained, this evaporation falls off rapidly under ordinary daily working conditions, and as against which the suction gas engine—having no surfaces to become foul, no varying draft pressure, not depending upon evaporative efficiency, stoking or any of the many other separated elements of the steam plant, maintains its expert results automatically and continuously. And it must be particularly borne in mind that guarantees obtainable on high-duty steam pumps are invariably based upon a given foot pound duty "per thousand pounds of dry steam" — without regard to the amount of coal which may have to be burned in order to supply the "thousand pounds of dry steam," and that the actual yearly coal economy is 35 to 50 per cent. below the usually advertised results. As against this a guarantee is given on the gas engine based upon a given foot pound duty per hundred pounds of coal and covering a period of an entire year's run, thus leaving no doubt as to over-all results or as to its continued economy.

The Hornsby-Stockport gas engine has demonstrated —in many installations in Canada—that, under continuous ordinary daily working conditions, a fuel economy of less than one pound of Pennsylvania anthracite pea coal per b.h.p. hour is obtained; that is to say, it delivers on the engine shaft 33,000 foot pounds x 60 minutes = 1,980,000 foot pounds per hour per pound of coal, or 198,000,000 foot pounds per hour 100 pounds of coal.

Should this engine, therefore, be direct coupled to a multiple-throw pump with an overall efficiency of say 80 per cent., then the combined efficiency would be 198,000,000 x 80 per cent. or a foot pound duty of 158,400,000 per 100 pounds of coal. Using a clean anthracite pea coal (such as is easily obtainable in the Canadian market) at a cost of say $5.00 per ton and pumping against a head of 100 feet—including suction lift—this gas engine has to its credit the phenomenal economy of 22.5 cents fuel cost per 158,400,000 foot pounds duty—net! or, expressed in terms representing daily working conditions, would pump one hundred and fifty eight thousand four hundred Imperial gallons per hour, against 100 feet head, for a total fuel cost of only 22½ cents, or 3,800,000 gallons per 24 hours for a total fuel cost of only $5.40—enough water to supply a city of 30,000 population and with 800,000 gallons per day as a margin. 3,800,000 gallons of water per day for a fuel cost of only $5.40 being equal to only $1.42 per million gallons per day!

It is perfectly safe to say that—with two, possibly three —exceptions, there is not a town in the entire Dominion but what its fuel cost for pumping is from three to ten times this cost. And the above figures represent by no means the best this gas engine can do. They represent an economy which is easily obtainable with small units—say down to 50 b.h.p.

As a matter of fact, in the larger units, say from 250 to 1,000 b.h.p.—a fuel consumption is easily shown of .8 of a pound of coal per b.h.p. hour. Taking, then, the pump efficiency still at 80 per cent., the result would be

$$\frac{158,400,000}{.8} = 198,000,000$$

foot pounds per 100 lbs. of coal or a fuel cost of only $1.14 per million gallons against 100 feet head.

No steam pumping unit—though it be of the best design, equipped with the most refined auxiliaries, and operated under the most ideal conditions, can approach such results! Furthermore, this gas engine can be attached to a turbine pump—a pump which is the acme of simplicity by means of the famous Wuest Double Helical Speed Increasing Gear—a gear which, like the gas engine, has recently forced its own merit upon a doubting public—and show results which, under ordinary daily working conditions, are rarely equalled even by the best modern high-duty steam pumps.

Taking one pound of five dollar coal for the gas engine per b.h.p. hour, 97 per cent. efficiency for the gear and a turbine pump efficiency of say 68 per cent., the result (with ample margin of safety) is 33,000 x 60 x 100 x 97 per cent. x 68 per cent. = over 130,000,000 foot pounds duty per 100 pounds of coal.

How many high-duty pumping sets — in the United States and Canada combined—will average a daily working result of even one hundred million foot pounds duty per 100 pounds of coal? Not a dozen!

And yet here is a gas engine, with self-contained enclosed gear and turbine pump—with capital cost, space occupied, cost of maintenance, attendance with maximum simplicity, fewness of parts, ease of accessibility—all in its favor—which, almost without attention, will develop 130,000,000 foot pounds per 100 pounds of coal every day in the year, and with the crowning feature of automatic regulation of its own economy—since not a pound of coal can be consumed except in direct proportion to the actual horse power required on the engine shaft.

In other words the efficiency of the steam plant depends directly upon boiler evaporative economy, and the boiler economy depends directly upon the intelligence with which every pound of coal is fired.

As against these varying and uncertain elements the gas plant eliminates all consideration of evaporative economy, draft pressure or intelligence of firing—by the substitution of a device through which and by no other means, the consumption of fuel is regulated by the movement of the engine piston itself and since variation of piston resistance is instantly met by the action of a sensitive governor, it follows that no fuel can be converted except in direct proportion to the variation of load.

It would be of great interest—did space permit—to go more fully into plotted data covering direct comparisons with actual results. May it suffice, however, for the moment, to say that very shortly a demonstration gas engine pumping set will be installed in Montreal, consisting of a small (55 h.p.) gas engine with Wuest Double Helical gear and a turbine pump, for the purpose of permanent exhibition—that Canadian engineers may see for themselves, not merely expert results; but results obtainable by a continuous 24-hour-per-day performance. This exhibition unit will be equipped with all necessary instruments for pumping under a variety of quantities and heads and any competent engineer will be permitted to make his own tests and satisfy himself as to results.

In a later issue of this journal the writer will deal with the mechanical questions of gears, belt and rope drive of turbine pumps.—[Advt.]

CONSTRUCTION NEWS SECTION

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

TENDERS.

Quebec.

MONTREAL.—The town of St. Louis is asking bids for the construction of a tunnel under the C.P.R. tracks on St. Lawrence Boulevard until 6th December. Plans and specifications to be seen at town engineer's office, 5 Beaver Hall Square, Montreal. A. F. Vincent, sec.-treas.

QUEBEC.—Tenders will be received up to Tuesday, 7th December, for supplying materials and doing the following works from 1st May, 1910, to 1st January, 1911:—Broken stone, broken stone (special), unbroken stone, stone curb, retaining walls, stone and brick pavements, sand, deals, etc., nails. Mr. W. D. Baillairge, city engineer.

QUEBEC.—Contractors for bridge superstructure are invited to visit the office of the Board of Engineers in the Canadian Express Building, Montreal, after January 3rd, 1910, where information may be had to enable them to prepare bids for the superstructure of a 1,758 feet span bridge 88 feet in width. The contractor is invited to submit alternative designs, which must conform to the conditions laid down in the general specification. L. K. Jones, secretary, Department of Railways and Canals, Ottawa. (Advertised in the Canadian Engineer.)

Ontario.

COBALT.—Tenders will be received until Monday, December 6th, for grading required in connection with the construction of tracks at Cobalt, Ont. Further particulars are given in our advertising pages. Temiskaming and Northern Ontario Railway, 25 Toronto Street, Toronto.

COBOURG.—Tenders will be received up to Monday, the 6th December, for an 8-inch vitrified tile drain, about 2,000 feet in length and from 6 to 14 feet in depth. D. H. Minaker, Town Clerk.

BERLIN.—Tenders will be received up to 14th December by Edmond Pequegnat, secretary of the Berlin School Board, Berlin, Ont., for the erection of an eight-rooom public school. Munro & Mead, architects, Hamilton, Ont.

TORONTO.—Tenders will be received up to December 7th for the supply of two 5-ton auto trucks. Specifications may be seen upon application at the office of the Medical Health Officer, City Hall.

TORONTO.—Tenders wanted for digging and drilling wells. McBrien Manufacturing Company, Main Street and Bartlett Avenue, or 1,000 Bloor Street West.

TORONTO.—Tenders will be received up to Thursday, December 7th, for the supply, erection and completion of floor beams for the engine-house of the main pumping station. Mr. Joseph Oliver (Mayor), chairman Board of Control. (Advertised in the Canadian Engineer.)

LATCHFORD.—A second-hand 25 or 30-ton yard locomotive is wanted by the Empire Lumber Company, Latchford, Ont.

WALKERTON.—A second-hand open heater and boiler for 80 horse-power steam plant is required by B. P. Kent & Company, of Walkerton.

Manitoba.

WINNIPEG.—Tenders will be received up to Thursday, December 9th, for the erection of iron fences at the Alexandra and Isbister Schools. For specifications and form of tender apply to J. B. Mitchell, Commissioner of Buildings, School Board Office.

WINNIPEG.—Tenders for 500 cords of tamarac or jackpine wood will be received up to Thursday, December 9th. For specifications, forms of tender or further information apply to J. B. Mitchell.

WINNIPEG.—Tenders for 600 tons of Youghiogheny steam coal will be received up to Thursday, December 9th. For specifications, forms of tender, or further information apply to J. B. Mitchell.

British Columbia.

VANCOUVER.—Tenders will be received until December 10th for the construction of a sewerage system for Vancouver Heights. D.L. 186. Tracy & Kilmer, civil engineers, 411 Howe Street.

VANCOUVER.—Tenders are invited by the clerk of the municipality of South Vancouver for 254,000 feet of ditching for water mains.

VICTORIA.—Tenders are invited for paving materials. The British Columbia Hassam Company have offered to lay a Hassam pavement on Douglas Street for $2.25 a yard, with a ten-year guarantee. Mr. C. H. B. Topp is the city engineer.

NELSON. — By the Nelson Street Railway Company, Limited, tenders are requested for two semi-convertible cars and for station metering and switching equipment, full particulars of which with copies of specifications can be secured at the office of E. B. McDermid, Secretary-treasurer.

CONTRACTS AWARDED.

Nova Scotia.

HALIFAX.—A contract has been awarded to Farquhar Brothers for heating the Chebuctos school.

Quebec.

MONTREAL.—A contract for the erection of the new bath in St. Denis Ward was given to Mr. Langevin at $26,500.

Ontario.

BURLEIGH.—Some weeks ago we stated that Bishop & Buchanan, of Owen Sound and Peterborough, would probably be awarded a contract for the construction at Burleigh Falls of a dam to cost about $50,000. This was confirmed on Tuesday.

COBOURG.—A contract has been let by the Provincial Steel Company to M. Jex & Company, Cobourg, for a 135 foot extension to the plant here.

HAMILTON —Sewer contracts were as follows:—J. J. Armstrong got the contract for constructing part of the sewers at the following prices: On Arthur street, 40 cents a foot; on Imperial street, 35 cents a foot; on the private right of way, 40 cents. The engineer's estimates were 47 cents, 39 cents and 41 cents. Andrew Mercer was awarded the contract for constructing that part of the sewer on the base line at 90 cents. The engineer's estimate was 92 cents. Thomas Williamson's tender of $1,325 to lay the iron pipe for the extension of the Ferguson avenue sewer through the revetment wall was accepted.

TORONTO.—For steel work, gates and railings in connection with the Broadview Avenue lavatory, the following tenders were received:—$764.70, $792.75, $720.00, $820.00, $1,051.00. The contract was awarded to W. Groeger, No. 65 Jarvis Street, Toronto, price $720.

TORONTO.—Tenders for 37,600 pounds, approximately, of copper wire for the electrical branch of the works department were as follows: 16 1/10c., 16 35/100c., 16 11/100c., per pound. The Board awarded the contract to the Canadian General Electric Co., Limited at 16 1/10c. per pound.

LONDON.—The Bissel Company, of Toledo, Ohio, have been awarded a contract for 450 35-foot poles at $5.15 each by the Niagara Power Committee of the City Council.

TORONTO.—Contracts have been awarded by the Hydro-Electric Power Commission for heating apparatus for the transformer stations. Two steel boilers will be installed in the Niagara Falls and Toronto stations by John Inglis & Sons, of Toronto, for $515. Two more boilers will be placed in the Dundas and London stations by E. Leonard & Sons, of London, Ont., for $511. Cast iron boilers will be placed in the stations at Guelph and Preston by Taylor, Forbes & Company, of Guelph, for $511. Similar boilers will be installed in Berlin, Stratford, St. Mary's, and St. Thomas, by

the Gurney Foundry Company, Toronto, for $9,520. Cable tenders have also been awarded: Siemens Bros.' Dynamo Works, of Great Britain, are to supply a 12,000-volt induction cable for $21,149, also a submarine cable for $1,943.12, and an underground cable for $1,556.

WOODSTOCK.—The Woodstock Water and Light Commissioners have awarded the contract for the supply of the equipment for the Hydro-Electric power station here to the Canadian General Electric Company, of Toronto, for $20,000.

TORONTO.—Tenders for the supply of 3,000 lineal feet of 60-inch rivetted steel pipe, and 500 lineal feet of special rivetted steel tapered pipe, also 1,782 lineal feet of 60-inch reinforced concrete pipe for the sewage disposal outfall were as follows:—

Tender	60-inch Reinforced Concrete Pipe. Bulk Sum.	60-inch Steel Pipe. Bulk Sum.
No. 1	.....	$41,000 00
" 2	.....	56,630 00
" 3	$21,562 00	.....
" 4	21,500 00	.....
" 5	18,855 00	.....
" 6	.....	55,530 00
" 7 (Informal	.....	57,600 00
" 8	.....	48,152 00
" 9 (Informal)	.....	74,000 00

Tender No. 1, of the Canada Foundry Company, Toronto, for rivetted steel pipe, and tender No. 5, of Mr. E. W. Hyde, jr., for reinforced concrete pipe were accepted. The rivetted steel pipe is to be used out in the lake, and the reinforced concrete pipe across Ashbridge's Bay.

British Columbia

VANCOUVER.—Palmer Bros. & Henning, were awarded a contract for the substructure of the new Cambie steel bridge, at $212,600, while the Canadian Bridge Company, Limited, of Walkerville, Ontario, received the contract for the superstructure at $439,210. Full particulars of all tenders submitted and figures showing dimensions, etc., were printed on page 607 of our issue last week.

VANCOUVER.—The Western Engineering Company, Ltd., have been awarded a contract by the municipality of South Vancouver for an electric plunger pump at $925. The pump will be made by Messrs. Hayward, Taylor & Company, of London, England, and will be driven by an A. C. motor. It will be designed to deliver 6,400 gallons of clear water per hour through 7,000 feet of six-inch pipe with a total head of 200 feet. The following firms were awarded contracts for water fixtures: Messrs. Crane & Company for galvanized fittings, amounting to $147.13; the Terminal City Iron Works Company for cast iron specials, amounting to $2,033.36; the Canadian Fairbanks Company for galvanized iron piping amounting to $2,350.80, also for brass goods amounting to $1,814.68; Messrs. Robertson, Godson & Company for hydrants at $48 each. The British Columbia Electric Company was given an order for lighting, which will involve the installation of 150 arc lights.

VICTORIA.—At a recent meeting of the City Council tenders for twelve iron posts, to be erected on the Causeway for street lighting purposes, and to support the trolley wires, were received from Andrew Gray at $1,300, and from Hutchinson Brothers at $1,500. The tenders were referred to the electric lighting committee and the purchasing agent to award the contract. The tender of the Colbert Heating and Plumbing Company for twenty tons of pig lead at $3.59 per 100 pounds was accepted.

A despatch from Ottawa says the Dominion Railway Commission on December 7 will consider the question of issuing a general order compelling all railways under its jurisdiction to equip cars with air brakes. The matter will come up in connection with an application recently made for an order of the board requiring air brakes equipment to be placed on the cars of the Hamilton & Buffalo and the Hamilton Radial Electric Railways, which are Federally incorporated. Should the board decide to issue a general order the other electric railways affected will be the Essex Terminal, the Oshawa Railway, the Ottawa Electric, the Hull Electric, the Montreal Park and Island, the Montreal Terminal Company, the Quebec Railway, the St. John, N.B., Railway Company.

RAILWAYS—STEAM AND ELECTRIC.

Quebec.

MONTREAL.—Three consulting engineers from New York city have been paying a quiet professional visit to Montreal during the past week and although no authoritative statement as to their business was given out, it is believed they are looking over the ground with a view to furnishing plans and estimates for either an elevated or an underground street railway system in the heart of the city.

Ontario

COBOURG.—Every section of the C.N.R. in Northumberland and Durham Counties is the scene of much activity. Between Trenton and Brighton over four miles of track is already graded, while the right-of-way is nearly all fenced in. Mr. J. O. Giroux, contractor at Colborne, brought in a train load of horses recently and work is being pushed in that vicinity. The route is through a fine stretch of country, and it is said that the heaviest grade in the road and greatest curve will be but three degrees, and this where the C.N.R. joins the C.O.R. near Trenton.

KINGSTON.—An agreement has been reached between the City council and the Street Railway Company, who have accepted the terms offered a month ago by the Light, Heat and Power Committee. Mr. H. W. Richardson, president of the railway signed a contract for five years to take power at $1,20 per kilowatt hour. The service has been discontinued for several days.

NIAGARA FALLS.—A newspaper report says the council of Stamford Township have ordered the Niagara and St Catharines Street Railway Company to tear up their track or restore a twenty-minute service between Falls View and Montrose station.

OTTAWA.—The Grand Trunk Pacific Branch Lines Company will apply to the parliament of Canada at its present session for an act authorizing the construction of the following additional lines of railway: From a point on the western division of the G.T.P. railway between the east limit of range 12 and the west limit of range 17 west of the third meridian, thence in a southwesterly and westerly direction to a point in the vicinity of Calgary or to a point on the line which the company is authorized under paragraph 14 of clause 11 of said chapter 99 to construct to Calgary. From a point on the proposed line mentioned in the preceding paragraph between the east limit of range 20, and the west limit of range 28 west of the third meridian, thence in an easterly and southeasterly direction to Regina or to a point in the vicinity thereof. From a point in the proposed line mentioned in paragraph 2 between the east limit of range 24. and west limit of range 27. west of second meridian, to Moose Jaw, or to a point in the vicinity thereof. From a point on the western division of the G.T.P. between Artland and Wainwright, thence in an easterly and southeasterly direction to a point on the line which the company is authorized to construct to Battleford. From Regina or a point in the vicinity thereof, thence in a southwesterly and westerly direction to Lethbridge or to a point in the vicinity of Lethbridge on a line which the company is authorized to construct from Calgary to the boundary of the province of Albert at or near Coutts. The company will also ask for power authorizing the issue of bonds to the extent of $30,000 a mile for its said lines of railway and comprising the said lines within what are defined as the "Manitoba Saskatchewan and Alberta extensions."

PORT ARTHUR.—Several parties of C.N.R. engineers are out working near Nepigon surveying a right-of-way. One party, in charge of Engineer Rose, is surveying between the Nepigon River and Long Lake and the other party is operating near Red Rock, between Nepigon River and Black Sturgeon River. The C.N.R. right-of-way is understood to cross the Nepigon River at Deschamps. The track will run close to the C.P.R. line at this point.

ST. THOMAS.—The commissioners of the municipally-owned street railway here, contemplate the purchase of two new cars, the installation of new motors and extensions, and debentures will probably be issued at an early date to provide the money.

TORONTO.—An offer to construct and operate a tube railway here, for 12 years, has been made by Messrs. Watson, Smoke, Chisholm & Smith, on behalf of a client of theirs whose identity has not been made public.

Manitoba.

WINNIPEG.—The Alberta and Great Waterways Railway northern line is now being rushed ahead rapidly, and it is expected to have the whole 350 miles of line completed by 1911. This announcment was made by Mr. J. A. L. Waddell, chief engineer for the company, who arrived in Winnipeg on Monday to engage engineers for the survey operations. Ten miles of grading have been finished, and Mr. Waddell stated that this work was to be pushed ahead with all possible despatch.

Alberta

EDMONTON.—By a majority of 1,311, the people of Edmonton carried a by-law connected with the entrance of the C.P.R. to the city. The terms include the construction of overhead bridges and subways on the streets crossed, the city assuming all liability for property damages.

LIGHT, HEAT, AND POWER.

Ontario.

HAMILTON.—After a long fight in the council and in the courts the city council unanimously decided on Monday to enter into a contract with the Ontario Hydro-Electric Power Commission for 1,000 h.p., on terms outlined by the Commission.

LONDON.—A contract with the London Electric Company for street lighting, was made this week, for one year, with a three-months' cancellation clause. If the city desire to break the contract by giving the necessary notice, a sliding scale of prices as presented by Mr. Chas. B. Hunt, the manager, will be paid, but if it runs the whole year, the present price, 23 cents per lamp, per night, will hold good.

OTTAWA.—At a meeting of the Eastview council on Wednesday night the first reading of a by-law to give the Ottawa Electric Company a ten year franchise to operate in the village and use of the streets, etc., came up. The rates fixed in the franchise are very nearly the same as those in the city. The franchise will be exclusive for five years, and after that the company will be liable to competition.

British Columbia.

FERNIE.—The fires were lighted under the boilers of the new municipal electric lighting plant at Fernie, for the first time, on November 19th, and the machinery was found to be in a most satisfactory condition. The consumers in the city will probably be supplied with electric light in a few days and the streets of the city will then be lighted properly, the first time since the fire destroyed the equipment. The arc lamps for the principal streets are already in position.

SEWERAGE AND WATERWORKS.

Ontario.

HAMILTON.—The City Engineer will lay out a sewer scheme for the southwestern corner of the new annex, and a new tank will be erected at the Ferguson Avenue sewage disposal plant.

FINANCING PUBLIC WORKS.

Ontario.

MIDLAND.—This town offers for sale until December 14th, $12,000 bonds, the proceeds of which will be used for walks and sewers. Thos. I. Trueman, secretary-treasurer.

TORONTO.—Three money by-laws are to be submitted to the ratepayers of Toronto on January 1. They are to provide for issuing debentures as follows: To raise $759,000 for the extension of Bloor Street easterly to Danforth Avenue, and the construction of a viaduct in connection therewith; to raise $320,000 for new buildings at the Exhibition grounds, and $262,000 for the purchase of lands and the erection thereon of six buildings for the fire department and four police stations.

Manitoba.

MINIOTA.—Until December 7th, telephone debentures amounting to $12,000 are offered for sale by this municipality. Wm. Howard, secretary-treasurer.

VIRDEN.—Debentures amounting to $25,000 are offered for sale until December 20th by the rural municipality of Pipestone, Man. A. P. Power, secretary-treasurer., Virden, Man.

British Columbia

VANCOUVER.—Tenders are invited by the North Vancouver City Ferries, Limited, for $128,000 debentures guaranteed by the City of North Vancouver. Tenders must be lodged before noon of the 22nd December. H. E. Kemp, secretary.

The following municipalities recently sold debentures:—Blind River, Ont., $12,000, town hall, etc.; Exeter, Ont., $22,000, waterworks; Stamford Township, Ont., $8,700, local improvements; Abernethy, Sask., $3,000, telephone, streets and sidewalks; Wetaskiwin, Alta., $2,328, local improvements; North Vancouver, B. C., $62,474, local improvements and loans; Victoria, B. C., $170,000, sewers and waterworks.

MISCELLANEOUS.

Ontario.

TORONTO.—City Engineer Rust estimates that it will cost $800 to install an electric bell at Wallace Avenue railway crossing and $150 per annum to maintain it.

Alberta

EDMONTON.—The largest expenditures of the year for public works have been as follows:—Power plant, $320,000; paving, $125,000; new water main, $40,000; water and sewer, $40,000; plank sidewalks, $16,000; boulevards. $16,000; Kinnaird St. bridge, $6,000; East End Park, $5,000; opening streets, etc., $4,000.

PERSONAL NOTES.

MR. E. A. SCHAUFFELBERGER, of the firm of Jens Orten-Böving & Company, London, England, was in Toronto this week on a business trip.

MR. G. E. MASON, representing the Lancashire Dynamo and Motor Company, of Manchester, England, has opened a Canadian office at 154 Bay Street, Toronto, Ont.

SUPERINTENDENT WILCOX, of Dauphin Division of the C.N.R. is re-appointed superintendent of the Winnipeg-Port Arthur division, succeeding C. D. Murphy, resigned.

MESSRS. RIDOUT & MAYBEE, patent solicitors, Toronto, after occupying offices at 103 Bay Street for sixteen years have removed to more convenient premises in the Manning Chambers, at the west side of the City Hall, Queen Street West.

OBITUARY.

MR. HUGO GROUT, C.E., one of the most prominent men of the Niagara district, died suddenly on November 25 at St. Catharines, aged 78. He was born in Grimsby. One brother, Canon Grout, of Kingston, survives. His other brother, John, was one of the first manufacturers of harvest implements in Canada. Mr. Grout was for thirty years in the employ of the old Atlantic & Great Western Railway Company.

MR. W. McLEA WALBANK, first vice-president of the Montreal Light, Heat and Power Company, died at his residence 241 Peel Street, Montreal, Que., November 28th, 1909.

Mr. Walbank was born at St. Johns, Newfoundland, the son of the late M. W. Walbank, Q.C. He received his early education in his native town, afterwards attending for two years Queen's University, Dublin. In 1875 he came to Canada and in 1877 graduated from McGill University with the degree of Bachelor of Applied Science. Shortly after he was admitted to the Provincial Land Surveyor's Association, of which at a later date he was vice-president.

For several years Mr. Walbank practised the profession of an architect in the firm of Bulman & Walbank, but drifted more and more into active engineering work especially hydraulic engineering, and finally turned his attention altogether to this work.

His great work has been with old Lachine Rapids Hydraulic and Land Company, and afterwards with the Montreal Light, Heat and Power Company, when the two companies amalgamated.

Although Mr. Walbank's creation lost its identity by the amalgamation, he did not lose his as he became vice-presi-

dent of the Power Company and the chief engineering authority of the big concern.

As managing director, Mr. Walbank secured for the Lachine Company the control of the Shawinigan Power Company's interest on the island of Montreal. He was also interested in other power schemes in Montreal and was president of the Citizens' Light and Power Company and of the Standard Light and Power Company of Montreal.

During his active business career Mr. Walbank took a prominent part in the activities of the various organizations among the local engineers. He was one of the founders of the Canadian Society of Civil Engineers, and in 1907 became president of that body. He was also a member of the Engineers Club, and in 1904 was vice-president.

CANADIAN PATENTS.

The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, Manning Chambers, Toronto, from whom further particulars may be obtained : — Franklin Sidey, harness ; Dr. Anton Messerschmitt, process for producing hydrogen; W. J. Green, branding machines; John H. Hall, means of securing spare rims; Wm. H. Hazard, strainers; E. E. M. Payne, purification of water; Friedrich Luthke, motor-waggon; Albert De Dion & Georges Bouton, motor-sleigh; J. F. Stephenson, joints of bedsteads.

Following is the weekly list of patents recently granted to Canadian inventors in Canada, which is furnished by Messrs. Fetherstonhaugh & Co., patent barristers, Royal Bank building, 10 King Street east:—A. Drowley, Priceville, Ont., snow plows; W. J. Curry Victoria, B.C., mops; J. M. Fleming, Ottawa, Ont., automatic regulating means for smoke consumers; J. R. Hamilton, St. John, N.B., combination tools and utensils; F. W. Harris, Owen Sound, Ont., high chairs; B. J. Hayes, Montreal, Que., coat hangers; W. H. Heard, London, Ont., spraying apparatus; J. H. Jackson, Hamilton, typewriting machines; P. Houston, Ottawa, Ont., warning signals for bridges and the like ; L. G. Mickles, Toronto, Ont., tires; J. Moore, London, Ont., ball-bearing chimney and ventilator tops to increase the draft; J. C. Nichol, Ottawa, Ont., lubricators for car axels journals; A. Noland, Midland, Ont., feed boxes for horses; T. H. Speight, Markham, Ont., waggon gears; R. Sylvester, Lindsay, Ont., travelling threshing machines; M. Whitman, Vancouver, B.C., sheaves; B. D. Wright, London, seamless caps; W. Atkins, St. John, N.B., nut locks; I. Wynn, Arnprior, Ont., gates for railway crossings and the like and means for operating same; W. Bolt, Wingham, Ont., railway crossing gates; J. H. Field, Victoria, B. C., electric alarm and call bell system.

RAILWAY ORDERS

(Continued from page 628).

8679—November 17th—Authorizing the H. A. Clemens Company, Limited, of the city of Guelph, Ontario, to construct and thereafter maintain a water pipe under the track of the Canadian Pacific Railway, near the Bramosa Bridge, Guelph, Ontario.

8680—November 4—Directing that the C.P.R. forthwith erect a shelter on or near the wharf at East Robson, B.C., suitable for the protection from the weather of merchandise shipped to or to be shipped from that point, by the boats of the C.P.R.

8681—November 8—Dismissing application town of Lemberg, Sask., for authority to open Main Street, in said town, in a northerly direction across the property and tracks of the C.P.R.

8682—November 4—Dismissing complaint of A. E. Watts, ot Cranbrook, B.C., with regard to inflammable material left on right-of-ways of railways, and the destruction of public roads, including the one from Yank to Copeland, and Sicamous to Vernon, B.C.

8683—November 4—Dismissing complaint of the Kootenay Shingle Company, of Salmo, B.C., that the C.N.R. has departed from the tariffs fixed by the Board with respect to rates, weights, and shortage on shipments of shingles originating at Salmo and consigned to points in British Columbia, Alberta, and Ontario.

8684—November 18—Granting leave to the East Luther and Amaranth Telephone Company to install a telephone instrument in the station of the C.P.R. at Grand Valley, Ont.

8685—February 5—Authorizing the corporation of the city of Winnipeg, Man., to construct a subway under its tracks on the east side of McPhillips Street, between Fonseca Avenue and Jarvis Street, said city.

8686—November 18—Authorizing the G.T.P. Railway to put on a tri-weekly mixed train service between Wainwright and Edmonton, Alta.

8687—November 18—Authorizing the city of Brantford, Ont., to lay and thereafter maintain a sewer pipe under the tracks of the T. H. & B. Railway at Gilkinson Street, between Walnut and Richardson Streets, Brantford, Ont.

8688—November 18—Granting leave to the Farmers' Telephone Company, Limited, to erect, place and maintain its telephone wires across the track of the C.P.R. at south side of highway, Parish of Northampton, County of Carleton, N.B.

8689 and 8690—November 18—Granting leave to the Farmers' Telephone Company, Limited, to erect, place, and maintain its telephone wires across the track of the C.P.R. Company's tracks at south side of highway parish of Brighton, N.B., and at Maple Street, village of Hartland, N.B.

8691—November 18—Authorizing the C.N.R. to open for the carriage of traffic that portion of its line from Saskatoon to Rosetown, Sask., a distance of 72 miles.

8692—November 17—Authorizing the C.P.R. to construct, maintain, and operate a system of industrial spurs, consisting of three tracks, across road allowance between Sections

22 and 23, Tp. 24, R. 9, west of 5th Meridian, and five other spurs in vicinity near Exshaw, Alta.

open for the carriage of traffic the extension of its Snowflake Branch to Windygates, Manitoba, mileage 0 to 6.5.

8695—November 18—Recommending to the Governor-in-Council for sanction agreement of the C.N.R. with the Northern Extension Railway Company.

MARKET CONDITIONS.

Montreal, December 2nd, 1909.

An estimate of the money value of the sales of wire products in the United States during the month of November, is $70,000,000 to $75,000,000. In the matter of raw material, however, the tendency of prices has been downwards. There has been a sharp contraction of business and a reaction in prices of pig-iron and coke. Speculative holders of foundry iron were forced to sell their holdings, yet the total volume of business was but little over one-third of what it was in October. In October, sales were 300,000 tons per week while the total sales in November were but 500,000 tons, including foundry, forge and steel making iron. Meantime, prices have run down all the way from 50c. to $1 per ton. There has also been some pressure to sell spot coke, and ovens have been offering concessions in order to dispose of accumulations. So far as the price of ore is concerned, there has been no reaction in prices among United States mines, but offers have been coming in from abroad to accept lower figures, the result being that more Spanish and Swedish ore has been sold for importation into the country. Finishers of material have been eager to obtain steel billets and have been making large purchases for delivery over the first half of 1910. Taking railway contracts, all round, considerable activity is observable, particularly in the matter of cars, although very little was done in locomotives and rails. There was considerable ordering of structural steel, and the activity promises to keep up.

The market in Great Britain is very quiet and uninteresting. Prices are still maintained but no advance has developed and the tendency is barely steady. Unfinished material is rather firm in tone, owing to the fact that it did not previously follow the advance in raw material.

In the local market, demand continues good. Orders are being received right along for general foundry grades for winter delivery, at advancing prices, and merchants are expressing themselves as greatly encouraged by the situation. It is said that the only furnace with accumulations is a small one and it is holding buyers off rather than encouraging them.

Prices of finished and semi-finished material are generally steady but alterations are now looked for to occur at almost any time. The Hamilton Steel and Iron Company has withdrawn prices on iron and steel bars and similar material, and it is expected that this means that prices are to be advanced by producers, all round. Prices for pig-iron, meantime, have been altered from a basis of dock to ex-store, practically all the iron having now been moved into store. The following quotations are offered:—

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

Bar Iron and Steel.—The market promises to advance shortly. Bar iron, $1.85 per 100 pounds; best refined horseshoe, $2.10; forged iron, $2; mild steel, $1.85; sleigh shoe steel, $1.85 for 1 x ⅜-base; tire steel, $1.00 for 1 x ⅜-base; toe calk steel, $2.35; machine steel, iron finish, $1.90; imported, $2.20.

Boiler Tubes.—The market is steady, quotations being as follows:—1½ and 2-inch tubes, 8¼c.; 2½-inch, 10c.; 3-inch, 11¼c.; 3½-inch, 14 1-2c. 4-inch, 18 1-2c.

Building Paper.—Tar paper, 7, 10, or 16 ounces, $1.80 per 100 pounds; felt paper, $2.75 per 100 pounds; tar sheathing, 40c. per roll of 400 square feet; dry sheathing, No. 1, 30 to 40c. per roll of 400 square feet; tarred fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch).

Cement.—Canadian cement is quotable, as follows, in car lots, f.o.b., Montreal:—$1.30 to $1.40 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight.

Chain.—Prices are as follows per 100 lbs.:—¼-inch, $4.90; 5-16-inch, $4.40; ⅜-inch, $3.70; 7-16-inch, $3.50; ½-inch, $3.25; 9-16-inch, $3.20; ⅝-inch, $3.15; ¾-inch, $3.10; ⅞-inch, $3.05; 1-inch, $3.05.

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

Copper.—Prices are strong at 14 to 14¼c.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 15c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, $2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 10,000, 75c. per 100; broken lots, $1; electric blasting apparatus:—Batteries, 1 to 10 holes, $15; 1 to 20 holes, $25; 1 to 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5. Double strength fuses, 4-ft., $3.75; 6-ft., $4.29; 8-ft., $4.83; 10-ft., $5.37. Fuses, time, double-tape, $6 per 1,000 feet; explohmeters, fuse and circuit, $7.50 each.

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

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

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

Laths.—See Lumber, etc.

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

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

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

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

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

Pipe.—Cast Iron.—The market is unsettled and uncertain, as dealers are compelled to meet competition from all sources. Prices are easy and approximately as follows:—$31 for 6 and 8-inch pipe and larger; $32 for 5-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—Demand is much better and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black and 44 per cent. off for galvanized; ½-inch, $8.50, with 69 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 72½ per cent. off for black, and 62½ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch, $95; 4-inch, $108.

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

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

Railway Ties.—See lumber, etc.

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

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

Spikes.—Railway spikes are firmer at $2.45 per 100 pounds, base of ⅝ x 10-5½ x 9-16. Ship spikes are steady at $2.85 per 100 pounds, base of ⅝ x 10-inch, and ⅝ x 12-inch.

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

Telegraph Poles.—See lumber, etc.

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

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

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

CAMP SUPPLIES.

Beans.—Prime pea beans, $1.85 per bushel.

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

Canned Goods.—Per Dozen.—Corn, 77½ to 82½c.; peas, $1 to $1.10; beans, 75 to 80c.; tomatoes, 82½ to 90c.; peaches, 2s, $1.65, and 3s, $2.65; pears, 2s, $1.60, and 3s, $2.30; salmon, best brands, 1-lb. talls, $1.87½, and flats, $2.02½; cheaper grades, 95c. to $1.65.

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

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

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

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

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

Molasses and Syrup.—Molasses, New Orleans, 28 to 30c.; Barbadoes, 40 to 50c.; Porto Rico, 40 to 45c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, $2.50 per case.

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

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

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

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

* * * *

Toronto, December 2nd, 1909.

The continued open weather favorable to building keeps the price of building supplies steady. If any change it is a slight advance.

Orders for next season's work are being taken at this year's prices, but for structural steel work the large firms are not anxious for orders as they expect prices to advance.

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

Antimony.—Demand active and price higher at $9.25 per 100 lbs.

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

Bar Iron.—$1.95 to $2, base, per 100 lbs., from stock to wholesale dealer. Market well supplied.

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

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $12.10; 3½-inch, $15; 4-inch, $18.50 to $19 per 100 feet.

Building Paper.—Plain, 30c. per roll; tarred, 40c. per roll. Demand is only moderate.

Bricks.—Business is very active, price at some yards $9 to $9.50, at others, $9.50 to $10 for common. Don Valley pressed brick move also freely. Red and buff pressed are worth $18 delivered and $17 at works per 1,000.

Broken Stone.—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 60c. per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. The demand has been active for some weeks, and supply not equal to it; feeling is upward. Broken granite is selling at $3 per ton for good Oshawa.

Cement.—Manufacturers' prices for Portland cement are $1.40 without bags, or $1.70 including cotton bags for car lots on board car, Fort William or Port Arthur; the price at Toronto is $1.30 without bags, or $1.70 with bags. Smaller dealers get $1.35 to $1.40 per barrel without bags, in load lots, delivered in town. Demand is fairly steady. A good deal moving in filling former contracts.

Coal.—Retail price for Pennsylvania hard, $7.25 net, steady. This price applies to grate, egg, stove, and chestnut; only pea coal is cheaper, namely, $6.00. These are all cash, and the quantity purchased does not affect the price. Soft coal is in good supply, American brokers have been covering the ground very fully. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote. Youghiogheny lump coal on cars here, $3.70 to $3.80; mine run, $3.60 to $3.75; slack, $2.65 to $2.85; lump coal from other districts, $3.40 to $3.70; mine run 10c. less; slack, $2.50 to $2.70; cannel coal plentiful at $7.50 per ton; coke, Solvey foundry, which is largely used here, quotes at from $5.75 to $6.00; Reynoldsville, $4.90 to $5.00; Connellsville, 72-hour coke, $5.50.

Copper Ingot.—Demand quite heavy, and price advanced to 14¼c. Supply adequate.

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.—An improvement in demand of late, no change in price, which is $1.80 per 100 lbs. Much is being now used for lumber camps.

Fire Bricks.—English and Scotch, $30 to $35; American, $25 to $35 per 1,000. The demand is steadv.

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

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

Iron Pipe.—Repeat quotations of last week, as follows:—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch, $3.28; 1-inch, $4.70; 1¼-inch, $6.41; 1½-inch, $7.70; 2-inch, $10.26; 2½-inch, $16.39; 3-inch, $21.52; 3½-inch, $27.08; 4-inch, $30.76; 4½-inch, $38; 5-inch, $39.85; 6-inch, $51.70 Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.43; 1-inch, $6.35; 1¼-inch, $8.66; 1½-inch, $10.40; 2-inch, $13.86, per 100 feet.

Lead.—Prices steady outside. This market is steadier, and demand quiet, at $3.75 to $3.85 per 100 lbs.

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

Lumber.—Prices continue steady, and city demand still active. We quote dressing pine $32.00 to $35.00 per M; common stock boards, $26 to $30; cull stocks, $20; cull sidings, $17.50; Southern pine dimension timber from $30 to 45, according to size and grade; finished Southern pine according to thickness and width, $30 to $40. Hemlock in car lots, $16.50 to $17; spruce flooring in car lots, $22 to $24; shingles, British Columbia, weak, and rather over-stocked, $3 to $3.10; lath, No. 1, $4.40, white pine, 42-inch; No. 2, $3.75; for 32-inch, $1.60.

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

Pitch and Tar.—Pitch, demand moderate, price so far unchanged at 70c. per 100 lbs. Coal tar fairly active at $3.50 per barrel.

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

Plaster of Paris.—Calcined, New Brunswick, hammer brand, car lots, $2; retail, $2.15 per barrel of 300 lbs.

Putty.—In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.05. Plasterer's, $2.15 per barrel of three bushels.

Ready Roofing.—Dealers report a large demand, the prices being as before, per catalogue

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

Rope.—Sisal, 9½c. per lb.; pure Manila, 12½c. per lb., Base.

Sewer Pipe.—

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

Business steady; price, 73 per cent. off list at factory for car-load lots; 65 per cent. off list retail. Small lots subject to advance.

Steel Beams and Channels.—Quiet.—We quote:—$2.50 to $2.75 per 100 lbs., according to size and quantity; if cut, $2.75 to $3 per 100 lbs.; angles, 1¼ by 3-16 and larger, $2.50; tees, $2.80 to $3 per 100 pounds. Extra for smaller sizes of angles and tees.

Steel Rails.—80-lb., $35 to $38 per ton. The following are prices per gross ton, for 500 tons or over; Montreal, 12-lb. $45, 16-lb. $44, 25 and 30-lb. $43.

Sheet Steel.—We do not alter prices as yet; 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. Quite a good demand exists, and there is prospect of higher prices.

Sheets Galvanized.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $2.90; 12-14-gauge, $3.00; 16, 18, 20, $3.10; 22-24, $3.25; 26, $3.40; 28, 3.85; 29, $4.15; 10¾, $4.15 per 100 lbs. Fleur de Lis—28-gauge, $4; 26, $3.80 per 100 lbs. Demand very active.

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

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

Tin.—The feeling in tin is firm, and the price 32 to 33c. per lb.

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

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

CAMP SUPPLIES.

Beans.—Hand picked, $2; prime, $1.90.

Butter.—Dairy prints, 21 to 22c.; creamery rolls, 26 to 27c.

Canned Goods.—Peas, $1.00 to $1.50; tomatoes, 3s, 85c. to 95c.; pumpkins, 3s, 80 to 85c.; corn, 75 to 85c.; peaches, 2s, white, $1.50 to $1.60; yellow, $1.90 to $1.95; strawberries, 2s, heavy syrup, $1.90 to $1.95; raspberries, 2s, $1.90 to $1.95.

Cheese.—No old cheese on hand; new cheese, large, 12¾c.; twins, 13c.

Coffee.—Rio, green, 10 to 12½c.; Mocha, 21 to 23c.; Java, 20 to 31c.; Santos, 11 to 15c.

Dried Fruits.—Raisins, Valencia, 5½ to 6c.; seeded, 1-lb. packets, fancy, 7½ to 8c.; 16-oz. packets, choice, 7 to 7½c.; 12-oz. packets, choice, 7c.; Sultanas, good, 5 to 6c.; fine, 6 to 7c.; choice, 7 to 8c.; fancy, 8 to 9c.; Filiatras currants, 6½ to 7c.; Vostizzas, 8½ to 9c.; uncleaned currants, ¼c. lower than cleaned. California Dried Fruits,—Evaporated apricots, 14 to 15c. per lb.; prunes, 60s to 70s, 7 to 7½c.; 90s to 100s, 6½c.; evaporated apples, 9¼c.

Eggs.—New laid, 25 to 26c. per dozen, in case lots.

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

Lard.—Tierces, 15½c.; tub, 15¾ to 16c.; pails, 16c. per lb.

Molasses.—Barbadoes, barrels, 37 to 45c.; Porto Rico, 45 to 60c.; New Orleans, 30 to 33c. for medium.

Onions.—$1.25 a bag.

Potatoes.—Best, 75c. a bag.

Pork.—Market uncertain. Short cut, $28 per barrel; mess, $26.50.

Rice.—B grade, 3½c. per lb.; Patna, 5½ to 5¾c.; Japan, 5¼ to 6c.

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

Smoked and Dry Salt Meats.—Long clear bacon, 14 to 14½c., tons and cases; hams, large, 14 to 14½c.; small, 15½ to 16c.; rolls, 14½ to 14¾c.; breakfast bacon, 17c.; backs (plain), 18 to 19c.; backs (peameal), 18c. to 18½c.; shoulder hams, 12c.; green meats out of pickle, 1c. less than smoked. Market very firm.

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

Sugar.—Granulated, $4.85 per 100 lbs. in barrels; Acadia, $4.75; yellow, $4.45; bags, 5c. lower; bright coffee, $4.65; bags, 5c. less.

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

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

* * * *

Winnipeg, November 30th, 1909.

The Winnipeg market is steady and a fair demand is still noted all around, especially for supplies for interior work; this demand, it is expected will be well kept up, but depends to a certain extent on the weather. There has been no severe weather so far, and several large contractors are still rushing outside work on a few large buildings that were not completed.

In conversation last week with the Winnipeg representatives of a large American steel exporting firm, they stated that architects, engineers, and contractors would do well to anticipate their steel requirements at as early a date as possible, if they wish to get delivery of their orders in time for them to get on with their work in the early spring. They also report a strengthening tendency in the steel market following the general advance of a month or so ago. While there has been no actual advance named, prices are now perceptibly stronger than they were a month ago, and the outlook is for a continuing stronger market situation. Wholesale hardware and crockery dealers have been having a run on lamps in Winnipeg during the past week, caused by the break down of the Winnipeg Electric Railway Company's power plant at Point du Bois. The demand for cement is fairly strong still, and lumber also continues to be active. Dealers in cement on this market state that in the spring they expect the price of cement to go higher, and in fact look for higher prices all around next spring, if present indications hold good.

Winnipeg quotations are as follows:—

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

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

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

Bar Iron.—$2.50 to $2.60.

Bars.—Crow, $4 per 100 pounds.

Beams and Channels.—$3 to $3.10 per 100 up to 15-inch.

Boards.—No. 1 Common Pine, 8 in. to 12 in., $38 to $45; siding, No. 2 White Pine, 6 in., $55; cull red or white pine or spruce, $24; No. 1 Clear Cedar, 6 in., 8 to 16 ft., $60; Nos. 1 and 2 British Columbia spruce, 4 to 6 in., $55; No. 3, $45.

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

Building Paper.—4½ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No 2 tarred, 62½c.; plain, 56c.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $9.75 large lots to $10.50 ton lots, net; Alleghany soft coal; carload lots, basis, Winnipeg, f.o.b., cars, $6 per ton; cannel coal, $10.50 per ton; Galt coal, $2