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The Canadian Engineer

ESTABLISHED 1893

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1907 INDEX READY.

Index for Volume 14 (1907) of the Canadian Engineer is now ready. Subscribers desiring copies will kindly drop us a postal to that effect.

CONTENTS OF THIS ISSUE.

WANTED—MEN.

Annual elections bring the annual crop of election promises and promised reforms. The Works Departments, or the Engineer's Department is the great spending bureau of the municipalities, and it is these departments that receive the most attention at such times.

Reorganization is the word that is expected to work magic, but it is not usually reorganization, but men that are required—and not always men in the Engineering Departments, but men in the city councils.

Not only men big mentally and of master minds, but men too big to be mean. It is the mean man who disorganizes any service, we want men big enough to inspire confidence in the municipal departments. Annually the councils change, it is the public servants that give steadiness and continuity to the city's government. How can we expect the best from them unless they feel their governors are too big to lie, too strong to bow to popular disapproval, too wise to be penurious?

Men in public office must be imaginative, men of wide vision, courageous men, then, and then only will we secure a good public service.

But sometimes bigger men are required in the service. Men so big that their own interests are not always in sight. Men with some patriotism and public pride, unselfish men. Men not too big for their office, yet bigger than their office. Then they will always be ready to attack new problems; ready to do what is required of them. Loyal men they should be, loyal to the men above them, loyal to the men below them, loyal to their profession and occupation.

It is not so much organization but bigger men that we require at the beginning of the year.

TORONTO'S SPEECH FROM THE THRONE.

The annual address of the Mayor of Toronto is always looked forward to with much interest. The city council yearly appropriate an amount for city services equal to that appropriated by the Provincial Government for the Province, and this year will be no exception.

Mayor Oliver first paid his compliments to party politics in municipal affairs, and it is well that Mr. Oliver sets his face against party politics; it will be better if he can lead the council for a year without allowing them to deal with measures and appointments regardless of their influence on party affairs. City finances he declared to be satisfactory, but not so the manner in which heads of departments submitted their estimates. Estimates must be submitted early, and they must be complete, for little encouragement will be given towards allowing interim appropriations.

The city water supply, the Mayor considers defective as to purity, which he thinks can be corrected by filtration beds; as to quantity which he suggests may be improved by enlarging the reservoir and increasing the capacity of the pumping station. The new six million gallon pump is expected to be completed in three months.

A trunk sewer has been advocated for years, the new Mayor is one of those who appreciates its necessity, and although he speaks well of the scheme, yet he gives but little hope of it being carried out in the immediate future.

In railway matters, the erection of the new Union Station, the extension of the street railway, and a petitioning of the Government as to a two-cent rate are discussed, but here, too, little hope of success is expressed.

The reorganization of two departments is suggested, Works and Treasury. The Works Department because the City Engineer has to devote too much time to office routine and detail, and cannot give the large engineering questions of Toronto proper attention; the Treasury Department should be separated from the audit department, and the audit department strengthened.

The Bell Telephone Company's franchise, public baths, and the city jail control were also dealt with.

Taken altogether the address was progressive in its tone. It showed a man experienced in civic affairs with a thorough grasp of the city's requirements. A man of constructive ability ready with a solution of the problems that were presented. A man of thorough business training not likely to be stampeded should trying times arise.

VACUUM PUMPS FOR DIRTY WATER.

C. M. Ripley, New York City.

The design and operation of pumps which work on the vacuum principle, are not generally understood by engineers, contractors, mine superintendents and men interested in irrigation work. It is fitting, therefore, to discuss the general features of vacuum pumps as well as the particular improvements in the latest addition to this type of pumping machinery known as the Emerson Steam pump, manufactured by the Emerson Steam Pump Company, of Alexandria, Va.

A pump operating on the vacuum principle possesses decided advantages where sand or other gritty material is contained in the water, and the remarkable lightness of weight and ease with which its location can be changed as excavation work shifts or mine shafts are sunk lower and lower, make this type of pump particularly useful in unwatering cofferdams, caissons, mines, quarries and isolated work of all kinds.

History.

The idea of raising water by the condensation of steam in a chamber and then forcing it up to a still higher level by the direct pressure of steam on the surface of this water in the same chamber, originated with Capt. Thos. Savery, who in 1698 patented his celebrated "fire engine." Properly speaking, his device was not an engine but a sort of pump, a forerunner of the present Emerson steam pump. In operating Thos. Savery's engine one cylinder was filled with steam, the steam valve was closed by the operator and a spray of water was then injected into the steam. The continual services of a man were needed to operate the steam valve and an almost continuous stream of water was delivered. A great sale was built up for this pump until Newcomens' atmospheric engine displaced it and piston pumps began to come into the field. The displacing of Savery's pump was largely due to the fact that the expansive power of the steam was wasted, and the steam consumption was hence enormous. No progress was made in vacuum steam pumps for nearly 200 years when in 1872 and 1881 Mr. Chas. Hall patented the Pulsometer.

A saving of at least 25 per cent. in the amount of fuel, one of the main advantages of the Emerson pump, is the result of early steam cut-off which is made possible by the design of the rotary slide valve steam ports.

Operation.

In general, as shown in the sectional cut, the Emerson pump consists of two long cigar-shaped cylinders or receiving tanks, each connected at the bottom through upward opening valves with the suction pipe; and also connected, again with upward opening valves, with the discharge pipe, thus having but four valves in all for the average standard pump.

In the Emerson pump the steam is used twice. First it presses directly down on the surface of the water in the chamber and forces it out through the discharge pipe. Second, this same steam is itself then suddenly condensed, creating a vacuum which re-fills that chamber with a new charge of water. Where two cylinders are used as shown in the picture one of them (which we will call cylinder No. 1) with full boiler pressure acting on the top of the water, is discharging; while at the same time the other cylinder (which we will call No. 2) has just created an almost perfect vacuum and is sucking in the water. Filling the vacuum requires less than two seconds, and after an interval of only a fraction of a second the next inrush of steam into that chamber empties it in about two more seconds. After an interval of but a small fraction of a second, the water having been expelled and cylinder No. 1 full of live steam, a jet of cold water as shown in the picture, is forced from cylinder No. 2 into this steam, condensing it and creating an almost perfect vacuum, thus completing the cycle for cylinder No. 1. This cycle can be summarized as follows:—

A. Steam admitted to cylinder No. 1, forces out liquid.

B. Same steam condensed by jet of cold water from cylinder No. 2, creates vacuum.

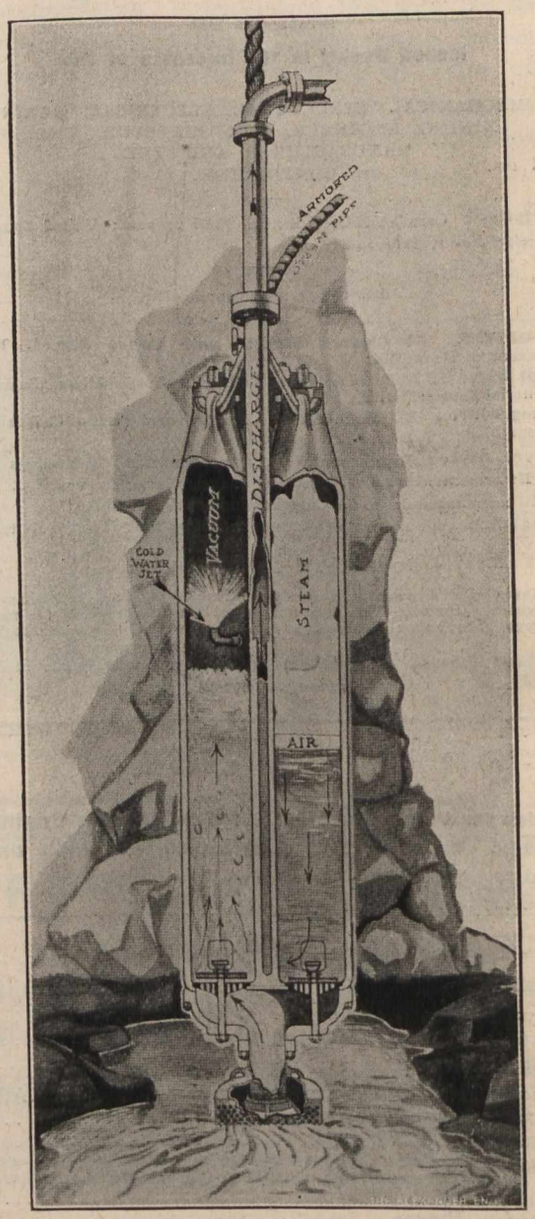
C. Vacuum thus formed refills No. 1 with water from the suction pipe, regardless of possible inrushing air, until the vacuum is relieved.

These items take place alternately in the two chambers. That is, comparing this pump with the human heart, one cylinder is acting as an auricle while the other is acting as a ventricle, and vice versa.

A number of conditions, however, must be properly dealt with in order to obtain a pump on the vacuum principle which operates satisfactorily.

Durability.

As all users of pumps realize, the wear and tear created by sand, grit, loam or any foreign matter, is a very serious item. By studying the pictures herewith it will be noticed that the liquid being pumped never comes into contact with any-



thing which moves, except the four round rubber valves, two in the suction and two in the discharge pipes. Thus the gritty material can be handled without the necessity of frequent repairs because the Emerson pump employs no plungers, pistons, piston rods, glands, stuffing boxes nor any other moving parts come in contact with the water being pumped.

Weight.

The weight per given capacity is considerably lower than that of any other pump on the market. A pump with a capacity of 1,200 G.P.M. against a 25-ft. head weighs only 2,700 lbs. It should be remembered, too, that there is no engine to be brought in order to furnish power to the Emerson pump, since the steam from the boiler is made to act direct, both in expelling the water and, by means of a vacuum, in sucking in the supply from the sump. Since this pump is self contained and operates entirely on the principle of steam expansion against a column of liquid, it follows that its weight is less than the weight of other pumps plus the weight of the engine necessary to drive them.

Transportability.

Where this type of pump is used in connection with excavation work, in cofferdams, caissons, quarries and mines, where the location of the pump must be frequently changed both in a horizontal and a vertical direction, it has proved a wonderful advantage as a time saver. It needs but to be hung on a rope and does not have to be lined up on a firm, level foundation so as to accommodate any transmission belts, shaft or chain, as would be necessary in a centrifugal or the average reciprocating pump and its engine.

Capacity.

Mr. W. R. Emerson, Vice-President, stated in a recent interview with the author, "Our standard pump will lift three times as much water as any other sinking pump of equal weight. It will pump three times as much water as any sinking pump that can be placed in the same space, and, furthermore, it can be had of a capacity four times as great as that of any other pattern of sinking pump." The above statement appears plausible when we consider that the cigar-shaped body of the pump makes it ideal for use in a mine shaft or as a sinking pump where the shaft area in cofferdams, sumps and caissons is very much confined.

Steam Control.

The mechanism for controlling the admission of steam alternately to the two cylinders, is all encased so as to be entirely protected from any danger of injury or clogging by dirt or other accumulation. The Emerson pump can be operated with perfect success, although nine-tenths submerged in water. The admission and cut-off valve is a flat rotary valve turned by a very small engine which is hidden in the upper end of the pump, the exhaust pipe of which empties into the suction pipe of the pump. Thus no steam is liberated and this pump is ideal for underground work where greasy steam in the air would cause discomfort for the workmen.

It is a matter of such importance as to deserve emphasis, that the engine is at the top, and hence no part of it or of the rotary valve is ever reached by the material being pumped. The steam chamber above the flat rotary valve is always filled with steam as long as the throttle is open. As shown in the sketch, the rotary valve has an open segment and when this latter is over the port leading to one of the chambers, this chamber is supplied with steam at boiler pressure, which is later shifted automatically to the other chamber.

CORES, CORE SAND AND CORE-MAKING MACHINERY.*

By C. H. Wadsworth.

(Continued from Last Week.)

A word with regard to such cores may be of interest. In the first place, where these cores have to stand up against quite a body of metal, it is often necessary that they be exceedingly stiff. This necessitates the use of core wire. The ordinary annealed iron wire is too soft for this purpose. Some foundries have overcome this difficulty by stretching the wire about 10 per cent. of its length, which hardens it and stiffens it. The same result may be obtained by having the wire passed a certain number of times through the drawing dies after its last annealing. Such wire as this is being manufactured by one firm in the United States. The mixture for these very small cores should be made of good, sharp silica sand and some very good, strong core binder. The expense per pound of mixture is a consideration which drops out of sight entirely in comparison with the necessity for having strong, accurate cores which can be handled, and which will not fail when the metal strikes them.

MACHINE-MADE CORES.

We will now consider cores known as machine-made cores. The line of core machines exhibited here to-night are the result of experiments carried to a successful conclusion to overcome difficulties met in foundry practice which had come under the speaker's observation.

The first machine developed was one to produce cylindrical cores from 1 in. to 1½ in. in diameter. Dies were afterward fitted to this same machine, which enabled us to make cores to 2¼ in. in diameter and down to ⅜ in. At first it was supposed that only cylindrical cores could be made, on account of the fact that it was observed that the core as it came from the die always rotated. Later, however, an attempt was made to turn out square cores, and as this proved successful many other irregular shapes of prismatic cross-section have been successfully turned out on the standard machine.

It was natural that some foundries would demand larger cores than the first machine could produce, and so a new one was designed, known as the No. 2, which was capable of turning out cores up to five inches in diameter. This was successful, and the design was later changed so as to enable it to make cores up to seven inches in diameter.

When the first machine was brought out it was intended to be operated by hand, but in response to the demand which came from certain customers power attachments were supplied. When the larger machine was designed it was intended as a power machine only, but experiments showed that by using a large flywheel it was possible to turn out any size of core by hand, and later there came an enquiry for a machine capable of turning out slab cores, and to meet this demand the multiple spindle core machine was designed, and it has proved very successful, indeed.

The next step was naturally to use the multiple spindles for turning out several cores in parallel, and a machine of this type is on exhibition. The next demand received was one that at first sight seemed a staggerer. It was for one which should turn out small, square cores which should not vary more than two 1,000 of an inch above or below the required size; in other words, should be held within four 1,000 inch as the total limit of error.

To accomplish this the multiple spindle principle was used, special dies designed for the purpose, and the cores turned out very satisfactory in all particulars. One point worthy of note is that these core machines could never have been designed and made successful without keeping in very close touch with the work which they were doing. Occasional visits to the factories where they were installed has given opportunity to study the weaknesses and to correct them, and this has resulted in the improvement of the machine and bringing it to its present state of excellence.

Core machine mixtures are an important part of the core machine business. They vary greatly, depending upon the size of the core used and the available material. As in all core mixtures, sharp sand is the base of the mixture. Flour has also been found to be the best binder for most core sands, but it has also been found advantageous to add a small quantity of boiled linseed oil to the mixture.

In the case of very small cores, a relatively larger amount of oil and flour is required, and the amount of water used in tempering the mixture must be kept as low as possible, as too much water will cause the sand to pack in the die and block the machine. The larger the die the smaller the amount of bonding material necessary, and the larger quantity of water the mixture can carry.

RECOGNIZED STANDARD MIXTURES.

Certain standard mixtures have been developed and recommended as a basis for experiment, but as the core sand used in each district is liable to vary from that used in other districts, the natural bond in the sand will have a varying effect, and hence the amount of bond to be added must vary to suit. As something to work on in beginning to experiment the following mixtures are recommended:—

Mixture for Grey Iron for Cores, ⅜ to 2¼ in.

Twelve quarts silica, lake or clear, sharp sand, free from loam or clay.
Two quarts flour.
Half-pint boiled linseed oil.

For Cores, 2¼ to 7 in.

Fifteen quarts sharp sand.
Three quarts Zanesville or a loam sand.
Three pints flour.
Half-pint boiled linseed oil.

(Continued on Page 51.)

*Extracts from a paper read at the Lewis Institute, Chicago.

CORRESPONDENCE

[This department is a meeting-place for ideas. If you have any suggestions as to new methods or successful methods, let us hear from you. You may not be accustomed to write for publication, but do not hesitate. It is ideas we want. Your suggestion will help another.—Ed.]

CONCRETE SPECIFICATIONS.

Sir,—Associate in his question of concrete specifications in your issue of January 3rd, 1908, has left out the most important part of the specification, which is that of the sand, also of the stone or gravel. The question would then be clear providing the material to be used conforms with the specification.

There should be no difficulty when clean sand and broken stone are used. But when gravel contains a proportional part of sand, the field engineer should conform to the clause which reads, "Unless otherwise specified," and obtain his proportions in accordance with the ratio of the sand to the stone, thus adding the cement to make his proportion for concrete as specified.

Yours truly,

Bala, January 9th, 1908. E. L. Miles.

CONCRETE HEATER.

Sir,—With reference to our letter in your issue of 10th inst., we beg to say that you would find it a good way of heating sand or gravel by taking an 18-inch cast-iron gas main, 8 inches to 12 inches long, and lighting your fire inside. This would give you a large heating surface and by blocking one end with bricks and putting a small pipe in you would have a good draft. This has been found an excellent way of heating sand as the sheet of cast-iron when it gets red hot is likely to bend and sink down in your fire.

Yours very truly,

G. L. Dobbin, Local Manager,
Mussens Limited.

Toronto, Ont., January 11th, 1908.

A CORRECTION.

Sir,—May I ask you to insert this correction of my small contribution to the columns of your issue of January 3rd, 1908, page 17. Towards the latter part the article should read as follows:—

EXAMPLE—Let y = 388 Chains 41.2 Links = 388 + 41.2
= 388.412 Chains.

then $B_0 = y\,(\frac{1}{2}+\frac{1}{10}) =$

194.206
38.8412
233.0472

$\therefore x =$

233.0472	..... = B_0
23.30472	..... = B_1
256.35192	

The remainder is in order.

Yours very truly,

W. H. Pretty, 476 Alymer St., Peterboro, Ont.

January 6th, 1908.

HEIGHT OF ARC LIGHTS.

Sir,—In your issue of January 3rd, Junior asked for information as to the height of arc lights.

In general, enclosed arc lamps for street lighting purposes are hung from 18 to 20 feet above the street level, a lower height being used on streets having shade trees. The old open arc lamp was placed as high as twenty-five feet above the street. This is not necessary with the enclosed arc, the distribution of light from the arc being more horizontal than the old open arc.

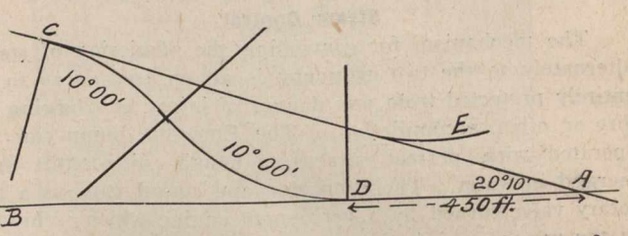
The illumination immediately under the enclosed arc lamp is good, and there are no heavy shadows.

Yours, Electrician.

Toronto, January 11th, 1908.

RAILWAY CROSS-OVER.

Sir,—Two railroad lines, C. E. and B. D., run side by side. From the point D on B D we wish to run the shortest 10° reverse curve that will connect the two lines. The angle



of intersection of the centre lines of the two roads is 20° 10' the point D is 450 feet from the intersection point. I would be pleased to receive a solution from yourself or any of your readers, as I do not find this problem treated upon in our field books.

January 13th, 1908. Yours, Rodman.

ENGINEERING SOCIETIES.

CANADIAN RAILWAY CLUB.—President, W. D. Robb, G.T.R.; secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

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

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

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, W. McLea Walbank; secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1908. January 28th, 1908, annual meeting of the Society.

TORONTO BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—96 King Street West, Toronto. President, E. H. Keating; secretary, T. C. Irving, Jr. Traders Bank Building.

ENGINEERS' CLUB OF TORONTO.—96 King Street West. President, J. G. Sing; secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months. January 23rd, 1908, "Water Transportation from the North-West," by Mr. F. L. Somerville.

CANADIAN ELECTRICAL ASSOCIATION.—President, R. S. Kelsch, Montreal; secretary, T. S. Young, Canadian Electrical News, Toronto.

CANADIAN MINING INSTITUTE.—413 Dorchester Street West, Montreal. Presilent, Frederick Keffer, Greenwood, B.C.; secretary, H. Mortimer-Lamb.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, R. McColl.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, TORONTO BRANCH:—Louis W. Pratt, secretary, 123 Bay Street, Toronto.

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

(Continued from Page 49.)

Mixture for Brass and Aluminum Castings.

Four quarts silica or good, sharp sand.
Two quarts brass moulding sand.
Quarter-pint boiled linseed oil.

The more water the mixture will carry the harder and stronger the core will be when baked.

No. 1 Core Mixture for Steel Castings, ½ to 2¼ in.

This mixture is used without grinding.
Six quarts silica sand.
One quart flour.
Quarter-pint boiled linseed oil.

Cores, 2½ in. and above.

Eighteen quarts silica sand.
Three quarts fire clay.
One and quarter quarts flour.
Half-pint boiled linseed oil.

These steel mixtures must be very thoroughly mixed by hand when a more suitable way is not available. The fire clay can be increased or decreased according to the hardness of the core produced by the particular sand in use.

No. 2 Mixture for Steel Castings, ½ to 2¼ in.

This mixture should be ground thoroughly in a mill.
Six quarts silica sand.
Quarter-pint boiled linseed oil.
One and a-half pints flour.

Cores, 2½ in. and above.

Six quarts silica sand.
Three pints flour.
Quarter-pint boiled linseed oil.

We know that in practice many foundries have departed a long way from these mixtures, but believe that the formulae given above will serve as a guide in working our core machine mixtures.

In some cases all cored holes are bored in the machine shop. Under these circumstances a perfectly smooth hole is not necessary. It is only essential that the core leave the casting readily, and that it does not leave a hard scale in the hole. This may usually be accomplished by the use of a good grade of sand and a moderate amount of flour and oil in the binder.

At this point, however, it may be well to state that flour as sold to the foundryman is not a definite compound, and that many so called core flours are loaded with plaster of Paris, ground gypsum, etc. Now, these adulterants may or may not have an effect on the scale which the hot iron will form when it strikes the core, but they certainly do have an effect on the bonding properties of the flour, and a few dollars thrown off the price per ton on these heavily loaded flours may be far more than offset by the reduction in the bonding power of the material; hence, in figuring your core mixtures it is well to see that you are really using flour.

To return to the subject of machine-made cores, it is of interest to note that with the advent of the core machine many agricultural implement manufacturers have discovered that machine-made cores can produce true, round, parallel holes, which will vary less than one one-hundredth of an inch in diameter, and that by the use of suitable blacking on the cores these holes can be cleaned perfectly, so that shafts may be safely run in bearings which are cored to receive them, and are given no subsequent machining. In like manner, wheels are run on axles without machine work. In fact, the machine-made core has revolutionized the design of several agricultural implements and these castings in which machine-made cores are used.

EXPERIMENTS CONDUCTED.

The speaker had carried on a series of experiments with a large variety of core mixtures in the attempt to determine what was best for use in his own foundry, and also in the foundries of many users of his core machines. Some of the materials experimented with have been interesting. For instance, some years ago the black loam from a celery swamp was tried in core mixtures with sharp sand, and it was found that when this was dried and ground, tempered and put through a core machine, it produced a core which left the work readily and gave a remarkably clean hole, and it may be that some foundrymen will find material of this kind good for his particular needs. The vegetable mixture contained in it shrinks in the core oven and gives ample vent to the core, and it burns out in the casting, causing the core to be very rotten, indeed. Great care must be taken in baking such cores as they will burn very easily. It would be probable, however, that it might be difficult to obtain a sufficient supply of this material in most localities.

One of the most recent materials experimented with is a natural core sand produced at the quarries of the Ballou White Sand Company, Millington, Ill., and there are on exhibit here to-night cores produced from this sand. It has been found that this grade of sand works in the core machine more freely than any other grade of sand that has ever come under the speaker's observation, as will be demonstrated later in the evening when the machine is in operation.

Before closing the talk I believe it will be of interest to speak of the manner in which the mixtures for the large cores used in connection with core boxes in our own foundry are treated at present.

These mixtures were formerly made by hand from a mixture of 50 per cent. new, sharp sand and 50 per cent. new No. 4 Zanesville, which is a loam sand with two parts compound. We decided that if the old core sand could be passed through a suitable mill that the bond could be made much more efficient and the old sand used over, but as we could not find an over-driven mill of the type that suited us, we designed and manufactured one. This was put into operation recently, and to our surprise we find that we can now use 90 per cent. of old sand in the mixture, and that we have been able to cut out the more expensive sand that we formerly used in our core mixture, so that at present we have 90 per cent. old sand and 10 per cent. new, sharp sand from a local sand bank.

Formerly we used two parts to the hundred of dry core compound; now we use but one part to the hundred and a little molasses water. That is to say, it has been found that the dry core compound in the old core prints, and also in the interior of the larger cores, is still active, and when thoroughly incorporated with the new mixture by grinding in the mill it becomes effective when the core is baked.

The saving effected in labor and materials will pay for the mill in considerably less than a year, and we think others will find it equally advantageous, and hence we have decided to put it on the market with our other foundry specialties.

BAKING OF CONES.

The subject of core mixtures would not be complete without some treatment of the baking of cores. In the baking of an ordinary core two processes take place. First, the water used as a temporary bond is expelled as vapor; and second, by the application of a higher heat the permanent bond is made effective. The natural or clay bonds are made effective by drying, for at the temperature of an ordinary core oven these bonds do not vitrify.

Such bonds as linseed oil, corn oil, resin, pitch, etc., become effective by first being made more fluid under the influence of heat so that they spread rapidly through the sand grains; and second, by being partially oxidized or changed chemically so hat as the core cools it hardens.

This is particularly true in the case of linseed oil or corn oil. Where flour is used as a binder the hardening process is essentially the same as the making of bread; in other words, through the action of the heat and the expulsion of the moisture, the gluten in the flour is made effective.

An efficient core oven should have the largest possible amount of the space in the oven occupied by cores. To accomplish this in the case of machine-made cores requires a rectangular oven with straight drawers. The drawers should be so designed that the expansion or contraction of the oven will not cause them to bind, and at the same time the drawers should be so arranged that the front of the oven is closed, no matter whether the drawers are pushed back into the oven in baking position or drawn out into the charging position.

To secure these advantages the oven exhibited here to-night has been designed, and the fuel used can be either coke, coal, gas or fuel oil.

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.

LIGHT, HEAT, AND POWER.

Ontario.

CORNWALL.—The International Waterways Commission has been asked by the Dominion Government for a report on the proposition of the Long Sault Development Company for damaging the St. Lawrence River at the foot of the Long Sault Rapids, above Cornwall. The power that would be created by the erection of a system of dams at this point would be very large, but it is claimed that the enterprise would have a serious effect on navigation, and that it would result in property damages for as much as thirty miles up stream from this point.

Alberta.

CALGARY.—The civic lighting plant cleared a net profit this year of $26,000. This is a good showing for municipal ownership. A portion of the net profits will be rebated to the citizens.

TENDERS.

New Brunswick.

MONCTON.—Tenders will be received until February 15th, 1908, for the lease of car and work shops, together with the siding to shops at Moncton. L. K. Jones, Secretary, Department of Railways and Canals, Ottawa.

CONTRACTS AWARDED.

Quebec.

MONTREAL.—The Grand Trunk Pacific has awarded a contract to Foley Bros. & Larson, of St. Paul, for the construction of 126 miles from a point six miles east of Edmonton to Wolfe Creek, 120 miles west of Edmonton. The contract amounts to several million dollars.

British Columbia.

REVELSTOKE.—Providing the city council can dispose of debentures, Mr. T. F. Sinclair has been awarded the contract for the construction of the sewerage system. The contract price being $51,454.18. The contract for septic tanks and pipes will be let later.

RAILWAYS—STEAM AND ELECTRIC.

Ontario.

FORT WILLIAM.—The Fort William Terminal Railway & Bridge Company has given notice of application to Parliament for an act to extend the time for the commencement and completion of the works authorized.

KENORA.—By a majority of two hundred and forty-three Kenora carried a plebiscite in favor of a street railway.

TORONTO.—It is rumored that Mr. Edmund Wragge, C.E., has been retained by the railway companies to prepare a plan dealing with the question of the railway viaducts in Toronto. Mr. Wragge was formerly local manager of the Grand Trunk Railway here. When seen he positively declined to state whether he was employed on a viaduct plan or not. He also declined to discuss the viaduct problem at all.

THESSALON.—Government aid is being sought for the Thessalon and Northern Railway from Thessalon to the main line of the Canadian Pacific Railway.

WINDSOR.—The Windsor, Chatham & London Railway Company is applying for an extension of time.

Quebec.

MONTREAL.—Mr. Howards, of the City Roads Department, has been directed by the council to superintend the preparing of plans for elevating of the Grand Trunk Railway tracks through the city.

Manitoba.

RIVERS.—The G.T.P. round-house is nearly completed. The buildings, it is said, will soon be in general use as the company are reported to be contemplating moving their headquarters from Portage la Prairie to this place.

ST. BONIFACE.—Perhaps there is no more tangible evidence of the progress of the work on the Transcontinental Railway east of Winnipeg, and of active construction mapped out for next summer in the vicinity of this city, than the fact that the headquarters for district "F," which, since the beginning of operations, have been located at Kenora, Ont., have been removed this week to St. Boniface. District Engineer S. R. Poulin, who lately succeeded Major Hodgins, is in charge, and a complement of sixteen engineers, draughtsmen, and clerks is employed. Before being appointed to his present position, Mr. Poulin was in charge of district "D," with offices at Fort William. Within a couple of hundred miles of this city there are enough men working on construction to populate a small town, over 6,000 being employed. Mr. Poulin stated that everything is being done to rush the work through as rapidly as possible, and, on account of the phenomenal weather conditions this winter and the splendid labor conditions, the contractors were enabled to push their work at a speed never attained before. The greater portion of the work on the line east of the Winnipeg River is now completed, and Mr. Poulin states that if the expectations of the commission are realied, trains will be running to that point at an early date next summer. The track has now been laid to within eighteen miles of Rennie, where the Transcontinental Railway crosses the Canadian Pacific, and on the completed stretch of track out of Winnipeg. J. D. McArthur & Company, contractors, have three or four engines, three long ballast trains, and a track laying machine at work. The line will be completed to Rennie in a few weeks. By June the bridge over the Winnipeg River will be ready for the steel.

New Brunswick.

FREDERICTON.—Mr. Burns and Gilmour Brown, the commissioners appointed to examine and report on the conditions of the branch lines of railway in New Brunswick, and also to obtain options on the same, have presented their findings to the Government. There are nine branch lines of railway in New Brunswick which tap the I.C.R. as follows:—The Caraquet and Gulfshore, the Kent Northern, the Beersville, the Buctouche and Moncton, the New Brunswick and Prince Edward Island, the Salisbury and Harvey, the Elgin and Havelock, the St. Martins, and the York and Carleton. The commissioners say they travelled over each of these lines, inspected thoroughly bridges, stations and all conditions connected therewith. They contend they notice many improvements and pay a compliment to the Kent Northern on the manner which it keeps running even through the worst winter storms. They quoted statistics to prove those branches are of incalculable benefit to the I.C.R.

British Columbia.

VANCOUVER.—The grading of the first ten miles of the E. & N. extension to Alberni will be commenced at once. Word to the effect has been received by the Provincial Government from R. Marpole, general executive assistant of the C.P.R. in this Province. The ten miles referred to covers from Wellington the present terminus, to the head of Nanoose Bay.

Alberta.

EDMONTON.—After months of patient endeavor the miniature army of surveyors that has been scouring the

Copper River country has at last hit upon a suitable grade for the Grand Trunk Pacific line direct from Fort George to Prince Rupert, and if this grade is approved the Grand Trunk Pacific Railway Company will adandon its proposed circuitous route between those two points, thus leaving Hazelton untouched. The new grade will save a detour of many miles, striking direct from Fort George to Prince Rupert.

CALGARY.—The city council have received another offer to install a street railway plant. The offer comes from Alexander and Budd, acting for J. Balfour, London, Eng., and includes among other things, a fifteen year franchise.

SEWAGE AND WATERWORKS.

Ontario.

GUELPH.—The Guelph Waterworks are installing a Duplex Boiler Feed Pump, being supplied by the Smart-Turner Machine Company, Limited, Hamilton.

TORONTO.—The high pressure system will be ready for operation in the early part of February, such was the statement made by Waterworks Engineer Fellows.

Saskatchewan.

SASKATOON.—Plans are being prepared for an extension of the sewerage and waterworks system next year.

NEW BUILDINGS.

British Columbia.

VICTORIA.—In view of the congestion which is now being felt in the postal and customs department, coincident with the increase in the city's population and business, the Ottawa authorities of the Public Works Department will shortly be asked to consider a request for additional accommodation. Plans of the projected changes have been prepared, and it is expected they will be carried out at an early date.

VICTORIA.—It is expected that $50,000 will be spent on new buildings by the British Columbia Agricultural Association.

Ontario.

NORTH BAY.—The Smart-Turner Machine Company, Limited, Hamilton, are installing one of their Automatic Feed Pumps and Receivers, in the new Normal School.

Saskatchewan.

SASKATOON.—The Dominion Government will spend about $100,000 on a new post office and custom house here during 1908. Excavation has been commenced.

MISCELLANEOUS.

Ontario.

BRANTFORD.—The Waterous Company, of Brantford, Ont., are negotiating with the Harmsworth Company for the erection of machinery for the manufacturing of wood pulp at Newfoundland.

TORONTO.—It is reported that negotiations are in progress between the Turbine Steamship Company, Toronto, and the Michigan Central Railway, whereby the former company may gain control of the Michigan Central's Niagara River line, and thus secure quick connections for their passengers to Buffalo.

PERSONAL.

MR. R. A. BROWN, late of Calgary, Alta., has secured the position of city electrician at Nelson, B.C.

MR. J. E. J. PATTERSON, formerly of Salisbury, has moved to Port Arthur, Ont., where he will be engaged in his profession as civil engineer.

MR. W. D. BARCLAY has been appointed general manager of the Halifax and Southwestern. Mr. Barclay is a civil engineer of wide experience, and for a number of years was a member of the firm of Foley Bros., contractors.

MESSRS. MATHEWS, MOORE AND HILL have been re-elected Water Commissioners for Peterboro, Ont.

WEBER STEEL CONCRETE CHIMNEY COMPANY, of Chicago, have opened an office at Room 36 Guardian Bldg., Montreal.

BAULNE, BERTRAND, GAGNON, Civil Engineers, Montreal, are preparing detail drawings for the bins of the cement works here.

MR. H. T. BALLANTYNE, B.A. Sc., architect, of 244 Fifth Avenue, New York, has opened an office in the Trafalgar Building, Ottawa, Can., where commissions will be executed.

MR. GEORGE W. STEPHENS, chairman of the Montreal Board of Harbor Commissioners, accompanied by F. W. Cowie, Harbor Engineer, has left for Europe on a trip which will extend until May, during which time it is expected they will have visited practically every European port of importance, for the purpose of inspecting their facilities with a view to introducing the best of them in the equipment of the port of Montreal.

SOCIETY NOTES.

On the 9th inst., the Engineers' Club of Toronto held their ninth annual meeting. The reports of the various officers were received. The secretary's report showed an increase in membership. The membership now numbers over two hundred and fifty. The treasurer's report showed a larger cash balance than last year, even with a much larger disbursement.

The officers elected for 1908-09 were:—President, J. G. Sing; first vice-president, A. B. Barry; second vice-president, C. M. Caniff; secretary, R. B. Wolsey; treasurer, L. B. Street; chairman of committees' rooms, W. Fuller; papers, R. Black; library, Mr. Reynolds; auditors, A. M. Wickers and R. Cummings.

During the evening many very complimentary references were made to Mr. Willis Chipman, C.E., and to his years of unselfish work in the interest of the Engineers' Club.

Refreshments were served and music, both instrumental and vocal, was provided. This innovation on the part of the executive was much appreciated.

Mr. Harry A. Moore will present a paper on "Induction Motors" at a meeting of the Toronto Section of the American Institute of Electrical Engineers. The meeting will be held at the Engineers' Club, 96 King Street West, this evening.

Vancouver ratepayers voted on Thursday on money-by-laws aggregating $1,068,800. Over a million dollars was asked with which to build permanent bridges in the city. Although the by-law is approved it is not probable that all the money will be spent next year, with the rate so high as at present. For new schools, $130,000 is required; $28,800 for school offices and storerooms; addition to general hospital, $130,000, and to assist a permanent annual exhibition, $50,000. In addition to these, the city has still on its hands $445,000 of unsold debentures based on the three by-laws that received the assent of the ratepayers last summer, namely, sewer by-law, $300,000; macadam roads, $100,000; additions to schools, $45,000. The by-laws approved by the ratepayers totalled $1,500,000. Two were rejected, $28,000 for school offices and storerooms, and $50,000 for exhibition. Those carried are for three steel bridges, $1,120,000; new schools, $130,000; opening, grading, and macadamizing streets, $50,000; addition to general hospital, $130,000.

EXPANSION, A HALT, AND NOW?

1906	**!**
1907	**!!**
1908	**???**

MARKET CONDITIONS.

Montreal, January 16, 1908.

The metal markets throughout the world appear to be at a standstill. From the United States comes reports of dullness, the anticipated improvements not having yet materialized. The general tone does not exhibit an increased tendency towards firmness while from different sections come reports of continued dullness, a disposition towards easiness being thus indicated. Finished material seems to be showing rather more easiness, even, than pig iron, for the reason that hitherto it has not been selling on a basis of the reduced cost of pig iron. Merchants seem to be putting up a firm front, their hope in present prices being largely based on their expectation of a number of orders from railways in the near future.

Very little is to be said of the English markets. In the absence of orders, either from home or abroad, furnaces are remaining out of operation. Stocks of metal in store are showing an increase and, on the whole, the situation must be regarded rather as easy than as firm.

In the local market, there is practically nothing doing. An order placed by the C.P.R. for 400 box cars has occasioned considerable comment. The Nova Scotia Steel & Coal Company was fortunate enough to get the order for the steel which will be used in the cars, while the Dominion Car and Foundry got the order for building the cars. The car company has been all but shut down for a short time past.

Antimony.—The market has shown increased weakness during the past seven days, and the result is that purchases may be made this week at 12½ to 13c. per lb. This is the lowest quotation for a long time past. Demand is on the dull side.

Bar Iron Steel.—Dealers in Montreal still demand the following figures: though purchases may possibly be made at lower figures: Bar iron, $2.15 per 100 pounds; best refined horse-shoe iron, $2.55, and forged iron, $2.40; mild steel, $2.20 per 100 pounds; sleigh shoe steel, $2.20 for 1 x ⅜-base; tire steel, $2.30 for 1 x ⅜-base; toe calk steel, $2.95; machine steel, iron finish, $2.30.

Boiler Tubes.—The market shows a strong tendency and dealers do not expect to see any declines in price, as boiler makers are very busy. Prices are as follows:—Two-inch tubes, 8 to 8¼c.; 2½-inch, 11c.; 3-inch, 12 to 12¼c.; 3½-inch, 15 to 15¼c.; 4-inch, 19¼ to 19½c.

Cement—Canadian and American.—Canadian cement is 10c. lower, being quoted at $1.80 to $1.90 per barrel, in cotton bags, and $2.20 to $2.30 in wood, weights in both cases 350 pounds. There are four bags of 87½ pounds each, net, to a barrel, and 10 cents must be added to the above prices for each bag. Bags in good condition are purchased at 10 cents each. Where paper bags are wanted instead of cotton, the charge is 2½ cents for each, or 10 cents per barrel weight. American cement is steady at $1 per 350 pounds, basis Lehigh mills, conditions being the same as in the case of Canadian mills, save that when the cotton bags are returned in good condition, only 7½ cents is allowed for them. American cement sold at $2 to $2.10 on track.

Cement—English and European.—English cement is unchanged at $1.80 to $2 per barrel in jute sacks of 82½ pounds each (including price of sacks) and $2.10 to $2.20 in wood, per 350 pounds, gross. Belgian cement is quoted at $1.75 to $1.90 per barrel, in wood. German is $2.52 to $2.55 per barrel of 400 pounds for Dyckerhoff.

Copper.—The market shows no change in price this week. Demand for copper is reported good and the market is firm. Quotations are 15½ to 16c. per lb.

Iron. — Dealers make the claim that they will not accept less than the following for carload lots: Londonderry is only offering for future shipments, and is quoted at $24 f.o.b. Montreal for No. 1. Toronto prices are about $1.25 more. Summerlee iron is arriving, and is quoted at $24 f.o.b. on cars, Montreal, for No. 2 selected, and $25 for No. 1. No. 1 Cleveland is unobtainable at the present time, and Clarence at $20 to $21. Carron special, $24; soft, $23.75, to arrive.

Lead.—Prices have been fluctuating for a considerable time past, but during the past few days they have steadied down somewhat and quotations are now $3.90 to $4 per 100 lbs. These figures are slightly higher than those of a week ago.

Nails.—The market is steady and demand is dull. Cut nails are quoted at $2.50 and wire at $2.55, base prices.

Pipe—Cast Iron.—The market is next thing to dead, as nothing is used during the winter. Prices are steady at $36 for 8-inch pipe and larger; $37 for 6-inch pipe, $38 for 5-inch, and $39 for 4-inch at the foundry. Gas pipe is quoted at about $1 more than the above.

Pipe, Wrought. — Trade continues on the dull side. Quotations and discounts for small lots, screwed and coupled, are as follows: ¼-inch to ⅜-inch, $5.50, with 53 per cent. off for black and 38 per cent. off for galvanized. The discount on the following is 66 per cent. off for black and 56 per cent. off for galvanized: ½-inch, $8.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; and 3-inch, $75.50.

Spikes.—Railway spikes are not in very good demand, $2.60 per 100 pounds, base of 5½ x 9-16 Ship spikes are steady at $3.15 per 100 pounds, base of ⅝ x 10 inch and ⅝ x 12 inch.

Steel Shafting.—At the present time prices are steady at the list, less 25 per cent. Demand is very dull.

Steel Plates.—Demand is quite dull. Prices are steady at $2.75 for 3-16, and $2.50 for ¼ and thicker, in small lots.

Tin.—The market for tin is easier this week. Demand is light, and prices are about a cent under those of a week ago, at 30½ to 31c. per lb.

Tool Steel.—Demand is light but the market is firm. Base prices are as follows: Jessop's best unannealed, 14½c. per pound, annealed being 15½c.; second grade, 8½c., and high-speed, "Ark," 60c., and "Novo," 65c.; "Conquerer," 55 to 60c.; Sanderson Bros. and Newbould's "Saben," high-speed, 60c.; extra cast tool steel, 14c., and "Colorado" cast tool steel, 8c., base prices. Sanderson's "Rex A" is quoted at 75c. and upward; Self-Hardening, 45c.; Extra, 15c.; Superior, 12c.; and Crucible, 8c.; "Edgar Allan's Air-Hardening," 55 to 65c. per pound.

Zinc.—The market has recovered somewhat during the past week, and prices are now 5 to 5½c. per lb. Demand is only fair.

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Toronto, January 16, 1907.

Not much to add about lumber to what was said last week. White pine is steady and prices maintained. Southern pine weak at somewhat lower prices. We hear of a cut of $2 on hemlock at Wiarton, but the price here is still $19 to $21.50 wholesale, as to size. Dressing pine commands a range of from $32 to $40, the latter figure for extra lengths; common, $30. No change in shingles and lath.

Most of the cement mills have closed down, and there is but little activity in the article at this season. Prices are maintained, however, at the figures we quote. Brick are moving more freely than is usual at this date. The Don Valley people have not reduced their quotations.

In metal goods and structural material not much activity exists; in fact this is the slack month of the year with hardware and metal dealers. Bar iron is steady, and in fact there is hardly any change to be noted in iron and steel. In the opinion of the United States Steel Company manufac-

turers' steel and heavy material generally is already as low as it can go. Other metals hold their own in price; copper is meanwhile unchanged, lead and tin are growing stronger in outside markets.

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

American Bessemer.—Fourteen-gauge, $2.65; 17, 18, and 20-gauge, $2.75; 22 and 24-gauge, $2.85; 26-gauge, $2.95; 28-gauge, $3.20.

Antimony.—Quiet at 11½ to 13c. New York opinions are that the present low prices cannot continue.

Bar Iron.—$2.20 base, from stock to the wholesale dealer. A moderate supply on hand.

Boiler Heads.—25c. per 100 pounds advance on boiler plate.

Boiler Plates.—¼-inch and heavier, $2.50. Supply probably adequate and quotations still firm.

Boiler Tubes.—Lap-welded steel, 1¼-in., 10c.; 1½-in., 9c. per foot; 2-in., $9.10; 2¼-in., $10.85; 2½-in., $12; 3-in., $13.50; 3½-in., $16.75; 4-in., $21 per 100 ft. There is no reduction in price.

Building Paper.—Plain, 32c. per roll; tarred, 40c. per roll, and the market decidedly strong at these prices.

Bricks.—Common structural $10 per thousand, as before, and the demand fairly brisk. Red and buff pressed are worth $18 at Don Valley Works.

Cement.—Star brand, Toronto, 1,000 barrel lots, $2.25 per barrel, 350 pounds net, including bags, or $1.85 ex-package, small lots cost $2.10 warehouse, $2.15 delivered. National and Lakefield prices are identical; English, Anchor, $3 per barrel in wood. Demand has relaxed.

Felt Paper—Roofing Tarred.—Market steady at $2 per 100 lbs.

Fire Bricks.—In steady request; English, $32 to $35; Scotch, $30 to $35; American, $25 to $40 per 1,000.

Galvanized Sheets—Apollo Gauge.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.25; 12-14-gauge, $3.35; 16, 18, 20, $3.50; 22-24, $3.70; 26, $3.95; 28, $4.37½; 29 or 10¾, $4.70 per 100 lb.

Ingot Copper.—Market shows improvement, quiet, with firm prices. Our quotation is 15 to 16⅛c.

Lead.—Outside markets are improving; no change here from 4½c.

Nails.—Wire, $2.55 base; cut, $2.70; spikes, $3.15. Supply moderate.

Pitch.—Quiet at 75c. per 100 lbs.

Pig Iron.—Summerlee No. 1, always in demand, generally for small lots, quotes now, nominally, $27; Glengarnock, $26.50; No. 2, $26; Cleveland, No. 1, $23.50, $24; Clarence, No. 3, procurable in Montreal, price here $23 to $24.

Steel Rails.—80-lb., $35 to $38 per ton.

Sheet Steel.—In moderate supply; 10-gauge, $2.65; 12-gauge, $2.75.

Tar.—Market unsettled, $3.50 per barrel the ruling price.

Tank Plate.—3-16-in., $2.65; Tees. $2.90 to $3 per 100 pounds; angles, 1¼ by 3-16 and larger, $2.75 to $3. Extras for smaller sizes.

Tin.—Developing great strength in primary markets. We still quote 31 to 32c here.

Tool Steel.—Jowitt's special pink label, 10½c. per pound; Capital, 12c.; Conqueror, highspeed, 70c. base.

Wrought Steam and Water Pipe.—Trade prices per 100 feet are: Black, ¼ and ⅜-in., $2.59; ½-in., $2.89; ¾-in., $3.90; 1-in., $5.60; 1¼-in., $7.65; 1½-in., $9.18; 2-in., $12.24; 2½-in., $22.15; 3-in., $30.00. Galvanized, ¼ and ⅜-in., $3.41; ½-in., $3.74; ¾-in., $5.06; 1-in., $7.26; 1¼-in., $9.90; 1½-in., $11.88; 2-in., $15.84; 3½-in., black, $39.00; 4-in., $42.85. Prices firm but unchanged, stock light.

Zinc.—The market is more active and price steady. Toronto, slab, $5.50; sheet, $7.50.

DEPARTMENT OF RAILWAYS AND CANALS, CANADA.

TRENT CANAL.

ONTARIO-RICE LAKE DIVISION.

SECTION No. 3.

NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Trent Canal," will be received until 16 o'clock on Thursday, 12th March, 1908, for the works connected with the construction of Section No. 3, Ontario-Rice Lake Division of the Canal.

Plans and specifications of the work can be seen on and after the 1st February, 1908, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, at the office of the Superintending Engineer, Trent Canal, Peterboro, Ont., and at the office of Mr. J. B. Brophy, Division Engineer, Trenton, Ont., at which places forms of tender may be obtained.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,

Department of Railways and Canals, Secretary.

Ottawa, January 16th, 1908.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

PROFESSIONAL PAGE

OFFICIAL TRIALS OF THE FASTEST WARSHIP.

H.M.S. "Tartar," the new 33-knot British destroyer, which has already, in its preliminary trials, broken the world's record for speed by attaining 35.952 knots per hour on an Admiralty course, carried out its final speed trials on Monday, the 16th December, in the presence of various Admiralty officials. The vessel maintained the unprecedented speed of 35.363 knots throughout a continuous run of six hours' duration, thus covering a total distance of nearly 233 miles during this period. On six runs over the measured Admiralty knot during the six hours run the mean speed proved to be 35.672 knots, and the best speed attained on any one run was 37.037 knots, thus creating still another record.

Built throughout by Messrs. John I. Thornycroft & Co., Ltd., at their works opposite Southampton docks, the "Tartar" is one of the first five high speed ocean going destroyers now being completed for the Admiralty. So far, her speed is very considerably in excess of that of any of the sister vessels by other builders, the fastest of which has attained only 34¼ knots.

The turbines of the "Tartar" are of Parson's type, and these, as well as the Thornycroft boilers using oil fuel, were constructed by Messrs.