

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

Coloured covers/
Couverture de couleur

Coloured pages/
Pages de couleur

Covers damaged/
Couverture endommagée

Pages damaged/
Pages endommagées

Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée

Pages restored and/or laminated/
Pages restaurées et/ou pelliculées

Cover title missing/
Le titre de couverture manque

Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées

Coloured maps/
Cartes géographiques en couleur

Pages detached/
Pages détachées

Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)

Showthrough/
Transparence

Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur

Quality of print varies/
Qualité inégale de l'impression

Bound with other material/
Relié avec d'autres documents

Continuous pagination/
Pagination continue

Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure

Includes index(es)/
Comprend un (des) index

Title on header taken from:/
Le titre de l'en-tête provient:

Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

Title page of issue/
Page de titre de la livraison

Caption of issue/
Titre de départ de la livraison

Masthead/
Générique (périodiques) de la livraison

Additional comments:/
Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>									

The Canadian Engineer

Vol. II.—No. 8.

TORONTO, DECEMBER, 1894.

PRICE, 10 CENTS
\$1.00 PER YEAR.

The Canadian Engineer.

ISSUED MONTHLY IN THE INTERESTS OF THE

CIVIL, MECHANICAL, ELECTRICAL, LOCOMOTIVE, STATIONARY,
MARINE AND SANITARY ENGINEER, THE MANUFACTURER,
THE CONTRACTOR AND THE MERCHANT IN THE
METAL TRADES.

SUBSCRIPTION—Canada and the United States, \$1.00 per year; Great Britain, 5s. Advertising rates on application.

Offices—62 Church Street, Toronto; and Fraser Building, Montreal.

BIGGAR, SAMUEL & CO., Publishers
Address—Fraser Building, MONTREAL, QUE.
E. B. BIGGAR
R. R. SAMUEL
Toronto Telephone, 1392. Montreal Telephone, 2689.

CONTENTS OF THIS NUMBER :

	PAGE		PAGE
Automatic Rudder Locking	231	Industrial Notes	245
Apparatus	231	Isolated Storage Battery Plant	241
Boiler Setting, Improved	232	Krupp Gas Engine	235
Canadian Association of Stationary Engineers	241	Literary Notes	243
Can. Society of Civil Engineers	240	Metal Imports from Gt. Britain	239
Canadian vs. Foreign Cement	240	Mining Matters	249
Cataract Construction Co.'s Turbine	233	New Street Stop Cock	242
Concrete - Iron Arches and Slabs	233	Patent Review	252
Crane's Noiseless Back Pressure Valves	244	Patents, List of	252
Electric Flashes	247	Personal	252
Georgian Bay Canal and Lake Simcoe Water Power	237	Railway and Marine News	251
Hamilton Water Power and Canal Scheme	229	Review of Metal Trade	244
Herr Friedrich Alfred Krupp	230	Road Tests of a Modern Locomotive	244
		Setting Valves	231
		Toronto and Hamilton Power and Water Supply Aqueducts—are they Feasible Schemes?	236
		Wind Pressure	230

THE HAMILTON WATER POWER AND CANAL SCHEME.

Reference was made in last number to the scheme proposed by William Golding, a well-known engineer of New Orleans, for a canal for water supply and power purposes from Lake Erie to Hamilton.

Mr. Golding gives THE CANADIAN ENGINEER a pretty fair outline of his proposals. In a letter to the city engineer of Hamilton in October, he wrote:

"Having been among the first to direct attention to the great power running to waste in the surplus water falling from Lake Erie to Lake Ontario, I feel much interest in everything relating to the subject, and having devoted much study to the engineering branch, I am anxious to direct your attention to the fact that your city is the proper location for central power works.

"I am well acquainted with Hamilton, having lived there previous to 1850. You are doubtless aware that at the Falls of Niagara, by reason of the Tail race, 27 feet high and 36 feet incline, also incline to inflow, the net fall is reduced to about 100 feet, while at Hamilton the fall will be fully 300 feet net; again at Niagara the power will be developed at the bottom of the pit and will lose considerable in transmission to the top, while at Hamilton the power will be delivered and utilized at the bottom of the fall, thus saving the loss by transmission. With the fall of 300 feet, water engines will give greater efficiency than the Turbine. I observe that some engineers claim that the flow over the falls is practically unlimited, yet you will find upon investigation that it will require a volume 300 feet wide and 15 feet deep to develop 100,000 horse-power at Niagara Falls, and since the loss by transmission, all considered, will be 33½ per cent., it is evident that the supply is not so great as supposed. Therefore, you will see that Hamilton is the proper place for a power centre. I have not a good map of the section in which I have indicated the canal, yet I have been over the ground

from Caledonia bridge to Brantford. My idea is to use the bed of Grand River by deepening and widening the channel as a part of the supply canal. At the brink of the mountain there will be a right angle canal which will feed the power plant."

In correspondence with this journal, Mr. Golding says: "A canal 100 feet wide and 15 feet deep will supply the water for 100,000 horse-power net. The water will flow through the canal with a velocity of three feet per second, the decline being two inches to each mile. The cross section being 1,500 x 3 feet velocity, equals 4,500 cubic feet per second, equals 270,000 per minute x 62½ pounds per cubic feet, the total weight will be 16,875,000 pounds, which falling 300 feet, equals 5,062,500,000 foot pounds, which, divided by 33,000, equals 153,409 horse-power, from which deduct one-third, 102,273 horse-power net.

"Grand River flows about midway between Lake Erie and the bank of the mountain at Hamilton, total distance 28 miles; therefore, by using the bed of Grand River from Lake Erie there remains but 14 miles of canal to cut. It may seem strange to make a river run backward, but this can readily be done by deepening the bed. Grand River could not supply the canal with any regularity; therefore, when the discharge of the river is sufficient, there will be no water taken from the lake, and when the river is low the water will flow in from the lake; in this way there will be a constant and uniform supply, and there will be no interference with the flow of commerce of Grand River.

"The cost of the canal cannot be even approximated without a careful examination of the ground, yet it is fair to assume that it will not exceed the minimum of work of this kind. The revenue of such a canal for commerce would be considerable. The revenue for power service would be ascertained as follows:

"The average cost of steam power in the United States, and, of course, Canada, is sixty dollars per year per horse-power; now if the total 100,000 horse-power could be disposed of at a reasonable price, there would seem to be plenty of margin for profit from the supply of power.

"The entire subject seems to be quite simple. There is no complication about it whatever, there is no experiment in it, everything being in strict line with engineering, and there is no doubt but that power can be supplied from Hamilton for one-half the cost it can be supplied from Niagara Falls, and with one-third of the flow of water.

"Now, why should power be developed at Niagara for service at Hamilton, 40 miles distant? Why should expensive works be put down at Niagara, where only 100 feet can be utilized, instead of at Hamilton, where 300 feet can be utilized?

"The more you investigate the subject, the more clear it is that Hamilton is the natural power centre.

"I, therefore, suggest that you begin by inviting your subscribers to furnish you with estimates of the power that could be utilized in their particular sections, provided that it be supplied at one half the cost of steam; also ascertain the cost of steam power for each

section. By thus showing that there is a demand for the service of power, you may induce capitalists to establish the works.

"I will also suggest that you make inquiries as to the value of the supply canal for commerce. You know that freight can be raised and lowered by power much cheaper than by locks. All things considered, I believe that the subject is sufficiently outlined for the present."

HERR FRIEDRICH ALFRED KRUPP.



A history of the Krupp works of Germany shows that it is the result of three generations of effort. Friedrich Krupp, the founder, grandfather of the present owner, the descendant of an old and honorable family in Essen, was born July 17, 1787, and commenced work very early in life as a forgerman. He started business in Essen in 1810, establishing a small steel crucible factory from which he turned out files, stamps, dies, and various small tools. His business increased, and in 1819 he opened a large place which is still standing amid the present array of buildings. At first successful, a few years later misfortunes came upon him, and when he died in 1826 he left his family in straitened circumstances. His son Alfred, who was born April 26, 1812, was but fourteen years old when his father died, but he had been carefully instructed by him in the trade secrets, and took charge of the business. For a long period the boy acted as smelter, forgerman and clerk. Owing to his diligence, energy and great inventive faculties, he became very successful. The introduction of railroads enlarged his markets, and his invention of a process for hardening steel increased his reputation very materially. His invention for the production of rails without welding pieces together was patented in all parts of the world in 1853. Twelve years later he began to acquire iron and coal mines. His first guns were produced in 1847, but it was twenty years later when the superiority of his steel for fire-arms was recognized. Alfred Krupp died July 14, 1887, and his only son, Herr Friedrich Krupp, who was born in 1854, and whose portrait is here shown, is his successor, and is now sole owner of this extensive establishment, which employs 2,700 persons. Comfortable houses, schools, hospitals and churches have been built by Herr Krupp for his employes. He also maintains several charitable institutions. But though the gun works have made the Krupps famous, they have other establishments, and make steam and gas engines, screws and a variety of machines, which are shipped to all parts of the world. One of the steam hammers used in the gun works has a striking force of 50 tons, and may be made much greater. In their engine works they

have 65 engines, 1,150 machine tools, 10 steam hammers, 18 cupolas, and 29 crucible furnaces. The works have taken 113 medals and first prizes at the leading exhibitions of the world.

WIND PRESSURE.

The amount to be allowed for in designing a structure has long been recognized as very disputable, says Prof. W. C. Kernot of the Australasian Association for the Advancement of Science. The pressure is modified enormously by different conditions. In the case of a roof, the vertical wall of the building may, by deflecting the wind current, greatly reduce the wind load, and similarly the leading edge of a plane inclined to the wind experiences a greater pressure than the leeward one. The old formulas connecting wind pressures and velocities are known to be most misleading, and, further, as has been shown by repeated experiments, the maximum mean pressure on a surface of many square feet in area is only about two-thirds the maximum pressure recorded on a single foot of it. The Board of Trade require in bridges an allowance for a pressure of 56 lb. per square foot, though a pressure of about 35 lb. per square foot would overturn nearly every carriage running on our railways. Professor W. C. Kernot's experiments as described in a paper read recently before the Australasian Association for the Advancement of Science, have been directed to two points in particular, viz., the relation between the pressure and velocity, and the determination of the modulus of different forms. The former experiments were not very satisfactory, as the results were somewhat discordant. The modulus of a form may be defined as the ratio between the area of normal cross-section of a solid body, and that of a flat plate which, exposed to the same wind, has the same total pressure on it. The wind was obtained by means of a special form of fan, the arrangements being such that a fairly uniform velocity was obtained at the outlet. The models to be tested were placed in the centre of the blast, and the pressure on them recorded directly by a delicate and a carefully calibrated spring balance. Thus the total pressure on rectangular blocks was practically the same whether they were placed with one face normal to the wind or diagonally. The total pressure was found to be .9 of that on a thin flat plate equal in area to one face in the case of a cube, and from 0.7 to .9 in the case of other rectangulars, the higher figure being obtained for blocks more than three times as high as the width of the base. A rectangular pyramid like a church tower showed a modulus of .8 when placed with one face normal to the wind. When placed diagonally, the pressure was increased 25 per cent. Cylinders gave a modulus of .52, and a cone one of .5. An octagonal prism experienced 10 per cent. greater pressure than its circumscribing cylinder, whilst a sphere had a modulus of .36. Hemispherical cups, such as are used in Robinson's anemometer, had a modulus of .36 when the convexity faced the wind, and one of 1.15 when the concavity did so. With model roofs a number of interesting experiments were made, and the effect of the vertical walls of a building in reducing the pressure was very marked. With a roof of 60 deg. pitch the pressure was reduced 40 per cent., and with one of 45 deg. pitch 80 per cent., whilst with one of 30 per cent. there was no observable pressure on the roof. When the wall is extended in the form of a parapet, the sheltering effect was much enhanced, and with a low pitch a negative pressure was then actually observed. The lifting effect was tested by a model house having two ends and one

side closed, the other being open and exposed to the wind. The lifting pressure on the roof was found equal to that on an equal normal plane. Model plate-girder bridges were next tested, with the result that when the two girders were separated by distances equal to their height, the leeward one was fully sheltered, but when the distance was doubled the pressure on the leeward one experienced a pressure of one-fifth that on the windward one. The pressure on latticework was tested by means of two cards, each 6 in. by 8 in. One of these cards had 16 rectangular openings cut in it, removing 43 per cent. of its area. The pressure on it was found to be 83 per cent. of that on the solid card. Placing the grating in front of the solid card, the pressure on the latter was reduced, as shown by the following figures:—

Card.....		Pressure.
6 in. by 8 in.		.37 lb.
" grating ..	1½ in. in front	.23 "
" " ..	3 "	.17 "
" " ..	4½ "	.12 "
" " ..	6 "	.11 "
" " ..	7½ "	.16 "
" " ..	9 "	.20 "

One curious point was noted, viz., that when a card 3 in. square was placed in front of a card 9 in. in diameter, the pressure on the former was reduced. The large card apparently caused a deflection of the stream lines which were banked up in front of it, diverting the current round the small card, the pressure on which was therefore reduced. When tested alone, the small card showed a pressure on it of .15 lb. With the disc 12 in. behind it, this was reduced to .14 lb., at 9 in. to .11 lb., at 6 in. to .09 lb., at 3 in. to .7 lb., and at 1 in. to .03 lb., or only one-fifth of what it endured if the disc were removed. The well-known phenomena of attraction between a large disc and a small one placed behind it was also observed. Another important point noted was that if the wind was prevented from escaping on one side of a cylinder or cone, the pressure was increased about 20 per cent. The effect was not noted with rectangular blocks.

ROAD TESTS OF A MODERN LOCOMOTIVE.

W. G. Kranz, Berlin, Ont., and J. B. Turner, of Cornell University, last year made some road tests of a ten-wheel freight and passenger locomotive, No. 593, built in the C. P. R. Co.'s shops at Montreal in 1892. The dimensions of this locomotive were as follows: Diameter of cylinders, 18 in.; stroke, 24 in.; diameter of driving wheels, 62 in.; number of tubes in boiler, 192; length of tubes, 12 ft.; outside diameter of tubes, 2 in.; heating surface of same, 1,008 sq. ft.; heating surface of firebox, 123 sq. ft.; total heating surface, 1,131 sq. ft.; diameter of pop-valves, 2½ in.; weight of engine on drivers, 102,000 lbs.; weight of tender, full of water, no coal, 65,600 lbs. The tests were planned to show the economy of the engine under the wide variation of conditions found in every-day working, the intention being not to interfere with the time schedule in ordinary use. The amount of coal used was accurately arrived at by first weighing the tender empty of coal and filled with water, and then weighing it with coal and water, the difference giving the required result. Four or five gunny bags filled with about 200 lbs. of coal each were placed on the tender and were used in firing up the engine in the round house, and in bringing the weight of fuel in the firebox up to a predetermined standard, at the time when the run began; at the end of the run the firebox

was left in the same condition with the weighed coal. At the end of the run again the coal remaining in tender was weighed in buckets on a platform scale. Feed water was determined by a 2 in. Hersey meter placed in the suction pipe of one of the injectors. A check valve was inserted between the meter and injector to prevent hot water from flowing back and injuring the meter. The cubic feet of water used was read on the dials of the meter, which was new and accurately calibrated. Meter readings were taken just before starting the run and immediately after ending it, the water level in the boiler being brought in both cases to a certain height on the gauge glass. Measurement of steam pressure was read from the gauge in the cab. Measurement of speed was noted in the cab by means of mile posts and a stop watch. Speed was at no time so great that the revolutions could not be accurately observed. For measurement of the dryness of steam, a throttling calorimeter was used, the pipe extending into the dome just below the mouth of the throttle valve. The thermometer was bared to steam, no cap being used, and was held securely by means of a stuffing box. For measurement of injector overflow, the injector was put on a number of times and the overflow caught and the waste per time averaged. Deductions for this last were made from records of meter. The time of popping was noted and approximate calculations made for this waste by comparison with previous tests on an engine carrying the same steam pressure. This loss was found to be 100 pounds per minute at full lift of valve, and for average lift, about 50 pounds. The measurement of vacuum in smoke-box was found by means of a glass U tube connected by rubber tubing to a ¼ inch plug placed on centre line of boiler and opposite the nozzle. Temperature of smoke-box was found by Schaeffer and Budenberg pyrometer registering up to 912° F. This pyrometer was screwed into the smoke-box at the centre line, extending to just below the exhaust nozzle. Cut-off was noted by the notches on the quadrant. Indicator diagrams were taken every other mile with the engine working in all positions of reverse lever, throttle and speed; also at all prominent changes in physical condition of the road. The authors, in their thesis of the tests, prepared for Cornell University, give very full and detailed descriptions of the runs made, but we give the conditions and chief results of each trip in condensed form. Part dimensions of locomotive tested have already been given. First run: Distance, 91.1 miles; distance of actual steaming, 68 miles; time on road, including stops, 5 hours 35 min.; time of actual running, 271 min.; number of cars plus van, 22; weight of train back of engine and tender, 618.65 tons; weight of train, engine and tender included, 704.65 tons; ton-miles of train, 56,359; ton-miles of train, engine and tender included, 64,194; coal used, 6,045 lbs.; coal used in handling train, 5,925 lbs.; coal used per ton-mile of train, .0923 lbs.; coal used per sq. ft. of grate per hour, 45.6 lbs. (a), 69.25 lbs. (b); coal used per mile travelled, 66.3; water used, 49,036 lbs.; water evaporated on trip, 48,997 lbs.; water used in hauling train, 47,997 lbs.; water used per ton-mile, from and at 212°, 879 lbs.; evaporation per lb. of coal at boiler pressure, 8.1 lbs.; evaporation per lb. of coal from and at 212°, 9.4 lbs.; evaporation per lb. of combustible from and at B.P., 9.4; evaporation per lb. of combustible from and at 212° F., 10.9; average speed, including stops, 16.6 miles per hour; average

speed, excluding stops, 20.6 miles per hour; size of exhaust nozzle, 4.25 in.; 1 h.p. average, 441.1; diagram water rate, 24.05 lbs.; actual water rate, 30.01 lbs.

Trip No. 2 could scarcely be taken as a representative test, as the locomotive was handicapped by excessive loading, poor coal, and an exhaust nozzle too large for good steaming. The grades also were heavier than are usually met with. The taking of results also was interfered with owing to the engine having stalled twice. We will therefore pass on to the results of the third run.

Run No. 3.—Distance run, 101.4 miles; distance of actual steaming, 77.06 miles; time on road including stops, 5 hrs 53 mins.; time of actual running, 297 mins.; number of cars, plus van, 22; weight of train back of engine and tender, 687.15 tons; weight of train, engine and tender included, 773.15 tons; ton-miles of train, 69.677 ton-miles of train, engine and tender included, 78,397; coal used, 8,907 lbs.; coal used in hauling train, 8,719 lbs.; coal used per ton-mile of train, 111 lbs.; coal used per square foot of grate per hour, 63.6 lbs (a), 91.2 lbs. (b); coal used per mile travelled, 87.8 lbs.; water used, 58,468.5 lbs.; water evaporated on trip, 58,398.35 lbs; water used in hauling train, 57,198 lbs.; water used per ton-mile from and at 212°, 8.615 lbs.; evaporation per pound of coal at boiler pressure, 6.56 lbs.; evaporation per pound of coal from and at 212°, 7.75 lbs.; evaporation per pound of combustible from and at B.P., 7.6; evaporation per pound of combustible from and at 212°F., 9.01; average speed, including stops, 17.2 miles per hour; average speed, excluding stops, 21.1 miles per hour; size of exhaust nozzle, 4.25 in.; 1 h.p. average, 507.8; diagram water rate, 23.5 lbs; actual water rate, 27.8 lbs.

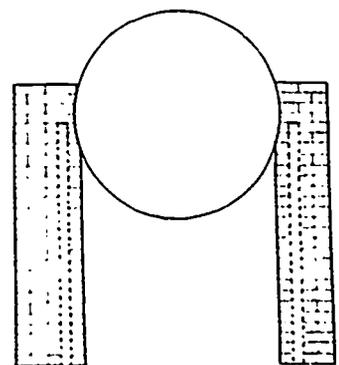
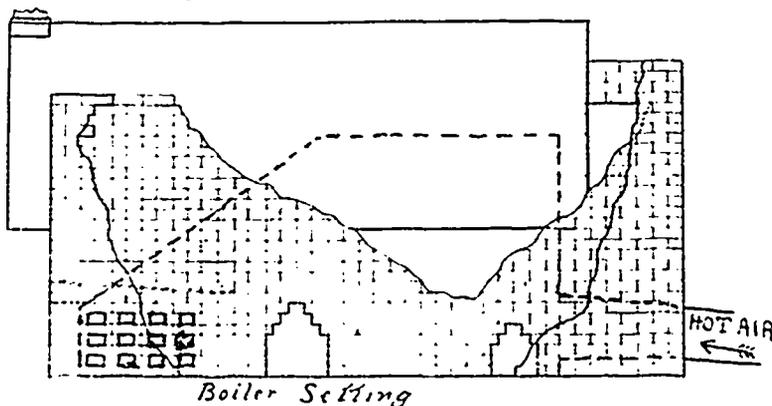
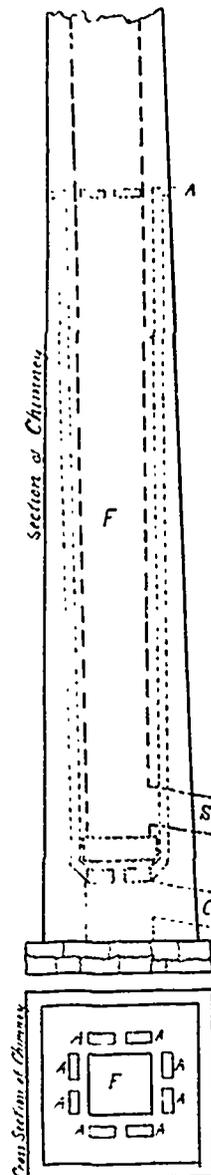
In conclusion, the authors are of opinion that the C.P.R. engine tested by them gives a very favorable showing on the score of economy, even in comparison with such well-known locomotives as the Baldwin.

IMPROVED BOILER SETTING.

The accompanying drawing is from a steam boiler in use at the Georgetown paper mills. The design of the inventor, J. R. Barber, was to furnish hot air to the boiler furnace, and to heat that air from the waste gases passing up the chimney. This may be considered an improvement on the Jarvis setting, which robs the

until they all meet in a common chamber, C, in the chimney below where the smokestack enters. From this chamber the air passes into the hollow wall of the boiler setting as shown, cross flues allowing one-half of it to pass over to the other side

of the boiler. Twenty-four openings under the grate bars—two by four inches—allow the heated air to pass from the hollow walls up to feed the fire. The effect of this system of setting has never been critically tested, but in working a day of twenty-four hours the fireman claimed to raise as much steam with a half ton of coal less per day than could be raised in another boiler of the same capacity set in the old way. Aside from any economy in coal, the change in the temperature of the boiler house both in summer and winter was very marked. The effect of this setting goes to keep the boiler house cooler in summer and warmer in winter. Formerly the boiler house door or a window had to be left open in winter to give the furnace sufficient air. Now the air to feed the fire comes down the chimney, and goes direct to the fire, freeing the floor of the boiler room from cold drafts. In summer the opposite effect is produced. The air from outside, passing through the casing, keeps it always at a much lower temperature than formerly, and no heat is discharged into the room excepting by the front plate and fire doors. Where manufacturers are putting in a single boiler and building a new chimney, this plan is certainly worthy of adoption. Mr. Barber is, we understand, the inventor of the plan now coming into general use in large boiler plants, namely, that of substituting air fans to give draft instead of chimneys. Some seven years ago the plans were first drawn, and cover the whole ground much more completely than do



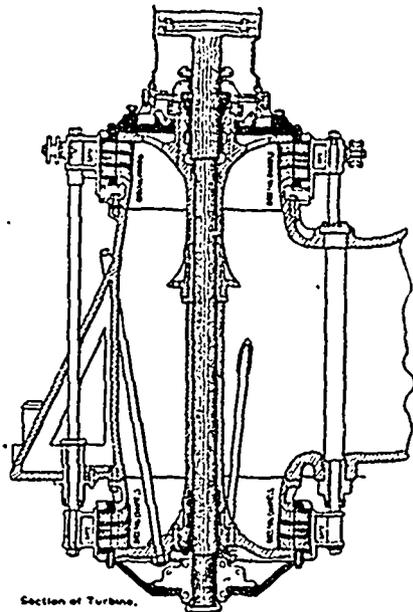
grate bars of the heat which it transmits to the current of air. As the sketch shows, the air on its way to the furnace passes into the chimney twenty-five feet above the foundation, through eight openings (A) in the outer wall of the chimney. The smoke flue F is in the centre of the chimney as usual, and is separated from the air flue by one brick, or say four inches. Each opening has a corresponding flue passing down the chimney

the best yet attempted. In the complete plan all of the heat is taken out of the waste gases and made to heat both the water for the boilers and the air to feed the furnaces. None of the plants yet erected make any attempt to heat the air. The best example of the idea in Canada is to be seen at the Riordon paper mills, where the plant has been in use over two years, and is effecting a large saving in fuel. The best in the United

States known to the writer has just been started by the Philadelphia Street Railway Company in their new power house. Without the use of hot air to feed their furnaces, they claim an economy of over 27 per cent. in fuel. They also claim that the plant did not cost so much as a chimney would have done and occupies less space on the ground. However, most of their plant was put in over their boilers where a chimney certainly could not have been erected. With a self-feeding apparatus for the coal, and hot air supplied to the furnaces, it is doubtful if any visible smoke would be discharged into the air. If six tons of coal can be made to do the work that ten tons is doing now, and get rid of the smoke nuisance at the same time, the street railway and electrical companies which are now so busy putting in large boiler plants all over the continent should find time to look into the matter. No patents have been taken out on the invention, or rather combination, for the whole plant is only a combination of Green's economizer and other well known inventions on which the patents have long ago expired.

THE CATARACT CONSTRUCTION CO.'S TURBINE.

Last month we gave a description of the work undertaken by the Cataract Construction Co. at Niagara Falls, and now we are able to give some diagrams illustrating the great turbine, for which we are indebted to *Power*. This wheel has thirty-two movable blades, the directing passages being formed by thirty-six deflecting plates. The shaft is vertical, bringing the wheels proper into a horizontal position, one at the top and one at the bottom of each case. Gates, controlled by the governor, are made to uncover more or less of the discharge, opening according as more or less power is required. It is expected that the governing mechanism will control the speed under ordinary variations of load within a variation of less than half of one per cent., and when one-quarter of the entire load is thrown off at once the variation of speed is calculated at not more than 3 per cent. To maintain the efficiency of the wheel on less



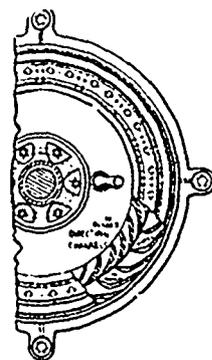
SECTION OF TURBINE.

than full gate opening, the discharge passages and the blades are divided vertically into three compartments, so that when the gate is only one-third open, for instance, the wheel is in the same condition as to direction and velocity of water discharged upon the blades as though the gate were completely open.

One serious engineering problem to be met in this installation was that of supporting the weight of the

long vertical shaft and the attached portions of the dynamo, amounting to about 152,000 pounds, and the enormous downward pressure of the column of water in the penstock. This is solved in this design by closing the bottom of the casing so that the water cannot act downward upon any of the parts attached to the shaft, while in the upper end of the casing are apertures through which the water can act upon the under side of the disc, carrying the movable blades of the upper turbine, and relieve the bearings of the weight of the shaft. In this way the weight of the water column is sustained by the stationary portions, which can be braced and supported for the purpose, and the pressure due to the head made to act upward for supporting the weight of the revolving shaft, which is thus nearly in the condition of a shaft spinning upon the water. The area involved is so proportioned that when the wheels are lightly loaded the upward pressure will be some 2,000 pounds in excess of the weight of the shaft, and when the wheels are running at full gait about the same amount less than the weight of the shaft, on account of the lesser pressure in the casing. This variation in pressure and direction is taken care of by a thrust bearing shown in section in the detail drawings.

The shaft consists of a steel shell about a foot in diameter, with smaller solid portions in the journals, which require to be of less frequency on account of the stiffness due to the large diameter of the hollow shaft. The latter is of rolled steel tubing without any visible vertical seam. No fly-wheel is required, sufficient momentum and inertia being furnished by the heavy fields of the dynamo which are carried upon the shaft.



HALF PLAN OF TURBINE.

CONCRETE-IRON ARCHES AND SLABS.

For some time past considerable attention has been attracted to various methods of combining iron and concrete for arches, floors, etc. The object of the iron is to make up for the low tensile strength of the concrete, which is much below its crushing strength. Repeated experiments have shown that the iron and concrete work very well together. They have much the same coefficient of expansion by heat, and hence the iron has no great tendency to separate from the concrete in which it is imbedded, and there is, moreover, considerable adhesion between the two, amounting to as much as 500 lb. per square inch of the surface in contact. The system seems to have originated in France, where a market gardener formed large flower-pots of concrete with iron netting imbedded in them. Pipes were afterwards formed in the same way, and finally arches and beams. Since then the matter has been taken up by various experimenters in Belgium and elsewhere, who have adopted different plans for the iron stiffening. Particulars of tests of concrete joists stiffened by $\frac{1}{2}$ in. iron rods were given in our issue of May 1, 1891, and showed a remarkable resistance when the newness of the concrete is taken into account. Sebastian Gruber, of Munich, gives London *Engineering* particulars of somewhat similar tests made at the Munich Mechanisch-Technische Laboratorium, of a concrete arch and a concrete plate, in which the stiffening bars were riveted-together into a sort of lattice-work, as shown in Fig. 1. This lattice-work is

made of hoop iron from .06 in. to .1 in. thick, and from 1 in. to 1½ in. wide. The report states that the presence of this iron-work almost quadrupled the strength of the concrete. The first test was made on an arch (Fig. 2) of 13 ft. 3 in. span, 17.72 in. rise, and 24.7 in. wide by 7.67 in. thick. The concrete used consisted of 1 part of cement, 3½ parts of sand, and 9 parts of river gravel. Some of the pebbles used were 2 in. to 2½ in. in diameter. The hoop iron was uniformly .06 in. thick

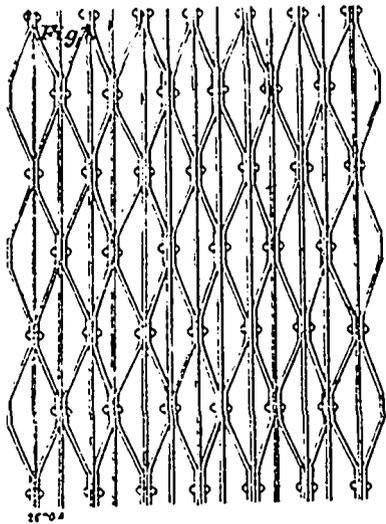
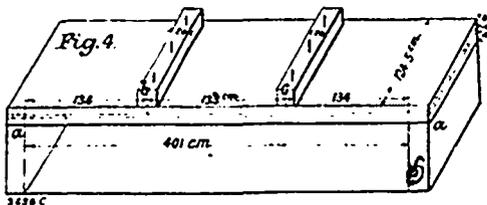


Fig. 3. Iron



by 1.18 in. wide. It was imbedded in the concrete slab 8 in. from the bottom surface, as indicated in Fig. 3. At the time of the test the slab was six months old. It was mounted on iron angles and rails, as shown, and loaded with rails. These rails were 18 ft. long, and projected, therefore, several feet on each side of the arch. Each rail length weighed about 485 lb., and these were loaded direct on to the plate, commencing on the left-hand side, and gradually covering the arch up to the right-hand abutment. The first layer consisted of 30 such rail lengths, the total weight being about 6.65 tons. A second layer of 34 rails was then added, starting at the right-hand side, which, when completed, gave a pretty uniformly distributed load of about 15 tons. A third layer was then commenced, but when the fourteenth rail was put on, *i.e.*, before the middle of the arch had been reached, the slab showed signs of cracking. Adding a fifteenth rail caused this crack to spread, and at the same time the abutments showed signs of yielding. When the eighteenth of the third layer was added the whole arch collapsed, apparently from crushing at the abutments. An examination made afterwards showed that the slab was cracked all over.

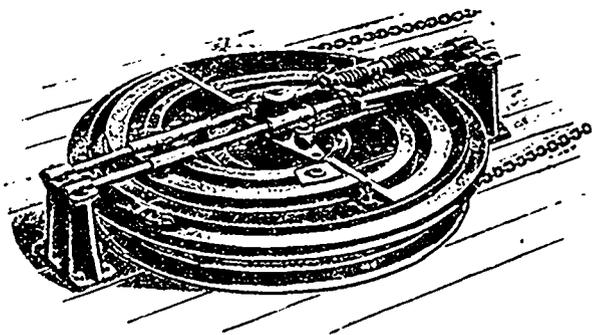
The second test was made on a flat plate 13 ft. 3 in. long by 4 ft. 1 in. wide by 6.3 in. thick, which was supported on two brick walls, as indicated on Fig. 4. The concrete was the same as in the previous case, but the

hoop iron was wider, *viz.*, 1.58 in., and its thickness varied in different parts from .06 in. to .1 in. It was imbedded 1.6 in. from the bottom of the plate. Two balks of timber 7.9 in. square were laid across the plate as shown in the figure; on this the rails were laid. This was not, however, done quite uniformly, so that the left-hand balk actually took about .6 of the load in place of one-half. The first layer consisted of 11 rails, and weighed 2.42 tons. The central deflection was found to be .28 in. The second layer consisted of 10 rails, and under it the deflection was increased to .73 in., the total load being 4.62 tons. Four more rails increased the deflection to 1.05 in., and the load to 5.5 tons. A fifth rail, added after waiting some time, at first made the total deflection 1.45 in., but later on the slab broke. The plate was most cracked in the neighborhood of the balk taking most of the load.

AUTOMATIC RUDDER LOCKING APPARATUS.

The shocks and noise occasioned by the tiller chains is a matter of much inconvenience and annoyance experienced by nearly everyone who travels by sea. The annoyance is practically constant during the whole time the vessel is under way, and of a very monotonous and irritating nature. Any device that will minimize the shocks produced by the surging of the sea, that occasions the noise, will most certainly meet with the best approval and appreciation of the travelling public.

The *Marine Engineer*, of London, illustrates an automatic locking apparatus for the rudder, for which are claimed the following advantages: First, the helm is automatically locked on the rudder cross-head direct by the action of the device, preventing any shock coming upon the steering chains or other communicating means, the locking being done by the rudder itself, when the surge and shocks of the sea take place. Secondly, the revolutions of the steam steering apparatus or other motive power increase as the helm goes over, whereby increased power is obtained. Third, by a very simple adjustment, a quicker motion or purchase can be given to the helm for narrow waters, where quick manœuvring is desired. Fourth, by the fact of all surges being taken direct on the rubber-head, all the steering connecting are thereby relieved, the steering will be affected more easily, and chance of breakage minimized.



Referring to the illustration, it will be noticed that the rudder-head carries a complete quadrant wheel, loosely journalled thereon. Within the quadrant wheel two pairs of circular racer guides are arranged, the paths of which are eccentric to the axis of the rudder, and disposed opposite to one another. Within these racer guides blocks are adapted to slide, which are each pivotally connected by pins to a sliding cross-head mounted on two cylindrical guides, one cross-head being arranged on each side of the centre. These cross-heads are connected by connecting rods to the ends of

the cross-head which is fixedly mounted on the rudder-head, one connecting rod being on the one side and one on the other side, and disposed in opposite directions. A set of buffer springs are arranged at one end to relieve the device of shocks. The steering chains are placed around and fastened to the periphery of the quadrant wheel.

The operation of the device is as follows: When the quadrant wheel is moved by the steering chains about its axis, the racer guides move their respective block and cross-head outwards from, or inward to, the centre of the rudder-head by reason of the movement of the blocks being controlled by the eccentric path of the racer guides. The rectilinear motion of the slide cross-heads upon their guides is communicated to the ends of the rudder cross-head by the connecting rods which cause the rotation of the rudder-head. It will be obvious that the locking of the rudder is practically positive, for to produce any motion it would be necessary for the rudder to revolve the quadrant wheel through the movement of the slides in the racer guides, an operation which is practically impossible, because of the enormous mechanical advantage of the eccentric racer guides over the rudder-head.

At first sight it may look somewhat complicated, but it must be borne in mind that the largest vessels now built have a complete quadrant wheel on the rudder-head, instead of the ordinary tiller, and all that is added to that in this device is the eccentric racer guides and their connections.

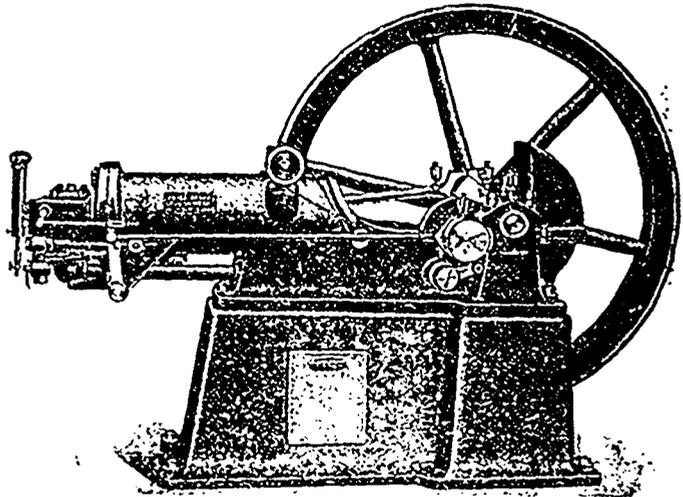
We understand that Lloyd's committee have had the matter submitted to them, and that they are of opinion that, with this type of device, no right and left hand screw gear was necessary, and that the secondary form of auxiliary steering gear, which has to be fitted into every ship as a stand-by, should take the form of a spare tiller keyed on the rudder-head, and therefore the right and left handed screw gear may be entirely done away with. It is claimed that so automatic is the locking on this apparatus that should the chains carry away, the machine will hold itself in position, and therefore separate rudder brakes are necessary. The device is being put upon the market by Davis & Co., of 12 Fenchurch street, London.

THE KRUPP GAS ENGINE.

There is a growing interest in gas engines not only as a motive power for electric lighting, but for general industrial purposes, and our readers will be glad to have their attention directed to a new gas engine produced by the Krupp Works in Germany, for whom the Canadian agents are Jas. W. Pyke & Co., Montreal. The fact that this great firm have taken up such an engine may be accepted as a guarantee that it has more than ordinary merit, but the first sample engine shipped to Canada is now being tested at the establishment of Samuel Fisher, 57 St. Sulpice street, who is acting as local agent for Montreal; and the engineers who have examined it admit that it is a fine piece of workmanship, and runs with remarkable smoothness. The accompanying illustration shows a horizontal engine for industrial purposes, but the Krupp Works are building a gas engine of this type especially suited also for electric lighting purposes.

These engines are not made too cramped or too short. On the contrary, it is considered an advantage to keep the piston and connecting rod long, in order to keep the surface-pressure in cylinder as low as possible. The piston has on its front end a longer guide in place

of a cross-head, while the piston rod has about six times the length of crank. This reduces the wear and tear to a minimum, and in addition an automatic lubricator prevents the possibility of wear of cylinder or piston. The larger the engine, the more favorable is the gas consumption, and at full load the largest engines require 0.45 cub. m. per brake horse power and hour, a result unsurpassed by any other gas engine. The regulation of the gas, as also the speed of the engine, is accomplished by a simple but very sensitive patent governor. The gas consumption keeps pace with the power required. In the engines for industrial purposes, the governor gives either full gas load or shuts it off for the whole stroke, according to the power required. The speed of these engines is small; the smallest engines make 230 revolutions per minute, while the larger ones



work at 200 revolutions or less. These engines are not therefore to be put in the same class as the "highspeed" engines, which make from 250--500 revolutions. The speed of the engines can be altered while running, which is for many industries a great advantage. The valve gear is very simple. One rod works the governor, the gas supply, and the igniting arrangement, while another works the exhaust valve.

The igniting method, which is one of the novel points of this engine, is very simple and very sure in its action. The ignition is effected by an incandescent body of peculiar composition. The explosive mixture passes to it at the right moment and is fired by coming in contact with its white hot walls. By this arrangement the continual extinction of the igniting flame and the puffing noise, so common in other engines, is obviated. The incandescent body is made of a material which is very durable and will last for many months, if properly treated.

The engine has no slide valve. The frame is strong, the bed plate long, and the number of moving parts, as can be seen from the figure, the smallest number possible. The cylinder cover and the frame are made in one piece, the former being sustained for one-third of its length; the cylinder itself is made of especially hard and solid material, and is slid into the cylinder cover. The moving parts are made of steel and are hardened where necessary.

The following is a summary of the Krupp gas engine: Simplicity of construction, ease of working, repairs small; working parts accessible and easily cleaned; easily and quickly started; economy in working, also when running light and with half load; very small gas consumption; automatic lubrication; number of revolutions small, small wear and tear; easy regulation of speed and almost noiseless motion.

For THE CANADIAN ENGINEER.

THE TORONTO AND HAMILTON POWER AND WATER-SUPPLY AQUEDUCTS ARE THEY FEASIBLE SCHEMES?

BY J. H. KILLEY, HAMILTON.

The notion that the water supply for Hamilton could be got from Lake Erie is a very old one. The levels were taken, I believe, by T. C. Keefer, C.E., some 35 or 40 years ago, to see if it was practicable to supply the city with water from that source. It was found, however, that a vast deal of tunneling would have to be done before the water could be run to the city, as the high land to south of the city was shown by the survey to be 53 feet above the level of Lake Erie. Assuming the distance from the lake to Hamilton to be 36 miles, and the fall required to give the water in the aqueduct a velocity of 200 feet per minute, or say 2½ miles per hour, 2 feet in the mile, and the bottom of the channel 10 feet under the level of Lake Erie, the aqueduct at Hamilton would have to be 135 feet under the level of the mountain. The aqueduct is proposed to be 100 feet wide, with a depth of 8 feet of water, and suitable for canal boats, as they say it will very much cheapen the carriage of coal to Hamilton. How they propose to construct it through the intervening high lands has not been explained. At some places it will be nearly 200 feet under the level of the land, and there is nothing for it then but tunneling. How this is to be done, with a clear opening through the land or rock of 1,000 square feet, or 20 per cent. over the sectional area of the canal, I am at a loss to know. If it is pierced in square section it will have to be 32 feet square—a tremendous piece of tunnel engineering. If the navigable portion is done away, it will take ten 10-foot drain pipes laid side by side to carry the water proposed to be delivered at Hamilton, the pipes to go under the land the same position as the tunnel. The aqueduct, if an open one in part, would have to be at least 6 feet above the level of Lake Erie to the top of its embankments, as the lake with certain winds rises much higher than its normal level. The construction of the aqueduct will have to pierce through solid rock for nearly its whole length. If the aqueduct is brought near to the city, its bottom would come out below the level of the entrance of the inclined railway to the mountain. If power has to be realized, as proposed, to give a fall of say 100 feet, a tail race would have to be excavated from the mountain to the bay, at least half the width of the canal proper, to take off the water passing through the turbines. Near the mountain it would have to be 110 feet deep and 50 feet wide to realize the fall mentioned. If the whole of the water passing through the canal was realized as electric power, it would develop 17,000 h. p., allowing for the losses invariably connected with this method of transmission.

When the matter of conveying Lake Erie water to Hamilton for domestic and manufacturing purposes by a pipe, was proposed 35 years ago, it was estimated to cost \$6,000,000, I believe. At the present time the work could be done much quicker than then, as there are very much better appliances for the purpose. Now in placing this very much larger project at, say, \$8,000,000, it is safe to say that it is very much under what the cost would be, without considering the machinery and buildings required to realize the power. Even at \$8,000,000, the cost of construction per 1 h. p. would be \$470. For water alone, at 8 per cent. interest on capital

invested in the canal alone, the cost for 1 h. p. per year would be \$37.60. The Manchester, England, ship canal has cost over \$120,000,000. It is only 26 miles long, and is yet incomplete. I have not thought it necessary to fill up this report with a long array of figures required to work out the power, etc., but if any of your readers desire them I will on a future occasion give you them in extenso.

The Lake Simcoe proposed aqueduct, if constructed, will not have the advantage of an unlimited supply of water, as would the Lake Erie one. I will endeavor to point out what would be the effect on Lake Erie of an aqueduct supplying water near Toronto, developing, say, 50,000 h. p., or nearly so. I do not propose to worry your readers with the calculations leading to the result, but to place the matter before them in a manner that can be easily understood. The available head at Toronto from the level of Lake Simcoe is, I understand, 420 ft. I think if a fair allowance were made for loss in transit by friction, etc., that I should not calculate the power from more than a head of 300 feet, the conduit to be as the Lake Erie one, 100 feet wide, with a depth of 8 feet and a fall of 2 feet to the mile, and a velocity of 200 feet per minute. This channel would be, as proposed by the Hamilton and Lake Erie aqueduct, equal to the carrying capacity of ten 10-foot in diameter pipes set side by side for the whole distance. Allowing for all losses in the conversion of this water into mechanical and electrical power, it would develop, if the quantity could be continued from the source of supply, 56,000 h. p. Let us see how this development of power would affect Lake Simcoe. The area of the lake, bays, etc., is, I have been informed, very nearly 300 square miles, having a superficial area of 8,363,520,000 square feet. Assuming the aqueduct to be 100 feet wide and 8 feet deep, with a fall of 2 feet to the mile and a velocity of 200 feet per minute, the power developed, as stated before, would be 56,000 h. p. This power would require 41,077 millions of cubic feet of water for a year of 315 days. This applies to all purposes for which the water might be applied, and this would cause the lake to lower its water surface *five feet every year*, assuming that the flow from the lake to Toronto could be kept up.

In this I have supposed that the comparatively small quantity of water going down the Severn River will continue to flow, but I am informed that in parts of the summer the mills cannot run for want of water. The cost of making the water connection from the lake to Toronto would be very heavy indeed. Until the nature of the strata that the aqueduct would pass through in its course is ascertained by borings and profiles got out, it would be impossible ever to guess at it. Then there would be the very large amount of work and cost of distribution of power at the power station, with buildings, and machinery and the large tail race to take off the water.

To use this water for domestic supply in Toronto through the main and service pipes of the city, would be a great mistake, as the continual lowering of the water in the lake, which is sure to take place, would drain out all the stagnant marshes, bogs, and water courses around the lake. Further than this, the lake, being a comparatively shallow one, and the temperature of the water high in summer, it would retain a large portion of its temperature in its course to the city, and probably increase it in the open parts of the conduit. There would be also a loss from evaporation and absorption of the

water in the canal, also losses in other ways in its course to the city. Looking at this proposal carefully and disinterestedly, I feel certain that engineers, with all the facts before them, would not advise a company to go on with the work as a paying speculation.

In fact there is very little difference in this respect between the Lake Erie scheme for Hamilton and the Lake Simcoe one for Toronto. A great deal more might be published showing the impracticability of both schemes, but the facts connected with them are so apparent to those conversant with the subject, that an extended report does not seem necessary.

For THE CANADIAN ENGINEER

GEORGIAN BAY CANAL AND LAKE SIMCOE WATER POWER.

NOTES BY THOS. C. KEEFER, C.E., OTTAWA.

1. If a ship canal has traffic enough to warrant its construction, Lake Simcoe would be an insufficient feeder in low water seasons and low water years, unless its level could be permanently raised by damming the outlet and storing the flood waters for this purpose.

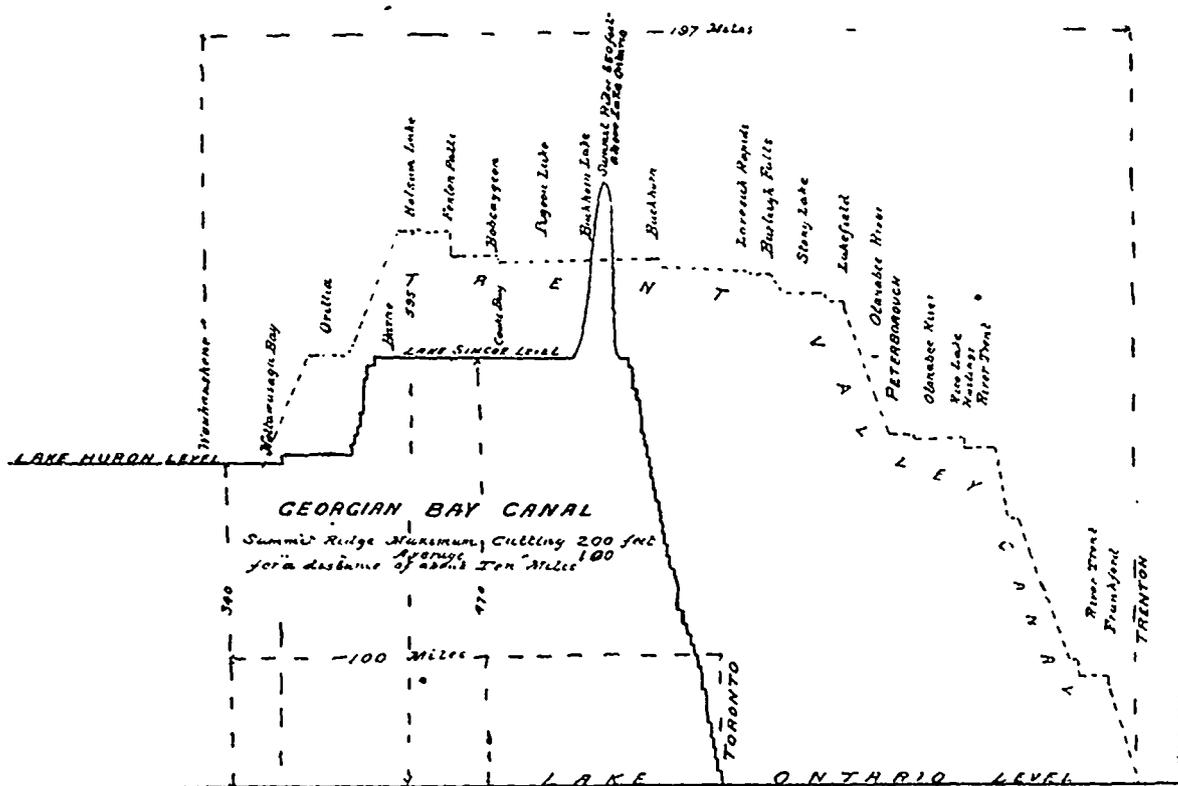
2. Lake Simcoe has a very limited water shed, in proportion to its size, and has no large streams as feeders. Except on the south-east the surrounding land falls toward Lakes Huron and Ontario, the fall beginning within a few miles of the shores of Lake Simcoe. Balsam Lake, which discharges into the Bay of Quinte, is within less than 20 miles of Lake Simcoe. The Simcoe lake surface must be deducted from its drainage area on water shed—because evaporation from that surface will equal the rainfall upon it.

5. If a larger canal than the Welland is needed it can be constructed much more quickly and cheaply by the Welland route than by any other, and when done would, for the reasons above given, be worth far more to the trade of the country.

6. For a ship canal and 20 feet water an open cutting about 200 feet in depth at the summit, with an average of about 100 feet in depth for about 10 miles would be required. There is nothing like this in canal history, except the celebrated cut on the Panama Canal—that grave of French millions—which was abandoned years ago. Before we can know what this cut will cost a series of shafts (some of them 200 feet deep) must be sunk to a level twenty feet below that of Lake Simcoe. The tens of millions of cubic yards of excavation in such a cutting would cover miles of territory, land or water, in embankments from each end. Highways must be bridged or abolished, all bridges requiring attendance night and day. Farm crossings would be "nowhere." If the canal is to do any through business electric lights would be required throughout its whole length.

7. If hydraulic power is combined with navigation, the dimensions of the prism of the canal should be the largest the water supply would warrant. If the locks were much used the water power at the locks would be precarious at such times, because navigation must have the preference and it would only be in winter that there would be no conflict.

8. If only a water power canal is wanted from Lake Simcoe, a tunnel at least ten miles long would be substituted for the open cutting. Such a tunnel like the cutting would beat the world's record for length. There



3. If the canal were in operation, a steamer of the Welland type could leave Toronto and be in Lake Superior, via the Welland route, before one could reach Lake Huron via Lake Simcoe

4. The length of the Simcoe route is about one hundred miles, that of the Welland canal twenty-seven. The lockage via Lake Simcoe is 600 feet, via Welland 326. It would, on account of excess in length of canal and in lockage, take three or four times as long to traverse the Simcoe canal route, as the Welland. Time being the measure of cost, nothing which could pass the Welland would take any other route.

"would be millions" in either. The probability is that the tunnel alone would cost more than all the water it could get would be worth after it is delivered as water power in Toronto.

From the tunnel to the city the water level would be kept somewhere near the natural surface by the dams instead of locks, as for the navigable canal. Open channels would be the cheapest conduits, but subject to diminution of delivery by ice in winter. The water power would be distributed over the route within twenty miles of Toronto, building up towns at every dam. Perhaps half of the power could be brought to the suburbs of

Toronto, where the tail water could be discharged into the Don or Humber, or into some artificial channel created for that purpose. Every horse power would cost several times what it could be produced for by coal.

As the cost of an aqueduct increases with its size, and this size is limited by the quantity of water which can be withdrawn from Lake Simcoe, the cost will always be greater than the value of the quantity; especially as no considerable quantity can be withdrawn without reckoning with the people on the Severn.

In this issue appears a discussion on the practicability of the Lake Simcoe and Lake Erie water power and canal schemes, by Messrs. Keefer, Killey and Golding. Our readers are here given statements for and against the projected enterprises. The facts presented against the Lake Simcoe canal or tunnel are overwhelmingly against that scheme proving commercially profitable. As for the Lake Erie enterprise, Mr. Keefer and other able engineers, who have been over the ground, give it as their opinion that it would be cheaper to lead water from the Welland canal along the brow of the mountain to Hamilton, than to make a cutting through the high ridge of land lying between the mountain brow and Lake Erie, back of Hamilton.

The designs have at length been completed for the two new large cruisers for the British navy, "Powerful" and "Terrible." The work of building has already started, and is making good progress. The dimensions are as follows: Length, 500 ft.; breadth, 71 ft.; mean load draught, 27 ft.; displacement at load draught, 14,200 tons. The coal capacity at this draught is to be 1,500 tons, but by utilizing wing spaces and spare bunkers, each of the cruisers will be able to stow as much as 2,500 tons. The I.H.P. to be attained on the contractor's trial is, with natural draught in the stokeholds, 25,000, which it is anticipated will give a speed of 22 knots. This is 5,000 more H.P. than that of the "Blake." The remarkable feature of the machinery department is the water-tube boilers on the Belleville system, the introduction of which was discussed on several occasions in the House of Commons.

THE vote at the recent convention at Atlanta, Ga., of the American Street Railway Convention, in favor of holding next year's convention in Montreal, stood at 38, against 17 for Philadelphia. When the result was made known, Mr. G. C. Cunningham, of the Montreal Street Railway, made the following remarks, which were heartily applauded: "I wish to say a few words to you to show how very pleased indeed I am to know that next year Montreal will receive this large and important association. I can assure you that we will do everything in our power to remove any difficulties that may exist as to entering any supplies for the purpose of exhibition. I can confidently promise you that there will be no difficulty in bringing in supplies to Montreal any more than there was bringing them to Atlanta. We recognize in Montreal, as well as the residents of other places, that this exhibition, which is a part of the annual meetings, has become a very important feature and should be maintained and improved, if possible, every year; and, therefore, for that reason I can promise you that we will do all in our power to remove any difficulties that may exist in coming to Montreal. You will receive there a most warm and hearty welcome." All of which is seconded by the citizens of Montreal generally.

ONE branch of electric lighting has never received the attention which it deserves, remarks *Electrical Industries*, and that is small, isolated lighting. That there is an opening for small equipments that are easily operated there can be no question. A plant that can be used anywhere, that contains its own power generator, that is complete in itself, and requires little attention, is the kind of plant required. It must also be placed on the market at a reasonable price. Summer residences, stores, warehouses and numerous other places where a considerable amount of light is required, would be equipped with such plants. The electrical parts of such equipment is manufactured by a number of companies, but have not been offered in connection with a suitable power generator. The windmill, which has been experimented on by a number of prominent men, has not filled the requirements of such a plant. The gas engine, for certain purposes, has for some time proved itself efficient, but for electric lighting it has been little used. A number of individuals have been seeking to overcome the defects of the engine. Recent improvements, as shown in a number of engines installed for driving dynamos, have given a closer regulation to the speed and increased its usefulness for driving electrical machines. The attention that a gas engine requires is small, and will permit it to be installed where other forms of power would be too expensive on account of the attendant or engineer. As still further improvements are made, the knowledge of the machines is extended and the cost is reduced, the use of the gas engine and the isolated lighting plant of small size will become general.

MUCH attention has been given to some experiments which were recently made in Havre, France, to test the efficiency of a process of sanitation by means of electricity, and C. W. Chancellor, U.S. consul at that city, has submitted to the Department of State an interesting report of the results which were obtained. The basis of the system is sea water, and the electric current is used to decompose the chloride of magnesia, the chloride of sodium serving as a conductor. The result is a liquid, almost odorless, disinfectant of great power. Besides leaving no residuum when used for flushing, it is claimed that the liquid consumes or dissolves all the solid organic matters found in sewerage. Microbes of the species which live without air, when brought into contact with it, die through the freeing of the liquid from oxygen, whilst those microbes which require air are instantly killed, owing to the presence of the poisonous gas chlorine. The presence of sea water in the neighborhood, though rendering the process cheaper, is not essential to its success, as in its absence a solution of chlorate of magnesia can be used instead. The chemical action is similar and produces the same effects on microbe life. In either case a central station is erected, supplied with tanks for holding the liquid, and the necessary electric apparatus. In Havre, by a simple arrangement of pipes, the electrolyzed water was distributed through the streets, like ordinary domestic water. After being treated with the disinfectant, drains and closets in private houses, instead of being a source of danger, help to purify the general drainage of the city. The action of the liquid has been found to be not instantaneous, but continuous, as long as there is any excess of chlorine remaining. Five grammes of active chlorine are sufficient to disinfect the contents of an ordinary closet within about two hours. The excellent sanitary effects

of the application of this system are acknowledged by all the experts who have looked into its merits, but there are objections on the score of expense. In places near the coast, such as Havre, there is no difficulty in obtaining sea water in sufficient quantities to thoroughly flush all the drains and sewerage pipes, but it is evident that before the system can be applied generally in large cities, much improvement and greater economy of method will be requisite. It may be remarked, however, that a very large quantity of water at present used for this purpose would be saved, such a comparatively small amount of electrolyzed liquid being necessary in order to obtain far better results. Doubt is also expressed as to the action of the chlorine gas on pipes, and as to whether the smell of the gas would not have evil effects on persons living in the vicinity, but all these matters will no doubt have to be left for future study and investigation.

THE official report of the Canadian commissioners at the late World's Fair has been a long time coming, but it contains some points of interest to our manufacturers. Referring to our exhibit of machinery, it says: "Although the machinery hall had not so many novelties as the electrical building contained, every branch showed a marked advance over the display at the Centennial. For a young country to attract attention in such company is good evidence of the enterprise of our manufacturers and the skill of our mechanics. This department suffered more from withdrawals of exhibitors than any other from Canada, and to so great an extent that in January, when the goods should have been ready to ship, not one third of the space allotted to us had been retained. James Clarke, who had charge of the machinery exhibit at the Colonial Exhibition in London, had given great satisfaction to the exhibitors by the care which he had taken of the machinery committed to his charge. His appointment to the superintendency of the Canadian exhibit was a means of inducing some exhibitors who had withdrawn to return, and though the goods were a little late in arriving, in the end there was shown, in the language of London *Engineering*, 'a highly creditable display.' It consisted of stationary, portable, high speed, marine and traction engines, boilers, water wheels, iron and wood working tools, steam fire engine, brick machinery, brass and iron steam plumbers' fitting, power hammers, grain grinders and some miscellaneous exhibits. A new type-setting machine was shown in a section remote from the Canadian space, in order that it might be seen adjoining similar machines from other countries. It was the invention of a citizen of the United States, but was made in the shops of the Lynotype Co., Montreal, owing to the facilities they afforded for fine work. The steam engines were not of great power, but their smoothness of running, and most modern forms, elicited the praise of writers on the subject, while the exhibitors of iron and wood working machinery were solicited for drawings, catalogues and prices from users of these machines in Great Britain and the United States." The American *Machinist* pronounced the Canadian iron and wood working tools to rank next to those of the United States, while London *Engineering* said that the highly creditable exhibit "showed the manufacturing power of the Dominion," that the "transportation building was of exceptional interest," and that the mineral exhibit "was a remarkable collection."

THE thirteenth annual convention of the American Street Railway Association, held at Atlanta, Ga.,

on the 17th, 18th and 19th of October, was a pronounced success, both from a social and practical point of view. Among the chief questions discussed was: "Can the T rail be Satisfactorily Used on Paved Streets?" a report on this subject having been prepared by Strathern Hendrie. The writers' conclusions were that the T rail was recommended by questions of price, joints, quick delivery, competition, coal pile and construction, and that the old argument for the "tram-head" no longer held good in these days of rapid transit and good street pavements. While the suggestion of a T rail for use on paved streets in cities is somewhat startling to the average citizen, yet it should be remembered that the reason for this is that the mention of a rail similar to those used on steam roads suggests the idea of four or five inches of steel standing up above the street level, and accompanied by dilapidated plank crossings and half-drawn spikes. Street railway people ought to try and teach the public that just as there are several ways of supplying motive power to a car, there is also more than one way of putting a rail in a street. Asphalt or macadam can be paved as easily to a T rail as to any other. They should be laid flush, and room should be allowed for the flange by running a railroad freight car, or other car having a larger flange than an ordinary street car, over the track before it is opened for traffic. Many paving-brick manufacturers now mould bricks to fit girder and T rails, those for the latter being provided with a space for the flange of the car wheel. Another interesting report presented at the convention was one by R. McCulloch, on the transportation of freight and mail matter by means of electric street railways. In order to ascertain to what extent this service was already in use, circulars were sent out to every street railway company in North America. Only about half the number of companies replied, but from these replies it appeared the American mail was being carried on 62 electric street railways, 58 of these having Government contracts. Fifty-five roads are hauling freight and 35 are engaged in the express business, though in the former case some of the services partake more of the nature of express rather than purely freight business. This report, however, appears to have omitted any mention of those cases in which mail and freight facilities are made use of on Canadian street railways. Other papers read were, "The use of the Booster on Electric Railway Circuits," by J. H. Vail and S. H. Wynkoop; "Power-brakes vs. Hand-brakes," by E. J. Wassel; and the "T-Rail Track Construction of the Terre Haute Electric Railway," by Russell B. Harrison.

METAL IMPORTS FROM GREAT BRITAIN.

The following are the values in pounds sterling of shipments of metals, etc. from Great Britain to Canada, as shown by the British Board of Trade returns for October, and for the previous ten months, compared with the same periods of last year:

	October.		Ten months ended October.	
	1893.	1894.	1893.	1894.
Hardware and Cutlery	£ 7,769	£ 5,894	£83,064	£58,119
Pig iron	9,002	5,597	48,121	23,386
Bar, etc.	2,037	797	23,918	16,993
Railroad	26,892	25,545	494,649	217,626
Hoops, sheets, etc.	13,528	6,742	61,379	75,752
Galvanized sheets	13,032	5,962	64,326	45,631
Tin plates	44,792	35,505	183,013	172,655
Cast, wrought, etc., iron	115,520	6,572	205,991	59,167
Old (for re-manufacture)	8,034	3,626	97,895	18,295
Steel	13,902	8,011	114,930	80,651
Lead	2,061	2,789	14,782	11,180
Tin, unwrought	6,068	3,473	27,952	20,574
Cement	7,946	1,905	48,598	33,028

CANADIAN VS. FOREIGN CEMENT.

Editor CANADIAN ENGINEER

In your last (November) issue, a complaint is made because the Government did not contract for Canadian Portland cement to the extent of 11,000 bbls., to be used, presumably, within the next one or two years

While no one would be more delighted than myself were the Canadian cements to drive all others from our markets it does not seem at all probable for some time yet to come The reasons for this are to be found

- (1) In a lack of uniformity in grinding.
- (2) In a lack of uniformity in burning.
- (3) In the limited output.

Now all of these defects can be remedied, and my reason for writing this is not to defend the Government which would be unnecessary and presumptuous, but to urge on the manufacturers of this very important article the necessity for great and unceasing care in the producing of an *invariant* article of *uniform* fineness and strength, which will answer severe specifications

When they have convinced the engineering public that they can supply Portland cement that will comply with specifications at *all* tests, and not vary with every sample or burning, then, and not till then, will their sales be so rapidly advanced that the question of increased output will solve itself

I have tested five Canadian cements sent by manufacturers, which gave the following results:

	Time of Setting		Spec Gravity	Residue on			3 days	1 week	4 wks.	2 mos.	3 mos.	4 mos.	6 mos.	115° for 24 hours
	Incipient	Full		50 Sieve	80 Sieve	120 Sieve								
(1) Portland	4°30	6°00	3.12	0.0	0.4	13.2	438	584	671					good.
(2) Portland	1°00	5°00	3.00	0.0	5.5	13.2	278	390	459					good
(3) Portland	0°37	3°10	3.12	0.8	2.7	6.7	335	388	505					good
(4) Portland	5°00	20°00	3.12	1.1	14.2	31.2	125	210	356					good.
(5) Natural	0°45	2°45	2.96	2.0	11.7	21.4	99	150	268	377	448	478	492	good.

These show good results, except No. 4, which is a poor Portland, but would rank as a strong natural cement. The 1st, 2nd and 3rd are all slow setting, and, as tested, were in every sense high class cements, being far above ordinary requirements for fineness. But what is wanted is not an occasional snap-verdict, but a *continual* convincing proof by these manufacturers that the engineers who use it can depend on what they are getting day by day.

I have tested three other samples of No. 1 brand as given above, with the following results, the samples being, in these cases, obtained not from the manufacturer, but from dealers, taken from the article as placed on the market —

	Time of Setting		Spec Gravity	Residue on			Tensile strength		
	Incipient	Full		50 Sieve	80 Sieve	120 Sieve	3 days	1 week	1 mo
1st Sample	200	6°30		3.0	13.6	20.7	312	531	To Test
2nd Sample				2.3	27.0	40.7		300	307
3rd Sample				31.4	52.2	61.2		261	268

Blowing Test: * Very good * Good * Very bad, checked and warped

That such a tremendous variation should exist is enough to cripple the industry until this is remedied

It is very probable, nay, almost certain, that some of our manufacturers have changed all this, and are turning out a good uniform product, but the civil engineers of this country do not, as a body, believe it yet

There is a determined rush towards Portland cements, good natural cements, such as are made at Thorold and Quebec, are given the go-by, because the reign of the testing machine is supreme. So that those who produce the article must follow the fashion, but, naturally, it will take some time to perfect the methods of making the artificial product, and much more time to convince users that it is an accomplished fact. In the meantime, the combined output of Portland cement in Canada will probably not exceed 200 barrels per day, or 60,000 barrels per year, which will by no means supply the demand

What is needed by manufacturers is something like this. Let them make arrangements by which responsible parties, residing near their works, should select samples from the daily output, say, once per month for the next two or three years, and send these to impartial laboratories to be tested. The published results, if satisfactory, would gradually convince engineers that their cements were uniform in quality and to be depended on. Then there will be no difficulty in driving out foreign competing brands

Yours sincerely, CECIL B. SMITH.

Technical Building, McGill College,
Montreal, Nov. 22, 1894

CANADIAN SOCIETY OF CIVIL ENGINEERS.

A meeting of the society took place in Montreal, on Thursday, the 8th ult., President Peterson occupying the chair

The discussion on the unprofessional conduct of some civil engineers in tendering plans, etc., without being remunerated, was resumed

A letter on the subject from Mr. Alan Macdougall was read, in which the writer asked for a further adjournment, in order to allow members at a distance to express an opinion. He cited another case, similar to the one at St. Lambert, which had come under his notice. Part of the blame, he thought, should be attached not only to the small municipalities which invited such tenders, but to the large corporations, such as bridge companies, etc., who sent in their tenders on the chance of their being accepted, without being paid for the work.

Mr. Irwin did not altogether agree with the writer's remarks. The bridge companies, he said, merely furnished a sketch of their proposed plan. If they spent money in preparing larger plans and they did not get the contract, it was their own fault.

Mr. Walbank agreed with Mr. Irwin, and thought that the society was not in a position to stop the practice, though it might proclaim the fact that it did not countenance such a thing.

Mr. Peterson said it would be a good thing to bring the matter up at the next annual meeting. Whether the society could bring in a by-law to dismiss any member found guilty of such unprofes-

	Tensile Strength per Square Inch (Net)							Blowing Test.
	3 days	1 week	4 wks.	2 mos.	3 mos.	4 mos.	6 mos.	
(1) Portland	438	584	671					good.
(2) Portland	278	390	459					good
(3) Portland	335	388	505					good
(4) Portland	125	210	356					good.
(5) Natural	99	150	268	377	448	478	492	good.

sional conduct, was a question that would have to be discussed more fully

It was resolved that the matter should be referred to the annual meeting for full discussion

Mr. D. A. Stewart's paper on "Building Railways across Pea Bogs or Swamps" was then discussed further.

Short letters from Mr. Stewart himself and from Mr. Macpherson were read in connection with the paper

In the latter was given the writer's personal experience on the C.P.R. in 1881. Work was being carried on across a certain swamp four miles long, with a creek passing through the centre, and the soil of which was peaty, and it was thought that when the trestles had been constructed it would bear satisfactorily. However, not long afterwards, sink-pools formed, and, though the ground looked firm, it was soon covered with water. He corroborated the theories advanced in Mr. Stewart's valuable paper.

Mr. Kirkpatrick gave some of his experiences on the Quebec Central Railway. While at work in that district he observed four different classes of bogs, some with thin crusts, and going down fifteen to thirty feet, others going down a hundred feet or more, and so on. Some trestle work on a shallow bog about 8 feet deep had failed after about eighteen months. The place had been filled up with cinders, and had been all right ever since.

Prof. Macleod understood that in portions of this track the road-bed had had to be raised

Mr. Kirkpatrick replied that in certain portions four years ago there was some very rough riding. In order to overcome this, section-men were appointed near every telegraph pole to see what could be done. It was found that in certain spots the weight of the engine caused a depression to be made. These places were noted, therefore, and were afterwards levelled up above the rest of the road, so that when an engine passed over the raised portions, the latter became weighted down to the level of the rest of the road. Another trouble was the creeping of the track, and he did not think a 12-foot tie (the adoption of which was recommended by Mr. Stewart) much improved the matter, as its life would be so short

Mr. Cyril Smith observed that on a certain line in the States some one had introduced a method of preventing creeping by means of fixed ties joined to the rails in two-mile lengths, the spikes being loose and projecting half an inch

Mr. T. C. Keefer, who had just come in, was asked to give particulars of what he had seen on the portion of line lying between Winnipeg and Duluth, but stated that he had obtained all the information he possessed on the subject from the superintendent of the line.

President Peterson thought it would be well to obtain from the writer of the paper under discussion the fullest possible details.

The discussion on Mr. Irwin's paper on "Retaining Walls" was then taken up again, the writer showing one or two samples of mortar taken from walls which had failed.

Mr. T. C. Keefer stated that he had had an opportunity lately of seeing some old locks on the Cornwall Canal, about fifty years old, in which the mortar was still wonderfully good. It seemed to have been made from ordinary lime. The mortar used in the old Lachine Canal, built in 1825, was even better. This was made from heated lime, hot water being used, according to the old Scotch method.

Messrs. Walbank, Irwin and McLeod gave a few instances of what rubbish was often put into modern buildings. Mr. Walbank thought that the Government ought to appoint proper inspectors, who would look after building materials in a thorough manner. He observed that there was some good pit-sand in the neighborhood of Montreal; a good deal depended on the manner in which the sand was used.

Mr. Munroe gave instances in which the "mortar of antiquity" was just as bad as the average modern mortar.

President Peterson observed that no doubt there were bad contractors in 1814, just as there are bad contractors now. Much of the cement made from limestone had in these days given place to hydraulic cement.

The meeting then adjourned.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

Editor CANADIAN ENGINEER:

SIR,—On Nov. 6th I had the honor of organizing in Carleton Place a branch of the C. A. S. E., which will henceforth be known as Carleton Place No. 16, C. A. S. E.

I was ably assisted by Bro. F. Robert, president of Ottawa No. 7, Bro. F. W. Donaldson and Bro. Cohen of Ottawa. This branch starts out with about 20 charter members and under very favorable circumstances. After the organization and installation of officers had been effected, several of the members were called on to express their views, among them was the mayor of the town, who is an old engineer, and during his remarks he eulogized the C. A. S. E. and its objects very highly. President Robert of Ottawa No. 7 gave the members some good advice regarding the work of the association in Ottawa, and expressed the belief that No. 16 would prove a progressive and useful association. Bro. F. W. Donaldson also spoke in very high terms of the good work that the association was doing, and urged the members of the new association to attend the meetings and make them interesting.

The newly-elected officers, from the president down, expressed their intention of leaving no stone unturned to make the association a success in every sense.

The writer was also called on for a few remarks, and complied to the best of his ability, on the work, aims and objects of the C. A. S. E. The meeting then adjourned, after having spent a very pleasant evening. W. H. Routh is President, and A. M. Schofield, Secretary.

On Nov. 8th, Brockville No. 15 was instituted by our worthy executive president, Bro. York, assisted by the writer. It was expected that Bro. Devlin, of Kingston, Bro. Past President Wickens, of Toronto, and Ryan and Hunt, of Montreal, would have been with us, but unfortunately Bro. Devlin was stricken down the night before with inflammation of the bowels, and was since for some days in a very serious condition, but is now on a fair way to recovery, a fact which all our members will be glad to hear. Bros. Ryan, Hunt and Wickens were unable to be on hand, which was a disappointment to all.

During the afternoon Bro. President York and myself were taken in hand by Mr. Storey, the genial superintendent of the Canadian Carriage Co., and shown through their very extensive establishment, where the manufacture of their world-famed carriages and sleighs is reduced to a science, and where there seems to be a place for everything and everything in its place, and this applies to everything in the place, even the engineers.

After we had seen everything in the factory, Mr. Storey very kindly drove us out to the new Asylum buildings, and to the fire halls, etc.

In fact, to make a long story short, we were treated with the utmost kindness by everyone, and shall long remember our visit to the Island City. I have enclosed an account of the instituting of

the association and the banquet in the evening, which was the most pleasant affair I have yet attended in connection with the C. A. S. E.

I remain, yours very truly,

A. E. EDKINS,
Provincial Deputy.

At the last meeting of the Hamilton branch C. A. S. E., two interesting papers were read by Bros. Peter Batty and A. Nash. This branch appears to be keeping awake.

Bro. J. J. York, president of Montreal No. 1, is pushing the education of its members; he is giving classes on Saturday afternoons for the benefit of those working at night, although the attendance so far is somewhat meagre. He is also making the educational Thursday nights a success. At the last meeting the following questions were asked: "A boiler 52 in diameter, $\frac{3}{8}$ inch plate, carries 97 lbs per square inch—what is the strain per sectional inch on shell?" Answered on the blackboard by President York: "Given diameter of flue 4 ft 2 in., length between rings 9 ft 2 in., thickness of plate $\frac{3}{8}$ inch, longitudinal seams double riveted butt strap—what is the safe working pressure?" Answered on blackboard by Bro. Weir. Several members gave their ideas of putting boiler compound in while under pressure. Bro. Thompson showed a good plan for making a lever for turning engine off centre.

St. Lawrence No. 2, of Montreal, have things in running order again. Although their membership is small, they are energetic.

AN ISOLATED STORAGE BATTERY PLANT.

BY L. M. PINOLET, MONTREAL.

Though there has been much discussion recently upon the advantages of storage batteries as auxiliaries to the dynamos in central electric light stations, but little attention has been given to the use of the batteries for the same purpose in small isolated electric light plants. The batteries are well adapted for this service, and in a number of cases would be even more advantageous than in a large lighting station. In many isolated plants, the dynamos and their driving engines are in charge of attendants who also have other duties to perform, such as looking after other machinery. Under these conditions the cost of operating the electric plant is small; but if lights are needed after the regular working hours, the cost is great, because then the other machinery is shut down and attendants must be provided for the electric plant alone. Where a small number of lights are required, this cost is usually so great as to preclude the running of the electric plant after the regular hours, and current must be obtained from some electric light company or recourse be had to gas. In such a case, a storage battery of sufficient capacity to carry the load after the regular hours of running, would be very economical and advantageous. As the battery would require but little attention, it could be taken care of by the regular attendants without extra help, and could be charged during the time when the dynamos and other machinery were running. The expense of its operation would thus be practically only the trifling cost of the extra coal burned to supply the power to the steam engine which drives the dynamo for charging the battery. Taking into account also the interest on the money invested in the battery plant and the expense of its maintenance, the cost of operating the battery would in nearly every case be considerably less than the cost of electricity or gas obtained from some outside company.

A model installation of this kind and one that will serve to illustrate the peculiar advantages of storage batteries in isolated electric plants, is the battery installation in the large dry goods store of Henry Morgan & Co., at Montreal. The electric light plant is located in the basement of the store, and its equipment consists of two 50-light G-H arc dynamos, one 250 light 110 volt, compound-wound Thomson incandescent dynamo and a 50 ampere, 140 volt, shunt-wound, Crompton dynamo for charging the storage battery. Power is supplied by two high-speed engines of 80 and 40 h.p., the larger one being belted to the two arc dynamos, and the smaller one to the incandescent and Crompton dynamos. Three Babcock & Wilcox boilers of a total capacity of 125 h.p. furnish steam to the engines and also to steam pumps.

The storage battery consists of 60 Crompton-Howell cells, manufactured by the Crompton-Howell Electrical Storage Company, of London, England, for whom John Forman, Montreal, is Canadian agent. The plates of the battery are of porous lead obtained by casting molten lead, when at the point of crystallization, into blocks composed of lead crystals held together at their points of contact. Plates of suitable size for the batteries are sawn from the blocks, and are so porous that almost every crystal in them is bathed freely by the electrolyte in the cell. The innumerable

surfaces of the crystals in the plates are formed by the Planté process into active material which adheres very firmly to the crystals, and, being interlocked in the spaces between them, cannot fall off to any serious degree. The batteries are thus able to stand very hard use without injury, and have a high capacity and efficiency, owing to the large surface of the crystals in the plates, which is exposed to the electrolyte.

The battery is located in a small room built expressly for the purpose near the dynamo room. Each cell rests on a separate tray supported by insulators filled with oil, and contains 10 positive and 11 negative plates. Glass vessels 13 in. by 17 in. in size, contain the plates which rest on celluloid combs on the bottoms of the vessels and are separated from each other by glass separators. The battery has a capacity of 450 ampere-hours at a discharge rate of 40 amperes, but can be discharged at the rate of 200 amperes and is thus able to carry the entire load for a short time in case of the stoppage of the incandescent dynamo.

The switchboard is so arranged that 19 cells at the negative end of the battery serve as regulating cells. The negative terminal of each regulating cell is connected in regular order to a contact in each of two circular battery switches. The switch on the right is used for discharging and that on the left for charging, and, as explained, their contacts are interconnected. When the double-throw switch to the right of the board is on its lower contacts, the arm of the charging switch is connected thereby with the negative terminal of the dynamo for charging the battery, and the positive pole of the battery is at the same time connected with the positive terminal of the dynamo. With the arm on the end contact of the switch, the charging current from the dynamo goes through all the 60 cells, but if the arm be moved to the next contact, the last cell at the negative end of the battery is cut out and the charging takes place through 59 cells. The cells are cut out of or cut into the circuit one after the other by moving the switch arm in one direction or the other, and any number of the regulating cells can thus be cut out when charging the battery.

When the double-throw switch is on its top contacts, the battery is cut off from the charging dynamo and is connected with the store lighting circuit to carry the entire load. Or, if there is an overload, the battery can be discharged in parallel with the incandescent dynamo. With the switch on the top contacts, the negative pole of the battery is connected with one side of the lighting circuit through the circular discharging switch, and the positive pole is connected directly with the other side of the lighting circuit. As the voltage of the 60 cells of the battery is greater than the 110 volts needed for the lighting circuit, it is necessary to cut out, by the discharging switch, a sufficient number of the regulating cells to bring the voltage down to desired pressure. The arm of the discharging switch is on the fifth contact from the end, therefore, 5 cells are cut out and the battery is discharging through 55 cells. The five cells serve as reserve cells to maintain the voltage of the battery near the end of its discharge, but are seldom employed for this purpose, as 55 cells are usually sufficient to maintain the voltage.

The greatest number of cells ever put into the discharge circuit at the same time is 57, though the rate of discharge has been as high as 75 amperes when the total discharge from the battery amounted to 300 ampere-hours. An important feature of the installation is that current at 110 volts can be obtained from the charging circuit for a small number of lights while the battery is being charged at a higher voltage. In order to prevent short-circuiting the cells of the battery when the arms of the circular battery switches are moved from one contact to another, each arm is provided with a pilot brush in circuit with a resistance.

At the upper corner of the switchboard are a voltmeter and an ammeter for the battery, and over one of the corners is a Weston station ammeter for measuring the current in the lighting circuit. Near the centre of the board is an automatic cut-out which automatically completes the circuit between the battery and the charging dynamo when the voltage of the dynamo reaches the right point for charging and breaks the circuit if the voltage of the dynamo falls below this point. Thus the battery current is prevented from flowing back through the dynamo during charging. At the extreme left of the board, is an Aron clock meter of a special construction, which records in ampere-hours the current put into the battery during charge and also indicates the current withdrawn during discharge. A simple contrivance automatically compensates the readings of the meter for the current wasted in the battery during charge and discharge, an allowance of 10 per cent being made for this purpose, so that the available charge in the battery at any time is accurately indicated.

The arc dynamos furnish current to arc lamps for lighting the main parts of the store, which are only needed when the store is open, and thus the arc plant has practically nothing to do with the storage battery and incandescent installations. The load on the incandescent circuit consists of incandescent lamps in the show windows, offices, workrooms and other parts of the building, besides 6 arc lamps for lighting the basement during the day time. Motors for operating cash carriers, sewing machines and ventilating fans are also run off this circuit. After the regular hours, when the store is closed, considerable current is used for lighting the drug department, which is kept open at night, and the windows, as well as to furnish light for sweeping and cleaning the store.

It is obvious that the expense of running the incandescent dynamo after the regular hours to supply current to these lamps, would be greater than the cost of obtaining the current from a local electric light company. For this reason, before the installation of the storage battery, current was obtained from a local company after regular hours, and the incandescent lighting plant was shut down. The cost of the current so obtained amounted to considerable, as an average of 350 ampere-hours was required each night during the fall and winter, and a slightly less amount during the spring and summer. This expense led to a consideration of the merits of storage batteries, and, after a careful investigation of the subject, the Crompton-Howell plant described above was purchased, and was installed about ten months ago. Since then the battery has run continuously without mishap, and has given great satisfaction both as to convenience and economy of operation. It not only carries the night load, but during the spring and summer also carries the day load up to 10 or 11 a. m. Before the installation of the battery, the engine and incandescent dynamo were started at 7 a. m. during this period of the year, and ran for the greater part of the day at about one-tenth their normal capacity. At present, the incandescent and charging dynamos are only started when the discharge from the battery is 400 ampere-hours, and are run till the store is closed, the surplus power of the engine being used to charge the battery. A good load is thus kept on the engine, so that it runs efficiently, instead of running, as formerly, very inefficiently for the greater part of the day, owing to the extremely small load.

During the winter, when the nights are long, the charging and incandescent dynamos are started at 7 a. m. but as the exhaust steam of the engine is used for heating the building, the extra steam used by the engine for charging the battery is inappreciable. Records of the coal consumed, show that no more coal is burned with the battery in operation than before. The entire expense of operating the battery consists therefore of the interest on the cost of the plant and the allowance for maintenance, which latter the makers guarantee not to exceed 5 per cent.

As to the care required by the battery, it is important to state that the plant was installed and operated without difficulty from the brief directions of the makers. The battery is inspected once a week to ascertain the condition of the plates and to guard against short-circuits. The specific gravity of the electrolyte in each cell is also taken at the same time with a hydrometer, and if not found at the right point is at once corrected. Since its installation the battery has discharged upwards of 60,000 ampere-hours, and not one of its 1,200 plates has given out. With the exception of three or four plates which were slightly buckled in the first charge, the plates appear to be in as good condition as when the cells were first set up.

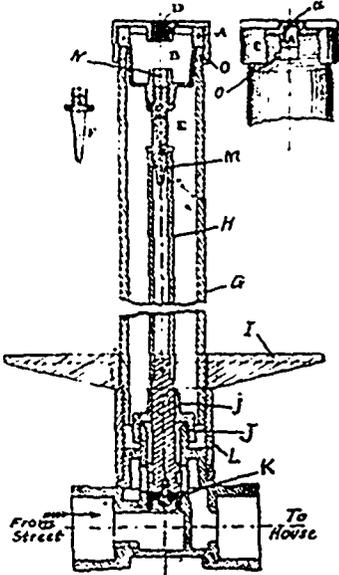
In concluding, the writer desires to acknowledge his indebtedness to J. McMurtrie, the electrician in charge of the installation, for information concerning the plant.—*Electrical Engineer, New York*

A NEW STREET STOP COCK.

A new stop cock for street use, having some important points of advantage, has been patented, and is now being introduced to the trade by Garth & Co., brass founders and manufacturers, Montreal. This cock, known as the Imperial stop cock, has been carefully tested for the past two years in Montreal and Longueuil, and the manufacturers are so convinced of its merits that they are now able to send out the guarantee with it. Among the points claimed for the Imperial stop cock are the following:

A lock top which effectually prevents tampering with the water supply. The operation of turning on or off being accomplished by the interchanging of a small brass plug, a perfect check can be kept on the man who is employed to do the work, by noting the number of plugs he brings back to the office. There are no heavy tools to be carried. The only part that can get out of order is the leather bucket, or washer, which, from the small amount of work it has to do, should remain in good condition a long time. When, however

-it has to be renewed, this can be done without digging up the stop cock; and herein the Imperial stop cock supplies a long felt want. It can be repaired without being dug up. Digging up or removing costs from \$3 in a wooden sidewalk to \$12 in a permanent sidewalk. The Imperial stop cock saves all this expense, which, in large cities, amounts to thousands of dollars annually. It can be taken apart, and the internal parts removed to renew washer in a few moments' time, by the aid of a specially constructed box-wrench supplied to corporations at a nominal cost. From its piston motion, no strain can come on the lead pipe joints, thus avoiding the leakage so common with all other styles of stop cocks, caused by turning on and off. No part can rust or corrode, the whole being made of brass and rustless iron.



The accompanying cut and the following directions for operating will explain the working of this stop cock: The top is locked by the engaging of the projections A (on cup B) with the recesses on the underside of the cap C. The cup is held against the underside of the cap C, by the pressure of the water on the bottom of the plunger K. To unlock the cap, drive in the lead plug D with small key, and the plug will fall into the cup B. Insert key into square hole N. Press down till projections A touch bottom of recesses O, and turn to right, locking projections a in recesses o. This holds the cup down, and allows the cap to be screwed off by hand. Now by inserting the key once more into the square hole and turning to the left, the cup is disengaged and can be lifted out by hand, and the plugs E and F interchanged as desired. F being shorter than E, allows the piston K to rise by the pressure of water, thereby opening the stop cock. E being long keeps piston down and water off. When the cup B and cap C are replaced, care should be taken to see cup is locked before replacing lead plug.

To renew the plunger or washer K, the cap is taken off and the cup taken out. The long hollow key is slipped down over the small tube H, the square hole in the end fitting on the square part j of cap J. The small handle of the key is now turned to the right, which fastens the key to the pipe H at M when it is tapped. The large handle is now used to unscrew the cover J, which releases the plunger K. The key is drawn out, bringing with it the plunger, when a new washer can be put on. The plunger is replaced and key detached from tube H. The cup B, cap C and lead plug D are then put back, the whole operation taking but a few minutes.

LITERARY NOTES.

Central Station Book-keeping and Suggested Forms, with an appendix for Street Railways. By Horatio A. Foster, Mem. A.I.E.E., New York: The W. J. Johnston Co., Ltd., 253 Broadway. Cloth, 139 pages, 75 forms and diagrams. Price, \$2.50. Until an attempt is made to gather data relative to the items of cost of the distribution of electric current, it is not easy to judge how little is known about those details by the majority of station managers. Most of the large low tension stations keep quite accurate data of this nature, but among high tension stations, both arc and alternating incandescent, such is seldom found to be the case. Small stations of all kinds neglect the matter altogether, and, therefore, have no ground to fight on when the subject of a municipal plant is brought forward, as it is sure to be sooner or later. The importance of going more deeply into the costs of operation and management can scarcely be exaggerated, and no central station manager can be in the best shape to do business in times of close competition with gas and other companies, until he knows the cost of every item

going to make up the total unit cost of supplying the electric current to his customers. It is in order to enable him to put his business on a rational basis, as suggested above, that this work has been written, and the well-known competency of the author to undertake the task is assurance that it may be consulted and followed with confidence. The book contains diagrams for the organization of the staff of electrical central stations, the classification of accounts and reports, and includes sample forms for every department. As the name indicates, the work is devoted mainly to the accounting department, both of central stations and street railways, and outlines a complete scheme for its organization and routine, which will enable the management to determine at any moment the condition of the business.

The *Engineering Magazine*, of New York, with its October number inaugurated a new feature which will be appreciated by all those interested in the engineering, scientific and allied professions. This new department of that handsome magazine is called a "Review of the Industrial Press," and the editor's idea is to do for the technical press what the "Review of Reviews" has succeeded in doing for the field of politics and literature. His purpose is to give expert reviews of the most important publications of the month in every branch of applied science; to supply a complete index to all the leading articles published in the scientific and industrial journals of the British Empire and the United States, and, finally, by means of a clipping bureau, to furnish the full original text of each article thus catalogued or reviewed. The exhaustiveness of this new enterprise will be better estimated when it is stated that in the October number over seventy pages are devoted to it, and as yet the review is only in an experimental stage; as time goes on the publishers will make additions and improvements as they shall be deemed necessary to the thoroughness of the work, and there can be no doubt but that the final outcome of their efforts will be a very valuable addition to the list of the world's indexes.

The legal fraternity and those interested in patents will feel under a debt of gratitude to J. G. Ridout, the well-known solicitor of patents, Toronto, for his new work, "Ridout on Patents," just published by Rowsell & Hutchison, Toronto. Considering that seventy years have elapsed since the first patent Act was passed in Canada, and that during all this time no treatise has appeared on the subject, it will be admitted that there is urgent call for such a work. As a barrister and civil engineer, and as a solicitor of experience, Mr. Ridout was peculiarly well qualified to undertake such a work, and the volume before us shows wide research and patient investigation. The author gives an interesting history of the development of the present patent laws of Canada, showing where they differ from the English and American laws, and giving numerous quotations from cases and judgments rendered in Canada in years past, in illustration of the leading principles of the patent laws of the country. Having had nine years' experience as a solicitor of patents, and having acted both as solicitor and counsel in some of the most important patent suits in the Dominion, he has acquired a wide knowledge of precedents, of which the reader has the full benefit in this volume. Our present law, it appears, was founded very largely on the American Patent Act of 1837, but differs in many material respects from both the present American and English Acts, so that till now no knowledge of their points of difference has been available to the ordinary lawyer who is not an expert, nor to the expert who is not a lawyer. The various forms and procedure requisite in obtaining a patent in Canada are given in this treatise, which makes a volume of about 600 pages, and is sold at \$5.50 in cloth and \$6 in half calf, postage being 12 cents extra.

The *Mining and Scientific Journal* is the title of a new trade journal started in Chicago. The first number to hand is very neatly printed and well edited.

The thirteenth edition of the "Electrical Trades Directory and Handbook," issued by the publishers of the *Electrician*, Salisbury Court, Fleet street, London, Eng., is now in preparation, and bids fair to be more valuable than any previous issue. It will contain apparently lists of almost every trade and business connected with electrical work, as well as electric railway, light and power plants, and will embrace in its scope Great Britain, the United States, and the continent of Europe. The publishers will be glad to receive reports from any firm interested for the new edition, which is to be issued in January next. Sample pages and forms are sent on application.

The *Architects' Directory for 1894 of the United States and Canada*, by Wm. T. Comstock, 23 Warren street, New York, and 260 Dearborn street, Chicago. Price \$1. This book has evidently been very carefully compiled. It contains lists of architects, with

addresses—divided into States and Provinces—and will be found most valuable to those desirous of reaching the members of this profession

"India as a Field for Industrial Enterprise;" published by the Indian Engineer Co of Calcutta and 28 Victoria street, London, S.W. England. Price, 1s. India, during the last decade or two, made wonderful progress, and the possibilities for still greater progress in the future are gradually becoming better known among European, and especially British capitalists. With each new development, however, the field of possibilities seems to become still more enlarged and more varied in its nature, and it is in order to show forth this multitudinous variety of openings that this interesting little pamphlet has been published. In a country of immense proportions like India, a land containing one-fifth of the whole population of the globe, the first desideratum is, as might be expected, good and cheap transportation. The chief natural arteries of the country are the rivers Indus and Ganges, and it is within comparatively recent years that the railways, which mean so much, and in the future will mean so much more for the proper opening up of India, have been built. The total length of railroads open in May last was 18,554 miles, but it is stated on good authority that India wants 10,000 miles of new railway per year for some years to come. For some time back the yearly average has been only 464 miles, so it will be seen what an immense opportunity presents itself in this field alone. Immediately in connection with transportation facilities comes up for consideration the subject of manufacturing enterprises, and on this matter it is extremely difficult to know where to begin, the requirements being great in so many different directions. Perhaps the most pressing wants, however, are factories for making up jute and cotton goods, and for the manufacture of machines, tools of all kinds, agricultural implements, etc. But for a more detailed and extended review of the possibilities in these various lines, we must refer our readers to the pamphlet itself, which they are sure to find of the greatest interest.

The *Canadian Almanac* for 1895 is to hand, and we must congratulate the publishers, the Copp Clark Co (Ltd.), Toronto, on the improved appearance of their 48th annual issue. The statistical and directory portions of the almanac will be found as usual accurate and up-to-date, but besides these the publishers have been fortunate in securing an article from Dr J. G. Bourinot, on "Canadian Parliamentary Procedure." The Doctor, who is a world-wide authority on such matters, describes in plain language the work of a session, and tells us how our laws are made. The series of articles on "Defences of Canada" will be found interesting. They comprise "H. M. regular forces in Canada," "H. M. ships on our coasts," "The Royal Military College," "The defences of Esquimaux," and "The fisheries protection service." A timely article on the "Canadian Sault Ste Marie Canal," with a map of the district, will be found of interest. Statistics of all the British colonies and possessions throughout the world are given, with a map of the world, showing British territory shaded. A study of this list shows to what a great and powerful nation we belong.

REVIEW OF THE METAL TRADE.

MONTREAL, Dec. 1st, 1894.

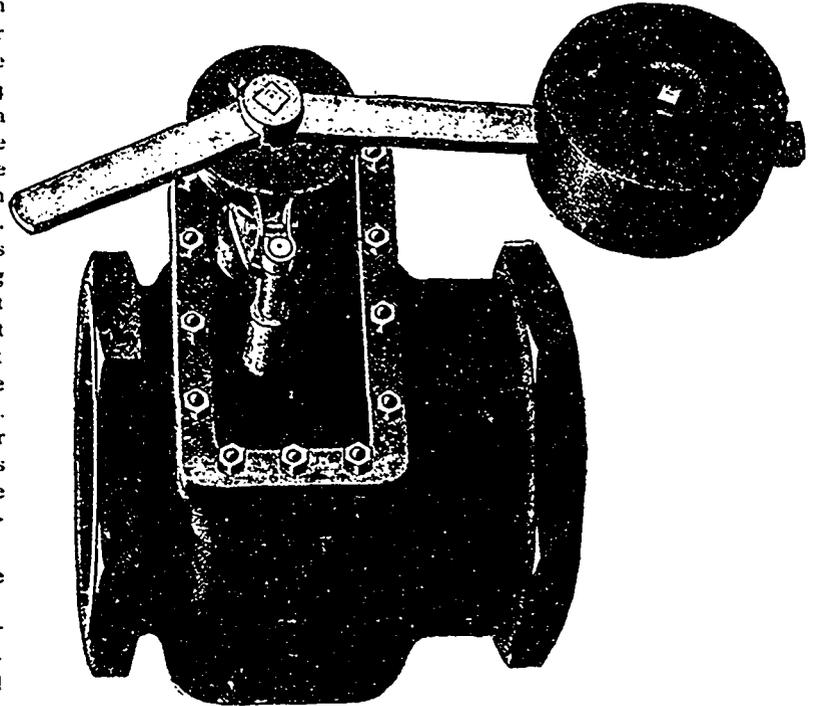
Trade is over for the season, owing to stoppage of inland navigation and increase in freight rates. Things are very quiet in the west, and though there is very little radically wrong with the country, yet dealers simply will not buy. There have been some indications of stiffening in the English markets, but the maintenance of this will of course depend only upon there being a continued demand, and, in face of the state of the American market, it would be idle to prophesy as to this. American goods are being sold very cheaply, including some articles which have not been sold to any extent by the Americans in this country heretofore, such as galvanized iron which they are putting on the western markets in somewhat large quantities. Manufacturers are all complaining of the prices of goods, there being no combination among them at present to keep prices up. Strong efforts will be made to cause a general stiffening at the beginning of the new year, but the result depends entirely on the state of the American market. At present hardware and heavy metal merchants are engaged in taking stock to see how much they have lost during the year. Prices are quoted as follows: Summerlee pig iron, \$21 to 21.50;

Eglinton, \$19; Carnbroe, \$19. Ferrona, \$17 to 17.50; Siemens, No 1, \$17.25 to 17.50, wrought scrap, No 1, \$14 to 15.00, bar iron, \$1.55 to 1.65. Tin plates, cokes, \$2.85 to 3.00; I. C. charcoal, \$3.35 to 3.50; Canada plates, \$2.05 to 2.15; terne plates, \$5.75 to 6.25, galvanized iron, 4½c to 5½c, as to brand. Orford copper, 9½ to 10½c; ingot tin, 17½ to 18c. Lead at \$2.70 to 2.85, and spelter at \$4.50 to 4.75. Cut nails, \$1.55 to 1.60.

CRANE'S NOISELESS BACK PRESSURE VALVES.

Steam users are well aware of the advantages obtained from using a good, reliable back pressure valve on the exhaust steam pipe, as by this means the exhaust steam from engines or steam pumps can be utilized for the purpose of warming buildings, as a large percentage of the thermal value of the fuel consumed in a boiler is obtained for this purpose, instead of wasting it into the air.

The manufacturers of the valve illustrated herewith claim the following advantages for it.



No objectionable and destructive hammering so peculiar to the common back pressure valve. Simple in construction, having no complicated adjustments, and not liable to get out of order. Constructed with a piston accurately fitted to body of valve, in which it slides freely, and having ports around its sides, the combined area of which are greatly in excess of the exhaust pipe. When pressure is brought against the under side of piston it raises, opening the ports just sufficient to let steam escape, and at the same time maintain the pressure for which it is set. It has no seat; the opening and closing of the valve is regulated entirely by the weight, consequently it will last much longer than old style.

The above noiseless back pressure valve is manufactured by the Crane Company, of Chicago, and is for sale in Canada by Samuel Fisher, 57 St. Sulpice street, Montreal.

SETTING VALVES.

If there is one point in engineering practice that is well established it is that the only sure mode of setting the valves of a steam engine is with the aid of the indicator. No matter how accurately a valve may be adjusted by actual measurement when the cylinder and steam chest are cold, the conditions may be widely different when steam is admitted. Indeed, in the case of an engine attached to a boiler, it is sometimes impossible to adjust the valves so that the engine will work well, except by actual trial when steam is raised in the boiler. There have been cases in which tests with the indicator have shown derangements of valves that were corrected in a few hours, almost doubling the economy of the engines. So far as experience goes it rarely happens that such a test is made without revealing some defects. Even if these are corrected there is no guarantee that they will continue in adjustment for an indefinite period, and hence the importance of having engines tested at frequent intervals. The saving of one pound of water per hour in an engine of 100 horse power, assuming that the boiler evaporates seven pounds of water per pound of coal, and that coal costs \$6 a ton, will effect a saving in the amount expended for fuel of about \$130 a year, and not unfrequently a reduction of 20 times this amount is produced in consequence of a test.—*Locomotive Engineers' Magazine*.

Industrial Notes.

W H ROSS is constructing clapboard and pulp wood mills in Sherbrooke, Ont

A NEW boiler is now being made at Deseronto, Ont, for the gas works of that town.

THE wages of the workmen at the St John, N B, rolling mills have been reduced to per cent.

D. MCK BEMIS has started a gold, silver and nickel plating establishment in Waterloo, Ont

THE Sydenham Glass Co., of Wallaceburg, Ont, capital stock \$50,000, has been incorporated.

WALLACE POINT, Ont., bridge is undergoing the work of being converted from wood into iron

A TEN to fifteen per cent reduction of wages at Foster's nail actory, St. John, N.B., has taken place.

THE Simpson Furniture Co., Berlin, Ont, propose to add a five storey building to their factory next spring

I G FISHER & Co. founders, Kincardine, Ont, are endeavoring to effect a compromise with their creditors

W. H. ROSS is about to start the building of a mill for sawing pulp wood and clapboards in Sherbrooke

THE Court of Revision have reduced the assessment of \$125,000 on Hamilton's Gas Company's mains to \$85,000.

THE Fred. Victor Mission Hall, Toronto, erected by H. A. Massey at a cost of \$60,000, was opened last month.

PREPARATIONS are being made for going ahead with the mason work on the new B C Parliament Buildings at Victoria.

PENETANG Ont., council have decided to exempt from taxation all manufactories locating there within the next ten years.

THE Rathbuns are now establishing a match factory in Deseronto, Ont., with Mr Paradise, of Quebec, as foreman.

WILSON & HENDERSON, of Brantford, Ont, have sold their patent bicycle chain rivet to American manufacturers for \$17,000.

THE Essex Brass and Iron Co., London, Ont., is endeavoring to effect a compromise with its creditors at 60 cents on the dollar.

SMITH'S roller mills at Jarvis, Ont., have been burned down. Loss, \$10,000; about one-half insured. The cause of fire is unknown

CHATHAM, Ont., Waterworks Co. have offered to sell out to the town for \$132,000, and a vote is to be taken on the matter within a few weeks.

A LARGE iron tank has just been completed at the Cornwall Foundry and Machine Works for use at the Fenelon Falls, Ont, pulp mill

THE old beet sugar refinery in Walkerville, Ont., is to be converted into a large saw mill, to employ 50 hands. The cost will be about \$50,000

THE large water motor at A. T. Graham's foundry at New Glasgow, N S., has been removed and its place taken by an 8 horse-power engine.

THE soap manufacturing firm of Vanuven & Co., at Napanee, Ont., has been dissolved, and the business will be carried on by A. F. Pruyn.

THE Dominion Glass Co., Montreal, have been incorporated with a capital stock of \$100,000. They will manufacture and deal in glassware of all kinds.

SMITH'S grain elevator, at Portage la Prairie, Man., has been destroyed by fire, together with about 13,000 bushels of grain Loss \$15,000; insurance small.

COTE ST ANTOINE, Montreal, proposes to apply to the legislature for power to build and operate its own gas works. At present it is dependent for its gas on Montreal.

THE North American Mill Building Co., Stratford, Ont, has assigned. Liabilities \$78,000, of which \$52,000 is secured to their bank. Last year they suffered a loss by fire.

THE name of the party who has agreed to establish a glass factory employing 200 hands in Wallaceburg, Ont., is Mr. Davis, who is at present engaged in a similar industry in Upland, Ind.

THE creditors of the Hamilton Bridge Works have resolved to dispose of the affairs of the company by the assignee, and not by the liquidator. M. Leggatt, A. Gartshore, and J. S. Hendrie have been appointed inspectors.

A MASONIC Temple is to be erected in Toronto at a cost of about \$250,000

STRATON BROS' saw-mill at Arthurette, N B., is to be converted into a spool factory

THOS LAWSON'S iron and brass foundry at Hull, Ont., was damaged by fire last month

JOHN BALLANTYNE is about starting work at his extensive machine shop in Preston, Ont.

T T SHURTFLEFF is engaged in making improvements in the Coaticook, Que., water works.

AN extension to the Jeffrey Hale Hospital at Quebec is contemplated, the cost to be \$70,000.

THE last section of the large international gas main was hauled across the St. Clair river last month

THE Dominion Paper Company are putting in some new machinery at their mills at Kingsey Falls, Que.

THE Hotel Quinte, at Belleville, Ont., is now nearly completed. The cost of the building is \$70,000.

S. J. CHERRY, whose saw-mill at Preston, Ont, was destroyed by fire recently, has decided to build anew.

W. R. HALL proposes to reopen the tannery at Calgary, N.W.T., and to establish shoe and horse-collar factories in connection with it He is asking for a \$5,000 bonus for that purpose.

THE Concord Lumber Co., of Minneapolis, are building a large mill at the foot of Long Lake, on the Madawaska river.

J H BURROWS, of Cincinnati, proposes to convert the old carriage works at Gananoque, Ont., into a large summer hotel

IT is said that owing to neglect the waterworks plant at Amherstburg, Ont., is badly in need of a thorough overhauling.

J. A. WHELPLEY & Co., skate manufacturers, Greenwich, Ont., are pushed with orders, including a large number from Holland

F. TOMS, contractor, Ottawa, has been awarded the contract for the new Government building in Vancouver. The price is \$300,000

GARSON, PURCER & Co. are about to start rebuilding their planing mill at Brockville, Ont., which was burnt down a short time ago.

J. A. ROUSSEAU, of Ste. Anne, Que., will shortly erect a steam saw-mill at Riviere-a-Pierre to cut deals for the English market.

THE by-law to raise \$10,000 for the erection of buildings for the Territorial Exhibition at Regina next year, was carried almost unanimously.

NEARLY \$14,000 has been subscribed towards the erection of a new Sunday-school building in connection with the Centenary Church, Hamilton.

HUGH KYAN & Co's machine shop at Sault Ste. Marie, used during the construction of the new canal, was, last month, burned down. Loss, \$25,000

WINNIPEG is dissatisfied with the present protection against fire, and will probably spend \$200,000 on improvements and extensions to its water works.

N GAUTHIER & Co., contractors, Montreal, have assigned. Liabilities about \$19,000. The chief creditor is H. Dupré, Montreal, \$8 500 (\$2,000 on mortgage).

THE Master Plumbers' Association, of Montreal, is applying for incorporation for the purpose of promotion of trade, protection of its members, sanitary education, etc.

THE work of improvement at the Toronto Island is now going on apace. The bridge at Hanlan's boat house is being widened to 22 ft., and roads are being built as quickly as possible.

THE Jenckes Machine Co., Sherbrooke, Que., are about to put up two large new buildings, their present works being inadequate. They ask the city for a bonus and exemption from taxes.

A FEW days ago, a chemical engine in Hamilton, while going to a fire, came into collision with an electric car and was wrecked. It cost over \$2,500, and had done valuable service in the fire brigade.

QUEBEC city council has granted an annual bonus of \$2,500 for five years to M. Frankenburg, owner of the Globe India Rubber Mfg. Co., Manchester, Eng., who is establishing a branch factory in Quebec.

THERE was a report last month that J. C. Wilson & Co's large paper mills at Lachute, Que., had been entirely destroyed by fire. This fortunately was untrue, though the property had had a narrow escape, a fire having started in the shafting. Not very much damage was done before it was extinguished.

THE buildings and stock of Chanteloup Co's brass founding establishment, Montreal, have been sold to David Yule and Jas King for \$80,000.

J. A. PICKETT, C.E., of Digby, N.S., is perfecting his plans for a water system for that town. The source of the supply will be a small brook about three miles from the town.

It was reported in a recent number that the Montreal Chambre de Commerce were about to construct a large new building. They have now abandoned their intention, however.

A FIRE broke out in the agitator at the Premier Oil Works, Petrolia, Ont., last month, and before it could be extinguished did damage to the amount of \$1,000. Insured.

THE proposed new gas company in Winnipeg is asking for a monopoly for twenty-five years, the price to be \$2.05 per thousand, and to be reduced by the sum of 5 cents every five years.

THE manufacture of hatchets, picks, &c., formerly carried on by E. Broad & Sons Co. (Ltd.) in St. Stephen, N.B., has now been taken in hand by a new concern styled the St. Stephen Edge Tool Co., at the same premises.

THE Ottawa Saw Works Co. have opened up a factory in that city for the manufacture of saws and saw mill supplies, and are fitting up the works with the latest improved machinery. The superintendent of the works is Mr. Fenby.

AMONG the supplementary estimates of the Quebec Provincial Government for the fiscal year ending June 30th next, is \$123,038 in settlement of contractors' and architects' accounts for the Montreal court house extension.

THE last and longest span of the new bridge at Woodstock, N.B., 225 feet wide, is now virtually completed, and the structure, it is hoped, will soon be open for traffic. This bridge is said to be the largest in the Maritime Provinces.

THE Hantsport, N.S., Foundry and Machine Co. have obtained a winding-up order from the judge. The property had been advertised for sale by the sheriff, but the company obtained an injunction forbidding this, and then applied for a winding-up order as stated.

THE Saint Maurice Tool and Axe Works Co., Three Rivers, Que., have been incorporated. Capital stock, \$40,000. They will manufacture all kinds of iron and steel tools, as well as wooden handles. The incorporators are E. L. and N. L. Denoncourt and others.

COSSITT BROS. Company, Ltd., Brockville, a note about whom appeared in last number, are applying for incorporation, with a capital stock of \$400,000. They will carry on, besides the manufacture of farm implements, a general manufacturing and foundry business.

THE new chemical laboratory of the University of Toronto is rapidly approaching completion. There are separate balance and explosive rooms, and every convenience for all sorts of special work. The building cost a little over \$60,000 and will be ready for occupation next fall.

THE township of Springer near Sturgeon Falls, Ont., proposes to grant a bonus of \$7,000 in aid of the establishment of a ground pulp mill. There is a water-power with a fall of 32½ feet in the vicinity, which could be utilized. The proposed mill is to have a capacity of two carloads per day.

THE Royal Pulp and Paper Co., of Montreal and East Angus, have gone into liquidation, the immediate cause being the taking out of an action by Newton Miles, of Sherbrooke, a creditor, to the amount of \$1,200. The company will probably not go out of business, a reorganization being expected.

THE Huntingdon, Que., organ factory has been sold to L. E. N. Pratte, of Montreal, for \$3,000. At the time of the failure of Somerville & Boyd the property was valued at \$20,000. Mr. Pratte will remove his shop and workmen from the Montreal factory to Huntingdon at the end of the year.

THERE has been a good deal of talk for some time past of the advisability of establishment of works in the Maritime Provinces for the creosoting of timber for use in wharves, piers and other marine structures. A recent estimate places the cost of the apparatus and building required for such a purpose at about \$25,000.

W. J. SPENCE, an employé at Davidson & Co's shingle mill, Toronto, attempted to replace a slipped belt on a pulley by means of a stout stick, but the latter became entangled with the running belt and struck him with terrific force on the chest, crushing his ribs. He died of internal hemorrhage a short time afterwards. Another employé, named Chas. W. Brown, met with a somewhat similar accident only a few days after the above, but fortunately it was not attended with such a fatal result.

AT Beamsville, Ont., the by-law voting for the raising of \$13,500 for the construction of a water works system has been carried. The council will begin the work of putting in pipes, &c., almost immediately.

CONTRACTOR MCKAY, of Chatham, who has the contract for reclaiming 3,000 acres on Point Pelee, Ont., has the pumping machinery all in readiness, but will not commence operations till the dredging is completed.

MENZIE, TURNER & CO., mfrs. of window shades, etc., and the McFarlane Shade Co., both of Toronto, are to be amalgamated, the former taking over all the latter's stock and carrying on the business as one concern.

A DISASTROUS fire occurred a week or two ago at Hayford's Mill, Cedar Point, N.B., in which staves to the value of \$8,000 were consumed, and from which the mill itself had a narrow escape. No insurance on the staves.

THE Magnetawan Tanning Company, Burk's Falls, Ont., are applying for incorporation, with a capital stock of \$50,000. C. G. Marlatt and W. T. Marlatt, of Oakville, Ont., and John Waldie, of Toronto, are to be directors.

GEO. MATTHEWS & SONS' great pork-packing establishment, Peterboro', Ont., is to be removed to Hull, Que. The cost of the buildings to be erected is to be \$100,000, and the average capacity will be about 3,000 hogs per week.

THE Council of Arts and Manufactures of Quebec is holding two classes a week at Point St. Charles, Montreal, in machine drawing and construction, and plane and solid geometry. The classes are under the direction of Jas. Powell.

THE new hydraulic pumps at London, Ont., waterworks are now in proper position, and are being run at the rate of 31 revolutions per minute, pumping 3,250,000 gallons in 24 hours. The city's official test will not take place for some time yet.

THE Dickson Lumbering Co., Peterborough, Ont., is retiring from business. This chronicles, says the *Review*, the approaching end of what is probably the oldest industry carried on continuously in Peterborough since its settlement as a hamlet.

THE plans and specifications prepared by Tanguay & Vallee, architects, for the proposed new Quebec City Hall, to cost \$130,000, have been accepted. The building is to be three storeys high, with mansard roof, and will be designed in the ante-renaissance transition style.

A PARTNERSHIP has been registered between Susan Agnes McIndoe, wife of Thos. L. Clark, brass founder and hardware merchant, Montreal, and his foreman, Auguste Comte, and they will in future carry on the business under the name of T. L. Clark & Co.

IN the case of the Queen vs. Andrew Somerville and Daniel Boyd, manufacturers of door sashes, agricultural implements, &c., who were charged with fraud in connection with a statement of their affairs, the jury found a true bill and the trial will be proceeded with shortly.

SIR W. C. VAN HORNE, James Ross, of Montreal, and others, are promoting a new company for the purpose of supplying gas to St. John, N.B. They will apply for a charter immediately, and hope to supply St. John with gas of a better quality and at a lower price than the present company.

C. F. LALONDE, of Ste. Cunegonde, Montreal, and C. Guimond, J. Leduc, and J. Bte. Roy, of Beauharnois, have formed a company under the name of the Star Iron Co., and have acquired the foundry and business carried on in Montreal by E. A. Manny & Co. Their principal product will be the "Star" hot water furnace.

LAFONTAINE & ROUSSIN have completed the extensions to the Richmond, Que., waterworks. The new reservoir is 500 feet above the old one, and is walled in with solid rock. The old reservoir will be retained as a reserve supply for fire purposes, and sufficient land has been reserved to build a third reservoir when needed.

CALGARY, N.W.T., has voted a loan of \$6,000 for six years, without interest, to Ratcliffe Bros., to aid them in establishing a creamery and cold storage warehouse at a cost of about \$12,000. Repayments are to be made annually in amounts of \$1,000 each, and security will be in the shape of a mortgage on the plant and premises.

THE Canada Cone Coupler Carriage Co., Ltd., Palmerston, Ont., has been incorporated, with a capital stock of \$25,000. They will manufacture and sell road vehicles of all kinds, and will acquire the St. John Cone Coupler patents and the right to manufacture thereunder. Among the applicants are W. E. Rothwell, manufacturer, Palmerston, and W. W. Vandervere, of Kalamazoo, Mich.

THE Renfrew, Ont., Creamery Co are now building the largest creamery in Canada, perhaps the largest in the world. It is 44 ft wide, 160 ft. long and three storeys high. The contract for apparatus has been awarded to D. Derbyshire & Co, Brockville. The boilers are to be 35 horse-power and the engine 12 horse-power.

E. J. RAINBOTH, of Ottawa, who was recently granted by the town of Aylmer a franchise for building and operating a system of water works there, has transferred all his rights and privileges to W. Poupore, of Morrisburg. The latter is reckoning on commencing operations at once and pushing the work forward with all speed.

AFTER a good deal of legal fighting, injunctions and counter-injunctions, the Montreal Gas Company has at length handed over to the Consumers' Gas Co the purchase price of the latter's works and franchises, viz., \$387,500, payable in stock of the old company at par, which at the present market price represents about \$700,000.

AMONG the amendments which the city of Montreal is endeavoring to make in its charter, in addition to those mentioned in our "Electric Flashes," is one authorizing the council to grant \$1,000 to the heirs of firemen mortally wounded or killed in the discharge of their duties, and to authorize the council to pass a by-law compelling firemen to insure themselves.

THE claim of P. Boileau & Freres, Montreal vs the Syndics of the Roman Catholic Church of Hochelaga, for extra work done in the completion and interior decorations of the building, has been dismissed on the ground that a special clause in the contract stipulated that no extra claims should be allowed except on a written order. There was no written order for any of the extra work performed.

THE St Lawrence Lumber Co., which had extensive properties in Bersimis, Que., and in Gloucester county, N.B., is being put into liquidation, owing to the failure of the Novelli Bank, London, Eng., their financial agents. The total liabilities amount to between \$350,000 and \$400,000, of which amount about \$60,000 is due in Canada for supplies. Senator Burns has been appointed liquidator.

A MEETING of the creditors of Wm. Brown, insolvent carriage hardware merchant, Toronto, was held recently, and a statement was submitted, which showed that the liabilities are as follows: Direct, \$20,841.50, indirect, \$800, secured, \$4,500; preferred, \$1,085; total, \$27,226. The assets amount to \$33,332, showing a nominal surplus of \$6,105. It is likely that the estate will be wound up.

THE Niagara River Tramway Co., Ltd., with a total capital stock of \$40,000, are applying for incorporation, headquarters at Niagara Falls Town, Ont. Their purpose is to operate a cable tramway across Niagara River by means of cables stretched between towers erected on each side of the river. The applicants are J. Flett and J. Tait, Toronto; G. W. Pound, Lockport, N.Y., and others.

THE Minister of Militia has awarded the contract for historical monuments, which were agitated for by the Canadian Institute and the Lundy's Lane Historical Society, to D. McIntosh & Sons, Toronto. They have been commissioned to erect granite obelisks 30 or 40 feet high, at Lundy's Lane, Chrysler's Farm and Chateauguay, each to be provided with a plate inscribed with a record of the action fought in its locality.

THE Montreal Gas Company are preparing a tender whereby they will be allowed to charge prices which will yield the shareholders a maximum dividend of ten per cent. on their capital stock. When the earnings of the company yield a revenue exceeding the amount necessary to pay a ten per cent. dividend, after paying expenses, the prices of gas are to be reduced sufficiently to reduce the earnings of the company to the maximum dividend of ten per cent. fixed by the agreement.

MONTREAL'S city surveyor, sanitary engineer and boiler inspector have finished their test of the Thackeray incinerator, and report that it gives absolute satisfaction, is in accordance with the specifications, and accomplishes the work required. They recommend that the incinerator be accepted, and placed under the supervision of the sanitary engineer, and that the sum of \$32,000, at 4 per cent. interest, be given to the contractors, according to contract. During the test the amount of refuse consumed per week was 81½ tons, this being more than 100 tons over what was called for in the contract. The cost of burning material was \$19.18 for 150 tons per day, while the contract called for \$21.60 for the same amount.

THE Dominion Government last month came to an important decision affecting the manufacturing interests of this country. Henceforward 99 per cent. of the duty paid on imported goods will be refunded, provided they enter into the manufacture of articles which are subsequently exported, whether materials of a similar nature to the former are manufactured in Canada or not. The minimum amount of any claim for "drawback" has been reduced also from \$50 to \$25.

A RECENT estimate of the number of feet of lumber sawed in the various mills in the Ottawa Valley this season reads as follows: J. R. Booth, Ottawa, 90,000,000, Bronson & Weston, Ottawa, 73,000,000; Buell, Orr & Hurdman, Hull, 70,000,000; W. C. Edwards & Co, Rockland, 65,000,000, Hawkesbury Lumber Company, 55,000,000, McLachlan Bros., Arnprior, 50,000,000; Gilmore & Hugheson, Hull, 40,000,000, MacLaren estate, Buckingham, 35,000,000, W. C. Edwards, New Edinburgh, 25,000,000; Gillies Bros., Braeside, 25,000,000, Ross Bros., Buckingham, 10,000,000, the total being 538,000,000 feet.

THE *Monetary Times*, Toronto, has the following reference to the affairs of Stevens & Burns, iron and brass founders, London, Ont., whose insolvency was noted in these columns recently: "The preferred claims amount to \$9,545, viz., bank liens, \$6,100; wages, \$1,434; taxes, \$948; insurance, \$130; mortgagees' distress, \$850; advertising auction sale, \$83. To these must be added the costs of assignment. At the auction sale held on September 18th, no offer was made that would realize even one half of the preferred claims, and the stock had to be withdrawn from sale. Subsequently an offer was obtained from the mortgagees of \$10,000 for all the assets, and this was accepted by the inspectors as the very best that could be done under the circumstances. We now learn that the estate does not pay the unsecured creditors one cent in the dollar, and that these unsecured liabilities reach \$40,000. Yet the concern is running again under the style of the Stevens Manufacturing Company, and is asking credit. They make the statement to one whose goods they want that their position now is better than ever, as they have no liabilities and have all the assets of the old company. When as a matter of fact the buildings, machinery and stock are owned by Fallows, Fitzgerald & Labatt, the mortgagees, who will not be liable for any new debts as they were in the Stevens & Burns Co."

Electric Flashes.

FRITZ LOVELL has just finished putting in a system of electric lights at Stanstead, Que.

AN English syndicate has purchased the electric street railway and electric lighting system of Vancouver, B.C.

TRURO, N.S., Electric Light Co. are about to instal a 600-light dynamo, similar to the one put in only a short time ago.

ROBERT WEDDELL has been awarded a contract for the erection of a new power-house at Trenton, Ont., at a cost of \$5,400.

CHAS. BANCROFT, JR., is pushing work on installing the plant at Foster, which is to supply Waterloo, Que., with electric lighting.

SMITH'S FALLS, Ont., Electric Light Co. have put in a new water wheel at Old Glys, which considerably improves the light.

THE Regina, N.W.T., Electric Light and Power Co. advertise their plant and premises for sale under execution on 19th inst.

STETSON, JORDAN & Co.'s saw mill, at Pleasant Point, N.B., is now lighted by electricity, and has begun to work at night as well as in the day.

STANSTEAD, Que., Electric Light Co. will probably sell their plant and privileges to the same company who recently purchased the water works.

THE Amherst, N.S., Electric Light Co. have placed an order for two new dynamos. These will give the plant an additional capacity of about 600 lights.

A SCHEME is under contemplation to build an electric railway from Parry Sound to Ahmic Harbor, power to be obtained from a waterfall in the neighborhood of Parry Sound.

BROCKVILLE, Ont., town council have appointed a committee to confer with A. B. Wilgers, with reference to his proposition to construct an electric railway in that town.

TORONTO Street Railway Company have purchased the building at the corner of King and Church streets for \$55,000, and will, after enlarging and improving it, use the same for general offices, their present building being too small for their requirements.

P. R. RANDALL has succeeded in obtaining a franchise for the construction of his projected electric railway through Port Hope, Ont., to Rice Lake, with perhaps a branch to Cobourg.

THE \$320,000 worth of 5 per cent mortgage bonds of the amalgamated electric companies of Ottawa were rapidly sold at par, the Bank of Ottawa taking almost the whole amount.

A COMPANY is being formed in Ottawa for the purpose of establishing a factory for the manufacture of carbons for arc lights, and also porcelain lamp shades. The building is to cost \$50,000.

HULL, Que., is the latest Canadian city where hoodling has been found to flourish. Certain aldermen are charged with accepting shares in the new electric railway company in return for their influence in getting certain clauses inserted in its charter.

THE Toronto and Suburban Street Railway will proceed with the construction of the line westward along Dundas street to Islington and Lambton, as soon as the franchise can be procured.

GEO SPOTSWOOD, C.E., has been calculating, and estimates that the cost of building an electric railroad between Kingston, Smith's Falls and Ottawa would be about \$500,000. This would meet all the requirements of an ordinary railroad, and would save hundreds of thousands of dollars.

SEAFORTH, Ont., has sold its plant to the Electric Light, Heat and Power Company, which has just been incorporated, as reported in last number. The council had come to the conclusion that a town cannot run an electric light company as cheaply as a private company.

THE Postmaster-General has been on a visit to Brooklyn, N.Y., investigating into the system of electric car postal service in operation there. The outcome will probably be the adoption of the system in Toronto and other Canadian cities. It is already in use in Ottawa with satisfactory results.

APPLICATION for incorporation is being made by a company who intend to construct an electric railway from Toronto to Hamilton, and thence to a point on the Niagara river, into a branch from Grimsby to Smithville and Dunnville. Biggs & Lewis, of Toronto, are the company's representatives.

THE New Westminster and Burrard Inlet Telephone Co. has arranged with the Canadian Pacific Telegraph Co. for lines between New Westminster and Snohomish, Wash., which will be converted into a telephone system. There will thus be through communication with Seattle and San Francisco.

THE Victoria Electric Light Co. have taken the old gas company's premises at Lindsay, Ont., which, after overhauling, they will use as an electric light station. They have already put in several dynamos and a powerful generator, and will shortly add a Goldie-McCulloch condensing engine and a large boiler.

THE work of putting in the new company's electric light plant at Summerside, P.E.I., is to be started at once under the superintendence of Mr. Condgeon. The council have made a proposition to the company for the latter to light the town for three years a \$600 per year, with thirty-three incandescent 32 candle-power lights.

W. KYLE, representing the Toronto capitalists who recently purchased the horse car line between Drummondville and Niagara Falls, with the intention of converting it into an electric road and changing the route so as to run to Chippewa, and connecting it at Queenston with boats for Toronto, is asking Niagara Falls council for a bonus of \$50,000 to \$75,000.

THE Quinze Electric Company are applying for incorporation to construct and operate works for producing electricity for light, heat and power purposes, and to construct electric railways in the county of Pontiac and particularly one between the townships of Guiges and Duhamel. The applicants are John Bryson, of Fort Coulonge, J. M. McDougall, of Hull, and others.

A NUMBER of Ottawa capitalists, including J. W. McRea, N. C. Sparks, S. M. Rogers and J. A. G. Trudeau have purchased the patent rights of a primary electric battery invented by C. J. Hubbell, of Washington, D.C. They are forming a joint stock company with a capital of \$45,000, and propose to erect in Ottawa a factory for manufacturing it. A number of skilled hands will be employed.

PROPOSALS for constructing and maintaining a new Pacific cable were opened by the Minister of Trade and Commerce last month, but the prices have not been divulged. Six tenders were sent in, all by London, Eng., firms, as follows: Fowler Waring Cable Co., Telegraph Construction & Maintaining Co., Stevens Bros., W. T. Henley's Telegraph Works Co., Francis A. Bowen, and the India Rubber Gutta Percha & Telegraph Co. The proposals are said to be more favorable than was anticipated.

THE city of Montreal is applying to the Legislature for amendments to its charter, amongst which are the following to regulate and modify the tax imposed on telegraph, telephone and electric posts and upon the wires and apparatus connected therewith, and to grant to the council control over all electric posts and wires, as well as power to cause wires to be placed underground.

THE Stadacona Water and Light Company, Montreal, are applying for incorporation, with a capital stock of \$40,000. Their purpose is to build and work aqueducts in the Province of Quebec for the furnishing of water and light to various towns and villages in that province. Among the applicants are J. O'C. Mignault, E. Belanger, and E. C. & Charles Amos, civil engineers, all of Montreal.

AYLMER, Que., town council have passed a by-law granting a twenty-year franchise to the Hull Electric Railway Co. for operating an electric railway between Hull and Aylmer, and through the streets of the latter town. Efforts will be made to get the road into operation before July next. The authors of the scheme contemplate next year extending the line to Quio, a distance of 20 miles, and perhaps to Arnprior.

AT St. John, N.B., a terrific snowstorm set in on the 6th ult., and within a few hours the streets were strewn with wrecked electric light and telephone wires and poles. The loss to the telephone company is given as \$10,000. All street cars had to stop running. The mayor ordered the Street Railway Company and the electric companies to turn off all currents in their wires, and this action no doubt was the means of saving many accidents, owing to live wires.

IN the case of *Grose vs. the Holmes Electric Company*, both of Montreal, in which defendants were charged with conspiring to injure the electric burglary protection business of the plaintiff and with damaging his property, a verdict was given in favor of Mr. Grose, and against the vice-president of the Holmes Company, Mr. J. B. Wood. The prosecution asked that the sentence on Mr. Wood should be as light as was consistent with justice, and he was fined \$50.

JOHN FORMAN, dealer in electrical machinery and appliances, has the contract for the "bolster" plant for the Royal Victoria Hospital, Montreal. This plant consists of two straight current transformers, one of which is sufficient in capacity to transform all current necessary for the Crompton-Howell storage battery plants already installed by Mr. Forman in the institution. The other transformer is a small straight current one, to be used for individual cells.

W. E. RATHBUN, of Deseronto, the principal stockholder of the company proposing to build the Oshawa, Ont., Electric Railway, has deposited on its behalf bonds to the value of \$2,000, which will be forfeited to the town unless the first section of the line is completed by June 15th, the second by July 15th, and the third section by September 30th next. This action was the result of popular dissatisfaction at the non-completion of the line within the time contemplated when the \$5,000 bonus was granted some time ago.

CHAS. KLINE, a man confined in the Ohio penitentiary, has invented a new telephone transmitter, the chief feature of which is its large number of points of contact, which amount to between two and three thousand. In the long distance telephone there are about three hundred of these points of contact, and in the ordinary Blake transmitter the number is still less. In the new telephone, even a whisper can be heard distinctly, but a remarkable feature is the fact that noises at a short distance are not transmitted, as in the ordinary system.

THE Citizens' Light and Power Co., Montreal, have erected a large new power station in St. Henry, and are now putting in, under the superintendence of T. Emile Vaniér, C.E., Montreal, a 1200 horse-power steam plant, which will be used for the purposes of running all their lights and of furnishing power for the Standard Light and Power Co.'s (amalgamated with the Citizens' Co.) electric railway to Lachine, now in course of construction. The new power-house will cost over \$120,000 and will be in operation next month.

ALBERT J. CORRIVEAU, of the Montreal Park and Island Railway Company, has taken an action against W. S. Williams, of New York, for the recovery of \$118,750 worth of stock. Mr. Corriveau, in 1892, took Mr. Williams into partnership with him, and the arrangement was that the former should furnish the franchises for the projected electric line, and that the latter, backed by a wealthy New York syndicate, should supply all the capital needed, the railway company paying for these services with \$125,000 worth of paid up stock each. Plaintiff now claims that very little of this capital was forthcoming, and, accordingly, that the above stock is held by defendant illegally.

THE Maganetawan Tanning and Electric Co., capital stock \$50,000, has been incorporated under the Joint Stock Companies Act. Besides carrying on a general tanning business, they will build or purchase and operate steam and other vessels, and build on their own land such communication as the company may desire to obtain connection with the waters of the Maganetawan River, and the G. T. R. G. & W. T. Marlatt, of Oakville, and J. Waddie and W. Cameron, of Toronto, are the chief promoters.

THE Laurie Engine Co., Montreal, have built for the Toronto Street Railway Co. the largest engine ever manufactured in Canada for a similar purpose. Its normal capacity is 1,200 horse power, and its generative power from 1,500 to 2,200 amperes. It cost over \$50,000. The fly wheel weighs 80,000 pounds, is twenty feet in diameter, and is one of the new inventions, built directly on the shaft and put up in ten sections. The combined weight of the fly wheel, armature, shaft and generator is upwards of seventy tons.

THE Hamilton and Lake Erie Power Company has had its charter amended so as to allow of its bringing power either from Lake Erie or from the Niagara river east of Dunnville, in a northerly direction, to some point on Lake Ontario or Burlington Bay, "passing wherever necessary" through the counties of Haldimand, Lincoln, Welland and Wentworth, and the city of Hamilton. The amended charter also provides authorization for acquiring rights of way and for the disposal of power wherever practicable.

Mining Matters.

OPERATIONS are being resumed at the "Washington," Slocan district.

THE machinery for the Slocan Milling Co.'s works, Nelson, is being put in position.

G. M. SPENCER and J. Ehrmanterant have discovered a ledge of silver quartz 190 feet wide, not far from Nakusp, B. C.

A GOLD brick weighing 53 ozs. was the result of three days work recently at the "Sultana" mine, Lake of the Woods.

THE Wentworth Company, Sherbrooke, N. S., intend soon putting in a new boiler. Their mill has just been put into thorough repair.

MILLER & BAUMGARTEN were recently on a visit to Tring, Que., with a view to purchasing and eventually working several asbestos properties.

CAPT. DONNELLY, superintendent of the "Ivanhoe" mine, Slocum, expects to strike the lead at a depth of 80 feet. The tunnel is now in about 40 feet.

A LARGE number of gold areas are being taken up at Indian Lake, near Wine Harbor, N. S., where a new lead has been struck.—*Canadian Colliery Guardian*

FITCH, FITCH & O'NEIL have sold the President group of mines, near Goat River, B. C., to a Wisconsin syndicate, and work is to be commenced on the property at once.

THE Wentworth mine, Goldenville, N. S., is showing good ore and running full blast. A ton and a quarter of quartz crushed a week or two ago yielded 128½ ozs of gold.

C. WHEATON and J. Adams have just brought from their property near Kaslo, B. C., a ton of ore averaging all the way through 5,000 ozs. silver. The vein is 8 inches wide.

AT Paddy's Peak, B. C., the Utica Marie mine has two tunnels driven in, one 40 feet and the other 20 feet. Four feet of galena and carbonates are present in the lower tunnel.

GEO. PEARCE, agent of the Ontario Natural Gas Co., has leased several thousand acres of land near Comber, Essex county, for the purpose of making investigations into it as a gas district.

THE Salisbury Company have discovered a valuable gold lode on their property in Montague, N. S., district. The lode is 6 inches wide, and the average yield of two buckets full of ore was three ounces to the ton.

JOHN SUTCLIFFE, a large shareholder in the Londonderry, N. S., Iron Co., accompanied by Hy Booth, of New York, last month paid a visit to Truro with a view to investing in some of the Nova Scotia gold mines.

WORK at Gowrie, Ont., mines is going on briskly, and the output has been considerably increased. The coal floor has been considerably enlarged, and will now hold 30,000 tons of coals. Preparations are being made for an immense amount of work next year.

It is expected that the "Wonderland," on Carpenter Creek, B. C., will ship about 200 tons of ore this season.

THE Smithfield, N. S., mines have resumed operations with 30 hands at work. The ore is said to be of very good quality.

AT the Beaver Lake, Que., mica mines about 130 men are now employed daily, and 40 more are employed on similar mines near Murray Bay.

THE "War Eagle" Nelson District, now shows a series of ore chutes for 1,200 ft., some of which are very wide. The grade of ore has improved with deeper working.

AT the "Slocan Star," B. C., there is said to be 232,000 tons of ore in sight, and at the "Idaho," likewise in the Slocan country, about \$30,000 worth of ore is on the dump ready for shipment.

THE Memramcook, N. B., Gold Company announce that further tests have established the fact that there is not enough gold in the mines to justify carrying on operations. The works will be abandoned and the plant sold.

SHIPMENTS of Nova Scotia coal this year, says the *Stellarton Trades Journal*, will probably reach 2,100,000 tons. Of this Cape Breton's contribution will be 1,220,000. Cumberland's, 480,000, and Pictou's should be 400,000.

G. J. GOODHUE, of the Kootenay Hydraulic Co., is preparing to have a 400 foot pier constructed in the bed of the Pend d'Oreille to form a foundation for some water-wheels and pumping machinery. The first cost of this plant is estimated at \$80,000.

JAS. A. FRASER purposes developing the Chicago gold claim at Goldenville, N. S., and he has just given out a contract for building a new crusher and engine house. The "Striker," "Sears" and "North" claims in this district are showing fair prospects.

AT the "Ruccan," Slocum, the upper tunnel is down 353½ feet, and the ore has been continuous for a length of 330 feet. It is all clean ore, is about a foot wide at the widest spot and assays 900 ozs. galena to the ton. It is expected to ship 600 tons this winter.

A B. C. paper says that J. F. Bailey, a mining engineer from New York, who visited the Hamilton group of claims on Howson creek, also the Alpha mine, and the Reid and Robertson group, took away with him an extraordinarily high opinion of the Slocan.

THE "Silver King" will probably continue shipping 8 tons of ore a day to Nelson for some time to come. A contract has been given to A. R. McPhee, Nelson, to construct a mile and a quarter flume for the purpose of bringing a water supply down to the power house at the mine.

B & F. VINNING, of Plantagenet, Ont., have struck what appears to be a valuable find of gold near Shoal Lake, about forty-two miles from Fort Francis. A company will be floated to work the mine, though an American syndicate has, it is reported, offered \$35,000 for a half interest.

THE "Kalispell," in Ten-mile Creek district, was located by Price & Radcliffe last summer. The ore, though not very clean, is high grade. A sample recently assayed 350 ozs. of silver to the ton. It will probably be bonded shortly at a high figure, and will be thoroughly opened up this winter.

THE miners at the "Eureka" mine, Wine Harbor, N. S., have struck work, owing to their pay being in arrears. The mine looks well, and there is said to be enough ore on the dump to more than pay all the company's debts, but owing to the non-completion of the mills this cannot be realized on.

B. FINNELL, while prospecting around the second tributary, which falls into Four-mile Creek, B. C., from the south, discovered a vein of high grade, dry ore, which he traced through the entire length of five claims, and these he and his companions located. They will work on the property all winter.

A QUANTITY of high grade cube galena has been struck on the High Ore, a fraction situated between the Idaho and the Cumberland. The owners of the last named claim intend shipping 200 tons of ore, which is now being sacked, as soon as the railroad is completed to Three Forks.—*Nelson, B. C., Miner*.

THE Ledyard Gold Mines Co., Belmont, Ont., turned out its first gold brick a few days ago. It was worth \$160, and was the product of 52 tons of ore, but besides this the same material produced about \$600 in gold concentrates. The capacity of the company's plant at present approaches 20 tons per day.

THE Canadian Copper Co. have won in the United States courts in the long-contested case against R. S. Ritchie, involving about a million and a quarter dollars. Ritchie claimed this amount from the company in return for services rendered, etc., but the courts disallowed all claims. The case will be carried to the Supreme Court of the United States.

J. H. WEST, of Yarker, has discovered what appears to be a rich gold mine in Barrie township, Ont.

THIRTY coke ovens have just been put in readiness for starting at the Acadia, N.S., mines. A busy season is expected.

Two large tubular boilers and an engine are being made for the General Mining Association at Sydney Mines, C.B.

G. O. FULTON, of Truro, N.S., has taken up several coal areas near Kemptown. The Nova Scotia Coal Co. are doing some boring work in this same region.

THE Central Gas Co. struck a powerful flow of natural gas at Dunnville, Ont., last month, where gas wells drilled just previously proved to be all failures.

WHITNEY & MOORE, of Bessemer City, N.C., want to correspond with owners of mica property, as they have an order for 10,000 pounds of that material.

A RICH strike is said to have been made in the "Goodenough" mine, near New Denver, B.C., consisting of a ledge of high-grade ore showing over \$1,000 to the ton.

THE Maud Hydraulic Mining Company, Vancouver, B.C., has been incorporated, capital stock \$25,000. J. M. Browning, J. M. Buxton, and C. Wilson are the trustees.

COMEAU'S HILL, N.S., stone quarry has been leased to the South Shore Railway Co., who will obtain from it most of the granite required for their bridge and culvert work.

R. ROBERTSON, manager of the Sydney, C.B., mines, is leaving for England, and has given up his position, which will be filled by Mr. Atkinson, underground manager of the "Victoria."

THE Regina mine property at Whitefish Bay, Ont., has been sold to an English syndicate, represented by W. G. Motley. The price is \$30,000. Active development work will be started during winter.

It is expected that the furnaces at the new smelting works in Hamilton will be ready for use early next month. About \$40,000 has already been spent on the works besides the cost of the railway spur.

D. E. NOYES and A. Coghlan have located quartz claims on the Myelte river, near the Jasper river, Rocky Mountains. The ore assays \$5.50 to \$7.35 of gold to the ton. A shaft will be sunk on the ledge this winter.

THE Slough Creek Co.'s mines, Cariboo, B.C., have been developed considerably during the past season. Some extra powerful machinery is about to be placed in, upon which work will recommence on a better basis than heretofore.

It is stated that there are over one hundred million tons of available coal in the newly-discovered fields at the head of Lingan Bay, C.B. The lessees of these fields propose to take joint action in forming a company to develop the property.

THE Dominion Smelting and Refining Co. are opening up the lead deposits at Smithfield, Middle Stewiacke, N.S., and active work is going on under the management of G. C. Underhill. Another very rich lead was struck a few days ago.

AT the "Le Roi" mine, Trail Creek district, B.C., men are still sinking on the shaft below the 300 feet level, and the ore is said to be coming up richer than ever. Burleigh drills have been put in, and about 30 tons per day is being shipped.

THE results of the last clear-up on the Horse-Fly hydraulic claim at Cariboo, B.C., showed \$13,000 for a fortnight's work, though the heaviest portion of the claim was not represented. The owners claim that the mine will eventually yield \$40,000 in gold per month.

THE enterprising firm of I. Matheson & Co., engineers and boiler makers, New Glasgow, N.S., have recently sold complete milling outfits to W. A. Saunders, of the Caribou mines and the Mooseland Gold Mining Company, both of Halifax county, N.S. Both outfits are of the very best and latest design.

GEO. A. COX and Wm. McKenzie, of Toronto, and T. G. Holt, of Montreal, and other wealthy capitalists, have completed negotiations for the purchase of the Victoria, B.C., Hydraulic Co.'s claims on the north and south forks of the Quesnelle river. The price paid was about \$70,000 in cash and paid up stock.

THE usual quarterly meeting of the Asbestos Club was held in Sherbrooke on the 8th ult. The aim of this club is to promote special intercourse between persons interested in the mining and manufacture of asbestos, in order to discuss matters of general interest. At the meeting now noted, a paper by Dr. W. Glenn, of Baltimore, on "Mine Explosions Generated by Grahamite Dust," was read.

D. DOODY and E. McDonald have taken up fifty acres on East River, N.S. From a crushing of 1½ tons of ore recently there was a yield of 1½ ozs. of gold.

LEE & DREANEY, who discovered the large talc deposits near Webbwood, Nipissing District, have formed a company with a capital of \$96,000 to work the mines.

THE last crushing of the Caribou, N.S., Gold Mining Co. yielded from 35 tons of ore, about 19 ozs. of gold. Next year they will operate the Truro, Dickson and Torquay mines, and will have the 20-stamp mill at work.

JONES & HARDIE'S claim, the "Golden Eagle," on Cariboo Creek, B.C., has a ledge 9 feet wide, one sample from which showed \$481 in free milling gold. D. A. McDougald and R. M. Yingling have bought a half interest in the mine for \$2,000.

THE Dominion Gold Dredging and Placer Mining Co., Toronto, are seeking incorporation, with a capital of \$40,000. The applicants are James Ames, James Perkins, Alex. Leslie and H. H. Dewart, of Toronto, and J. Mulholland, of Charles City, Ohio.

A SMALL quantity of Leech River, B.C., gold has been bought by Mr. Worlock, of Golden, for \$17.50 per ounce. Mr. Worlock will test its quality with a view towards taking up a claim in the neighborhood of its discovery, should circumstances warrant it.

S. LIVINGSTONE has been prospecting, with fine results, along the south Saskatchewan river, near Medicine Hat. He and his party have located a claim about fifteen miles from the town, which promises such a reward that prospectors are coming in from all sides.

THE Little Bay copper mine, on Notre Dame Bay, Nfld., is now down about 1,300 ft. Twenty-five men are at work. At Tilt Cove work is being pushed ahead, the present output being about 6,000 tons per month. Three new furnaces were erected a short time ago.

THE B.C. Government is being asked for aid to establish a bureau in which ore from every part of the province can be kept on exhibition, and full particulars printed in pamphlet form for general information. It is hoped thereby to form the nucleus of a future School of Mines.

ABOUT a ton and a quarter of ore from the Stellarton, N.S., Gold Mining Co.'s mines recently yielded 125 ozs. of smelted gold. This, added to the result of the former crushing at Mr. Naughton's mill, Wine Harbor, gives the large total of 226 ozs. from less than three tons of quartz.

THE Buffalo Point coal pits, Fort William district, Ont., have been tested and found satisfactory, and the proprietors, Messrs. Watson, Moody, Falkner and Neal, are now making arrangements to put in machinery and build a railway in order to operate the property as soon as possible.

MR. WAGNER, who owns six claims in the Lardeau, B.C., district, recently made a new discovery which he called the "Francis Jewel." A body of solid ore was struck nine feet below the surface consisting of native silver, bromide of silver and grey copper, averaging over 2,000 ozs. to the ton.

HARRY BOSS arrived at Thompson's from his claims north of Trout Lake City. He is interested in seven claims, four of which he staked this summer, and all are high-grade propositions. He thinks most of the "Hunter" group, on Pool Creek, the ledges on which are from 20 to 40 feet wide, and assay from 100 to 300 ozs. silver to the ton.—*Kootenay Mail*.

CAMPBELL & JOHNSON have been steadily developing the Badshot all summer, and have struck a body of ore larger and richer than they ever expected. The lead where they have sunk on shows 12 feet of solid grey copper ore between the walls, averaging over 300 ozs. to the ton. Some of their assays ran from 1,100 to 1,700 ozs. They have employed four men all summer.

GRAHAM FRASER, who leased about five square miles of iron areas on Belle Isle, Nfld., is thinking of constructing a pier on the south-eastern shore of the island, and proposes to carry the ore across from the other shore, a distance of two miles, by overhead cable. Analysis of the ore on this property, says the *Canadian Colliery Guardian*, shows about 62.7 per cent. of metallic iron.

E. L. W. HASKETT-SMITH, A.M.I.C.E., who spent the summer of '93 investigating the copper deposits at Waugh's River, Tatamagouche, N.S., intends having the ore thoroughly tested at Swansea, England. F. H. Mason, F.C.S., of Truro, has received instructions from him to take samples and ship several tons of ore to England for practical tests. This ore is a grey sulphide of copper found in nodules in blue clay, and when washed free from the clay, runs between 55 and 63 per cent. of copper.—*Canadian Colliery Guardian*.

Railway and Marine News.

THE "Nickel Plate" and "Josie" mines near Rossland, B.C., will resume work as soon as the coming of snow allows sleighing. The "Le Roi" will ship about thirty tons of ore per day as soon as sleighing commences.

IN the "Similkameen," Kaslo district a large body of high grade copper ore, showing, it is said, 71 per cent., has been discovered by A. R. Brown, who has staked three claims, called the "Sunset," "Vancouver," and "Helen H. Gardner." The ledge has been traced for a length of 4,000 ft.

AT the Cape Breton collieries there has been great activity throughout the past shipping season, all the mines having been taxed to their full capacity to meet the demand of the local and the St. Lawrence markets. The "Old Sydney" will probably show the largest output of any one mine, says the *St. John Telegraph*.

THE recent survey of the international boundary line, north of Spokane, Wash., disclosed the fact that twelve mining claims, owned by C. Knulton and others, were situated on the Indian reservation in the United States. The unfortunate miners immediately ceased work, but are on the watch for future developments.

A COMPANY has been incorporated under the name of the Bocabec Black Granite Co., of Portland, Me., to work the quarries at Bocabec, near St. Andrews, N.B. Capital \$250,000. The company will also be incorporated under the New Brunswick laws, and later on polishing works will be established either at St. Andrews or Bocabec.

AT the "Last Chance," Kaslo, a ledge of ore about thirty inches wide has been disclosed. The tunnel is run on an incline, and is in 52 feet. About 30 tons of ore are now on the dump, and about 100 tons more will be shipped shortly. Clean ore runs 205 oz. in silver to the ton and 96 oz. in carbonates. The owner of this mine is E. H. Tomlinson.

THE gold output of the Kootenay, B.C., district this year is approximately \$200,000, divided as follows: Trail Creek district, \$150,000; Nelson, \$28,000; Trout Lake, \$20,000; Revelstoke, \$10,000, and Fort Steel, \$10,000. Most of this is from quartz mines, especially in the Trail Creek region, whereas the Cariboo output is from gravel mines.

ABOUT thirty-three claims will work and ship ore in the Slocan this winter. Times promise to be more prosperous there than in any other mining section of the North-west. The output will probably reach 17,000 tons by next spring. The town of Three Forks, in the centre of the mines, is building up very fast and anticipates a large amount of business.—*Nakusp Ledge*.

A DISPATCH from Kaslo, B.C., states that the placer excitement still continues; all the leading men in town have recorded claims to be worked as a whole. Twelve claims were recorded on Saturday. The poorest day's work on the claims known is \$2 per yard and the highest was \$950 per yard. The gold is all coarse in many instances, and large as a silver five cent piece and about twice as thick.

THE Isaac's Harbor, N.S., Gold Mining Company has been formed, with John McMillan, president, and S. R. Giffin, Robert C. McMillan, Roderick McLeod, Reuben H. McMillan and Edward Richardson, provisional directors. Having previously located the gold-bearing anticlinal in two shafts on their property, they now purpose making the road to their mine, and operating on it as soon as possible.

THE profit obtained from the "Treadwell" mine, B.C., during the past year exceeds any previous record, it being \$429,949. During the year the owners paid four dividends of \$75,000 each, besides a bonus dividend of \$150,000. The yield averaged \$3.20 per ton, against \$2.94 for the previous year, owing to the level worked showing higher grade ore than heretofore. The reports show that the total receipts were from bullion sold, \$705,948; interest, \$3,000; profits of store, \$18,835; making a total of \$727,838. The working expenses were \$297,924, leaving a profit of \$429,949 for the year.

A WAGON road is being built from Three Forks to the Idaho basin. This will serve the Idaho, Alamo, St. John, Cumberland, Democrat, Young Dominion, Queen Bess and other mines. The output of this one basin this winter should be not less than 3,000 tons. The Montana Chief will ship probably 700 tons. Finch & Campbell are building a trail to and erecting winter quarters at the Wonderful, and will ship 500 tons. On the south fork of Sandon creek the Ruth, which has already shipped one carload, and the Wills group, owned by Moore, Humphreys & Blackaller, on which thirty men are at work, will also be heavy shippers.—*Nakusp, B.C., Ledge*.

THE Irondale, Bancroft & Ottawa Railway Co. now have trains running to Wilberforce.

THE C.P.R. car shops at Winnipeg are to have an extension measuring 145 ft. by 45 ft.

THE Nelson Loop Railway connecting Nelson with Chatham, N.B., has just been completed.

A COMPANY is applying for a charter to build a railway from Arrow Lake to Trout Lake, B.C.

THE steamer "Ripon City" went aground last month at Long Point near Montreal, and was badly damaged.

THE Lake St. John Railway have just received from Deseronto, a large lot of box cars for the Chicoutimi division of the road.

THE machinery of the lighthouse at Pointe Plate, St. Pierre, has been destroyed by fire. It will be replaced as soon as possible.

THE South-Eastern Railway has passed into the control of the C.P.R. Co., who owned \$1,200,000 in first mortgage bonds on the road.

THE Lorne Bridge at Wellington over the Rideau canal is to be rebuilt this winter. The piers are to be of wood and the superstructure of iron.

A DEPUTATION interviewed the Minister of Railways recently, and endeavored to obtain Government assistance for the repairing of Marsh Bridge, St. John, N.B.

IT is now stated that the report published recently with regard to the coming consolidation of all the important east coast steamship lines is totally untrue.

IT is stated positively that 175 miles of the Hudson Bay Railway will be built this year, and that next year the road will be extended as far as the Saskatchewan.

THE Donaldson line steamer "Hestia," bound from Glasgow to Quebec, last month lost her propeller and broke her shaft in mid-ocean, but was towed home in safety.

TRUCK laying has now begun on the Fort Fairfield branch of the Bangor and Aroostook Railway. The new bridge across the Meduxenkeag at Monticello is well under way.

THE O. A. & P. S. Railway Company are surveying the route from Long Lake to Emsdale, and it is expected that contracts will be given out shortly for the construction of that section.

THE sheriff's sale of the Montreal & Lake Muskegonge Railway, running from St. Gabriel de Brandon to St. Felix de Valois, with its dependencies, has been postponed until the 9th prox.

THE railroad now under construction by the C.P.R., from Mattawa to Lakes Temiscamingue and Kippera, is ironed for a distance of 43 miles, and the line will be about completed this month.

THE Toronto, Hamilton and Buffalo Railway Co. are pushing work on five bridges east of Cainsville. They have just placed with Wood, Vallance & Co., Hamilton, an order for 30 tons of iron bolts for the same.

CONTRACTOR REID, who is engaged in building a railroad across Newfoundland, has stopped work and discharged 1,200 men for the winter. This action is understood to have been caused by the unsettled state of the colony's government.

THE C.P.R. is to begin construction work on its new East End Depot, Montreal, next May, and it must, according to contract, be completed within a year, when the city is to pay over to the company \$750,000, its stipulated share of the cost.

TEN miles of the Ottawa, Arnprior & Parry Sound Railway, between Barry's Bay and Opeongo Forks, are now completed, and have been pronounced by the Government inspector as satisfactory. Twelve miles beyond the Forks, in addition, are almost completed.

THE P. & P. J. Railroad Co. have decided to make Black River the terminus for their line for some time to come. To continue to Pembroke would require the expenditure of \$200,000 for bridges over the Ottawa River at Allumette Island, and for this the company is not at present prepared.

D. D. MANN, a Montreal contractor, has been on a visit to British Columbia to determine the best route for a proposed railway from some point on the C.P.R. to Barkerville, a distance of 280 miles through the centre of the Cariboo gold mining district. The promoters of the scheme include Sir Wm. Van Horne and Mr. Shaughnessy, of the C.P.R. Company.

ARCHIBALD McNAUGHTON, contractor for the harbor works at Goderich, Ont., was last month given a complimentary banquet by the leading business men of that town, in celebration of the completion of the work.

THE G.T.R. contemplate the construction of a spur line between Brantford and Copetown. Brantford will be asked to grant a bonus of \$7,000 or \$8,000 to help defray expenses, which will amount to between \$20,000 and \$30,000.

THE Philipsburg Junction Railway & Quarry Co. are applying to the Legislature for authority to change the company's name, also to build and operate a railway from a point on the present line westward to a point on the Richelieu river, in the county of Missisquoi.

TRACK laying on the United Counties Railway between South Indian on the Canada Atlantic and Rockland, a distance of seventeen miles, has commenced, and the work will be completed by next month. The road is leased to the Canada Atlantic for a number of years.

As a result of the recommendations of Chief Engineer Anderson, chief engineer to the Marine Department, next spring thirty-two buoys will be placed on Lake Nipissing. The four outlets to French River from the lake will also likely be dammed, in order to give a uniform depth of water.

THE receipts of Montreal Harbor Board show a falling off for the year of \$41,379. The revenue from imports fell from \$137,000, in 1893, to \$110,000 in 1894, and that from exports fell from \$95,000 to \$78,500 in the same period. The revenue for local traffic increased from \$25,749 to \$27,870.

MRS. OBADIAH PUDSEY, who brought suit against the Windsor & Annapolis Railway Co. to recover damages for the death of her husband, who early this year was engineer on a snow-plow special and lost his life owing to its having been improperly balanced, has been awarded the sum of \$4,500. Notice of appeal was given.

An application in the English Chancery Court for the winding-up of the Beaver Steamship Line has been remanded till the 18th inst., in order to enable the liquidator of the company in Canada to be represented at the hearing. The S.S. "Lake Nipigon" was put up at auction in Liverpool, but the only bid made failed to reach the reserve price of \$10,000.

THE Nakusp and Slocan Railway Co. have leased their line for twenty-five years from completion to the C.P.R., who will pay as annual rental an amount equal to 40 per cent. of the gross earnings. The Dominion subsidy of \$24,328 is to be paid into the hands of the B.C. Provincial Government to indemnify them against possible loss owing to change of liability.

THE contract for section one of the Simcoe & Balsam Lake division of the Trent Canal has been awarded to Andrew Underdonk, of Chicago, and that for section one of the Lakeshield division to Hogan & McDonald, Montreal. The prices are \$500,000 and \$250,000 respectively. Both tenders were the lowest offered. Work on the Balsam Lake section will probably be commenced at once.

AN American syndicate has purchased the rights and privileges of the Centreville, N.B. Railroad Co., agreeing, it is understood, to begin the work of construction so as to have it completed before the end of next year. It is also understood that the line will be extended to Bridgewater and connected with the Bangor and Aroostook, and it will, perhaps, eventually become a part of that system, thus becoming a competitor with the C.P.R.

TWENTY-THREE miles of the Lotbinière & Megantic Railway, connecting Lyster on the G.T.R. with St. Philomine, in County Lotbinière, have been completed, and the official inauguration of the track took place on the 22nd ult. The last twelve miles section was constructed by Loomis & Sons, of Sherbrooke. This branch is part of a railroad forty miles long now being built from Lyster to St. Jean des Chailions, and passes through a thickly-wooded region, offering advantages for colonization purposes.

Personal.

THOS. B. ROSS of Montreal, for the past fifteen years treasurer to the Dominion Cotton Mills Co., died last month of heart failure.

WM. McKAY, who has been head engineer in Ogilvie's mills, Seaforth, Ont., for the past eight years, has moved to Amherst, N.S., having accepted a position with the Robb Engineering Co.

At the recent convention of the American Street Railway Association, held at Atlanta, Ga., J. C. Cunningham, of the Montreal Street Railway, was elected a member of the Executive Committee.

CHAS. F. CHAPMAN, C.E., who was for ten years inspector of surveys for Ontario and who made a complete survey of the Canadian lake shores, died last month in Minneapolis from the effects of a hemorrhage.

THE will of the late Prof. Chas. Carpmael, of Toronto Observatory, has been filed for probate. The estate amounted to \$33,537, the income from which is to go to his sister-in-law until the youngest of his two children becomes of age, when the whole of the money goes to them.

JOHN WILLIAM MURRAY, who for the last ten years has been a machinist with Goldie & McCulloch, Galt, and who was before that time in the employ of the Hamilton Tor Works and the Hamilton Rolling Mills, died a short time ago at the age of 60 years. Mr. Murray leaves a widow and two children, and many friends will mourn his loss both in Galt and Hamilton.

LIST OF PATENTS.

Compiled at the Patent and Technical Office of Brockhues & Co. Cologne. Information on all questions referring to this list is given gratis to our subscribers.

Burchelt & Co., Grünberg, in Silesia, Bridge Building and Iron Construction Works, portable bridge.

Siemens & Halske, Berlin, arrangement for the prevention of accidents with cables through which a current is passing.

Carl Baum, and Wilhelm Dietz, Mannheim, street cleaning apparatus.

Dr. W. Ule, Halle, T. S., apparatus for measuring the length of curves.

Gas Engine Works, Dentz, Cologne-Dentz, admission valve-gear for gas and petroleum engines with slow combustion.

H. Mittermayr, Cologne-Ehrnfeld, rotatable crank-pin disk for changeable valve-motion.

O. Klatte, Neuwied on the Rhine, rolling mill for the manufacture of chains, without welding, from one rod of cross-shaped section.

Friedrich Siemens & Co., Berlin, Bunsen burner for cooking purposes.

P. Rodel, Dresden, addition machine.

The Patent Review.

45.689 Hugh E. McColl, Toronto, ash-sifter.

45.692 James E. Weyman, Guildford, Eng., oil or hydro-carbon motor.

45.697 Frank Peterson, Montreal, gas governor.

45.701 Henry S. Pruyn, Hoosick Falls, N.Y., railway car.

45.703 Henry A. Laughlin, Pittsburg, Penn., steam boiler.

45.711 Wm. Halliday, Barnett, Miss., railway switch.

45.713 Oliver T. Springer, Burlington, Ont., folding door.

45.714 Edward C. Gravelle, Ottawa, woven wire mattress.

5.715 J. E. Turgeon, Sherbrooke, Que., non-heat conducting cement for boilers, steam pipes, etc.

45.717 Wm. W. Towne, Danville, Que., heating stove.

MANUFACTURERS OF
*Robin & Sadler, Leather, Belting,
 Oak Tanned Leather, Montreal & Toronto.*

We make Belting for all kinds of work. In ordering state where belts are to run.