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THE HAMILTON WATER POWER AND CANAL SCHEME.

MR. GOLDING'S IDEAS MORE IN DETAIL.

In the last number of THE CANADIAN ENGINEER, Wm. Golding, C.E., of New Orleans, La., and formerly of Hamilton, gave an outline of the scheme for bringing water from Lake Erie to Hamilton for water power and navigation purposes. In the same number J. H. Killey, of Hamilton, took up the subject and gave facts to show the impracticability of the enterprise. Mr. Golding, who is an engineer and inventor of more than local repute in Louisiana, now sends us further details of his scheme, with two diagrams showing the route and plan of works. In support of his case Mr. Golding says:

"When all of the machinery of Hamilton is being run by electricity, the required water supply will be greatly diminished; and since the power to operate the pumps now in use may be furnished from the electric plant, the matter of river water cuts no figure. The bed of the Grand River presents no difficulties whatever, as it will be only necessary to deepen the channel, the river being of an average width of 1,000 feet. The bed of the river at Caledonia is very little, if any, higher than the surface of Lake Erie, therefore the deepening of the channel will be a very small affair compared to the result; the cut from Caledonia to Hamilton will nowhere exceed 50 feet in depth and will not average over 30 feet.

"I have thoroughly investigated the conditions of Grand River for the purpose suggested, and am the more convinced that it is the true way of bringing water from Lake Erie to Hamilton; of course the distance from Caledonia to Hamilton could be tunnelled, but as a tunnel would be of no service for navigation, I favor the open cut, for the reason that to bring shipments from Lake Erie and for the purpose of

distributing the manufactured articles and for assembling raw materials, the importance of a canal for navigation would be very great."

Louis A. Congdon, deputy reeve of Dunnville, Ont., writes Mr. Golding on the subject as follows:

"The width of the Grand River, from Dunnville to Lake Erie, is about 1,000 feet; depth, say 18 to 20 feet; distance by river, a winding course, $4\frac{1}{2}$ miles, through a low-lying country. No rock in the channel or shores; mud bottom, easily dredged.

"From Dunnville to Cayuga, 17 miles, for three or four miles above the dam at this point the river is say three-quarters of a mile in width; depth average, 15 feet; balance of course, 300 to 600 feet in width; depth gradually lessening to 7 feet at Cayuga; clay banks and bottom.

"From Cayuga to Caledonia, 10 miles, width 30 to 600 feet; shallow, with several small rapids; rock bottom in many places; high banks.

"Current through its general course slow, except during spring and fall freshets, when the volume of water is larger, but am unable to give you any data as to the quantity of water passing through the river."

Mr. Golding goes on to say that the body of the Grand River in the part affected by this scheme is much greater than its present flow requires; that as it is not higher than Lake Erie, the cutting of a reverse channel in its deepest part to the point where the canal would tap it would be a comparatively small matter; that the use of the river for all purposes for which it is now used would not be impaired, and that this reverse channel could be made wide or narrow according to whether it is required for navigation purposes or not. He finally calls attention to the fact that a similar canal is now actually being cut from Cleveland, leading into the Ohio River—a canal which may affect the level of Lake Erie.

The cost of these canals and tail-races, as illustrated and described, I have estimated to be within \$3,000,000 all told. To which add 100 turbines of 1,000 h.p. each, set up in position at the cost of say \$2,000 each; total, \$3,200,000. The cost of a steam plant at same station of same power for same service would be as follows:—100,000 h.p. of boilers set up complete with brick work and chimneys, \$16 per h.p., will be \$1,600,000; 100,000 h.p. of steam engine, 1,000 h.p. each, at \$16 per h.p., set up on foundations and piped complete, \$1,600,000. Total, \$3,200,000. Cost of coal for same at 3 lbs. per hour, 3,600 tons per day, worth \$10,000, \$3,650,000 per year. Assuming that all the other expenses are the same, and the cost of maintaining the canal and the cost of maintaining the boilers and engines, and the cost of attendance on both, we have a clear margin of gain in favor of the water-power plant over a steam plant of \$3,650,000 per year. The steam plant would require to be renewed every ten years, while the water-power plant would continue indefinitely.

In a letter received at a later date, Mr. Golding says:—

I have read the paper of Mr. J. H. Killey, of Ham-

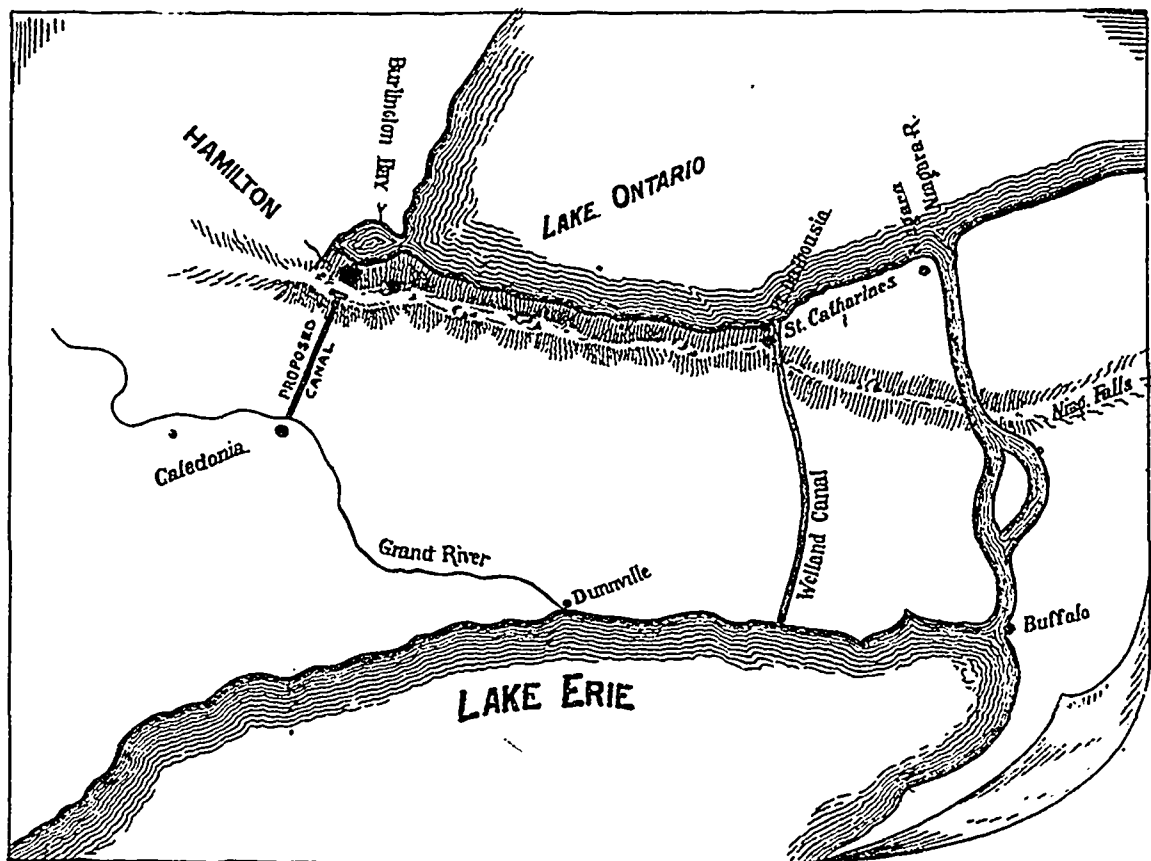
ilton, which appears in your December number. I have estimated the highest lands between Lake Erie and Ontario, on the route of the proposed canal, to be 50 feet; Mr. Killey states that the survey fixed the height at 53 feet. By using the bed of Grand River for part of the canal as proposed, there will be no danger of the wind blowing the water over the banks as anticipated by Mr. Killey.

In regard to the velocity of water through open canals, I cite the case of the Mississippi River, which has a fall from Cairo to the Gulf of Mexico of 330 feet, the distance being 1,100 miles by river, or $3\frac{1}{4}$ inches per mile of incline; and from New Orleans to the Gulf the velocity is fully three miles per hour, with a fall of less than one inch per mile on the surface of the river.

The bed of Grand River at its entrance to Lake Erie is twenty feet below the surface of the lake. Now, if the bed be dredged to true level back to Caledonia (disregarding the inflow from above), the depth of water at Caledonia will be twenty feet, and the surface will be

feet; length, 36 miles. By utilizing the bed of Grand River, as suggested, the cost need not exceed \$3,000,000 all told.

Mr. Killey is away off in regard to the flow of water through open canals. There is no necessity for inclining the bed of a canal, as the surface will form its own incline for every condition. I can fully sustain every proposition made in this matter, and will be pleased to do so when occasion offers. I have all the data and all the books, and while I have not been over the ground for many years, and have neither map nor profile, I begin to think that I know as much about the matter as those who have had every advantage. Local engineers need not be offended that suggestions come from abroad, as it is often the case; the great improvements made at the mouth of the Mississippi River were suggested and carried out successfully by persons living 2,000 miles away, and, as in the present case, were bitterly opposed by local engineers. The same is true of other great improvements, to wit, the Suez Canal, the draining of



on a true level with Lake Erie; if an open canal be cut from Caledonia to Hamilton on the same true level, the surface of the water on this canal on the top of the mountain will be on the same level with Lake Erie and twenty feet deep, and the surface will be 330 feet above Lake Ontario.

The foregoing supposes that no water is being taken from the canal; as soon as the water is taken out for power, or other purposes, the surface will fall until an incline is formed sufficient to induce the flow, and this incline will not exceed two inches to the mile for a velocity of three feet per second for continual flow—a velocity that will not be too great for navigation. If the bed of the channel be depressed two inches to the mile, the surface will remain practically level for the same velocity—three feet per second.

The cost of the Welland Canal is set down officially by Mr. McAlpine to the New York Legislature in 1853, at \$7,000,000; width of the canal, 71 feet; depth, 10

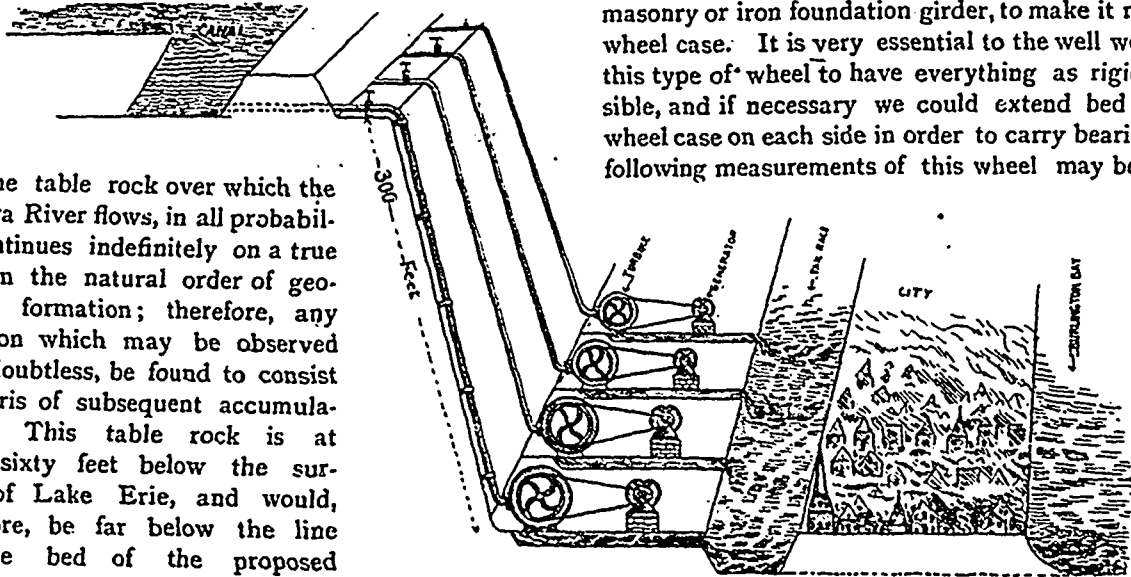
the Zuyder-Zee, and the Panama Canal, which will surely be completed. History is often repeated.

When I mentioned Hamilton as a proper place for a central power station, I meant Hamilton or vicinity. The station may be located at or near the city, as may be found best. The tail race will run parallel with the base of the mountain or the distance required for the turbines, and then take any route found most suitable. The bed of the tail-race will be at least ten feet below the surface of Lake Ontario. Since the greatest cost of the works will be the bringing of the water from Lake Erie to the top of the mountain, it would be but proper to set the turbines as low as possible in order to obtain the full benefit of the fall, which will not be less than 300 feet.

Now, as before said, my proposition is a canal running through the bed of Grand River, having a depth at Lake Erie of fifteen feet below the normal lake level, and having an incline of two inches to the

mile as far as Caledonia, thence with same inclination direct to top of mountain at Hamilton, the cross section to be nowhere less than 1,500 square feet. At the top of the mountain the canal will turn to the right or to the left, as desired, retaining same cross section and depth for a distance of 2,000 feet. At the base of the mountain there will be a canal of same dimensions running parallel thereto for same distance, the bed of which will be at least ten feet below the surface of Lake Ontario; from the end of this canal, at right angle thereto, the tail-race of same dimension will continue to the bay or to the lake, as may be found best.

I do not propose to locate manufactories or work of any kind at the power station, but to distribute the power to manufactories and other works where at present located. All of the cutting under the base of the mountain will be of the least expensive character, and I am of the opinion that the high lands on the top of the mountain, lying between Lakes Erie and Ontario, will be found to be of broken material and not solid stone.



The table rock over which the Niagara River flows, in all probability, continues indefinitely on a true level in the natural order of geological formation; therefore, any elevation which may be observed will, doubtless, be found to consist of debris of subsequent accumulation. This table rock is at least sixty feet below the surface of Lake Erie, and would, therefore, be far below the line of the bed of the proposed canal.

Considering all the facts, I am of the opinion that the cost of the proposed work is quite within the limits of results favorable to investment and that the subject should engage the attention of those likely to be benefited. One hundred thousand horse power means the work accomplished by 3,600 tons of coal per day. It means the supply of all the mechanical power required within a radius of fifty miles from the power station. It means the lessening of the cost of manufacturing, thus increasing the demand for the manufactured articles. It means the employment of all the present unemployed. Investment respects neither sentiment nor patriotism, yet in the beautiful city of Hamilton, so favored by nature in location, climate and surroundings, there should be found many good citizens who could repeat with pride, "This is my own, my native land."

Regarding the use of water wheels under such a great head of water, Mr. Golding encloses the following letter from the firm of J. C. Wilson & Co., manufacturers of turbines, Glenora, Ontario:

"Your favor of 26th ultimo received re horizontal turbines for Hamilton, Ont., to develop 1000 h.p. under 300 feet head.

"By this mail we send you under separate cover a photograph of a twenty-one inch diameter shallow bucket "Little Giant" (No. 620), which will develop

1000 h.p. under the head mentioned, making 800 revolutions per minute. This wheel is a special pattern of extra strength throughout, and one we will guarantee to withstand the pressure due to a head of 300 feet. The photograph was taken from a lot of eight wheels we made last year for the Montmorency Electric Power Company of Quebec City, to operate under a head of 185 feet for generating power for transmission to Quebec from Montmorency Falls. This company have over a dozen of our wheels in operation, some of which have been in use for eight or ten years.

"In the event of furnishing wheels for your head, we would make a few minor alterations, such as mounting the gate on friction rollers, which would reduce the friction from sliding to rolling, and make gate operate more easily. Cut No. 620 represents wheel without bearings; these are intended to be placed just outside of stuffing boxes at each side of wheel case. And if you drive from both sides of wheel we would suggest having two sets of bearings on each side of wheel case and the driving pulley between bearings. If this plan is adopted it will be necessary to have these pedestal bearings set on masonry or iron foundation girder, to make it rigid with wheel case. It is very essential to the well working of this type of wheel to have everything as rigid as possible, and if necessary we could extend bed plate of wheel case on each side in order to carry bearings. The following measurements of this wheel may be useful:

Diam. of wheel, 21 inches; depth of bucket opening, $5\frac{1}{2}$ inches; size of wheel shaft (steel), 5 inches; length of shaft, 10 feet; this could be lengthened or shortened as desired; distance from bed plate to centre of wheel shaft, 24 inches; width of case, 48 inches; length of case, 61 inches; height of case from bed plate to top of case, 40 inches.

"We make a specialty of horizontal wheels, especially for high heads, and can get you up any type of case you may require. The case we now make is so constructed that the whole wheel can be laid bare by simply removing the bolts at division in case, which does not disturb wheel, bearings or stuffing boxes. This is one very important feature in this particular style of case. Hand holes are provided in case it is necessary to remove any obstruction that might get in wheel."

OWING TO the steady increase of the advertising patronage of THE CANADIAN ENGINEER, we are enabled to enlarge the paper now for the third time, four pages being added to the present issue. In wishing our patrons and readers a prosperous new year, we take this opportunity of expressing our gratitude for the generous way in which the paper has been supported, and to the loyalty of our friends we attribute the advancement of the journal.

TRANSPORTATION ON OUR INLAND WATERWAYS.

At a meeting of the Canadian Society of Engineers at Montreal last month, a paper by A. L. Hogg was read, entitled "Transportation on our Inland Waterways and Canals." After dwelling on the great cost of the locking system at present in use on our canals, the author went on to discuss what he considered a good alternative plan for the transfer of vessels over summits, or from one water level to another. This plan consisted of a series of skidways, combined with pontoons and slips, applying the French principle used in the "Chemin de fer Glessant." This consists in eliminating friction, so far as is possible, between the sliding surfaces of the ways, while the vessel is being drawn up the incline, and in making it act as brake power when the vessel is being let down an incline. To utilize to greatest advantage this system of skidways, the engineer must secure a suitable site; gently sloping hillside is the most favorable for the purpose, as then the work of grading up the ways, being mostly surface work, gives greatest strength with least expense. There are a variety of ways in which these skids can be placed, according to the nature of the ground selected for site, but the simplest form of their use would obviously be up and down in one direction. The utilization of these ways in connection with dams and weirs, for the improvement of natural water-courses, especially in mining or isolated districts, as are found in the Kootenay District of British Columbia and many other parts of the interior of Canada, would be an economical means of local transport to the highways of trade for the products of these districts, and thereby develop the country and benefit our mining and other interests, which have been sadly neglected, and which are in much need of some encouragement. That it is possible to lift vessels from out of the water on to cars or platforms, on which they can be transported any required distance, does not at this day require proof, and of this idea the system proposed in the paper by Mr. Hogg was but a new and developed application. The vessel is raised to the incline by means of pontoons, to which is attached a swinging gridiron, consisting of a very stiff combination of longitudinal and cross girders made of steel and firmly riveted together, and which when lifted to the angle of the incline is supported at intervals by iron chock-blocks and stays underneath worked by hydraulic power, so that the gridiron then in effect constitutes a solid part of the main skidway. Hydraulic power is also to be provided for pumping pontoons, capstans and winches for manœuvring the vessels on the ways; at the ends of the incline, cradle slips are provided to expedite the work of placing the vessel on cradle over-ways, and properly securing it before being hauled up incline. These slips have also attached a swinging gridiron, similar to those in the pontoons described above. The cradles, like the gridirons, are formed of a rigid combination of steel girders carrying keel-blocks and sliding bilge-blocks of the usual lifting-dock type. The order of procedure in raising a vessel and transferring it across the skidways would be as follows: The vessel is floated into the pontoon or cradle slip, as the case may be, over the submerged, swinging incline and cradle, then sufficient water is pumped out of the pontoon to bring it to the level of the incline, where it is secured, and the vessel with cradle on gridiron properly blocked; the whole is mechanically swung to the angle of the incline. The ship and cradle would then be in position to be hauled

along the ways, on to the incline, in the cradle slip at the foot of incline, and there placed in the water to resume her voyage by a converse operation to that used when being raised to the incline at the other side of the way. Of course the details of the system may be varied according to circumstances, but these are its fundamental principles.

For THE CANADIAN ENGINEER

THE LAKE SIMCOE POWER AQUEDUCT.

BY E. A. MACDONALD.

Lake Simcoe is a large body of fresh water, lying about 40 miles north of Toronto, at an elevation of 477 feet above the latter. The lake is one of the largest on the continent, the great chain of lakes excepted.

The slack waters of the Holland River (one of Lake Simcoe's feeders) now constitute 15 miles of the proposed aqueduct, leaving but 25 miles to be constructed; seven of the 25 miles of land above Lake Simcoe that cannot be dredged, constitutes "the divide" between Lakes Simcoe and Ontario.

The company are now actively at work on the surveys and in the sinking of test wells preparatory to actual construction.

Besides the boring made by themselves, the company are in possession of the results of borings made under the personal supervision of Mr. Kivas Tully, C.E. They show conclusively that there are no rock formations on the line of the proposed work, and the absence of rock enables the company to apply hydraulic power direct upon the work of excavation by means of a temporary construction tunnel, which reduces the cost of excavation by fully 70 per cent. as against any other known method.

Besides the cheapening of the work, the hydraulic principle of excavation enables the company to complete the aqueduct in a much shorter time.

Upon the completion of the aqueduct the company will be in a position to develop for sale 691,674 electric horse power, to be generated by the waters of the aqueduct. Electricity is now selling in Toronto at from \$60 to \$150 per horse power per annum. The company propose to sell at an average of \$20 per horse power per annum, and at that price 691,674 horse power would yield an annual revenue of \$13,833,480, a sum sufficient to pay interest at four per cent. on \$300,000,000, besides leaving \$1,833,480 for working expenses.

It is not urged that any such revenue could be derived for many years, if ever. The figures are simply given to show the immensity of the possibilities of the undertaking, which are only limited by the market for the electric energy. But for the purpose of this paper it will be sufficient to show one item of assured revenue.

The company proposes to sell electric energy for heating and lighting purposes. Over \$3,500,000 per annum is expended by Toronto for coal, wood and other fuels, including oils for illuminating purposes. All the results derived from the use of fuels and oils can be obtained at less cost and in an infinitely superior and preferable manner by the use of electric energy. It is therefore fair to assume that the \$3,500,000 now expended for fuels and oils will become part of the company's revenues, which sum alone would pay interest at seven per cent. on \$50,000,000, or four per cent. on \$77,500,000.

Nothing has been said concerning Toronto's do-

mestic water supply. It is a matter of indifference to the company (from a financial standpoint) whether the city continues to pump diluted sewage from Toronto Bay or adjacent portions of Lake Ontario, or buy water from the company. If the company supplies the water to the city's reservoir, the people will have pure water at higher pressure, which means lower fire insurance rates, and the increased volume of cheap water would enable the city to keep its sewers constantly flushed. But if the city prefers the present system, the inexorable laws of commerce must compel it to apply to the company for cheap and reliable pumping power.

Lake Simcoe water, notwithstanding all that has been said to the contrary, is of the highest quality for domestic purposes, and if it were not, the best medical authorities claim that sixteen miles flow, exposed to the sun and air, would purify almost any water. If that be so, what could be purer than the quality of Lake Simcoe water after flowing thirty-five to forty miles through an open duct. If that should be deemed insufficient, the domestic supply can be filtered by gravitation through specially constructed sand and gravel beds at high altitudes at a trifling cost; the water can thus be delivered into the homes of the people absolutely pure and free from the remotest suspicion of taint. This feature of the company's enterprise will take care of itself.

Toronto occupies a position in relation to this enterprise that cannot be duplicated in the universe. True, there are watersheds as great or greater than ours, but during the great freshets the water flows to waste for lack of a natural reservoir like Lake Simcoe, but if the reservoir and the supply be found together, they are invariably remote from market, and the power, after being produced at great cost, must be transmitted to distant points for consumption, which entails enormous waste.

Since the dawn of the electrical era the Niagara Falls has been generally regarded as the ideal water power of the world, but let us contrast it for a moment with the enterprise under consideration. The Niagara Falls Power Company have already expended over \$4,000,000, and to complete their present undertaking it is estimated that it will cost fully as much more, as the whole work has to be done in rock. The company will then be able to develop 100,000 horse power, the greater part of which will have to be transmitted to a distant market at a loss of fully 20 per cent. By the Lake Simcoe Aqueduct over 500,000 horse power can be developed within six miles of the point of consumption, and this result can be achieved at a fraction of the cost of the same volume of power by Niagara waters. It would cost the Niagara Falls Company \$40,000,000 to produce that amount of power, judging by the cost of their work up to date.

The Niagara Falls Power Company, recognizing the enormous value of water power as an electric developing force, have not alone invested the large amount of capital as above stated, but entered into an agreement to pay to the Province of Ontario \$35,000 per annum for ever, for the exclusive right to construct a hydraulic tunnel under Queen Victoria Niagara Falls Park, which charge represents a capital of one million dollars at 3½ per cent. Lake Simcoe, with the waters that can be made tributary to it, can furnish power far in excess of any controllable energy capable of being developed at reasonable cost from the waters of Niagara, nearer the point of consumption, and at a mere fraction of the cost.

It is not claimed that Lake Simcoe can at all com-

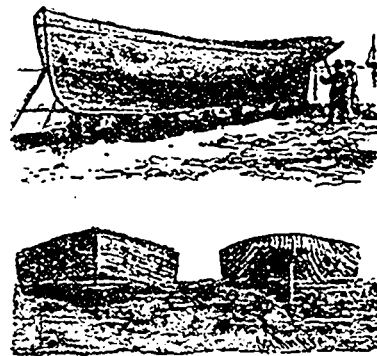
pete in point of volume, with Niagara Falls, but the former has an altitude (or fall) three times greater than the latter, hence one pound of water from Lake Simcoe will do the work of three pounds of Niagara water. Besides, every ounce of Lake Simcoe water can be easily and cheaply harnessed and made to do duty, whereas it is generally admitted that only an infinitesimal portion of Niagara power can by any possibility be utilized.

Let it be understood that the Lake Simcoe project is in no sense a rival to the Niagara Falls undertaking. Humanity has need of all the power that can be exacted from both these giant slaves of man.

If any further evidence of the value of the company's franchise were wanting, it is supplied by our bitterest opponents in the Legislature, as will be seen by the following extract from the Toronto *Globe's* report of the proceedings of the Provincial Parliament, April 21st, 1894:

"The House then took up Dr. Gilmour's private bill to incorporate the Georgian Bay Ship Canal and Power Aqueduct Company. The bill occasioned a very interesting discussion. The Commissioner of Public Works, who had apparently been waiting all the afternoon until this order was called, led the attack on the bill. For the purpose of the construction of the aqueduct the bill proposed to invest the company with enormous powers. It gave an actual monopoly of water power and water fall over a large section of the province. There was danger, he said, of the bill resulting in the creation of a great corporation on this side monopolizing as much in its way as the Standard Oil Company had done on the other side. He did not feel well enough to discuss the subject very much, but he thought it right to warn the House of what he considered to be the dangerous nature of the bill. The company, by the passage of this bill, would be invested with a monopoly of enormous privileges over the territory affected by it. He knew of no company in the Dominion with such enormous powers as it was proposed to give this company."

IMPROVEMENT IN VESSELS' HULLS.



The accompanying illustrations represent an improvement in the hulls of vessels designed to afford the maximum of speed and safety, while the construction is such that drift to leeward will be in a great measure avoided. The invention has been patented in Canada, Great Britain and the United States by the Rev. Patrick O'Brien, of St. Patrick's Deanery, St. John's, Newfoundland. The bottom of the vessel is curved in convex form from the stem to the stern, and has a concave face from the keel to the sharp-edged bilge, while from the bilge to the top of the hull the sides are curved, presenting an outer convex surface at the stern. The small figures represent bow and stern views. In every

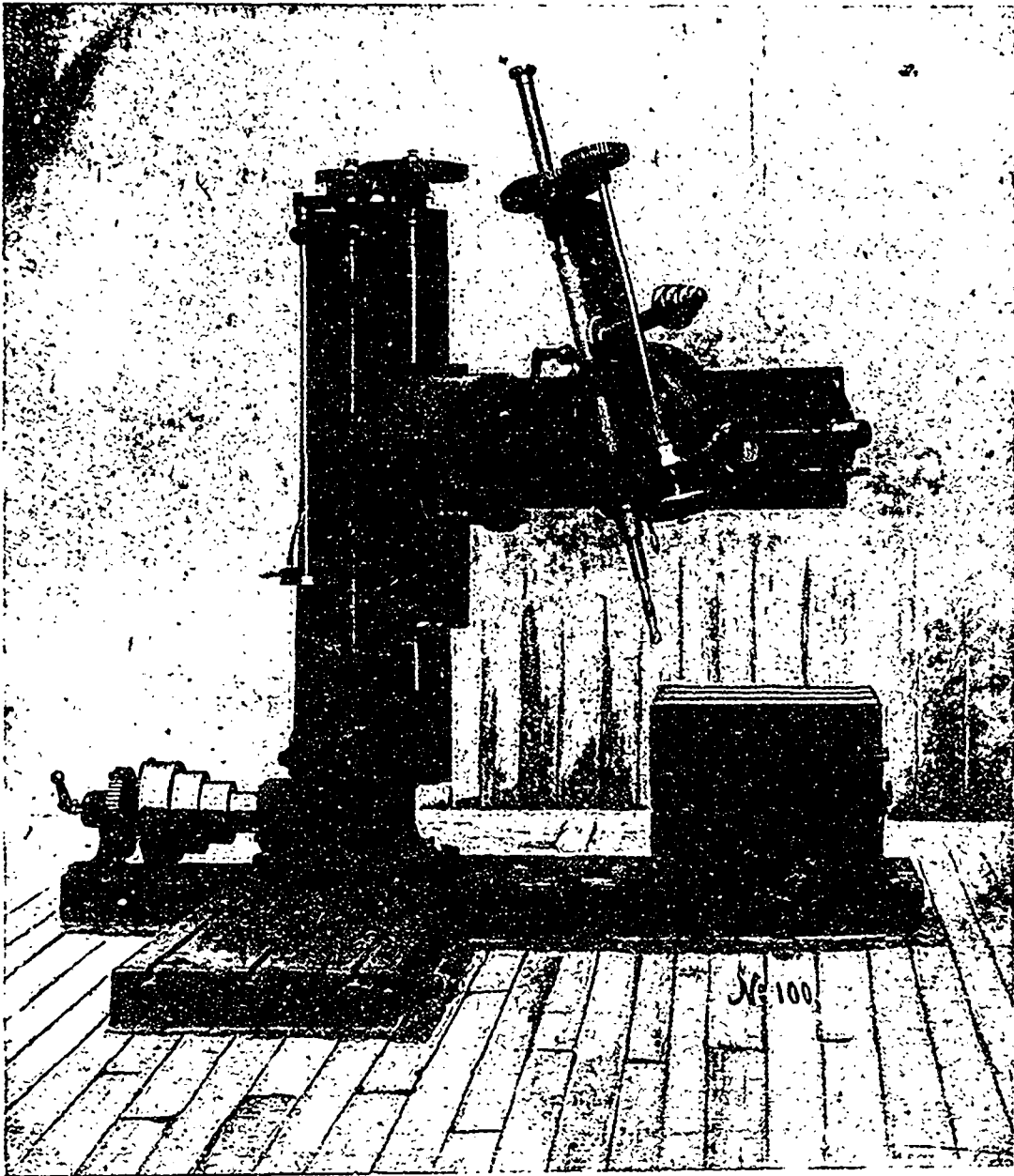
case where a cross section is taken through the bilge the sides and the bottom of the hull meet at an obtuse angle, and the outward inclination of the sides preferably increases from the ends of the hull. The steering qualities of vessels built after this plan are designed to be greatly improved, especially in high winds, which throw the hull over upon its side, as the bilge sections then serve as a side keel to hold the vessel to its course. The *Scientific American* says this improved vessel has received the indorsement of many practical captains and seamen.

UNIVERSAL RADIAL DRILLING MACHINE.

The first specimen of a Radial Drilling Machine made by John Bertram & Sons, Dundas, Ont., was exhibited at the Centennial Exhibition, Philadelphia, and

drill head are both operated by worm gear, and graduated for an adjustment to any angle. The spindle is 2 15-16 in. diameter, and has a vertical feed of 14 in. This machine possesses features both for solidity and handiness which have earned for it the popularity it maintains in the workshop. The drill illustrated is a 72-inch machine, and the weight is 10,300 lbs.

The electric furnace, strange to say, has been the means of supplying an illuminating gas designed to compete with the incandescent light. Thomas L. Wilson, in carrying on some experiments in the reduction of refractory oxides, found that large quantities of calcium carbide could be produced in a comparatively inexpensive way, and it is from this substance that acetylene, the brilliant illuminating power of which is well known,

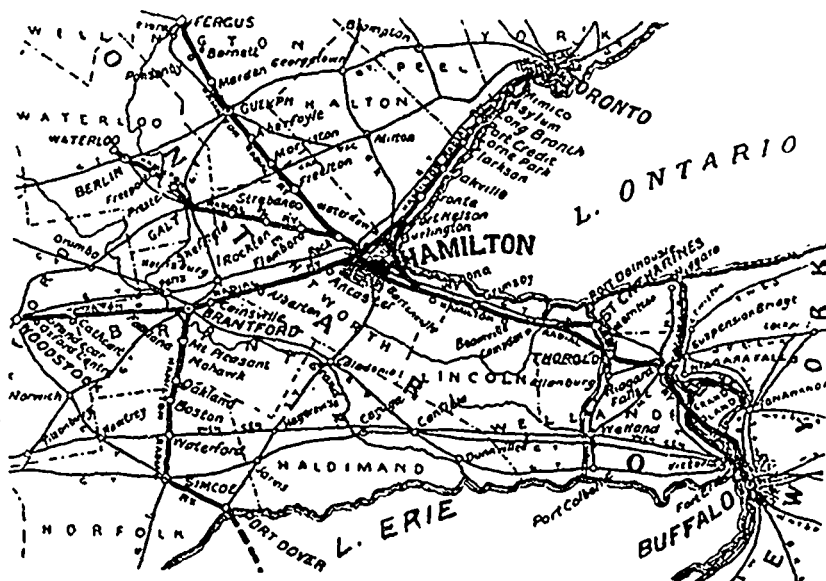


though to a certain extent embodying the principal features of the latest production, the experience of 18 years has worked a radical change in the details of this machine. The bed is L-shaped, having the two wings slotted for the reception of work; on either of these is placed a movable box slotted on three sides. On the centre column is a sleeve extending its whole depth, having an upright slide on front. On this slide is a movable block carrying the radial arm, which is raised or lowered by a screw and reversing gear. The radial arm and

can readily be obtained. The brilliancy and steadiness of the light produced from acetylene are acknowledged on all hands, and it is claimed that a burner taking 1 to 1½ cubic feet per hour affords a light equal to about 50 candle-power. Of course, the arguments in favor of the electric light still hold good, however cheap and brilliant may be the acetylene light, but there can be no doubt that the latter may have a large field of usefulness before it, especially in houses or localities not easily within reach of the present modes of electric lighting.

THE HAMILTON RADIAL RAILWAY SYSTEM.

The city of Hamilton has in the past spent large sums of money in bonusing railway schemes which have brought no returns in trade, but the scheme now before the city, promoted by the Hamilton Radial Electric Railway Company, seems likely to bear some tangible fruit. The Hamilton, Grimsby & Beamsville Electric road has proved to be a success beyond expectations, the winter traffic being much larger than was ever hoped for, and the new scheme, though promoted by another company, is an enlargement of this idea. The map given herewith shows the scope of the scheme, the heavy lines indicating the directions which the system will take at present. The company ask a bonus of \$300,000, divided as follows: \$100,000 for the line from Hamilton to Woodstock, \$75,000 for that to Schaw Station, \$50,000 for the road to Guelph, and \$75,000 for that to Berlin. A line is to be run from Hamilton to St. Catharines, to connect at that point with the Ni-



agara Central. No bonus will be asked for this branch, which is to be operated by steam, but all the other lines will be operated by electricity. Although a formal denial has been made that the C.P.R. has anything to do with the scheme, it is understood that when the system is completed it will be operated by the C.P.R. Connection with that company's road will be made at Schaw Station and at Woodstock. This system will draw the trade of large portions of the counties of Lincoln, Welland, Brant, Oxford, Wellington and Halton, all of them rich counties, and having numerous towns and villages to be drawn into closer touch with the Ambitious City. The capital of the company is \$2,000,000, and among those interested in it is Col. A. A. Rand, of Boston. The system at present will comprise about 157 miles of road, which may be increased by feeders running from each branch.

SOME of our subscribers have complained of irregularity in the delivery of THE CANADIAN ENGINEER. The paper should be in the hands of every reader before the tenth of each month, and when any subscriber fails to receive it, we shall take it as a favor if he complains at once. We cannot be expected to remedy an omission if we do not hear of it. We may say, however, that we are making arrangements for a new mailing system, which will insure greater regularity.

OUR illustrated description of the new waterworks at Peterboro', Ont., is crowded out of this issue, but will appear in our next.

SOME articles contributed to THE CANADIAN ENGINEER have been unavoidably crowded out of this issue, but will appear later.

DENVER, Col., and Omaha, Neb., water works companies have provided their reservoirs with a means for cleaning which seems to be both simple and effectual. The bottom of the reservoir is made so as to form several large pockets at the lowest points, in which are located blow-off valves, and through these water, or sediment of any description that may have collected, is discharged to any convenient point. The blow-off valves are of the disc pattern, and are operated from small hydraulic cylinders over them, the valve stems in each case being continuations of the piston rods worked from the cylinders. Water under pressure is supplied underneath the pistons by pipes running along the

reservoir bed; and the cylinders and pistons are so proportioned for the available pressure that, when the water is admitted, the total pressure under the piston is sufficient to raise the blow-off valves from their seats and allow the escape of water and mud from the reservoir. From each of the blow-off valve openings there is a 24-in. pipe running down vertically some 15 feet, connecting with the main discharge pipe, the operation being at once simple and complete.

THE exhibition in connection with the convention of the American Street Railway Association in Atlanta, Ga., was one of its most interesting features. Among the exhibits were noticed a large number of cars, trucks and small appliances, some of them being made by quite new manufacturers, which serves to indicate the wonderful progress and increase in importance of the comparatively new electric street railway industry in the States. Among the special items of interest were some electric heaters and several new forms of brakes, the latter especially being one of the chief wants of the day. If this exhibition is to be repeated, as we understand it will be when the convention takes place in Montreal next year, it will be one that will prove of great interest to Canadians.

A WRITER in the London *Economist* predicts that Canada will eventually control the ship-building industry, and bases his argument chiefly upon a remarkable fact

of only recent realization. It is now practically proved that steel mixed with from three to five per cent. of nickel is double the strength of ordinary steel, and as it does not corrode or take on barnacles, ships constructed of it will possess the very great advantage of never requiring to be scraped. Moreover, as ships of nickel-steel may safely be built much lighter than ordinary steel ships, their engine power and consumption of coal may be safely reduced without diminution of speed. In short, according to this writer, such steel seems bound to supersede the ordinary article, and probably also other materials in present use in ship construction; and this being the case, the nation which is in a position to produce this metal must necessarily control the ship-building industry. For the present, at least, there is no considerable supply of nickel outside of Canada, which, in fact, possesses nickeliferous pyrites without limit, the entire bleak region extending from Lake Superior to Labrador being rich in it. It is remarkable, indeed, but it is declared by experts that the Dominion can supply a million tons of the pure metal annually, if necessary, for an indefinite period.

On the morning of December 4th a disastrous explosion, due to the careless handling of dynamite, took place at Hull, Que., by which four men and a boy were killed and ten or fifteen wounded. The dynamite was used in connection with excavations for the new water mains, and was kept in a small portable hut. Although this hut was only three or four feet square, a small stove was kept in it for thawing out the dynamite, this stove being almost in actual contact with the explosive. A more than usually strong fire set the wood floor ablaze, and the explosion followed while some of the men were working round the hut. The windows and doors of thirty or forty houses were more or less shattered, and had not the buildings in the street been on a foundation of almost solid rock, the loss would have been much greater. Such ignorance and carelessness are almost inconceivable, but the most remarkable sequel to this terrible disaster is the verdict of the jury, which laid the blame for the accident on the poor dead victims, who had been either working under instructions or who were in no way connected with the work, one of them being a boy going to school. The name of the contractor, who of course was responsible for the management of the work, was not even mentioned in the verdict. Such is the mistaken pity of a French-Canadian jury. It is high time that really effective regulations should be put into force on the subject of explosives.

M. MEIGS, at a meeting of the American Society of Civil Engineers, recently advocated the use of canvas in order to render cofferdams tight. In repairing the locks of the United States Mississippi Canal at Keokuk, this was the method employed. Here each leaf of the lock gates was 27 ft. high by 46 ft. wide and weighed 40 tons, and the leakage from the lower ten feet was beginning to become serious. The only time of the year available for repairing work was in November, when owing to possible frosts, the use of gravel and timber in building a cofferdam would have been very difficult. It was decided therefore to build the dam of timber and to make it tight by means of canvas. A timber frame was accordingly built and towed into place, where its ends abutted on the flaring ashlar walls of the lock approach, whilst below it was a clean rock bottom. The framing was sunk by loading with old rails, and planks were then spiked on to it. For this purpose a "shot-gun" was used, which consisted

of a $\frac{7}{8}$ -inch pipe with an iron rod working in it. This pipe and rod extended above the surface, whilst below it was brought over the spikes to be driven by a diver. The rod was then struck by a hammer at the top. A canvas sheet was then spread over the face of the dam; 12-oz. duck was used, and a $\frac{1}{2}$ -inch iron chain was sewn along the lower edge of the canvas to sink it into place. The canvas overlapped the bottom and wing walls by some inches. The work of placing the dam took about five days, after which the lock was pumped dry in about six hours. The leakage was insignificant, the head being 12 feet.

ROBERT CAREY recently read before the British Society of Engineers a paper on Hydraulic Lifts or Elevators, in which he dwelt upon the endless variety in which nowadays they were to be found. He thought that continuous passenger lifts ought to be used more frequently, as they were very convenient, and not so much waiting for the cage ensued. It was doubtful, he thought, whether electric lifts would ever be as safe and smooth running as the almost perfect hydraulic lift. Of all lifts the most important was the passenger lift, and nothing at present equals water under pressure for working them. The author divided hydraulic lifts into two broad classes—direct-acting and suspended. He pointed out the advantages of balancing cylinders for direct-acting lifts, and gave a description of a direct-acting lift with a cylinder bored and fitted with piston, no overhead gear, which afforded great safety. Suspended lifts, on account of greater cheapness, were becoming more common. When the cage is suspended by four wire ropes, the question arose, Should one rope do all the work, or should all do equal work? If only one rope broke out of four, no great harm is done. Entrance doors or gates were considered, and their conditions of safety, as to whether they should open and close automatically. The author advised locking the starting-rope when the entrance door was open. He also recommended the inspection of passenger lifts by Government inspectors, to avoid the dangers attending cheaply-made lifts. Special attention was drawn to hydraulic lifts and cranes, which automatically apportioned the quantity of water used to the weight raised. The author described valves for such lifts, or cranes, automatically adjusting the power of the machine, and stated that the actual saving of water by a lift of this kind had been 828.3 gallons per day, or about 58 per cent. The most economical arrangement was to stop the power-setting valve from going into larger power when the lift commences to move. There was great safety in a machine of this kind, and the arrangement could be adapted to balancing cylinders for direct-acting lifts.

THE question of the day among shipbuilders and marine engineers is the adaptability of water tube boilers for large vessels. Several British and French authorities are of the opinion that the water-tube boiler is to be the boiler of the future, and they base their prediction on the ground that it possesses the following advantages over those of the ordinary type: (1) It is the means of obtaining higher working pressures than are practicable with ordinary boilers, owing to the excessive thickness of plates which would be necessary both for the shell and also for the heating surfaces. (2) Economy of maintenance, due to the comparative ease with which in some designs every part of the boiler, both external and internal, can be examined and cleaned, and, if necessary, renewed, it being with some types possible to

entirely re-boiler a vessel without opening decks, etc. (3) A decrease of space required, and also of weight of boilers and accessories necessary for producing a given power, or an increase of power obtainable with a given weight. (4) It is also generally claimed for all classes of water-tube boilers that they are less liable than ordinary boilers to dérangement or damage through accident or neglect; and also that, even in the case of rupture, the damage which would result would be much less than with ordinary boilers. On the other hand, the opponents of this type of boiler argue that a very important point to be considered is durability, and that a system of coils or tubes cannot be said to possess this attribute to any marked degree. The advocates of the cylindrical or Scotch type of boiler state its advantages as follows: (1) Structurally it is the most perfect in form conceivable for resisting strains from interior pressure, and at the same time accommodating furnaces, chambers and tubes, also for giving access to all parts outside and inside; (2) it contains within one enveloping shell its water, steam, fires, and fire gases, while the heat generated, until it leaves the boiler, is entirely utilized for this proper purpose of evaporation by being surrounded by water from first to last. This feature ensures a more effective heating surface and greater proportional economy than can be attained by any other type, such as a water-tube boiler, not possessing this feature; (3) the fire gases act on the smaller interior surface, while the water receives the heat on the larger exterior surface of the communicating plating. This feature ensures a quicker and safer evaporation than when the conditions are reversed, as in a water-tube boiler. The *London Marine Engineer*, which inclines rather in favor of the former type, yet acknowledges the weight of these arguments in favor of the cylindrical boiler. It qualifies this, however, by calling attention to the fact that the tubular type of boiler is practically in its infancy, and that, now they have commenced to enjoy a thorough "boom," future developments and the mistakes of the past will together serve to bring about such a modification of its defects and an increase in its good points that it will triumph after all, and in time will displace the old-fashioned form of boiler altogether.

CANADIAN CEMENT.

Editor CANADIAN ENGINEER:

SIR,—Since my article appeared in your December issue in reference to Canadian Portland cement, I have received a very friendly letter from one manufacturer, in which, however, he urges that I have been too hard on his brand, and that it is a first-class, fine, sound Portland cement. I must say that the tests I have made of it have been quite satisfactory, as the table given by myself in my article showed, but my reason for writing to you was to stir up the public and the manufacturers on the subject. I must reiterate that I don't believe the engineers of Canada, as a body, know much about Canadian Portlands. And it is time they did! This gentleman informs me that his output has, alone, been largely increased within the last month and is 150 bbls. per day. Let the good work go on! But a few tests, such as I had the misfortune to make, of samples hopelessly coarse, very weak, and laden with free lime, are enough to keep back the infant industry by years. I believe Canadians are rather apt to accept our own inferiority in some things like this one, believing that English and American cements are better; and they have a show of reason on their side. The burden of proof rests with the manufacturer. The change from natural cements to Portland has been very recent, and people hardly realize yet that we are making and can make as good a Portland cement as the best imported. But to prove this, I believe, will need persistent public agitation, proof of uniform and good results, and I believe the best way to do this is to follow out some such plan as that which I proposed last month. In the meantime

if the makers of Portland cement in this country, which I believe are (1) Owen Sound Portland Cement Co.; (2) Canadian Pacific Factory in British Columbia; (3) Rathbun's "Star" Portland factory, Deseronto; (4) Morgan's "Crescent" Portland factory, Longue Pointe; (5) Wright's Portland factory, Hull, will only watch closely to the uniform fineness of their product to the detection of an excess of lime, and a uniformly well burnt clinker, then the tests following on such an action will soon proclaim the fact, and we may hope to see a product of 1,000 bbls per day within the next five years

Yours sincerely,

CECIL B. SMITH

McGill College, Montreal, 24th Dec., '94.

GEORGIAN BAY CANAL AND LAKE SIMCOE AQUEDUCT.

Editor CANADIAN ENGINEER:

SIR,—The last number of the *ENGINEER* contained an article on the Lake Simcoe Aqueduct by J. H. Killey, of Hamilton, Ontario, and an article on the proposed Georgian Bay Canal and Lake Simcoe Aqueduct by one Keefer. Those articles have a tendency to injure the company that has been chartered to do these works. The only way to counteract the erroneous impressions given is for the company or its friends to state the facts, thus forcing the company to divulge its private information obtained at much cost. This is not a fair and honorable use to make of your journal. When the company makes an appeal to the general public to subscribe capital, they would then issue a statement or prospectus giving full and complete information. Then any fair criticism made by you or others in the public interest could not reasonably be objected to.

Under the circumstances you will permit me to point out the errors contained in several statements made by these gentlemen.

Mr. Killey's first statement concerning the Lake Simcoe project is "The Lake Simcoe proposed aqueduct, if constructed, will not have the advantage of an unlimited supply of water, as would the Lake Erie one." Let us see what the supply is. Lake Simcoe has a natural water shed of 1,364 square miles, including the lake proper, which is 300 square miles in extent. The lake forms one of the greatest natural reservoirs in the world (outside the great lakes). It is possible to make tributary to this lake the water-shed, over 4,200 additional square miles, by diverting other waters flowing at higher altitudes, but the diversion of some of these waters might involve the payment of more or less damages. Two thousand one hundred and fifty-four square miles can be added to the Lake Simcoe water-shed, making in all 3,518 square miles, without involving the payment of any substantial damages. We will consider only the latter one for the present.

Mr. R. McCallum, the Chief Engineer of the Ontario Public Works Department, estimates the surplus waters of this district at 18 inches. This estimate is based on returns furnished by the Meteorological Office at Toronto, covering a period of thirty years, checked by actual measurements. Taking the available watershed of 3,518 square miles, 18 inches of surplus water would give a total of 147,114,316,800 cubic feet per annum, which multiplied by 62½ (the number of pounds in a cubic foot) gives 9,299,644,800 lbs., but it brings it more within the compass of the mind to call it four thousand six hundred and forty-nine million eight hundred and twenty-two thousand four hundred (4,649,822,400) tons. This unthinkable volume can be so stored and regulated as to give a daily supply of over 12,739,212 tons, or 25,478,424,000 lbs.

The available head of Lake Simcoe above Ontario is 477 feet (not 420 as assumed by Mr. Killey). After allowing 27 feet for flow, we have a clear available head of 460 feet, which properly applied (as it can be in this case), will give 552,316 horse-power gross, or 414,137 horse-power net for 365 ten hour days per year in perpetuity, which at \$20 per horse-power (from \$35 to \$75 are the present ruling rates), would yield a revenue of \$8,282,740 or more than sufficient to pay four per cent. on two hundred million dollars; and this great volume of water can be almost doubled should it ever be required. The above valuations are based upon 33,000 lbs. falling one foot in one minute, producing a standard horse-power for one minute. At the late Deep Waterways Convention at Toronto, one eminent engineer stated (I think it was Mr. L. E. Cooley, of Chicago) that if Lake Simcoe was situated within one hundred miles of New York or Chicago, at the same elevation above either of those places as it is above Toronto, it would be worth a hundred million dollars in a state of nature to be converted into power.

I have gone into the above detail at considerable length to show the amount of reliance that can be placed in the statements of

Messrs Killey and Keefer, who make broad, general, foundationless statements. Let us now take Mr. Keefer's third statement, as follows

"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."

Passing strange, is it not, that a vessel can go 304 miles further through a shallow, narrow water-way in less time than through a deep, broad, open water-way, but there are so many remarkable statements made by Mr. Keefer that neither my time nor your space will permit of a detailed reply, but I would like to ask why does Mr. Keefer constitute himself guardian of the financial world? Why does he render such valuable expert opinions gratuitously when other people charge so much for theirs. And then I find that engineers whose opinions are of any value do not give publicity, or even private utterances to them, except after examination of all plans and data, and after hearing all that the advocates have to say about their own scheme. Mr. Keefer has been gratuitously thrusting his opinions upon the public through the Toronto newspapers, and otherwise. Opinions given under those circumstances are generally worth just what they cost.

I may safely add that the company will take the public into its confidence and state its case before any stock or bonds are placed upon the market. In the meantime the company ought to be permitted to spend its own money without unsolicited advice or opinions, which only "darken counsel by words without knowledge."

I enclose you an article on the Aqueduct, which may be of interest to your readers.

I will furnish you an article upon the Georgian Bay Ship Canal for your next issue, should you desire it

E. A. MACDONALD

MUNICIPAL ELECTRIC LIGHTING.

Editor CANADIAN ENGINEER

SIR.—I have just read the very pertinent article under the above heading in your issue for November last, and would merely add that the only way of arriving at a reliable comparison of the actual cost of electric lighting is by a reduction of all prices to a uniform basis. Some cities and towns have what is termed a 1,200 c.p. system, while others claim to indulge in 2,000 candle power lights, which practically makes little difference, as, though nominally different, the latter are in many cases not more than the figure first quoted. Where a tangible difference, as to cost, obtains, is with towns which light up to midnight or to 1 or 2 a.m., and exclusive of moonlight nights, as compared with those where lights burn all night and where no account is taken of moonlight.

Previously to renewing our Quebec five years' contract for some 360 arc lights, for which we had been paying \$80 for 2,000 c.p. light, burning from sunset to sunrise and during every night in the year, under agreement with the Quebec and Lévis Electric Light Company, on the Thomson-Houston system (now some two years ago or more), I wrote to every city and town of note in Canada and the United States, and received answers from the city engineers or mayors thereof, or from the superintendents of lighting of said cities, as to c.p., number of nights, and whether with or without moonlight nights.

These I tabulated to arrive at comparative figures, the result being that the general average for all night lights all the year round was \$139, but by leaving out extreme prices I found the reliable average to be \$110.

Parties who wished to have a finger in the municipal concern were advocating a plant of our own, and putting it down as certain that the city, by manufacturing and running its own lights, could do so for \$60 instead of the \$80 we were paying. But when offered the contract at that price, and even at \$70, they declined to run the risk, whereupon we renewed our contract with the same company for another five years, the tabular statement prepared by the undersigned rendering it evident that the lowest *bona fide* figure that the work could efficiently be done for was \$90, though our company could afford to do it for \$80 on account of their only paying \$10 per light for the water power at Montmorency Falls, some seven miles from the city, while steam must have cost them or any other company from \$10 to \$20 per lamp additional.

Another argument against the probability of our being able to run our own lights for less than the \$80 which they were costing us, is the fact that the city of Topeka, Kansas, had been endeavoring to do so for then over two years, as I have it from the city engineer himself of that city, and had not been able to get below \$90,

with all due economy, and though nothing seems to have been allowed, as should have been, for depreciation of plant, and not a cent profit to the city.

For further information, Mr. Editor, I would refer you to my article on the subject which appeared in the February, '92, number of the *Water and Gas Review*, of New York

CHAS. BAILLAIRGE,

City Engineer, Quebec

Quebec, Dec 1st, 1894

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

Editor CANADIAN ENGINEER

I send a few remarks on branch No. 16, Carleton Place. This branch of the Canadian Association of Stationary Engineers was organized November 6th, 1894, by Bro. Prov. Deputy Edkins. There are twenty names on the charter, seventeen of whom have been duly initiated. The officers are: G. H. Routh, president; Joseph Mackay, vice-president; A. M. Schofield, secretary; Henry Derrer, financial secretary; Jas. Dougherty, treasurer; J. M. Murphy, conductor; David Welsh, doorkeeper; A. Nichol, J. D. Armstrong and A. McCallum, trustees. The association meets 1st Saturday in each month, in the hall over Central Canadian office, at eight o'clock. The meetings so far have been very interesting, questions being brought up and discussed, making it both instructive and pleasant. We are about to adopt a form of instruction by which the president will give questions one meeting night, and the members will have till the next meeting to study and answer them, which they may do by using the "question box," or personal. The subject to be taken up first is "Mechanical Mining," and after each member has had his say on the question, the president having the correct answer, will explain it fully. By adopting this system first, I think we will get worked up together, and by the time we have it thoroughly exhausted we may venture on something else. We also have a blackboard, which we shall get some of our members to make use of. This association is young yet, and would be pleased to be helped in any way by the sister branches. By the progress it is making at present, I am sure No. 16 will be a thriving association. The membership is limited, as the town is small, and having mostly water power, the stationary engineers are few. But looking on the bright side of affairs, I think they have a work to do. As small steam plants are being transferred into electrical power, it stands to reason that stationary engineers must be practical men to operate and run engines to supply this electrical power, therefore no time must be lost in improving young men to this great science. Hoping the day will soon come when all engineers shall be banded together in the bond of brotherhood, and wishing your readers a happy New Year.

A. M. SCHOFIELD,

Sec. Branch 16, C.A.S.E.

I am glad to report on behalf of Hamilton, No. 2, C.A.S.E., that we are getting along very nicely. We are having very interesting meetings of late. At our last instruction meeting a very good departure was made by the special committee. Instead of papers being read a series of questions were asked, and then were discussed with very great interest. The first discussion arose on a question asked by a member of the committee as to which is the more advantageous, a dome or a dry pipe for a steam boiler? The question was discussed for some time, and among the different opinions a great many good points were struck. A question on boiler feeding was also taken up, as well as the proper blow-off for a boiler. The last two questions always find room for plenty of discussions, and although they are mentioned so often, there always appears to be something new to be gained when discussed by practical engineers. We also had the pleasure of a visit from Bro. Mitchell, of London, Ont., who is always ready to take part in any discussion that may forward the objects of the C.A.S.E. Wm. NORRIS, cor. sec.

The numerous friends of George Hunt, Past-President of the Executive of the Canadian Association of Stationary Engineers, will regret to hear that he has sustained a severe affliction in the loss of his wife, who died last month from enlargement of the liver. The funeral was largely attended, especially by the members of the Montreal branches of the association.

During the past month John J. York, of Montreal, Executive President, and James Devlin, of Kingston, Executive Secretary of the Canadian Association of Stationary Engineers, were laid up by sickness, the former with congestion of the lungs, and the latter with inflammation of the bowels. Both, we are very glad to say, are about again, attending to their duties, and Mr. York is out with a New Year's address to the association, which will be found elsewhere in these notes.

On the 18th December a meeting of the Kingston branch of the Stationary Engineers' Association was held in Fraser's hall. President King was chairman. A discussion took place as to the steam pressure on boilers of various sizes. It was deemed advisable to invite steam-users and proprietors of machinery to attend an open meeting to hear a paper of great interest to steam-users and to their employers. There are now 50 members in the association.—*Whig*.

This has been a prosperous month for Montreal No 1. Four well attended meetings have been held—two educational, at which some difficult technical problems were solved, and two regular meetings. The association has been presented with a register book from Pres. York, a ballot box from Past Pres. Hunt, and ledger from Bro. Garth—three very handsome and useful presents. It was intended to have a course of lectures, but owing to the difficulty of getting lecturers the idea will be given up

A HAPPY NEW YEAR.

The following address, issued by John J York, executive president of the Canadian Association of Stationary Engineers, and sent to every member of every branch on New Year's Day, is a happy thought, and will no doubt be productive of much good :

DEAR SIR & BRO.—I cannot let this joyous season of the year pass without wishing you all a very happy and prosperous New Year, not only to yourself, but to your family also. May the coming year bring peace and plenty, with some to spare. May long be the years granted you in which to rejoice and be glad for all the goodness that will surely fall on the good and true man.

I also at this time take the liberty of addressing a few words of advice, which I trust will be taken in the spirit in which they are given. Try to make this great and noble association greater still. This can best be done by regular attendance at all the meetings.

Remember, above all things, it is not your money we want—it is your presence and assistance. If you are under the impression that you help us or that we help you, simply because you pay your monthly dues, get rid of the idea—it is wrong

Consider your membership an honor and a privilege, and a golden opportunity to improve your knowledge. The man who had sufficient learning has never lived. This should be a strong incentive to all, even the most learned, to push on and upward. Within our doors information is had for the asking that cannot be obtained outside for gold. Therefore, my brethren, work hard during the coming year for the prosperity of our Order, which is the advancement of your own and others' knowledge, for in teaching others we undoubtedly teach ourselves, and the higher up we reach as mechanical engineers, the more will our employers' interests be benefited. This is seed sown in good ground, and it will in due time without doubt produce a bountiful harvest.

Fraternally yours,

JOHN J. YORK,
Executive President.

FROM NEAR AND FAR.

THE CANADIAN ENGINEER comes to us in its usual bright and beautiful form. It is a monthly that should be in the hands of all our mechanics who wish to keep abreast of the times in the many subjects dealt with by such a paper as THE ENGINEER.—*Truro Daily News*.

In the course of a letter to the editor, Wm. Norris, stationary engineer, Hamilton, has this to say of THE CANADIAN ENGINEER: "I may also state my satisfaction with your journal and with the way you have built it up. It is, indeed, a credit to the country."

BESSEMER, Mich., Dec. 15, 1894.

SIR.—I received your letters and sample copy of CANADIAN ENGINEER all right. I inclose \$1 for next year's subscription. I am well pleased with it. I think it well worth the money as a valuable paper for our line of work.

JOHN BALL.

DUNDAS, Ont., Dec. 10, 1894.

DEAR SIRs.—Among the many enquiries from foreign engineering concerns, we are pleased to note a letter to-day from an engineer in Pilsen, Austria-Bohemia, referring to our advertisement in THE CANADIAN ENGINEER.

JOHN BERTRAM & SON.

SIRs.—Having read THE CANADIAN ENGINEER for the year 1894, I would like to renew our subscription for the six copies for the Society of Marine Engineers for 1895. We are pleased with the journal, but there is one thing I have to complain about, and that is we do not get them regularly.

WM. B. PARKS,

Secretary Brotherhood Marine Engineers, St. John, N.B.

[We are obliged to our correspondent for calling our attention to such irregularities, and we refer him and others having similar complaints to a paragraph in another column announcing a change in our mailing system.]

CLEVELAND, Ohio, Dec. 22, 1894.

We have received your late copy of the paper, and compliment you on its fine appearance. CLEVELAND TWIST DRILL CO

In the course of a letter received from J. C. Wilson & Co., of Glenora, Ont., manufacturers of turbines, this firm takes occasion to say:—"Just here we might add that we are very much pleased with THE CANADIAN ENGINEER. It has filled a long felt want for a high class engineering journal, and will compare very favorably with the older American papers of this type. We compliment you on your success."

MODERN MEASURING INSTRUMENTS.

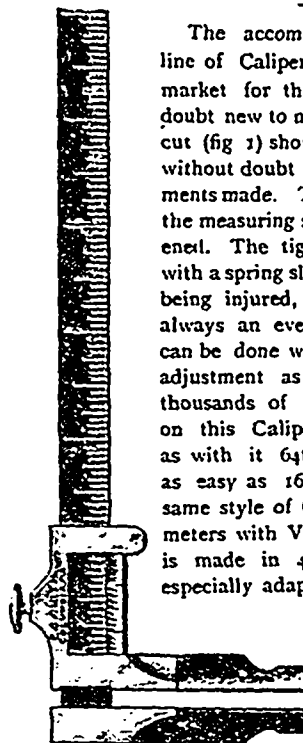


FIGURE 1.

The accompanying illustrations represent a line of Calipers, which, although being on the market for the last two or three years, are no doubt new to many of our readers. The largest cut (fig 1) shows the \$5 style Caliper, which is without doubt one of the best measuring instruments made. They are made entirely of steel, and the measuring surface and end of scales are hardened. The tightening screw acts in conjunction with a spring slide, which prevents the scale from being injured, besides giving the sliding jaw always an even motion, so very fine measuring can be done without the usual clamp and screw adjustment as used on the Calipers to read thousands of an inch. The Vernier, as used on this Caliper, is quite a valuable feature, as with it 64ths, and even 128ths, can be read as easy as 16ths on the ordinary rule. This same style of Caliper is also graduated in millimeters with Vernier to read tenths of m m, and is made in 4 and 6-inch lengths, longer sizes especially adapted for physical laboratories, etc., being made to order.

The smallest cut (fig. 2) represents the plain Calipers, which are graduated on one side in 16ths, and on the other side in 64ths. The other cut (fig. 3) shows the clamp and screw ad-

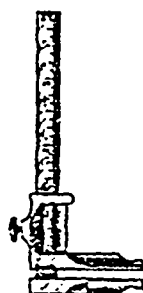


FIG. 2.

justment as used or attached to these Calipers, which are made to read 1,000ths by means of the Vernier, or 100ths of millimeters. These Caliper squares are specially recommended on account of their superior finish and low prices, which bring them within reach of all mechanics requiring such an instrument. Every one of the Calipers is warranted accurate and satisfactory. The manufacturer of these useful instruments is E. G. Smith, Columbia, Pa., who

will be pleased to send copies of his recently issued catalogue to all those interested. This catalogue, which is illustrated and contains 18 pages, is full of information concerning measuring instruments, one of its most interesting features being instructions as to how to read the Vernier.

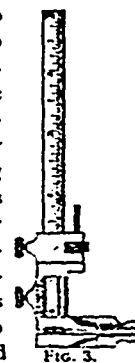


FIG. 3.

THE WORTHINGTON PUMP CASE IN ENGLAND.

The following case is reported by *Industries and Iron*, of London, England: Worthington Pumping Engine Company v. Naval Construction and Armaments Company, Ltd.—This case came before Mr. Justice Romer on the 26th Oct., and raised the question as to how far the plaintiffs were entitled to the exclusive use of the words Worthington pumps. The facts were shortly as follows:—The plaintiffs are an American company carrying on business at 153 Queen Victoria Street, London, E.C. They sell, but do not manufacture, pumps or pumping engines called "Worthington pumps." The original Worthington pump was patented by Mr. H. R. Worthington in America in 1859. The patent was originally granted for fourteen years, and was extended for seven years, coming to an end in 1880. The company was established in 1884, its principal object being to place on the European market the inventions of Mr. H. R. Worthington. It is apparently auxiliary to a company in America, which is the successor in business of Mr. Worthington and his partners, and the company last named manufacture in America the pumps sold in England and elsewhere by the plaintiff company and

other auxiliary companies. The only people who have manufactured the pumps in England under the name of Worthington pumps are apparently (1) James Simpson & Co., Ltd., who made certain kinds of Worthington pumps under a license to do so from the manufacturing American company, and (2) according to the plaintiff company's allegations in the present action, the defendant company. The principle of the Worthington pump is too well known to need description, and since the expiration of the patent the invention has been extensively adopted by manufacturers, the pumps made by them being advertised and sold as 'duplex pumps'. The defendants are shipbuilders, and make pumps on the Worthington principle for use on ships, and the present action was brought to restrain them from selling their pumps as "Worthington pumps." A number of witnesses were called on behalf of the plaintiff company, who said that the meaning of the term "Worthington pumps," as understood by engineers and manufacturers, was pumps manufactured by the Worthington people. At the conclusion of the evidence adduced on behalf of the plaintiff company, Mr Justice Romer said that it did not appear that any purchaser from the defendants had been led to believe, or had understood, that the pumps supplied had been made or sold by the plaintiff company. Having regard to the pleadings, it could only be contended that the defendants had threatened and intended to sell their pumps as Worthington pumps. His Lordship said he was prepared to hear the defendants' evidence as to this, but suggested that the action should be dismissed without costs.

Mr Moulto, Q.C., for the plaintiff company, said his clients would consent to this if the defendants would say they had no intention to pass off their pumps as Worthington pumps, and in such a way as to lead purchasers to suppose they were pumps supplied by the plaintiff company.

Sir Richard Webster, Q.C., for the defendant company, also assented, on the terms of all imputations of fraud being withdrawn.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

A meeting of the society was held in their rooms in Montreal, on Thursday the 6th ult., Pres P. A. Peterson in the chair.

A letter was read from E. L. Corthell, chairman of the Engineering Congress held at Chicago during the World's Fair, with reference to the formation of an International Institute of Engineering and Architecture. The object of this proposition was to unite into closer relationship representatives of all branches of engineering and architecture in all parts of the world, and among the chief functions which would be performed would be the publication of interesting papers read before any of the national boards of which the International Institute would be composed. These papers, after being thus reprinted, would be distributed amongst the members in all parts of the world. Another object would be the testing of materials which would be carried on under direction of the International Board, which would be located in the United States, to as great an extent as opportunity permitted. The projectors of this scheme also have in view the holding of an International Congress in 1900 at Paris, during the exhibition there. Consideration as to what steps will be taken by the Canadian society in the matter was held over for a future occasion. The subject of the annual meeting then came up for discussion.

The secretary announced that the date then fixed upon, viz., Jan 8th, would make it clash with the meeting of the Medical Society at McGill College, and it was decided therefore to postpone it. It was decided to leave the exact date for the annual meeting to be decided by the Council, but it will probably take place towards the end of next month.

It was practically decided also to have a conversazione, but the details of this and any other entertainments connected with the annual meeting were left for a committee to decide upon. Committee appointed.

A. I. Hogg's paper on "Transportation on our Inland Waterways and Canals" was then read. Particulars will be found in another column. There was some discussion.

Mr. Kennedy thought that what was new was not good, and what was good was not new. The hauling of ships up short inclines was of course well known as the ship-railway system. He did not know much about the skidway system himself, but presumed it was only a new application of an old idea.

Mr. Irwin thought it would have added greatly to the interest of the paper if the author had made some sort of an estimate as to the cost of his system compared with the ordinary locking plan at present in use. It seemed to him that a good deal of expensive machinery would be needed—hydraulic rams, etc., as mentioned by Mr. Hogg.

Mr. Sproule supposed that the chief advantage of the proposed system would be the saving of water which would be effected, though this was not mentioned in the paper.

Mr. Irwin remarked that in the States there were several places at which they hauled or slid vessels in this manner.

Further discussion was postponed.

The attention of our representative was drawn to the fact that the meetings of the Society of Architects for the Province of Quebec clashed with those of the Canadian Society of Civil Engineers, thus causing inconvenience to those who were members of both societies.

Another meeting was held on the 20th ult., Mr. G. C. Cunningham in the chair, the attention of those present being chiefly devoted to a discussion of the approaching annual meeting. It was decided to hold the latter on Friday, the 25th inst., and the conversazione on the previous evening, at McGill College. A committee was appointed to arrange the details of any entertainments which will be offered in connection with the annual meeting.

Another meeting was held on the 3rd inst., President Peterson in the chair. The chief feature was a paper by Henry F. Perley, on "The Resistance of Piles." Further reference to this paper will be made in next number. The question of arrangements for the annual meeting was discussed, but nothing very definite was decided upon. The discussion on Mr. Hodge's paper on "Inland Transportation," was continued.

WEST COAST OF NEWFOUNDLAND.

The mineral wealth of Newfoundland is but little understood, even by those whose interests lie there, and vast areas of that interesting but now distressed island, may be said to be unknown. Geo. A. Spotswood, C.E., of Kingston, spent the greater part of last summer on the west coast of Newfoundland in the interests of a corporation who are buying property there, and in conversation with a representative of THE CANADIAN ENGINEER gave an interesting description of the country. Mr. Spotswood favors us with the following brief but valuable record of his investigations, which, we understand, are to be resumed at an early date:—

Left Kingston in the latter part of June for Straits Bellrish to examine and report on the petroleum property of the Newfoundland Oil Company, and to locate the position for the boring of the primary wells. Geological formation—Quebec group—probably first petroleum found in this formation—oil of valuable quality, containing by analysis over 82.5 per cent of lubricating oils.

Made examination of Bluff Head and Lewis Brook asbestos fields. These properties contain large quantities of good quality of short fibre mineral, with a fair percentage longer fibre up to 2½ inches. Numbers of test pits have been sunk at random over both locations, and in every case mineral was found, some veins over 27 inches in width. The whole range of hills facing the sea seems to contain asbestos, that is the serpentine portion. In several outbursts of amygdaloidal trap native copper and chalcocite occur. Time being limited could not give it particular attention.

Examined part of the carboniferous area of Bay St George. One locality contains several seams of fine quality bituminous coal, low in sulphur; one seam four feet wide. The railway now building will run over these beds, which are about half dozen miles from the sea coast.

This same formation is well represented in gypsum. One location has been selected, and a railway survey made connecting with the only harbor in the district where good, safe anchorage can be obtained.

The outcrop is an immense mass of pure white mineral several hundred feet high and 150 yards across the bed, which is nearly perpendicular. The owners intend to form a company to build a large storage dock and the five miles of railway connection, so as to be able to ship to Europe in large quantities.

Brought back several samples of argentiferous galena and sphulcrates for assay.

The climate is fine, the thermometer scarcely going above 75° Fahrenheit in summer, and only a few times below zero in winter. This west coast is almost entirely free from fogs, and in time will evidently become a fine grazing country, grass remaining green the major portion of the year.

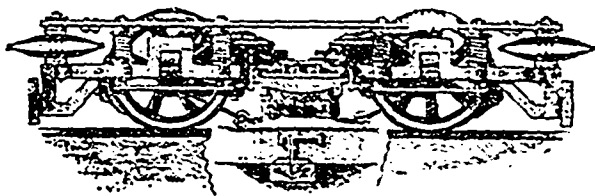
All the mountain streams contain fine brook trout, also salmon and sea trout in season to more than satisfy the sportsmen. Inside the coast hill range caribou and ptarmigan in abundance.

There is a great opening there for the paper mills industry, spruce, fir and aspen being found in large quantities and favorable locations.

BELLEVILLE'S NEW ELECTRIC RAILWAY.

Belleville is jubilant over the prospects of its new electric street railway, construction on which is to be commenced when the frost leaves the ground, and the citizens are proud of the fact that it will be the first electric railway system built without the trolley and overhead wire. The projectors of this new enterprise are S. F. Lazier & Sons, who have also a charter for the electric lighting of the city. T. C. Lazier, of this firm, and Henry Pringle, of the St. Charles and Pringle Car Company, visited a number of American cities to examine into the best system, and determined to adopt the "E. M." system invented by Jas. F. McLaughlin, of Philadelphia. This new system is now being tested in Philadelphia, and if the test proves as satisfactory as is expected (and this will be determined in a month or two), it will be applied in Belleville, and Messrs. Lazier & Sons will have the general agency for the system in Canada.

The appearance of the road when finished is much like that of the cable car system. Along the centre of the road, between the rails, is a cast-iron tube bolted on the ties, and in the centre of this tube is placed the main line conductor, carrying the current, the wire being insulated in the tube by a packing of bituminous cement. Underneath the car are two flexible controlling devices running on the tube with metal wheels like inverted trolley poles. The conductor is a strip of rail one inch wide and $4\frac{1}{2}$ inches high. It is laid in sections of varying lengths, insulated from one another by blocks of wood or asphalt. The current is supplied to each of these sections through a switch-box, but the circuit is not completed until the two trolley wheels pass over these sections and pick up the current for the motor. Thus the rail is never charged with electricity except at some point under the car, so there is no danger, it is claimed, of any man or animal receiving an electric shock, unless, indeed, he got under the car. For this reason we imagine extra precaution will have to be taken against accidents in which human beings might be run over by a car. Switching by this system would be much better than by a trolley wheel, which is so frequently thrown off the wire in turning corners. In the E. M. system the two trolley wheels are so far apart that one of them is always on the rail.



The above cut shows the mounted track of a car with the trolley wheels underneath. The inventor claims that his system will cost from 20 to 30 per cent less than a trolley line. The connection is made without the use of switches, magnets or other automatic devices, but the method of connection is at present kept secret. Another advantage which the "E. M." system would undoubtedly have would be to do away with the electrolysis of water pipes, although the damage from this source is not so great in Canada, where the pipes are deeply laid, as it is in the United States.

THE BOILER EXPLOSION AT MONTICELLO.

The steam boiler used for generating steam to operate the engine in Essery's saw and shingle mill, at Monticello, exploded on November 25th, completely demolishing the mill and causing the death of two persons, besides seriously injuring several others.

With a view to securing the help of some competent person, to assist them in ascertaining the truth as to the cause of the explosion, the Attorney-General's department of the Ontario Government instructed the Boiler Inspection and Insurance Co. of Canada to send an inspector to the scene of the accident to examine the fragments of the boiler, etc., and to report to them as to the probable cause of the explosion.

Geo. C. Robb, chief engineer for the Boiler Inspection and Insurance Co., sent Inspector A. E. Edkins to Monticello on Nov. 29th, and a copy of the company's report is given below, viz:

"As arranged with you, Inspector A. E. Edkins visited the scene of the recent boiler explosion at Essery's shingle mill, near Monticello. The boiler had been literally torn to pieces, and portions of it have not yet been found. The front head was found complete, and had been blown about 250 yards from where boiler had stood. The boiler had been of the ordinary horizontal tubular style, externally fired. It had been

about 44 in diameter and ten or 12 feet long, made of iron plate $\frac{1}{4}$ in thick and single rivetted, and having 38 tubes of 3 in diameter. Above the tubes, the heads, which were of $\frac{1}{2}$ in iron, were stayed by two iron rod stays $\frac{3}{8}$ in diameter. The safety valve was $2\frac{1}{2}$ in diameter, and loaded by means of a lever and weight. The lever had been broken, and it cannot now be determined at what pressure of steam the valve would have opened. The valve spindle is now bent a little, and that interferes with the free opening of the valve, but was probably bent by the same force that broke the lever. The valve is amply large for the boiler, and if loaded at safe pressure should have relieved the boiler of any excessive pressure.

"The remains do not show any evidence of the boiler having been dirty inside, nor is there any evidence to show that the water was lower than it should have been.

"The amount of damage done to the building, and the total wreck of the boiler itself, prove that there was plenty of water in it, and that the pressure of steam had reached a point at which the whole structure had to give way. The plates of the boiler were $\frac{1}{4}$ in thick when new, and in some places corroded so as to be about $\frac{1}{8}$ in, and $\frac{1}{4}$ in thick close to a seam of rivets.

"The boiler when new should not have been used at a pressure higher than 60 lbs per sq. inch in order to be safe. This conclusion is reached from a consideration of the thickness and quality of plates, as shown by the fragments, the form of rivetted joints, and the manner of staying the heads.

"The probability is that the front head gave way first, as it is complete and was thrown a great distance, and that it gave way because of a mistaken idea of the strength of the boiler, leading those using it to carry an undue amount of steam pressure, in order to get the engine to do the work they wanted.

"Had this boiler been examined with a view to insuring it, it would not have been accepted, unless for use at a very low pressure, such as about 20 lbs, because of the insufficient staying of the heads.

"There is nothing now to be seen to prove that the boiler had been carelessly used at the time of the accident, either by being allowed to get dirty or to run short of water. So far as can now be determined, I judge that by a mistaken idea of the boiler's strength steam was raised and used at a pressure that was really unsafe, and the wonder is that the boiler did not blow up sooner."

The above report was forwarded to the Government, and Inspector Edkins was requested to attend the inquest at Grand Valley, on December 4th. The inquest was commenced at 1 p.m. and lasted until about 1 a.m., when the jury retired.

There were some twenty witnesses examined, and it was proved that the boiler was about forty years old, and when first made had two 8-in flues in it, but afterwards had new heads put in, and was then made into a tubular boiler. After this the boiler lay in a yard at Acton, Ont., for about fifteen years, when it was bought by Mr. Essery and put in his mill at Monticello.

It was also proved that the boiler had been run at from 60 lbs to 90 lbs per square inch during the time it was in Mr. Essery's mill.

One man who had run the boiler said that the safety valve would not blow off without being eased with a stick which he did when steam got too high.

Another witness said that on the morning of the explosion he was assisting the engineer to pack some joints, and that he had (at the engineer's request) moved the weight on the safety valve out about 10 inches farther. Still another witness gave evidence to the effect that he was in the boiler room and noticed the steam gauge indicated 120 pounds, and that he had scarcely called the engineer's attention to the fact, when the explosion took place. This witness was blown 20 yards into a brush heap, and then got up and commenced to run away, when he was felled to the ground by some debris falling on him. He then got up and made another attempt to run, when a piece of the boiler, in falling, struck him, knocking him down, breaking his arm and otherwise injuring him.

Inspector Edkins was then placed in the witness box and examined touching the strength of boiler, etc. He made calculations as to the bursting pressure of shell, percentage of strength of seams as compared to the solid plate, the pressure the boiler was capable of carrying with safety, the number of stays that should have been put in to enable the boiler to carry 80 lbs per sq. in, etc. The examination was then closed and the jury retired for an hour, when they returned with a verdict as follows: "That the said persons came to their death through the explosion of a boiler in Essery's shingle mill on November 25th, and that the explosion of said boiler was caused through a mistaken idea on part of the man in charge of

it as to its strength, thereby leading him to carry a high pressure, contrary to the instructions of his employer. And we recommend that the Ontario Legislature pass a law at its next session providing for the inspection by Government of all stationary and portable boilers."

QUEBEC'S MINING INTERESTS.

According to the report of the Mining Inspector for the Province of Quebec, the mining industries last year suffered from the general commercial depression. Phosphate mining nearly altogether ceased in consequence of the low prices of that article and the ruinous competition given to the Canadian product by the Florida phosphates. The number of hands employed in it during the year was 167 and the number of tons extracted was 3,284. The output of copper and silver at the mines near Sherbrooke was also greatly affected by the depreciation of these metals in the markets of the world. Of copper ore only 42,082 tons were taken out, employing 227 hands. The demand for asbestos slightly increased, but prices ruled low and the output consequently only amounted to 1,296 tons, of which only 225 were exported. In this branch of the industry 418 hands were engaged, of whom a small proportion were women and children, whose labor is utilized in "cobbing" and "sorting." Very little was done at the gold mines in Beauce, the whole output of the precious metal, acknowledged at least to the Government, only amounting to some 77 ounces. In the Gaspé district borings for petroleum were continued and the results show some progress over those of the previous year. Of galena only 75 tons were extracted. On the other hand, the output of iron ore amounted to 28,672 tons, giving work to 690 hands, and of ochre to 1,080 tons, employing 42 hands. In the line of mica, the output amounted to 1,206 tons, of which only 223 tons were exported. In this branch 270 hands were engaged.

CANADIAN FORGINGS AND SHAFTINGS.

It is gratifying to all Canadians who take a pride in the industrial progress of the country to know that not only machinery of the heaviest calibre, but the heaviest shaftings and castings, can be produced in the Dominion. The steamship "Rosarian," one of the boats of the Allan Line, and carrying 4,000 tons dead weight, has had her shaft put in by the Nova Scotia Steel and Forge Co., of New Glasgow. The shaft is 26 ft long, with two solid forged couplings, each 24 in diameter and 3½ in thick. It was finished by the N.S. Steel and Forge Co. complete, ready to place in ship, the weight being 10,950 lbs. Less than one week elapsed from the time the steel ingot went into the forge until the finished shaft was in place in the ship. The time included the transportation of the shaft 655 miles by rail. The Allan Co. have written to the N.S. Steel and Forge Co. complimenting them on the quality of their work and the promptness with which it was finished. This, however, is only one of many steamship shafts turned out at these large Nova Scotia works. They now have in hand a large steel two-throw crank-shaft for Vancouver, British Columbia, which is to replace an iron shaft now broken in one of the largest lumber mills on the Pacific Coast. In this case, also, despatch is of the utmost importance, as vessels are now lying alongside of the mill, waiting for cargoes of lumber, which must be sawn before they can be loaded, and this cannot be done before the crank-shaft is in place. This crank will cross the continent by express, and is the second one so shipped from New Glasgow to the Pacific Coast.

The reputation of these works has extended all over the Dominion, as evinced by the fact that their forgings are to be found in almost all the large steamers on the St. Lawrence, the Canadian lakes and the British Columbia coast. Indeed, the largest boats built on the coast have all been supplied with forgings from New Glasgow. In addition to steamship work, all the forgings for the Esquimalt graving dock were also supplied from New Glasgow, as were the heavy forgings for the gates of the Sault Ste. Marie canal. Within a few days they have shipped to Inglis & Co., of Toronto, the shafting, pistons, cranks and, indeed, all the forgings required for the steamer now being built by the Northern Transportation Co., at Collingwood. The forgings required for the new engine of the power house of the Toronto Street Railway, built by the Laurie Engine Co., Montreal, were also supplied from New Glasgow, the shaft in these engines being the largest forgings of the kind in Canada. In addition to this a large amount of work has been done for the disabled Atlantic liners coming into Halifax. Among the latter are the steamers "Chateau Margaux," "Burgermeister Peterson," "Cachar" and "Barcelona," all of which have received new stern frames and rudders, and the steamers "Ensker," "Aspatia," "Polina," "Harlaw," H. M. steamer "Newheld," H. M. steamer "Acadia," S. S. "St. Lawrence."

A NEW LANTERN.

The lanterns used in street illumination are constructed in the most various forms, which, however, all suffer from some defect or other. The four and six-sided lanterns throw long shadows on account of the rods between which the panes are secured. One has sought to diminish this disadvantage by only using two rods, which are indispensable for the support of the roof. But in this case another disadvantage has shown itself, viz., the panes of glass are not securely fastened and thus rattle if there is any wind, and if there is a storm they are also frequently thrown down. Furthermore—a fact which must not be overlooked—there is continually a strong draught in the lanterns which agitates the flame and not rarely puts it out altogether.

THE CANADIAN ENGINEER is informed by the patent office of Brockhues & Co., of Cologne, Germany, that there has been in use for several years in a number of towns a kind of lantern differing entirely from those in use hitherto. This lantern has been greatly improved by the above-mentioned firm and protected in several States by letters patent.

On account of their great advantages these lanterns meet with universal recognition, especially with the daily increasing use of the incandescent gas-light, which, as is well known, cannot bear a strong draught at all. This lamp may be equally well employed for electric, oil and petroleum lamps.

The lantern which, on account of its many excellencies, is rightly called the "Brilliant Lantern," consists in the main of a single round, hollow glass body, conically widened at the top, of especial strength and of a peculiar crystal material, which is fastened at the top and at the bottom with putty in two cast-iron frames, while the roof is made of strong sheet-metal of a pleasing and curved shape, enamelled or galvanized on either side. On the roof a small perforated turret is fixed, through the openings of which only the air reaches the flame, while the products of combustion escape by an outlet provided in the centre.

In order to increase the illuminating power a reflector is placed in the lantern, differing in a peculiar manner from the reflectors generally in use, since it is not placed like a roof over the flame, but has an inverted shape. The other reflectors send the rays of light downwards in a limited circle, while by the new arrangement the rays are not only reflected downwards, but equally in all directions to a great distance, whereby a far better lighting up of the street is obtained.

The illuminating power is still further increased by the absence of any shadow, caused by the peculiar shape of the glass. We may further mention that, owing to the rounded form of the glass, the flame, according to the laws of optics, appears considerably enlarged. These lanterns may not only be used for street lighting, but may also be employed with equal advantage in gardens, halls, stores, etc. They are manufactured so as to stand or to be hung up. Full information will be given by the firm of Brockhues & Co., of Cologne, Germany.

USEFUL FORMULÆ FOR THE FOUNDRY.

To tin cast-iron studs and chaplets. Pickle the studs in oil of vitriol, then cover or immerse them in muriate of zinc; after which dip them in a melted bath of tin or solder. *To chill iron very hard.* Use a liquid made as follows: Soft water, 10 gal., salt, 1 peck, oil of vitriol, ½ pint, saltpetre, ½ lb., prussiate of potash, ¼ lb., cyanide of potash, ¼ lb. Heat the iron a cherry red and dip as usual; if not sufficiently hard, repeat the process. *To soften cast-iron.* Steep in 1 part of aqua fortis to 4 parts of water, and let it remain 24 hours. *Case-hardening cast iron.* Salt, 21 lb., saltpetre, ½ lb., rock alum, ¼ lb., ammonia, 4 oz., salt of tartar, 4 oz. Pulverize all together and incorporate thoroughly. Use by powdering all over the iron while hot, then plunging in cold water. *To remove rust from cast-iron.* To 1 part of sulphuric acid add 10 parts water, into which dip the casting. When it is withdrawn it should be at once dipped into hot lime water, and held there until it becomes so heated that it will dry immediately when taken out. Then rub with dry bran or sawdust, and a clean surface is the result. *To scour cast-iron, zinc or brass.* Cast-iron, zinc or brass surfaces may be scoured with great economy of labor, time and material by using either glycerine, stearine, naphtha, lime or creosote mixed with diluted sulphuric acid. *To solder grey cast-iron.* First dip the castings in alcohol, after which sprinkle muriate ammonia over the surface to be soldered. Then hold the castings over a charcoal fire till the sal-ammoniac begins to smoke, then dip it into melted tin. This prepares the castings for soldering, which is done in the usual way.—*Ironfounder*

LITERARY NOTES.

For those wishing to have in concise form an exposition of furnace work in all its branches, we commend the *Furnace Work Manual*, compiled from the pages of the *American Artisan*, by Sidney P. Johnson, the object of which is not so much to propound new theories as to the combinations of gases or the phenomena of heat, as to treat of the practical problems arising in every-day furnace work. The author endeavors, so far as is possible, to give the entire *modus operandi* necessary for the manufacture, location, and most feasible plan of putting up the different types of cast iron, steel, or wrought plate furnaces. All the patterns required in such work are given, as are also tables and general data for the calculations which are sure to come up for settlement in daily practice. These calculations are stated in plain figures, so as to be readily understood by every one, and the author's efforts are aided by the many well executed plans and diagrams appearing in the book, which will be found extremely useful to those interested. The *Manual* is published by the American Artisan Press, 69 Dearborn street, Chicago.

The special number of the *Indian Engineer*, containing the history of the great Manchester ship canal, is to hand, and its publishers are certainly to be congratulated on their enterprise. No less than twenty-seven pages of extra large size, and nearly every one of them containing one or more well executed illustrations connected with the construction and opening of this great work, are to be found in this number, the balance of which is given over to advertisers.

The Gas, Water and Electric Lighting Companies' Directory, the 18th issue of which has just reached us, is, to engineers, one of the most useful directories which we have so far seen. It contains carefully compiled lists of associations of engineers and managers of gas, water, and electric lighting undertakings in all parts of the world, together with a summary of the leading events of the year ending with June, 1894, in the gas, water, and electric lighting industries. In the latter department of the book there will be found full descriptions of the various processes which have been brought forward for the enrichment of gas, a subject which will prove of great interest to all those interested in the manufacture of this useful adjunct to civilization. The summaries in the water and electric departments will be found equally interesting. The directory is published by Hazell, Watson & Viney (Ltd), Creed Lane, London E. C. England.

We are indebted to Joseph R. Oldham, N.A. and C.E., of Cleveland, O., for a copy of his "*Great Lakes Register of Shipping: also, Rules and Tables of Scantlings for the Construction of Steel Ships*." The committee represented by Mr. Oldham find that by paying careful attention to the cleaning and painting of the surface and by repairing damages in the best manner, a well-constructed steel ship for lake navigation will last a much longer time than is the usual life of salt water vessels, and it is their purpose to class ships already built on their general merits, having special reference to the quality of the materials, the character of workmanship, the disposition and size of the parts where the several stresses are concentrated, and to the equipment of the vessel. In this book are given rules and regulations for the construction and repair of lake steamers and sailing vessels intended for such classification, as well as a quantity of other information connected with the same subject.

We have briefly referred on another occasion to the proposition to hold an international exposition in Montreal next year. We have now received from Joseph H. Stiles, Commissioner for Great Britain and member of the Committee on Awards at the recent California International Exposition, a pamphlet treating of the project—which, we understand, was first mooted by this gentleman—in greater detail, and containing pictures of the proposed buildings. Certainly, if the idea presented by these pictures really foreshadows what the finished buildings will look like, the exposition will not be a failure from an architectural point of view. The proposed exposition, whether it proves financially successful or otherwise, is sure to be of great value to the interests of Canada, and we recommend a perusal of this little pamphlet by all those interested in the country's advancement. It may be obtained from Mr. Stiles, St. Lawrence Hall, Montreal.

One of the best Christmas numbers in connection with weekly newspapers that we have met with is that published by the *Petrolia Advertiser*. We must compliment our contemporary upon the very creditable manner in which this number is gotten up, both the letterpress and the illustrations being first class.

The W. J. Johnston Co. (Ltd.), 253 Broadway, New York, send us a catalogue of electrical books published by them. The

high class and useful character of the books brought out by this enterprising firm of publishers, who are also the publishers of that widely-circulating journal, the *Electrical World*, is well known, and this little catalogue, which is admirably annotated, will be found of interest by many of our readers.

We have received from the Sperry Electric Railway Co., of Cleveland, O., a handsomely printed and illustrated catalogue of apparatus manufactured by them. A special feature is their single motor equipment, in which the driving wheels are all coupled and revolve in unison, greater efficiency being thus obtained than where each axle has a separate motor coupled to it.

The Palmer Car Ventilator Co., of Boston, have sent us a pamphlet describing their system for the ventilation of cars. In this system there are, in each car, two air chambers, one over each platform, having connection by inlets with channels on either side of the top of the car, and extending the entire length of it, with a partition in the centre of the channels.

The Engineer and Superintendent's report for 1893 on the sewage and water supply of St. John, N.B., is to hand, a sad feature in connection with its publication being the death of its writer, Gilbert Murdoch, C.E., shortly after its completion. The report is a very exhaustive one on the quality and quantity of the water supplied, the extent of the sewerage system, etc. Another portion is devoted to the fire protection service, a good deal of attention being given to the location of fire plugs. Other subjects treated of are meters, house-to-house inspection, first appearance and action of frost, etc. This report has evidently been compiled with the greatest care, and altogether it is a model of what such books should be.

The Pacific Lumberman, Contractor and Electrician has now been turned into an exclusively electrical journal, and is the only paper of the kind on the Pacific coast. It is now called the *Pacific Electrician*. It is neatly turned out.

With the December number *Power* enters on its tenth year. *Power* is one of the most instructive and wide-awake papers that comes to our desk, and on this occasion its numerous friends will join us in saying, "More power to its elbow."

To the Cleveland Twist Drill Co., of Cleveland, Ohio, we are indebted for a neatly gotten-up calendar combined with a diary and memorandum book. As stated by the well-known manufacturers who are sending this little memento out, only those who have used such a diary can realize its benefits and comforts, and we would recommend our readers to write for a copy.

R. H. Buchanan & Co., pumping machinery, etc., Montreal, send us a neatly executed calendar for 1895, with the figures all in large, easily legible type. It is one of the most useful-looking almanacs for the current year which we have so far seen.

THE GEORGIAN BAY AQUEDUCT AGREEMENT IN TORONTO.

The city engineer and city solicitor of Toronto have submitted a joint report on the agreement between Toronto and the Georgian Bay Aqueduct Co., in which they suggest the following points and precautions.—

1. The city streets should only be broken up by the city engineer at the cost of the company. The agreement does not contain this clause.
2. The company should deposit \$10,000 with the city treasurer for any possible contingencies. This idea is not contained in the agreement.
3. The city cannot legally enter into an agreement to purchase the company's works at the expiration of 24 years or at periods of five years thereafter. If the council determines to enter into this agreement it might be well to obtain legislation validating the whole agreement.
4. The agreement as at present drafted does not clearly define whether it is the intention of the council to purchase only the works of the company within the city of Toronto, or, in addition, the aqueduct which may be supplying these works in the city with power from Lake Simcoe or the Georgian Bay.
5. While the rate to be charged for electric energy is fixed by clause 3 at 1 cent per horse power, it is not clear what will be the price charged by the company for electric light or heat, if the company should go into the business of supplying these to the consumers. Some arrangement as to the prices to be charged for light and heat should be made in the agreement.
6. No time is indicated within which the company is to complete its electric system, and its right in this respect is practically a perpetual one.

7 We have made the clause as to amalgamation with other companies about as strong as we are able to, but it is a very difficult thing to provide against, as there are so many ways of getting over such a clause.

8. We have added a clause as to annexed territory, because we felt that if any additional territory should be added to the city, it would be very awkward to carry out with the company different agreements applying to different districts of the city.

9 There is no penalty provided for the company failing to complete the aqueduct within the period of five years. It might be well for you to consider if the aqueduct is not completed within the period of five years, this agreement should cease, and the parties be in the same position as though it had not been entered into, or, if you desire, to provide some other penalty in case the work is not completed within that time.

A RICH MINE.

One of the richest mines now being developed in British Columbia is that of the Fish River Copper and Silver Mining Co., of Hamilton, Ont. This property is situated near Illecillewaet, on the line of the C P R., and we understand only a short siding is required to place the ore right on the railway. W. A. Wood, of Wood, Vallance & Co., Hamilton, who is interested in this mine, has received the following results from a car of copper ore shipped by the company from their property to the Chicago Copper Refining Co of Blue Island, Ill —

NET WEIGHT IN POUNDS OF ORE, 34,055.

Gold	9 1/2 oz at \$27 00	\$187 50
Silver	115 " " 0 60	69 00
Copper	7,506 lbs " 0 09	680 94

Deducting freight \$15 per ton, and smelting charges \$20 per ton, this leaves about \$347.06 for mining the ore and delivering on the track. If there was a small concentrator on the spot there would be a larger profit, as freight would not be paid on dead weight, etc. It is said that the quantity of ore of this grade in sight is immense, and Mr. Wood and the other gentlemen who are about to develop the mine are to be congratulated.

The engines for the International Steamboat Co.'s new steamer, which is to ply between Boston, Portland, Eastport and the Maritime Provinces, are to be of the best design triple expansion type, and will develop about 2,200 horse-power, with 100 revolutions. There will be four boilers of the Scottish type, each with three corrugated furnaces, built for a working pressure of 165 lbs. A speed of 16 miles per hour is guaranteed.

Work has commenced at Collingwood, Ont., on the new steamer for the Great Northern Transit Company, and it is hoped to complete the vessel by the opening of navigation next spring. The engines are to be fore and aft, compound and jet condensing. The high pressure cylinder has a diameter of 28 inches, and the low pressure measures 54 inches. The length of the stroke will be 36 inches. The new steamer will have two square firebox boilers, each 15 feet in diameter and 14 feet long, with all the most modern improvements. This will develop 1,200 horse-power, and will drive a propeller 11 feet in diameter. The machinery will cost \$35,000.

The Chateaugay and Northern Railway Co are applying for incorporation. They will construct a railway from some point on the boundary line between the Province of Quebec and the State of New York, thence northerly to a point in Soulanges county, thence northeasterly to and across the Island of Montreal, and continue to Joliet or some point near by. The railway and its branches would be operated by electricity or some other motive power besides steam. The company would also purchase or erect docks, wharves, warehouses and elevators in connection with the railroad. The petitioners for incorporation are A. F. Savaria, of Waterloo, Dr. Cartier, of St. Madeleine and E. Malo, J. Cheffers, and P. Poulin all of Montreal, and others.

A COMPANY will apply at the next session of the Dominion Parliament for an Act of incorporation for the purposes of constructing a railway from a point near the city of Quebec, thence westerly in a straight line to a point near Norway House, north of Lake Winnipeg, thence northwesterly by the Yellow Head or other practicable Pass through the Rocky Mountains, and thence by the Skeena River to Port Simpson or Port Essington, with the option of adopting any other convenient route west of the Rockies in order to reach a point on the Pacific Coast between 50 and 55 degrees north latitude; with power to construct a branch from Montreal to the main line north of the city, and a branch from some point near Pine Island Lake, west of Lake Winnipeg, to some convenient point on Hudson Bay, with power also to navigate freight and passenger vessels between Canadian and foreign ports, also to construct and operate telegraph and telephone poles along

the proposed railway and its branches for the transmission of messages for the public.

PROBABLY the oldest steam engine now in existence is a pumping engine built by Newcomen in 1705, and it is now standing in the Fairbottom Valley, near Oldham, England. It was there discovered some time ago by Mr. Samuel Fletcher. The date of its erection on the present site is not quite certain, but it was probably toward the end of the last century. Of its history but little is known, though some of the older residents of the neighborhood say that 60 years ago it was used for pumping water from a mine. The engine consists of a solid masonry pillar, 14 ft. 6 in. x 7 ft. 3 in. at the base, carrying a walking beam made of oak, 12 x 14 in., braced with iron, and having segmental ends, with the balance weight at one extremity and the piston at the other. The beam is about 20 ft. long, the bearings being trunnions resting on the masonry pillar, and the piston and pump rods are attached to it by chains. The cylinder, of cast iron, is 27 1/2 in. in diam., and 6 ft. stroke, and is open at the top, as the steam entered only at the bottom. It is cast in one piece, and is about 1 1/2 in. thick. In this old type of engine, as is well known, there was no separate condenser, and steam was condensed by injecting water into the cylinder. The valve gear is not at present in place, but the pieces are believed to be lying underneath the engine. The boiler is of the old wagon type, varying in width from 6 ft. 3 in. to 5 ft. 7 in., and 7 ft. high. It is not certain that this is the original boiler, most probably it is not. So far as known this is the oldest steam engine actually in existence, but having been long exposed to the weather it is in a very dilapidated state. People in the neighborhood have made some effort to preserve it, but have not had the means, and the owners, who are the trustees of the Earl of Stamford and Warrington, have taken no interest in the matter. It would be well to save this relic of the past and set it up in some accessible position where it could be carefully preserved as a memento of the past, and it is to be hoped some such action will be taken.—*Engineering.*

REVIEW OF THE METAL TRADE.

MONTREAL, Jan. 2nd, 1895.

As stated in last report, hardware and heavy metal merchants were engaged in taking stock, and though this is now practically complete, yet the new stocks are hardly yet made up. There has been no change in prices at all, though goods keep firmly to quotations. Travellers are all in, but are preparing for another siege, and within a few days will be hard at work in all directions. There is a lack of contracting operations in the building line, which, of course, must restrict the amount of metal and hardware goods in demand. Altogether, the prospects are not as bright for the future as they were this time last year. Perhaps the severe weather will deter the Americans in some measure from the policy which they have adopted of late, of throwing cheap goods on the Canadian market, especially in the west, but this remains to be seen. On the whole, business could not be quieter than it is at the present time; absolutely nothing is moving either in this city or in the country.

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 November, and for the previous eleven months, compared with the same periods of last year:

	November.		Eleven months ended November.	
	1893.	1894.	1893.	1894.
Hardware and Cutlery	£ 5,504	£ 4,655	£ 88,628	£ 62,774
Pig iron	7,764	3,450	55,885	26,836
Bar, etc	2,349	1,269	26,267	18,262
Railroad	1,617	11,935	496,266	229,561
Hoops, sheets, etc	4,130	6,375	65,509	82,127
Galvanized sheets	5,551	9,375	69,877	55,005
Tin plates	25,846	20,115	208,859	192,770
Cast, wrought, etc., iron ..	8,958	4,765	114,949	63,932
Old (for re-manufacture) ..	5,988	1,299	103,883	19,594
Steel	10,040	4,556	124,070	85,297
Lead	1,020	538	15,802	11,718
Tin, unwrought	2,533	3,380	30,485	23,954
Cement	4,489	2,571	53,687	38,599

There was no copper ore exported from Canada to Great Britain during the month of November, whereas in November, 1893, copper ore to the value of £4,130 was exported. The figures for the eleven months ended November for 1893 and 1894 were £25,367 and £24,562 respectively.

Industrial Notes.

F. TUTTON & SONS, founders, Orillia, Ont., recently assigned. It is proposed to build a new gaol in Hamilton in the North End Park.

A CHICAGO firm talk of establishing a metal roofing works in Toronto.

THE Doty Engineering Co., Toronto, are resuming business at 2 Church street.

THE Westminster, B.C., Masonic Temple Co. (Ltd.) has been incorporated. Capital stock, \$35,000.

THE Ogilvie Milling Co. have given orders for the construction of six new elevators in Manitoba.

McLEOD's sash factory in Kingston, Ont., has been destroyed by fire. Loss, \$7,000; insurance, \$6,000.

CHATHAM, Ont., ratepayers have defeated the by-law to purchase the plant of the local waterworks company.

WINNIPEG Fire Committee has ordered a Merryweather fire engine from England, through the Montreal agents.

AN Ontario capitalist proposes to start a modern steam flour mill in Moncton with a capacity of 200 barrels per day.

It is proposed to hold an exhibition in Toronto to celebrate the 400th anniversary of the discovery of Canada by Cabot.

THE new wing of the Chateau Frontenac hotel at Quebec, the building of which will start next April, is to cost \$100,000.

A. MCKAY, Chatham, Ont., has been awarded the contract for dredging Wawanosa Marsh. The estimated cost is \$20,000.

THE Goldie Milling Co.'s mill at Ayr, Ont., is running again, after extensive repairs and putting in of additional machinery.

A. DUBOIS' boot factory in Montreal was last month seriously damaged by fire. Loss, \$10,000 or \$12,000. Partially insured.

THE Acme Silver Co., Toronto, are applying for incorporation; capital stock \$30,000. They will make silver and other metal goods.

THE Stern Bicycle Co., Syracuse, N.Y., propose to establish a factory in Toronto, and are asking the city council for inducements.

CARLETON PLACE, Ont., ratepayers have at last decided to raise \$25,000 by means of debentures for the purpose of building a new town hall.

A COMPANY is applying for incorporation to build a bridge over the Ottawa River at Deschênes Rapids, in Britannia Bay, to Deschênes Mills.

WINDSOR, Ont., city council will shortly submit a by-law to raise by loan the sum of \$25,000 for the purpose of putting in a filtering system.

DARLING BROS., Montreal, have been appointed Canadian agents for the Sterling Safety Boiler, manufactured by the Sterling Company, Chicago.

THE Lake of the Woods Milling Co. have decided to erect twelve storage elevators and a receiving elevator at Winnipeg and other points in Manitoba.

MCKAY & Co., millers, Ottawa, are about to erect an elevator in Prescott, Ont., at a cost of \$150,000. The elevator will prove a rival to the one at Ogdensburg.

THE St. Hyacinthe, Que., Waterworks Co. is going into liquidation. Louis Cote, president of the company, and J. Nault, secretary, have been appointed liquidators.

THE new C.P.R. cement works at Vancouver, B.C., have commenced operations. They have a capacity of 600 barrels a week, and are under the management of S. Warsap.

A CONFERENCE of stove founders took place last month in Hamilton. The resolutions arrived at were not made public, excepting that no change will be made in the price of stoves.

THE Hamilton Bridge Co.'s contracts up to date having been completed, the works are now closed down. The creditors have decided to sell the property in one block some time this month.

JAMES CALVERT's large roller flour mill at Thedford, Ont., was a few days ago consumed by fire, which was supposed to have originated in a hot box. Loss, \$7,000; insured for \$6,000.

THE Valley City Seating Co. of Dundas, Ont. (Ltd.), has been incorporated for the purpose of manufacturing and dealing in furniture, iron and brass work and other hardware. Capital, \$50,000.

THE work of excavating for the waterworks at Aylmer, Que., has commenced.

THE building for the McClary Enamel Ware Man'g Company at London, Ont., is now completed.

THESSALON, Ont., ratepayers are about to vote on a by-law to raise \$3,500 for a system of fire protection.

A BY-LAW will probably be brought forward in Ottawa shortly to raise \$10,000 for the rebuilding of Hurdman's bridge.

THE Sterling Silver Plate Co., Toronto, are applying for incorporation. Capital stock, \$50,000. They propose to manufacture gold and silver goods.

ST. CUNEGONDE, Que., ratepayers are contemplating the erection of a House of Refuge, at a cost of \$25,000. It would be conducted under the supervision of the Grey Nuns.

MIGNAULT, BELANGER & ANOS, civil engineers, Montreal, have obtained a franchise for the construction and operation, for a term of 25 years, of a system of waterworks in Fraserville, Ont.

STANLEY, MILLS & Co., hardware merchants, Hamilton, have just paid \$65,000 for a large piece of property on which they will erect a five-storey building to be run as a department store.

J. H. REID, of Chatham, Ont., proposes to establish a land roller factory in Berlin, and is asking the council for inducements. They offer him exemption from taxation for a term of ten years.

COWAN & MCGINTY'S shingle mill at Marble Cove, St. John, N.B., has been completely destroyed by fire. Loss, \$14,000; insurance, \$4,000. The mill had not been in operation for over a year.

GAW & Co.'s planing mill at Kingston, Ont., was last month destroyed by fire, which started from an oil tank near the shaft. Loss \$10,000; insurance \$6,000. Work has already begun on rebuilding.

MERRICK, ANDERSON & Co., whose wholesale hardware warehouse in Winnipeg was burned down a short time ago, owing to insufficiency of water, will enter a suit against the city for \$10,000 damages.

A COMPANY is in course of formation in Montreal for the purpose of placing on the market a gas produced from coal-oil. It is said that two gallons of Canadian oil will produce a light equal to 1,000 ft. of gas.

THE mayor of Westminster, B.C., has been accused of accepting a bribe of \$50,000 from an American firm of contractors to secure for them the contract for the projected \$300,000 bridge over the Fraser River.

THE Montreal Terra Cotta Lumber Co. have recently overhauled their works at Maisonneuve, and have added an expensive plant of the latest machinery. The capacity of the works has been materially increased.

S. DAVIS & SONS, of Montreal, are thinking of building a cigar factory in Maisonneuve, and they are asking the council for a bonus of \$50,000. The latter have offered a free site and exemption from taxation for twenty years.

SOME excitement was caused at McGill College, Montreal, last month, owing to a fire which had broken out in the cellar of the old Arts building and threatened to do serious damage. The cause of the outbreak was a leak from a gas-pipe.

SOME Montreal aldermen are in favor of the city building its own gas works. They estimate that a complete outfit, similar to that of the Montreal Gas Co., could be put up for \$1,500,000, and that it would be the means of saving \$240,000 a year, besides giving to the citizens cheap light.

R. G. GAUCHER, hardware, Montreal, is endeavoring to make a compromise with his creditors, a demand of assignment having been made by Caverhill, Learmont & Co. The principal creditors are Dame Flore Cardinal, \$5,750, and G. G. Gaucher, \$1,450; and the liabilities are \$20,000.

GEO. BARRINGTON & SONS, manufacturers of trunks and valises, Montreal, have assigned. Liabilities amount to about \$75,000. The business was carried on by F. D. Barrington, and the demand of assignment was made by George Barrington, who is a creditor to the extent of \$40,000.

BRANTFORD, Ont., city council now offers to buy the present site of the Waterous Engine Works Co. for \$40,000 and to grant to the company exemption from taxation for ten years, also light and water privileges, provided they will give up their intention of removing and erect new buildings in the city and employ four hundred men. The company will, therefore, not move from Brantford.

F. PAYNE and J. C. Barr are starting a wrench factory in Granby, Que.

VERDUN, Que., ratepayers have decided to construct a dyke costing \$70,000.

W. G. WARREN, of the iron works, Vancouver, B.C., is selling out his business.

J. A. JOHNSON, St. Mary's, Ont., is about to establish a planing mill in that town.

THE new iron bridge across the Yamaska river at Granby, Que., was opened for traffic last month.

WILL & JONES' cold storage buildings at Jarvis, Ont., were destroyed by fire last month. Loss about \$12,000.

GAGNON BROS.' foundry and machine shop, in Quebec, have been destroyed by fire. Loss \$100,000, mostly insured.

LARKE & BAILES, founders, Oshawa, Ont., have dissolved partnership, and the business will be carried on by the latter.

OSBERHOLTZER & Co. are taking over the old Erb factory, in Bloomingdale, Ont., and will carry on the manufacture of furniture.

THE factory and shops, including machinery, belonging to the insolvent estate of F. X. Simoneau, Sherbrooke, Que., are to be sold at auction.

RIBBON'S upper pulp mill at Merriton, Ont., was last month almost destroyed by fire. Loss about \$4,000, covered by insurance. The mill will be rebuilt at once.

A. E. ALEXANDER'S shingle mill at Campbelltown, N.B., has been burned down. Loss, \$2,000; not insured. The work of rebuilding will be started at once.

J. S. MAYO, manufacturer of oils, Montreal, mysteriously disappeared last month, and it is believed that he committed suicide. The estate will be wound up at once.

RICHARD SMITH, of Beebe Plain, Que., proposes to remove his saw mill to Sherbrooke, provided he could operate under the same roof with the Jenckes Machine Company.

J. H. MOONEY, of Montreal, on behalf of a large syndicate, is out with a proposition to buy up all the tanneries in Ontario. It does not look, however, as if it will be accepted.

THE steel bridge over Cedar creek in Colchester South, Ont., has now been completed. The main portion of the bridge is supported by four iron pillars and there is a 66 ft. span.

THE new asylum which the Sisters of Providence contemplate building at Long Point, Que., will, it is estimated, cost \$1,000,000. The city of Montreal will be asked to contribute \$100,000.

WORK has been stopped for the present on the new parliament buildings at Victoria, B. C., owing to lack of capital on the part of the masonry contractors. This contract amounted to \$300,000.

FOUR United States capitalists have decided to invest \$50,000 each in a new theatre to be built in Montreal. The lessee will be Mrs. Henry Thomas. The work of construction will begin shortly.

FRED. GLEBE, of Shelburne, Ont., has bought the saw mill and flour mill belonging to W. H. Schneider, at Mildmay, for the sum of \$12,500. Mr. Schneider reserves an interest in the saw mill for two years.

HOGG & Co. propose to establish a large cannery either at Fredericton or Moncton, to cost some \$20,000, and employ 75 or 80 hands. They are asking Fredericton council for exemption from taxation.

A STONE addition is to be built to the convent of the Sisters of the Good Shepherd at Ottawa. It will be 108 by 89 feet, five storeys high, and its estimated cost is \$35,000. J. S. J. Routhier, Ottawa, is the architect.

THE scheme for building a big new hotel in Toronto is materializing. The stock is to be \$250,000, and debentures \$750,000. The Ontario Government will probably grant part of the Upper Canada College grounds on easy terms.

THE Niebergall Stone and Lumber Co., of Staples, Ont., are applying for incorporation; capital stock \$45,000. Among the directors are G. Niebergall, of Goderich; G. M. McEwan, of Hensall, and D. R. Menzies, of Clinton.

THE Jas. McLaren Company will apply to the Dominion Government for incorporation for the purpose of carrying on the business of miners, lumberers, building tramways, and manufacturing the products of mines and mills generally.

A NEW company is being formed in Quebec to control the sale of machinery and agricultural implements throughout the district surrounding the city. If the company's views are carried out a reduction of about 20 per cent. in all these articles will be made.

TENDERS are invited for the extension of the sewerage system at Sudbury, Ont.

DUNDAS, Ont., has passed a by-law authorizing the raising of \$5,100 to erect bridges.

SPRATT & GRAY, machinery, Victoria, B.C., have dissolved partnership, A. K. Munroe retiring.

THE new steel bridge between St. Stephen, N.B., and Calais was opened for traffic on the 22nd ult.

MOSES GOWAN'S steam saw mill at St. John, N.B., has been gutted by fire. Loss, \$15,000; insured.

THE machinery for the E. B. Eddy Co.'s new paper mill at Hull, Que., is now nearly all in position.

A SOAP factory is to be established in Collingwood, Ont., in connection with the meat curing factory.

THE Western Wire & Nail Company, London, Ont., is applying for incorporation. Capital stock, \$50,000.

THE Buckingham, Que., Manufacturing Co. are about to rebuild their pulp mill, which was burned down recently.

W. H. MARCON has bought a large saw and stave mill at Marwell, Ont., and will carry on operations on an extensive scale.

THE Metallic Roofing Co. are about to start work on a large new factory in Toronto on a site leased from the city council.

ROBERT GARDNER & SON, Montreal, machinery manufacturers, are hard at work on a number of orders from the "old country."

THE Windsor, Ont., Patent Brush Company are moving their plant to Berlin, and will carry on their business for the future in the latter town.

THE Cookshire, Que., Machine Works Co. have re-elected the old board of directors. The foundry and shops will be kept in operation all winter.

TRUMAN BROS' saw-mill at Truemanville, N.S., has been totally destroyed by fire, together with a quantity of new machinery. Loss, \$5,000., not insured.

THE Prescott Elevator Co. (Ltd.), capital stock \$250,000, are applying for incorporation. The chief applicants are Thos. Ahearn and J. W. McRae, of Ottawa.

THE Wilmot Spa Spring Company, Ltd., Middleton, N.S., have re-let their factory and plant to George Smith, who has managed the business for some time past.

MONCTON, N. B., a week or two ago made a new issue of city bonds to pay the amount of the award in the arbitration between the city and the Gas and Water Company.

THE Dominion Bridge Co.'s (Lachine) tender for the construction of a bridge on Notre Dame street, Montreal, over the east-end station, has been accepted, the price being \$34,747.50.

THE plant of the Hamilton glass works has been removed to Toronto. The rumors that the Burlington glass factory, in the former city, is to be closed down altogether are repeated.

MAISONNEUVE, Que., town council will shortly lay before the ratepayers a by-law to grant \$3,500 to the Gane Brush Manufacturing Co., as well as exemption from taxation for twenty years.

G. GILBERT and M. Lockwood, of Stratford, Ont., have purchased Snetsinger's large flour mill at Moulinette and will refit it with first-class machinery. They also contemplate building a saw mill near by.

ON the new civic buildings in Toronto the sum of \$697,000 has been expended already. Work was commenced in 1889 and is not expected to be finished for three years yet. About three hundred men are employed at present.

ALPHONSO LACHANCE was killed last month in the factory of Esplin & Co., trunk manufacturers, owing to being caught in the machinery. The coroner's jury brought in a verdict to the effect that death had been brought about owing partly to deceased's own negligence and partly to that of the company.

F. P. O'LEARY, of Buffalo, has sold to Hannaford Bros., Hamilton, Ont., the sole right to manufacture his patent plastering cement in Ontario, Manitoba and British Columbia, and the latter will establish factories for this purpose as soon as possible.

THE proposition to build an open subway of 40 feet wide through St. Lambert's Hill, Montreal, from Craig street to Commissioner street, and also a street on the present level 30 feet wide on its east side, has been ratified by the Quebec Legislature.

THE Pembroke, Ont., Milling Co., Ltd., has been incorporated with a capital of \$75,000. They will engage in the milling business and operate elevators, etc. W. B. McAllister, A. Foster, A. Millar and C. Chapman, all of Pembroke, are some of the incorporators.

MCMILLAN & HAYNES, saw manufacturers, St. Catharines, Ont., have leased the old battery factory adjoining their works, and will extend their own factory.

E. CARON has retired from the Sherbrooke, Que., Iron Works, and the business will in future be carried on by the remaining partners, A. G. Campbell and D. W. Hyndman.

THE saw mill belonging to the Norris estate, St. Catharines, Ont., was sold at auction a short time ago to John Sully, representing a Canadian syndicate, for \$34,000.

THE machinery and limits of Leamy & Kyle's saw-mills, Victoria, B.C., were put up for sale by auction last month, and the property was bid in by the mortgagees at \$55,000.

A FIRM of Chicago billiard board makers are establishing a branch factory in Windsor, Ont., and the machinery is about to be put in place. About 25 hands will be employed.

A PARTY of surveyors have been engaged in laying out a water-way from Chippewa Creek, near Gainsborough, Ont., to Ball's Falls, near Jordan. The chief idea is to benefit Welland.

S. S. COOPER, of Clinton, Ont., has the contract for building in that town a House of Refuge for the county of Huron. It will cost \$9,874, and is to be completed by Oct. 1st next.

THE Brantford, Ont., Starch Co. (Ltd.), capital stock \$100,000, has been incorporated. They will manufacture starch, glucose and syrup, taking over the works formerly owned by Geo. Foster & Co.

S. CHERRY has a gang of men at work pulling down the ruins of his saw mill, at Preston, which was burned down recently. If the weather will permit, a new five-storey building will be put up at once.

THE Hamilton Auer Light Co. are applying for incorporation, for the purpose of acquiring the right to manufacture, sell or lease the Auer gas burner. The capital stock is \$50,000. Among the applicants are Thos. E. Leather and Alfred Ward, of Hamilton, and A. O. Granger, of Montreal.

THE Facer Hammered Solid Steel Car and Locomotive Steel Co. (Ltd.), Perth, Ont., are applying for incorporation for the purpose of manufacturing wrought or forged steel wheels, including car and locomotive wheels, etc. Capital stock, \$150,000.

MONCTON, N.B., sugar refinery, which has been closed down a long time, during which extensive repairs have been made, is now in operation again. The hoop and barrel-making machinery in connection with the refinery will be worked in future.

JAMES C. ROBERTSON, James Mowatt, Charles A. Palmer and Thomas Miller, of St. John, and John D. Chipman, of St. Stephen, have applied under the Joint Stock Companies Act for the incorporation of the Portland Rolling Mills Co., Ltd., with a capital stock of \$200,000, with head offices in St. John.

WM. MILNER, late manager of the wagon department of the Chatham Manufacturing Co., is about to start a factory in Chatham, Ont., for the manufacture of wagons, carts and lorries. He is fitting up the works with the latest improved machinery, and will employ from 25 to 30 hands, with a capacity of three to five wagons per day.

THE employes of the Royal City Planing Mills, Vancouver, have struck work owing to a cut in wages ranging from 10 to 30 per cent. This and the Hastings mill, which belongs to the same company, are the only large mills in British Columbia, and the owners claim they cannot pay higher wages owing to the keen competition of the Puget Sound mills.

RICHMOND, Que., ratepayers have passed the by-law granting a bonus of \$2 500 to the Richmond Water Power and Manufacturing Co. to aid them in establishing a trunk and valise factory, employing a hundred hands. The works, which will be under the direction of L. Labelle and G. B. Coram, of Montreal, will, it is hoped, be in operation in a short time.

CONTRACTS for the construction of the new Quebec City Hall have been awarded as follows: Excavation and masonry, J. B. Jinchereau, \$71,316; carpentry and joinery, J. B. Gingras, \$27,966; plumbing and gasfitting, P. Parent, \$1,775; heating apparatus, Ovide Picard, \$7,400; roofing, N. K. Connolly, \$5,400; painting and glazing, Gauthier & Frere, \$2,755. Total, \$116,612.

IN another place is chronicled the disastrous dynamite explosion in Hull. Another one took place about the same time at Little Glaco Bay, C.B., whereby two men were killed, the explosion being brought about by the same cause, namely, careless thawing of the dynamite required in blasting in connection with the Dominion Coal Co's waterworks. Surely it is time that some more efficient regulations were laid down for the carrying on of this dangerous practice.

ST. LOUIS DU MILLE END council have awarded the contract for the construction of sewers in the Montreal annex, to Bastien & Valiquette, Montreal, the lowest tenderers. The price is \$34,975. The work will be put in hand at the earliest opportunity.

T. C. WALLACE has established a factory near Milledgeville, N.B., for the treatment of the moss which abounds in that neighborhood. The product is very useful for littering stables, deodorizing closets, &c., and it is hoped to create quite a large industry.

THE Guelph, Ont., Heading and Stave Co. have purchased a building, which they will use as a factory. Machinery is now being put in, and the mill is expected to be in readiness for operation this month. The capacity will be about 2,000,000 staves and 500,000 headings per year. About twenty hands will be employed.

THE Dominion Rubber Reclaiming Co. (Ltd.), Montreal, has been incorporated. Capital stock, \$100,000. They will make up reclaimed rubber and supply it to rubber manufacturers. The incorporators are Wm. Clendinneng, Wm. Currie, W. T. Costigan, Wm. D. Lighthall, all of Montreal, and F. Dagenais, of St. Henri.

THE first of the monthly dinners of the Association of Architects for the Province of Quebec was held a week or two ago in Montreal. After the dinner, the members of the association adjourned to their rooms, where Chas. Baillaigé read a paper on "A quick and easy way of getting at the weight of iron scantling, girders, columns, etc."

AS noted in a recent issue, a joint stock company is being formed to take over the piano and organ business of L. E. N. Pratte, Montreal, and to engage in the manufacture of musical instruments at Huntingdon, Que. L. E. N. Pratte, A. Desjardins and G. J. Shepherd are those principally interested, and the capital stock of the company is to be \$200,000.

THE Canada Paper Company will build a new dam at their works at Windsor Mills, Que. When completed, this dam will give an increased capacity of between 3,000 and 4,000 horse-power, part of which will be utilized in establishing an electric light plant for lighting the company's factory and the town in general. Altogether, about \$200,000 will be spent.

THE plans are now in readiness for the new swing bridge to be built across Burlington Canal, near Hamilton. They show a bridge 262 ft. 11½ in. in length, the part spanning the canal to be 161 ft. 4½ in. long from the centre of the pivot, and the end over land to be 101 ft. 7 in. Tenders for the masonry work will be received at the office of the Resident Engineer, 36 Toronto street, Toronto, and at the Department of Public Works, Ottawa, up to the 10th inst.

THE Royal Paper Mills Company, Montreal, are applying for incorporation, with special power to acquire the property of the Royal Pulp and Paper Co., and to issue to such shareholders of the Royal Pulp and Paper Co. as may become shareholders of the new company, deferred stock certificates of the latter. Capital stock, \$400,000, with power to increase it. The applicants are W. B. Ives, Rufus Pope, F. B. Buck, G. Van Dyke and Irwing W. Drew.

THE St. Anthony Lumber Co. (Ltd.) have been granted letters of incorporation by the Ontario Government. Capital stock, \$1,500,000. They will carry on a lumbering and milling business and the manufacture of wooden products, purchase mills and factories, and run steam and other vessels, as may be found necessary. Amongst the incorporators are E. M. Fowler, of Chicago, E. C. Whitman, of Minneapolis, and J. P. Whitney, Q.C., of Morrisburg, Ont.

IN the last assessment in Hamilton the Hamilton Gas Company's mains were assessed \$125,000. The court of revision reduced this to \$74,000, but the company appealed against the assessment altogether, taking the ground that gas mains were not taxable. Judge Muir has given judgment upholding the assessment, taking the ground that the Act passed after the case of the Toronto Street Railway suit was meant to cover just such cases, and made all such property liable to taxes where it was not specifically exempt.

AS mentioned in last number, J. A. Pickett, C.E., has been engaged in preparing a scheme of water supply for Digby, N.S. He estimates that for \$35,000 a water supply could be put in on the gravitation system, sufficient for a town of 10,000 inhabitants or more. For fire purposes hydrants could be put in and a pressure of 90 pounds or more to the square inch obtained, which would enable the water to be thrown 100 feet above the highest point in the vicinity, thus doing away with the necessity for fire engines. The town council has now decided, therefore, to borrow \$35,000 for the purpose of carrying out this plan, and it is hoped that the work will be completed before next summer.

THE by-law to raise \$225,000 for a system of waterworks in Winnipeg for fire protection purposes was defeated. The present waterworks company has a franchise to run several years longer and the ratepayers were not willing to incur the expense of establishing another water supply solely for protection against fire.

OTTAWA was a few days ago without a water supply for some days, owing to the interference of anchor-ice, and since then a good deal of discussion has ensued as to whether it would not pay the city to put in an auxiliary steam pumping plant, and also to enlarge and extend some of the mains. The cost would approach \$200,000, but it is believed that this would be more than made up for by the increased safety against fire and in the greatly enhanced value of the waterworks.

THE Ontario Malleable Iron Works at Oshawa have been gutted. The fire broke out in the smelting room, and owing to the delay in obtaining water, spread so rapidly that the whole building was destroyed. The works have been in constant operation ever since 1872, giving employment to 300 men and paying out \$100,000 annually in wages. Loss estimated at about \$120,000; insurance, \$27,000. The employees held a meeting and offered their services free of charge to clear away the debris for a new site. A meeting of the town council has been held and it is likely aid will be given to the company to rebuild. The company will not rebuild either in Oshawa or elsewhere for the present.

SHERBROOK city council have decided, subject to the passing of a by-law on the 16th inst., to grant to the Jenckes Machine Co. a bonus of \$30,000 in city bonds, bearing interest at 4 per cent., payable in 25 years. The conditions are as follows: First, the company to expend in new buildings \$25,000; second, to equip said new buildings with modern machinery and plant to cost \$50,000; third, to have *bona fide* subscribed capital of \$150,000; fourth, the company shall continuously operate said works for a period of twenty years, and employ a yearly average of not less than 200 men, and pay wages not less than \$60,000 annually; fifth, that the company give security to the city by mortgage on present works situated on the flats, and on proposed works, and a further security by transferring five insurance policies to the amount of \$30,000 to the city.

Mining Matters.

Two large tubular boilers and an engine are now being put up at the old Sydney mines, C.B.

A. C. VENMOERKERKE has commenced operations on the "London" mine, near Watson, B.C.

THE Dominion Coal Co. are having several coal-carrying steamers built for them in Scotland.

THE International Oil Co. has sold its lands at Gaspé, Que., to the London Petroleum Oil Trust Co. for \$2,500.

GOLD has been discovered lately at Mount Rascal, Hants county, N.S., and 50 areas have already been taken up.

FRED TICHBOURNE is having his numerous oil wells near Osborne, Ont., overhauled, and a supply of tanks added.

THE Pelequin gold mine, on Wahnapike Lake, Ont., belonging to R. McConnel, now shows four veins of rich gold quartz.

THE proposal to grant a sum of money to the Kingston School of Mining and Agriculture was defeated by the county council.

ORE from the D. A. mine, Midway, B. C., recently assayed 104 to 150 oz. in silver and 4 oz. in gold. The vein is opened up 75 ft.

ON the Homestake claim, Adams' Lake, Kamloops, B.C., the tunnel has now reached the true mineral vein, at a depth of 170 feet.

ACCOUNTS from the "Fisher Maiden," Nelson, B.C., district, continue encouraging, and about five tons of ore is being sent away daily.

THE Montreal and British Columbia Prospectors' & Promoting Co. (Ltd.), Vancouver, has been incorporated. Capital stock, \$20,000.

SOME valuable discoveries of mica have been made on a small creek close to Nakusp, B.C. It is of a pure white in color and runs in veins about 9 ft wide.

THE Cariboo, N.S. Gold Mining Co.'s property has been purchased by W. H. Brookfield and W. G. Brookfield, of Halifax, and H. Sturdee, of St John, for \$50,000. A condition in the transfer calls for the return of the property to the vendors, providing they pay back \$30,000 within nine months.

THE New Glasgow Iron, Coal and Railway Co. (Ltd.), and the Nova Scotia Steel & Forge Co. (Ltd.) are proposing an amalgamation.

BUSINESS is still light at the Joggins mines, N.S., about 500 tons of coal being raised daily, the quality of which is above the average.

THE "Helen," near Midway, B.C., is shipping ore to the Everett smelter, which runs, it is said, to sometimes \$200 in gold to the ton.

THE ordinary quarterly meeting of the Ontario Mining Institute was held in Kingston on the 3rd and 4th inst., several instructive papers being read.

A DEAL is now in course of negotiation for the purchase of the Sol Holden gold mine in Big Bend district, B.C., by American capitalists, for \$10,000.

THE Nelson Hydraulic Mining Co., Ltd., have elected J. F. Ritchie, president; R. J. Bealey, vice-president, and G. W. Richardson, secretary-treasurer.

A GOOD deal of attention both in this country and in the States has been attracted to the recent discoveries of iron ore in the Antikokan district, near Lake Superior.

THE mines in Nova Scotia belonging to Messrs. Blair, J. F. Fraser and others, recently produced a gold brick weighing nearly fourteen pounds, and valued at \$3,700.

A MOVEMENT is reported to consolidate the coal mines of Fenwick, N.B., into one concern, the management of which will carry on the work of mining with more vigor than ever.

THE Essex Standard Oil and Gas Co. are applying for incorporation with a capital of \$400,000. They will compete with the Ontario Natural Gas Co. in the South Essex gas fields.

SEVERAL prominent Kingstonians are discussing the advisability of establishing smelting works at Kingston, Frontenac county, possessing within its area considerable wealth in minerals.

J. A. FINCH will probably shortly finish negotiations for the purchase of a third interest in the "Little Daisy" and "Golden" mines in the Slocan district, the price mentioned being \$10,000.

A DEPOSIT of china clay, which appears to be very valuable, has been found in the township of Amherst, Que. The Quebec Government will take steps to ascertain the extent of the deposit.

THE *Canadian Colliery Guardian* hears that operations are likely to begin at the George's River iron mines, Cape Breton, next season. The ore has been tested and is said to be of excellent quality.

DENZLER & SCHOFIELD have sold the "Stemwinder" and "Greenwood" mines, Kootenay district, to the same parties who recently bought several claims in the "Summit" camp, viz., Ferrelle & Midgen, of Butte.

THE Boston mine at Malaga, N.S., has about thirty-five men employed, and is running day and night. Between four and five hundred tons of low grade gold ore are crushed by the mill every month, and give a fair return.

A PROSPECTOR of the name of McKay, who represents a syndicate of Seattle capitalists, has been on a trip through the country between Lake Winnipeg and Hudson's Bay, and reports the discovery of valuable copper deposits.

THE "War Eagle," on Trail Creek, B.C., has now a shaft 80 feet deep, the tunnel cutting the ledge at a depth of 100 feet. The ore, which is from eight to ten feet wide at this depth, is copper and iron pyrites, carrying silver and gold.

ACCORDING to a recent test, the flow of gas at the new well near Leamington, Ont., is 1,000,000 cubic feet per day, which is equal to the great well from which the Ontario Natural Gas Co. supplies Walkerville, Windsor and East Detroit.

ASSAYS of the quartz from the Mammoth Gold Mine, belonging to the Bonanza Nickel Mine Co., Ltd., of Sudbury, Ont., show gold varying in value from \$65 to \$165, one assay showing \$206 in gold to the ton. The vein is 55 ft. wide.

DAVID REID, a B. C. trappist and prospector, has discovered a flowing well of petroleum near a tributary of the Peace river. He states that its capacity must be at least 1,000 barrels per day, and says also that it is in close proximity to a coal field.

THE bonds held by Patrick Clark, Austin Corbin, B. C. Kingsbury, Finch & Campbell, E. J. Roberts, and J. C. Wakefield, all of Spokane, or the "War Eagle," the "Iron Mask," and the "Virginia," in the Trail Creek district, B.C., have now been taken up. About \$8,000 has been expended by the purchasers in development work. The three claims cover a vein parallel to the "Le Roi."

THE *Island Reporter*, of Sydney, N.S., gives an account of colliery No. 1 of the Dominion Coal Co., in which it is stated that with the improvements now being made, the output before the end of 1895 will reach 1,000 tons a day.

THE Ontario Natural Gas Co., after a month's hard work, have struck a new well near Rathwell. The flow is estimated at 1,000,000 cubic feet per day, the pressure being about 400 pounds. The new well will be kept as a reserve.

THE 5th annual general meeting of the Mining Association of the Province of Quebec will be held in Montreal on the 9th, 10th and 11th inst. The meeting will be devoted to business, and to the reading and discussion of several valuable papers.

THE Quesnelle, B. C., Quartz Mining Co. will probably give to a syndicate a half interest in the Hixon Creek mine, provided that \$100,000 are spent on the property. The intention is to work the ore by the cyanide process and operations will begin in the early summer.

THE mayor of Hamilton has had before him the deed of mortgage between the Hamilton Iron & Steel Co. and the Atlantic Trust Co. This provides for the mortgaging of everything on the smelting works site as soon as placed there. The obligation of the company is limited to \$250,000.

A CONFLAGRATION took place last month on the west slope of the Springhill, N.S., mines, and several buildings were quickly destroyed, owing to everything being saturated with oil. Loss, \$75,000. The origin of the fire is unknown. About 400 men are thrown out of employment.

THE Montreal Quarry Co. (Ltd.), capital stock \$200,000, are applying for incorporation for the purpose of acquiring quarries and quarrying and manufacturing building stone. The applicants are P. Alex. Peterson, C.E., P. Lyall, D. A. McCaskill, W. G. Reid and Geo. McDougall, all of Montreal.

G W MAYNARD, mining engineer, of New York, has been prospecting for gold in the Renfrew, N.S., district, and is satisfied with the prospects. Apropos the number of fine mining districts in this country altogether untouched in the way of development, Mr. Maynard commented on the lack of enterprise shown by Canadians in making use of the wonderful resources of their country.

THE Crystal Gold Mining Co., Ltd., of Rathbun, Ont., has been incorporated with a capital stock of \$1,000,000. They will deal in mines and minerals, carry on mining operations, manufacture electric power and appliances, compressed air, etc. The charter members are Peter White and Thos. Hale, of Pembroke; Wm. Anderson, Ottawa; Rinaldo McConnell, Mattawa, and J. L. Caverhill, of Montreal.

THE city council of Hamilton will grant the Hamilton Iron and Steel Co. an extension of time for completing their smelting works from January to July 1st next. The following officers have been elected: President, Wm. Foster, jr., New York; secretary, H. N. Curtis, New York; treasurer and general manager, J. J. Morehouse, Hamilton. A portion of the new building was blown down in a gale the other day, but this is being rebuilt and work is progressing favorably.

Railway and Marine News.

THE new G.T.R. bridge over Trout Creek, at North Bay, is completed.

THE Dominion Government are preparing to build a pier at Thessalon, Ont.

THE C.P.R. are about to erect additions to their flour and freight sheds in Owen Sound, Ont.

A NEW steamer, the "John Milne," was launched last month at Barrie, Ont. She is 112 ft. long.

CONNOLLY BROS. are about to start the building of a new dredge at Kingston dry-dock, to cost \$60,000.

SINCENNES, McNAUGHTON & Co., Montreal, are building a large new tug for the harbor commissioners of that city.

THE assistant engineer of the department of public works recommends the preparation of plans for a new dock at North Bay.

R. O. & A. B. MACKAY, Hamilton, are refitting their steamships "Michigan," "Acadia" and "St. Magnus," at a cost of \$12,000.

LONDON, Ont, city engineer is making plans for freight terminals for the Lake Erie and Detroit River Railway. The cost will be about \$10,000.

THE railway suspension bridge at Niagara Falls, Ont., is to be taken down and replaced by an arched cantilever bridge.

THE Temiscouata Railway Co. are applying for power to extend their line to a point on the I.C.R., between Berry's Mills and Moncton.

THE steamer "Persia," belonging to the Norris estate, St. Catharines, Ont., was sold at auction last month to John Carruthers, for \$9,700.

THE Great North-West Central Railway Co. are applying for an extension of time of seven years in which to complete their proposed line.

THE Ottawa, Arnproir and Parry Sound Railway Co. will apply to the Dominion Government for an extension of time in which to complete the line.

It is likely that the Nelson and Fort Sheppard and the Columbia and Kootenay Railway Companies will build a large union depot at Nelson, B.C.

HENRY SMITH, contractor, Ottawa, has finished the construction of the Point du Chene, N.B., breakwater. It is 600 feet long by 27 feet wide, and about 25 feet high.

THE Gould Coupler Co., of Buffalo, proposes to establish a factory on the Canadian side in order to avoid the duty, their goods having a considerable sale in this country.

A DEPUTATION recently waited on the Ontario Government to ask them to renew or grant \$2,000 per mile that was made some years ago to aid the Port Burwell Railway.

THE London and Port Stanley Railway Co are drawing up plans for an engine house, freight shed, turn-table, etc., to be erected at Port Stanley, at a cost of \$10,000.

THE Nova Scotia Coast Railway Co have suspended work for the winter, the cost of excavating in that season having been found to be more than half again as much as two months ago.

THE Hamilton Steamboat Co. have elected officers as follows. President, G. E. Tuckett; 1st vice-president, M. Leggatt; secretary-treasurer, Seneca Jones, and manager, F. Armstrong.

THE directors of the Restigouche & Victoria Railway have ratified the agreement with the American syndicate who are to operate the road. Construction work will begin in the summer.

THE Toronto, Hamilton and Buffalo Railway Co. has been re-organized with S. E. E. Peabody, of Boston, as president. Construction work is now going on between Brantford and Hamilton.

DUNKIRK (France) Chambre de Commerce, in deference to the wishes of a number of Montrealers, will do all it can towards the establishment of a direct steamship service between France and Canada.

A PARTY represented by R. A. E. Greenshields, of Montreal, are opposing the enlargement of the span of the proposed bridge of the South Shore Railway at Sorel, the order for which was granted some time ago.

IN the case of Murray, Cleveland & Co. vs. the Queen, in which plaintiffs claimed the cost of some improvement work on the Galops Rapids, judgment was given for the former to the amount of \$8,907.30.

TENDERS have now been sent in for the construction of the Dartmouth branch of the I.C.R., the work to be finished by July 31st. The branch line will be 10½ miles in length, running from Dartmouth via Tufts Cove to Windsor Junction.

THE New York, New England and Canada Railway Co. are applying for incorporation for the purpose of building a railway from some point on the I.C.R., near Halifax, through the counties of Halifax, Lunenburg and Queen's, to Yarmouth Harbor.

THE C.P.R. have completed the survey of a route from Robson, B.C., at the mouth of the Kootenay river, to Northport. There is a good deal of gold and silver ore in this district, and the completion of a line of railroad would assist very greatly in its development.

THE Lake Superior & Atlantic Railway Co. have now made satisfactory financial arrangements, and work on the four chief sections of the road will begin at once. It is expected that the Baie des Chaleurs & Great Eastern sections will be completed within a year, and the Ottawa Valley & Ontario Pacific sections within two years.

THE Toronto and Montreal Steamboat Co (Ltd.), Toronto, are applying for incorporation, with a capital stock of \$24,000, for the purpose of acquiring the steamship "Persia," of St. Catharines, Ont., and other vessels, and conveying therein passengers and cargo on the lakes, the St. Lawrence, and all connecting rivers or canals, and on the high seas. Among the applicants are Jas. Carruthers, J. I. Davidson, and Michael McLaughlin, all of Toronto.

RAMSAY ratepayers have passed the by-law authorizing the council to aid the Carp, Almonte and Lanark Railway by taking \$20,000 stock in the company.

RICHARDS, MILLS & Co., Liverpool, England, have bought out the Dominion Line of steamships at about \$9 per share. The company will be reorganized, but business will be carried on as usual.

A BILL is to be introduced shortly into the American Congress to provide for the erection of a bridge for railways, carriages and foot-passengers, to connect Buffalo and Grand Island with the Canadian shore.

THE following have been elected officers of the Temiscouata Railway Co.: President, E. D. Boswell; vice-president, Geo. Irvine; secretary-treasurer, D. Lindsay; general manager, Mr. Crockett.

HAMILTON city engineer is preparing plans for a \$200,000 steel viaduct along Cannon street, in connection with the proposed railway line from Woodstock to Niagara Falls. The line will probably be operated by the C.P.R.

THERE is a report that the Duluth, Missaba and Northern Railway will be extended in a north-westerly direction to Winnipeg, and thence to North Saskatchewan, thus forming a trunk line competing with the C.P.R.

PREPARATIONS are being made by the Nova Scotia Southern Railway Co. so that track laying may begin as early as possible in the spring. The rails have been purchased, and the wharf at Shelburne will be finished next spring.

JOHN ABBOTT, engineer to the Bangor and Aroostook Railroad Company, is preparing plans for a proposed new bridge across the river at Washburn. He estimates the cost of a steel bridge, with stone foundations, at about \$30,000.

THE New York, New England and Canada Company will shortly apply for a charter to build a railway from a point on the I.C.R., near Halifax, to Bunker Island, in Yarmouth harbor, and between any places within those points.

FURNESS, WITHY & Co. (Ltd.) have just added a new steamer, the "St John City," to their line of vessels plying between St. John, N.B., and London, Eng. The vessel measures 300 feet by 37 feet by 25 $\frac{3}{4}$, and is of about 2,300 tons register.

THE Nova Scotia Railway Co. are applying for incorporation with power to construct a railway from Port Maitland or Meteghan to a point on the Dominion Atlantic Railway, between Ohio and Meteghan stations, thence to points on the Tusket river.

THE Victoria & Black Rock Ferry Co. (Ltd.), Kingston, Ont., are applying for incorporation. Capital, \$12,800. They will operate vessels on Niagara river above the Falls and on Lake Erie, east of Long Point, and will construct wharves, docks, elevators, etc., as required.

GREGORY BARRETT and others, of Calgary, N. W. T., are applying for a charter for a railway to be built from Clearwater, on the C. P. R., through Baldur, Glenboro, Carberry, Neepawa, on the Manitoba & Northwestern, to a point on the proposed Hudson Bay Railway in the Dauphin district.

THE first section of the United Counties Railway between St. Hyacinthe and Sorel, Que., was completed ready for traffic last month, and the second section will be finished this month. The completion of this line to Sorel will give a water-side terminus to the Canada Atlantic Company, which is to operate the line.

AN application will shortly come before the B. C. Legislature asking for an extension of time in which to build the Red Mountain Railway. An effort is being made in the province to checkmate this, as the building of the railway would be of great benefit to the American town of Northport, and of but very little value, comparatively, to British Columbia mining interests.

A COMPANY composed of Mr. Englehart and John Kerr, of Petrolea, and W. D. McRae, Mr. Wilson and others, of Wallaceburg, will shortly apply for a charter for the purpose of building a railway between Chatham, Wallaceburg and Petrolea. The road would open up a large section of new country and put it into communication with the growing town of Chatham.

THE case of Emile Dube against the Temiscouata Railway Co. is now before the railway committee of the Privy Council. Mr. Dube complains that in 1892 he paid the company 2 cents per tie for shipping ties, but since then the officers of the company went into the business in competition and raised the rates against him, till they were now 5 cents per cwt. for an average of 32 miles, thus injuring his trade and discriminating against him. Judgment has been reserved.

J. N. LEEHAN, marine engineer, is building an engine for a barge to be built for Capt. Foster at Smith's Falls. Capt. Foster is also rebuilding the barge "Quebec."

THE Ottawa & Gatineau Railway is now in running order to Pickanock, a distance of 56 miles, and next summer it will be carried 25 miles further to Desert, the Indian name of which is Maniwaki.

G. W. RAMEY, C.E., of Peterboro, reports that the Irondale and Bancroft Railway is now completed for 30 miles from Victoria Junction, east of Wilberforce. Two trains per day are now running regularly.

THE Boston and Maine Railway Co.'s steamer "Lady of the Lake," which plies on Lake Memphramagog, will, before next season, have new engines added, enabling her to make two trips daily between Magog and Newport.

IT is proposed to build a railroad from some point on the Northern Railway to pass through Durham, and Warton, and terminate at Kincardine. A charter has been already granted for a line from Warton to connect with the C.P.R. near Chatsworth.

THE propeller "Freeman," owned by Mr. Craig, of the Kingston Foundry and Machine Company, has been bought by Folger Bros., of Kingston, and is being refitted with a new boiler and new timbers. She is to run between Montreal and Oswego next summer.

THE Buctouche & Moncton Railway was last month sold by auction under foreclosure of mortgage by the Central Trust Co., of New York. The amount of the mortgage was over \$407,000, but the road was sold to Capt. Israel J. Meritt, of New York, for \$22,000.

THE Marine Underwriters' Association held a meeting in Montreal on the 20th ult., and elected the following officers: President, John Popham; Vice-President, Archibald Nicoll; Treasurer, E. L. Bond; Executive Committee, J. H. Routh, W. B. Evans and W. Cunningham.

CAPT. JOHN SIMPSON, who has the contract for building the hull of a new "Black" line side-wheel steamer at Owen Sound, Ont., has commenced work. The dimensions of the vessel are to be length, 150 ft. over all; keel, 140 ft.; beam, 24 ft.; moulded depth, 8 ft. 6 in. The engines will be of the Manitou type.

THE new marine railway at Victoria, B.C., is completed, and is said to be working very satisfactorily. The hauling machinery consists of a wire rope coiled on two drums, and driven by means of three intermediate trains of gear wheels from a 95 h.p. engine, and it is capable of taking out vessels of all kinds up to 1,000 tons register.

THE Toronto, Hamilton and Buffalo Railroad Co. are applying to Legislature for power to extend the time for commencing work on the line from Watford to Lake Erie and for completing the line to Toronto, also for power to build a line from some point in the counties of Brant or Wentworth to some point in the counties of Waterloo and Wellington.

THE C.P.R. have agreed to extend the Montreal and Ottawa branch some time this year. They bind themselves to construct and operate the line as far as Alfred village during 1895, to expend \$50,000 on construction work west of Alfred, in addition to the \$100,000 which they have bound themselves to the Dominion Government to expend during 1896, and to ask no further extension of time.

R. DAVIS & SONS, steam yacht builders, Kingston, Ont., are very busy in their dry dock rebuilding the iron steamer "Maud," lengthening the bow 18 feet, and the stern 12 feet, making her 150 feet long. She will have all new cabins and joiner work, and all the modern improvements, including electric search light. They have also a contract to build a 111 feet steam barge, 22 feet wide, for the Folger Bros of Kingston. She is now in frame. They have a contract to build a new 100 feet passenger steamer for the same firm, to be completed June 1st, 1895. They are also to lengthen the steamer "Laurel" for Capt. J. Dix by adding 12 feet amidships. This firm will employ 40 to 50 men all winter.

THE method adopted in Antwerp for purifying the filthy water of the River Nethe is to pass it through revolving cylinders containing small pieces of iron, it having been ascertained that 15 lbs. of metallic iron is sufficient to purify a million gallons of water. The water thus treated is said to be completely freed from germs, bacteria, and other objectionable matters. Chemists find that the contact with iron reduces the organic matter from 45 to 85 per cent., and albuminoid ammonia by from 50 to 90 per cent., and all free ammonia is removed. The process has been applied with success to the water of the Delaware River in Pennsylvania, and is reported as being both simple and cheap.

Electric Flashes.

NORTH BAY, Ont., electric light plant is approaching completion.

AN electric light plant is being put in at the Woodstock, N.B., woolen mills.

THE Northwestern Electric Co.'s works in Winnipeg are to be considerably enlarged.

PREPARATIONS are being made for the extension of London' Ont., street railway to Springbank.

THE Oshawa Railway Co. have obtained a franchise to build an electric line from the town to the lake.

THE Niagara Electric Railroad Co. have made a survey for a line to be built below the bank to the gorge.

H. EVERETT has resigned the vice-presidency of the Toronto Street Railway and sold the whole of his stock.

BUCKINGHAM, Que., town council has granted right of way to the Buckingham Electric Light and Railway Co.

AN electric light plant has been installed in the Pilot Bay, B.C., smelter. Its capacity is 150 16-candle-power lamps.

WINNIPEG Street Railway Company are issuing bonds secured by mortgage on its assets to the amount of \$400,000.

T. W. NESS has registered business as T. W. Ness & Co., of Montreal, electrical supply manufacturers and fitters.

MIGNAULT, BELANGER & AMOS, of Montreal, are about to put in a system of electric lighting and power in Fraserville.

MATTAWA, Ont., electric light station is in operation, and a large number of buildings are now lighted by electricity.

KINCARDINE, Ont., electors have decided to place the management of the electric light system in the hands of commissioners.

THE Bell Telephone Co. have now brought Portage du Fort into their long-distance circuit. The line will be continued to Shawville.

A. ROSS, manager of the Oxford, N.S., Electric Light station, was caught in a belt driving the dynamo, and sustained severe injuries.

IN future the London branch of the Canadian General Electric Co. will be known as the London Electric Co. (Ltd.) Capital, \$300,000.

THE Dundas County Telephone Co. are applying for incorporation with a capital stock of \$10,000. They will operate telephones in Chesterville, Ont.

WHEN the Canada Paper Co.'s new Jam at Windsor Mills, Que., is completed part of the power will be utilized for the electric lighting of that town.

THE Cookshire, Que., Machine Works Co. have decided to supply no more electric light, and to dispose of their electric plant at the earliest opportunity.

MONTREAL city council have resolved to tax every telegraph, telephone and electric light pole at the rate of \$1 each, and electric wires at the rate of \$10 per mile.

THE Royal Electric Co., Montreal, has declared a quarterly dividend at the rate of 8 per cent. per annum on paid-up capital stock for the quarter ending November 30th.

THE Point Albino Street Railway Co., capital stock \$100,000, are applying for incorporation to construct and operate electric railways in Fort Erie and Port Colborne, Ont.

THE Kay Electric Works, Hamilton, have shipped a motor to A. E. Alexander, merchant, of Campbellton, N.B., and a plating outfit to Neff Bros., founders, near Welland.

THE Montreal Street Railway Co. have elected officers as follows: President, L. J. Forget; vice-president and managing director, James Ross; manager, G. C. Cunningham.

THE Hull, Que., Electric Co. have been, after some little difficulty, granted a charter, with power to extend the line from Hull to Aylmer and Gatineau Point, but not to Ironsides.

A PROJECT is on foot to construct an electric railway from St. John, N.B., to Fredericton, a distance of 85 miles. The route would pass through a highly-cultivated farm country.

A ROWAN, of St. John customs' department, has been appointed Inspector of Electric Motors for New Brunswick. The instruments used in the work of inspection are now being placed in position.

THE W. A. Johnson Electric Co., of Toronto, are having a good sale for their arc lamp, and are busy in their repair department.

THE Petrolia, Ont., Electric Light, Heat and Power Co. are rushing work on their new power-house. A 125 horse-power Wheelock engine and a steel boiler are being placed in position.

T. BELANGER, a Montreal electrician, has invented a substitute for the overhead trolley system. In this system three surface tracks are used, the third of which conveys the motive power to the car.

IN the Yarmouth Gas and Electric Light Company amalgamation case, a brief report of which appeared in a recent number, judgment has been given in favor of the plaintiffs for the sum of \$248,000.

PETER MCGREGOR, of Ottawa, is thinking of establishing a factory in that city for the manufacture of electric heaters. He has been employed for some time past in perfecting some improvements in this line.

THE Packard Lamp Company have been contemplating the removal of their works from Montreal to Niagara Falls, but the question has not yet been settled, and will not be decided till the meeting of the directors next month.

THE project of lighting Ormstown and Huntingdon, Que., by electricity seems to be taking a definite shape, and a proposition will shortly be made to the councils of those places. Power will be derived, probably, from Hewittville.

CHARLES CORLISS, a wealthy capitalist of Haverhill, Mass., proposes to build an electric railway from that city to Quebec. It would be a gigantic undertaking, but there are strong hopes held out of its soon becoming a *fait accompli*.

W. J. CLARKE, electrician, Trenton, Ont., who was charged with inciting J. J. Cooley to burglary in order to obtain the key to the cipher of the Brush Electric Co., in connection with the Toronto boodle enquiry, has been committed for trial.

THE Halifax Street Railway is said to be in a bad plight. The city council threatens to ask the Legislature to cancel its charter, owing to the inefficiency of the service. One hundred thousand dollars' worth of its bonds have been repudiated.

A NEW form of street-car gong has been put into use on the Toronto Street Railway. One of its advantages is that when a clapper becomes damaged, all the motorman has to do is to take it out and insert a new one, thus avoiding waste of time.

THE Peterboro Electric, Carbon and Porcelain Company have elected the following officers: President, Wm. Cluxton; directors, A. P. Poussette, J. W. Taylor, Jas. Stevenson, Thomas Brooks, H. Le Brun, T. E. Bradburn, A. E. Dixon, and A. L. Davis.

THE Montreal Park and Island Railway Co. has commenced work on its new line through Western avenue and also on the one from Outremont around via Cote St. Antoine to the M. A. A. gates. A spur is also to be built to the village of St. Laurent.

THE Stanstead Electric Co., Stanstead, Que., who have been running their station by water power, have decided to put in an auxiliary steam plant, and have placed their order with the Robb Engineering Co. for a 100-horsepower Robb-Armstrong engine and Monarch Economic boiler.

G. T. SIMPSON, manufacturer of transformers, Hamilton, is now supplying an equipment of his new transformers to St. Hyacinthe, Que. There are three generators of 120 kilowatts each, it being a three-phase plant for the transmission of light and power on one system of alternating current. Over sixty transformers will be used, and the plant is the first of its kind in Canada. A description of this plant will appear in an early issue of this journal.

WATERLOO Council have granted to the Preston and Berlin Street Railway Company the rights and privileges asked for by the company; also the franchise to lay the track on the high road between Freeport and Berlin. The reeve, however, refused to sign the by-law until the coming municipal elections shows whether the ratepayers are really in favor of such an action. In the meanwhile the by-law has been signed by the deputy reeve.

THE Ottawa Porcelain & Carbon Co. (Ltd.) are applying for incorporation, with a capital stock of \$100,000, for the purpose of manufacturing all kinds of carbon and porcelain, also electric light and power machinery, cables and wires, incandescent lamps, and of carrying on any other business in connection with the above. The applicants are Francis Clemow, J. W. McRea, G. H. Perley, T. Abearn and Thomas Birkett, all of Ottawa. Building operations will be commenced early in the year, but it will probably be June before all the machinery and appliances are in place and the factory ready to produce goods. About 100 hands will be employed.

THE Dartmouth Electric Co., Dartmouth, N.S., are enlarging their plant, and have ordered a 125-horse power engine and boiler from the Robb Engineering Co. The engine will be a Robb-Armstrong Tandem Compound, and the boiler a Monarch Economic with Adamson flanged furnace.

THE Walker Manfg. Co., of Cleveland, Ohio, have appointed the W. A. Johnson Electric Co., York st., Toronto, as their agents for electric railway equipments. The Walker Manfg. Co. are said to have one of the best equipped workshops in the United States. A fifty-ton casting was recently turned out of their foundry.

"ELECTRIC Lighting Specifications," "Electric Light Installations," by Salomons (7th edition), "Practical Electricity," by W. E. Ayrton, "Electrical Engineering," and "Electricity in Daily Life" are among the works on electrical subjects placed on the shelves of Wm. Drysdale & Co., booksellers, Montreal.

THE Whitney Electrical Instrument Co.'s works at Sherbrooke, Que., were a few days ago almost completely destroyed by fire. The alarm was given by Chas. E. Shedrick, the company's electrician and superintendent, who sleeps on the premises. Loss about \$3,000, insurance about half. The work of rebuilding will start at once.

HAMILTON Street Railway Co. have elected the following officers: President, B. E. Charlton, vice-president, E. Martin, Q.C., manager, J. B. Griffith. At the annual meeting, which was held recently, a fair dividend was announced, though the company's receipts had fallen off considerably during the past few months owing to the extensive repairing of streets in the city.

A DEAL which has been pending for some time between the Stanley Electrical Company of Massachusetts and the Royal Electric Company of Montreal, has at last been closed. The business will be carried on under the name of the Royal Electric Company, but the manufacturing branch will be taken in hand by the Stanley company, whose patterns and patents will be made use of for the Canadian market.

THE Whitney Electrical Instrument Co., of Sherbrooke, have placed a voltmeter of unusual size on trial at the Sherbrooke Electric Light Station. The base of the instrument is about three feet square, and the pointer has a 36 inch swing. The readings can be distinctly taken at a distance of ten rods. Mr. Sangster, the superintendent, speaks highly of its accurate work and distinctness, and thinks that a three-inch dial potential indicator for running large electric light plants will soon be a thing of the past.

WITHOUT regard to the new company who propose to build an electric railway from Hull to Aylmer, Que., Ahearn & Soper are preparing to extend their connections to the same town. They will build a road to Aylmer, a distance of eight miles, crossing the Ottawa by an iron bridge to be built at Britannia at a point where there is only about a foot of water in the low water season. The distance to Hintonburgh, through which they will run, is two miles, and the council of that village are anxious that the road should be built. It is expected that construction work will be commenced in the coming spring, the line to be finished during the summer.

THESE who bring actions against street railway and electrical companies for damages for injuries are not to have it all their own way where proof of carelessness is not shown. In the Superior Court, Montreal, the other day, in the action of F. Normandin for \$5,000 on account of injuries to his little son, who was run over by an electric car, the judge decided that the accident was due not to the negligence of the company, but to the carelessness of the parents in allowing the child to run about the streets. In the Toronto courts Judge Rose last month dismissed an action brought by Mrs. Hartford against the Bell Telephone Co., the Toronto Electric Light Co. and the Holmes' Electric Protection Co., for \$25,000, as compensation for injuries received in the live wire accident on October 6th.

THE Kingston, Ont., School of Mining are about to institute a prospectors' course, similar to the one which gave such satisfactory and useful results last year. This course, which will be especially useful to assayers, prospectors and mining men in general, will begin on the 5th inst. and will continue for eight weeks, during which time the following subjects will be treated by Dr. Goodman, Prof. Nicoll, Mr. Miller, Hamilton Merritt, Mr. Walker and Mr. Mason: Chemistry, mineralogy, geology, lithology, discovery and mining of ores, milling, blowpiping, assaying, drawing as applied to mining work, etc.

Brief, but Interesting.

JOEL HURT, the newly elected president of the American Street Railway Association, is the head of the Atlanta, Ga., Consolidated Street Railway Company, to which position he was appointed in 1891.

A NATIONAL School of Electricity is about to be started in Chicago, the honorary faculty including the names of Edison, Tesla, Gray and other eminent electricians, and the president being J. P. Barrett, who was chief of the Department of Electricity at the World's Fair.

IT has been decided to use petroleum as locomotive fuel on the Baltic railroad, although this line is almost the most distant of any in Russia from the oil wells. Great reservoirs are to be built in St. Petersburg and Reval, and three other stations, which will hold in the aggregate about 5,000,000 gallons.

SOME idea of the steady increase in the size of ships can be formed from the statistics compiled by Lloyds' Register. These statistics are confined to seagoing vessels of over 100 tons, and from them it appears that the shipping tonnage of the world in 1890 was 22,151,651, and the number of vessels 32,298. In 1893 the figures were 24,258,375 tons, represented by 32,010 vessels, showing an increase of tonnage in three years of 2,100,724, with a decrease in the number of vessels of 288.

A RAT managed last Thanksgiving night to get behind the switchboard of the Baltimore, Md., electric lighting works, and extinguished a large number of incandescent lights, besides incidentally doing a considerable amount of damage to the plant. Punishment was meted out to the daring rodent, however, according to his deserts, for about 2,700 volts passed through his body, death being instantaneous and causing the corpse to look as if it had been suddenly frozen while in the very act of passing from one brass terminal to the other.

Personal.

BEVERLY ROSS, of the Niagara Falls and Queenston Electric Railway, tripped as he was jumping off a train at Port Hope, Ont., and the wheels of the last Pullman car passed over his left arm. The limb had to be amputated just below the elbow.

JAMES ROBERTSON, of the James Robertson Company, Montreal and Toronto, has been in poor health for some months past. Mr. Robertson took a trip to the old country last summer for the benefit of his health, but we regret to say that the voyage has not resulted in much improvement.

J. J. LANNING, assistant general manager of the G.T.R., who, as mentioned in a previous number, has been forced to try a change of climate owing to ill health, is once more back in his Montreal office. Our readers, among whom Mr. Lanning has many friends, will rejoice to hear of his convalescence.

P. S. ARCHIBALD, chief engineer of the I.C.R. at Moncton, has returned from a trip to Manitoba, and gives the Moncton Times an interesting and encouraging account of prospects in the Prairie Province. Mr. Archibald mentions that nearly all the small towns in Manitoba now have the electric light.

JOHN FENSON, civil engineer, Toronto, and head of the Fenson Elevator Works, has been appointed consulting engineer of the East Hamilton Improvement Co., and he has been on a trip to the States with the object of obtaining the latest "wrinkles" on incline railways.

J. W. HECKMAN, C.E., who is well known to readers of THE CANADIAN ENGINEER as the artist of some finely executed photographs which have appeared in its pages at different times, has left for Italy with his camera. No doubt when he returns to Canada it will not be empty-handed, and we trust that he will succeed in obtaining many fine views from that land where beautiful scenes and beautiful art work are common as the day.

THOMAS PATTERSON, for 25 years mechanical superintendent of the G.T.R., died last month in Toronto at the age of 71. He was born in Scotland, but emigrated to the United States forty-five years ago, only staying there, however, a short time before removing to the Queen City. Mr. Patterson was particularly complimented upon the able manner in which he superintended the work of converting the G.T.R. track to the standard gauge system.

T. J. DRUMMOND, of the Drummond & McCall Pipe Foundry Company, Montreal and Lachine, was confined to his house last month for some days, owing to sickness. We are glad to hear he is now convalescent.

ERNEST MARCEAU, C.E., the recently appointed superintending engineer of canals for the Province of Quebec, was born in 1853, and after he had undergone a complete course of study at the Polytechnic School, Montreal, graduated from there with the highest honors in 1877. He was then appointed assistant engineer on the Grenville Canal, and from 1879 to 1889 was assistant superintending engineer on the Ottawa canals. After acting as superintending engineer *pro tem.* on the canals of Quebec Province since May, 1893, he has been honored by the formal appointment as stated.

GREAT THINGS FOR 1895.

The year 1891 has seen some remarkable developments in the electrical and mechanical sciences, but the present year is likely to witness the inception and development of inventions more important in their bearing on the welfare of mankind, and more revolutionary as regards the industrial sciences than perhaps any year of the century. Not to speak of what is being done in other countries, two inventions now being perfected by two Canadians are designed to make the year an epoch in manufacturing and the industrial arts. One of these is a new system of air compression by which the power of falling water may be converted into mechanical power by compound air, a fall as small as two or three feet being available for this purpose. The other is a rotary engine, the efficiency of which may be imagined when it is stated that a tiny engine which was sent as an express parcel developed 25-horse power, with 3,000 revolutions per minute, and that a larger one now being completed, and which can be put into a box six or eight feet long, is calculated to develop 250-horse power. Neither of these are Keely motor mysteries, but engines of a simple character, which have surprised those who have viewed them. At present these inventions—or discoveries, as we may call them—are not public property, but THE CANADIAN ENGINEER hopes to give the world some account of them as soon as the time is ripe.

These are inventions that have come under our own observation at home and abroad. Maxim and others appear to be in a fair way to achieve the long-looked for attainment—*aerial navigation*—before the close of the year; a problem which, by the way, could be readily solved by the possession of an engine so light and so powerful as the new rotary engine alluded to.

Again, we have the reported discovery of Nikola Tesla, of a means of combining a steam engine and electric motor in one machine, which will save the loss of energy inseparable from the present form of both the steam engine and motor. And all the while the evolution of electricity in its new applications to the various sciences and arts goes on without interruption, even on the existing lines and methods of generation. What could it not do with these new principles applied? Again, the gas engine is being rapidly improved, and along with this improved efficiency, we have the confident assertion of the inventors of the Comstock system of producing gas that this gas can be manufactured almost anywhere on this continent at 20 cents per thousand, which would mean a marvelous cheapening both of motive and illuminating power. In view of all this development we can only watch and wonder at the enormous forces of nature now being and to be harnessed for the use of humanity; and when such forces are fully applied we shall think that hitherto the world has slept.

RECENT GERMAN PATENTS.

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

August Hickel, Barmen, elliptical compasses.

Dr. H. C. Merrill, Cologne, apparatus for indicating torpedoes that have run aground.

H. Feith and A. Floeck, Elektrik, Galvano-plastic Institute, Cologne, material for pouring behind galvanic deposits.

Gottfr. Liessem and Peter Lauffenberg, Cologne, apparatus for measuring fluids.

Z. Schroeder, Hildorf, sediment and fining-vat for wort as substitute for the coollers.

W. Battner, Gummertsbach, furnace.

A. Bruckner, Aix-la-Chapelle, hollow tablets of gypsum and frame for making them.

A. von der Vahmer, Alexanderwerk, Remscheid, copying-press.

The Patent Review.

- 45,722 Edward Thunderbolt, Carlton, Victoria, Australia, governor for machinery.
- 45,723 Philibert Gauthier, St. George, Que., water elevator.
- 45,724 John C. Grant Peterborough, Ont., curd cutting machine.
- 45,725 Albert Penhollow Jones, Toronto, Ont., wooden bicycle rim.
- 45,728 John Horace O'Brien, East street, Kilda, Victoria, Australia, nut lock.
- 45,729 Gustave A. Drolet, Montreal, electric fire alarm system.
- 45,731 Theron Rudd Gue, Halifax, N.S., explosive.
- 45,734 Wm. Luther Teter, Philadelphia, Penn., furnace.
- 45,735 Wm. Pinkerton, Toronto, process of making building composition.
- 45,736 Clarence Leroy Wheeler, Marion, Indiana, rail joint.
- 45,737 Joseph Lachace, St. Francois de la Beauce, Que., nut locks.
- 45,744 James Wright, Jackson, Tennessee, belt tightener.
- 45,747 George T. Orton, Winnipeg, Manitoba, ventilator.
- 45,749 Matthew Belk, Palmerston, Wellington, New Zealand, apparatus for preventing locomotives from leaving the rails.
- 45,750 Edward Wilson, Exeter, England, hot water heater.
- 45,755 Albert Franklin, Kingsley, Washington, boiler furnace.
- 45,759 James Lund, Ardwich, Manchester, England, oiler.
- 45,760 Hubert T. Chailoux, St. Hyacinthe, Que., horse power or capstan, etc.
- 45,762 George Wellington Butler, Oxford, Ont., oil cup for carriage axles.
- 45,763 Willard F. Richards, Buffalo, N. Y., car coupler.
- 45,764 Wm. S. Wilson, Brantford, Ont., process of manufacturing rivet studs, etc.
- 45,767 John Horner, Dubois, Penn., nut lock.
- 45,770 Robert A. Danning, Bath, Maine, weighing scales.
- 45,772 George L. Klein, Toronto, stem winding watch.
- 45,781 Gasper S. Grosch, Milverton, Ont., over-stocking.
- 45,782 Wm. Silver, Oliver, Halifax, N. S., army accoutrement.
- 45,783 Louis Gauthier, St. Pie, Que., sap evaporator.
- 45,784 Franklin Streater Randall, Philadelphia, Penn., electric wire covering.
- 45,789 Wilford A. Shahan, New Whatcomb, Washington, dredging and gold saving machine.
- 45,790 Vincent Davis, Auburn, N. Y., rotary engine.
- 45,791 H. C. Hogarth, Tilsonburg, Ont., road cart.
- 45,798 Parker Pillsburg Hogue, Cincinnati, Ohio, injector.
- 45,802 Joseph Greenfield, Hamilton, Ont., ventilator for stove pipes.
- 45,804 David Cameron Ferguson, Ottawa, Ont., electric burglar alarm.
- 45,805 Thomas W. Van Tuyl, Petrolia, Ont., gear chain wheel.
- 45,806 Margaret Killeen, Halifax, N.S., fire escape.
- 45,807 Richard Turner Gilliam, Chicago, Ill., railway switch.
- 45,808 Eugene Beaubien, Montreal, washing machine.
- 45,809 John G. Dundalk, Owen Sound, Ont., fire extinguisher.
- 45,812 Wallace Thurmann, Chicago, Ill., sprinkler head for fire extinguisher.
- 45,816 John White, London, Ont., bolt heading machine.
- 45,821 Wm. H. Starr, Liberty, Nebraska, motor.
- 45,822 Edward B. Hyre, Elk Fork, West Virginia, wrench.
- 45,825 Wm. Timmis, Pittsburg, Penn., tank for the storage of compressed air.
- 45,828 Levi Hildreth Young, St. John, N.B., nut-lock.
- 45,832 Lyman Jones, Toronto, stirrer for mixed paint.
- 45,836 Francis J. Bell, Kingston, Surrey, England, ore separator.
- 45,839 Walter G. Davis, Portland, Maine, lobster trap.
- 45,840 John Henry Rings, Lowell, Mass., police patrol system.
- 45,841 Joseph Bingeman, Berlin, Ont., brush.
- 45,842 Harold R. Hayden, Chicago, Ill., car coupler.
- 45,843 Henry Vachon, Golden, British Columbia, car coupler.
- 45,847 Alexander Turnbull, Bishopbriggs, Lanark, Scotland, valve.
- 45,848 Oscar Friedrich, Dinsberger Eisenund, Prussia, Germany, method of manufacturing seamless metal tubes, etc.
- 45,850 Wm. C. Trethewey, Mission, B.C., can labelling machines.
- 45,851 Job Dubley, Toronto, ticket punch.
- 45,853 James E. Weyman, Guildford, Surrey, England, explosion engine.
- 45,872 Thos. H. Stackhouse, Philadelphia, Penn., stencil printing machine.

- 45,873 Wm. F. Hutchinson, Passaic, N. J., wood-cutting machine.
 45,874 Niles M. Miller, Philadelphia, Penn., machine for rolling glass.
 45,875 Wm. Dicks, Buffalo, N. Y., wrench.
 45,877 John C. Poland, Boston, Mass., centrifugal extractor.
 45,878 Jas. B. Brand, Milwaukee, Wis., underground conduit for electric conductors
 48,879 Napoleon Matte, Quebec, Que., window sash.
 45,882 John Tobin, Chicago, Ill., scale and bristle detaching machine.
 45,884 John M. Ellicot, Hamilton, Ont., metallic and elastic packing
 45,885 Wm. A. Drewett, Brooklyn, N.Y., valve.
 45,891 Marshall L. Smith, Hamilton, Ont., saw filer.
 45,895 Frederick A. Ives, Grant's Pass, Oregon, metallic packing.
 45,896 Geo F Pearson, Lowell, Mass., street car jack.
 45,897 John Q. C. Searle, Chicago, Ill., steam trap.
 45,898 Wm W. Owens, Peterboro, Ont., nut lock.
 45,900 Peter S. Rose, Newark, N. J., sub-aqueous rock breaker.
 45,903 Eugene Meurer, Palmer Falls, N.Y., digester.
 45,906 Geo. A. Watson, Toronto, Ont., furnace
 45,909 Jas. L. H. Paddon, Montreal, Que., radiator.
 45,911 Wm. H. Thompson, Hamilton, Ont., vehicle.
 45,915 W. D. Gray, Milwaukee, Wis., middlings purifier and dust collector.
 45,918 O. G. Ketchum, Toronto, Ont., generator for gas.
 45,919 Indiana Novelty Mfg. Co., Plymouth, Ind., wooden rim bicycle wheel.
 45,920 J. W. Hill, Chicago, feed-water purifier.
 45,921 W. H. Ford and J. Mooney, both of Shelton, Conn., driving and steering actions for cycles.
 45,929 Chas. Punchard and James Ritchie, Toronto, Ont., transfer ticket for electric railways.
 45,930 S. Dentler and H. Loewenthal, both of New York, cement.
 45,934 W. A. Harris, Benj. S. H. Harris, both of Peizer, S. C., and W. Fowler and L. C. Cannon, both of Spartanburg, S. C., automatic air-brake coupler.
 45,936 Samuel Irwin, Markdale, Ont., transfer ticket
 45,945 H. A. Wheeler, Chicago, car seat.
 45,946 T. Parker, J. D. Wright and A. M. Colquhoun, all of Toronto, brick press.
 45,949 D. J. C. Arnold, New London, O., shaft hanger
 45,950 Ebenezer Hill, South Norwalk, Conn., gas forcing plant.
 45,951 G. Phillips, Victoria, B.C., sanitary grate
 45,952 A. W. Finlayson and the Finlayson Boiler Co., both of Detroit, Mich., steam generator.
 45,953 W. M. Dodd, Dayton, O., steam-pressure indicator.
 45,954 O. Friedrich and W. Schulte, both of Dreisburg, Germany, method of manufacturing ring-shaped bodies from solid metal blocks.
 45,958 L. R. Blackmore, Newark, N.J., radiator section.
 45,959 W. R. Mills, Chicago, smoke preventer.
 45,964 E. McLennan, O'Leary Station, P.E.I., mode of shunting cars.
 45,967 E. J. Armstrong, Oswego, N.Y., rock arm for horizontal steam engines.
 45,969 J. D. Connell and J. P. Nolan, both of Algiers, La., hose coupler.
 45,970 F. Hardy, Birmingham, La., railway frog.
 45,971 G. C. Hicks, Boston, Mass., tube closers for steam boilers.
 45,972 W. H. Jenks, Brockville, Pa., fluid pressure engine.
 45,973 O. Tessier, Stukely, Que., snow plough.
 45,975 H. W. Hill, Cleveland, O., self-oiling journal box.
 45,976 E. M. Birdsall, Buffalo, N.Y., hose reel.
 45,978 R. Pfail, Berlin, Germany, railway signal.
 45,979 W. P. Kidder, Boston, Mass., safety device for elevators.
 45,981 J. Boyd, Nespawa, Man., spring bar shaft holder.
 45,984 W. Rowlands, Montreal, railway frog.
 45,985 G. Moore, Boston, Mass., street railway car.
 45,986 T. J. Bailey and J. Rowley, both of Ottawa, car brake.
 45,988 J. C. Rose and J. F. MacMillan, both of Aspen, Col., car coupler.
 45,989 C. La Vallée, Toronto, lifting jack.
 45,992 J. E. H. Paddon, Montreal, ventilator.
 46,000 H. B. White, Louisa, Ont., steam boiler.
 46,001 W. G. Tretheway and R. H. Brett, both of Mission City, B.C., pipe and hose coupling.
 46,003 J. A. and G. M. Bell, both of Philadelphia, Pa., street railway car.
 46,007 E. Ackmann, Berlin, Germany, device for recording speed of engine governors.
 46,010 J. C. Orr, Winnipeg, pipe bending machine.
 46,012 J. Brown and H. L. Prowse, Toronto, car coupler.
 46,013 J. C. Orr, Winnipeg, radiator.
 46,015 J. B. Davids, North Dartmouth, Mass., method of promoting combustion in furnace.
 46,021 J. L. Boweles, Philadelphia, mortar mixing machine.
 46,024 G. H. Benjamin, New York, incandescent lamp.
 46,025 R. G. Nash, Morrisburg, Ont., centrifugal dredging machine.
 46,026 R. J. Gagnier, Detroit, Mich., suspended railway.
 46,033 J. C. Walter, Waco, Tex., rotary engine.
 46,041 W. F. Nicholson, Worcester, Mass., hand implement for tooling stone surfaces.
 46,046 W. B. Hollingshead, Bronxville, N.Y., and H. S. Blackmore, Mount Vernon, N.Y., ejector.
 46,047 S. R. Stead, Haliburton, Ont., and W. H. Munro, Toronto, car coupler.
 46,050 Lawrence Electric Co., New York, current conveyor for electric railways.
 46,051 Waddell-Entz Co., New York, dynamo electric machine and motor.
 46,053 Consolidated Car Heating Company, Albany, N.Y., steam gauge and car heating apparatus.
 46,056 G. R. J. Newman, Washington, D.C., coupler for cars and air brakes.
 46,063 M. W. Dewey, Syracuse, N.Y., electric propulsion of vehicles and boats.
 46,065 J. Neafie, Boonton, N.J., railway frog.
 46,076 A. W. Case, Highland Park, Conn., screw propeller.
 46,084-5 Hasell Perfected Railway Signal Co., New York, and E. C. Seward, Montclair, N.J., railroad signal system
 46,087 O. F. Teed, J. A. Comstock, and H. D. Captain, all of Chicago, hydraulic motor.
 46,088 Canadian General Electric Company, Toronto, armature for motors and generators.
 46,089 Laird & Sweeney Mfg Company, St. Johnsbury, Vt., power hammer.
 46,090 C. M. Davis and A. A. White, both of Boston, Mass., turning machine.
 46,091 J. G. McRoberts, St. Louis, Miss., improvement in steel founding.
 46,092 C. H. Taylor, W. T. Ross, R. W. Sutherland, and H. Millen, all of Montreal, hydraulic air-compressing apparatus.
 46,095-6 J. Metzger, Louisa county, Ia., journal boxes.
 46,102 R. H. Nogar and Albert Cooke, both of Toledo, O., burner for sawdust.
 46,103 D. A. Barrackman, Decatur, Ill., combined anti-rattler and shaft support.
 46,104 Electric Selector and Signal Co., electric selecting device.
 46,108 Arch. P. Campbell, Portage la Prairie, Man., device for providing hot air for furnaces.
 46,110 N. P. Massicotte, Ste. Geneviève de Batiscan, Que., bridge.
 46,111 Consolidated Car Heating Co., Albany, N.Y., electric switch.
 46,113 A. Hurst and J. I. Boyer, Reading, Pa., faucet.
 46,116 C. H. Sherwood, Utica, N.Y., and H. C. Lyman, Sherburne, N.Y., automatic railway gate.
 46,126 D. M. Maxon and W. H. Whittemore, both of Bay City, Mich., vessel steering gear.
 46,129 H. L. Reynolds and H. W. Ketchum, both of Seattle, Wash., winding engine.
 46,148 G. M. Conway and H. G. Underwood, both of Milwaukee, Wis., furnace.
 46,153 E. A. Sperry, Cleveland, O., method of and apparatus for arresting the motion of electrically propelled mechanisms.
 46,157 H. T. Dawson, Salcombe, Eng., gas engine.
 46,160 H. Hobbs and A. W. Friese, both of Milwaukee, Wis., extensible tool, carrying bracket for power-actuated devices.
 46,170 T. Lessard, Montreal, ventilator.
 46,173 R. L. Mason, Butte City, Montana, track-clearing apparatus.
 46,180 W. E. Everitt, Buffalo, N.Y., earth-boring machine.
 46,184 Waddell-Entz Company, New York, dynamo and motor.
 46,186 T. H. Muller, Philadelphia, Pa., furnace grate.
 46,191 L. Roll, Wilkesbarre, Pa., car wheel.
 46,197 F. C. Weir, Cincinnati, O., steam engine.
 46,198 H. L. Leach, Cambridge, Mass., track-sanding apparatus.
 46,199 W. W. Wallace, Willoughby, O., friction clutch pulley.
 46,201 H. Bartlett Wyman, Slingerland, N.Y., and A. C. Goodwin, Albany, N.Y., cleats for supporting conducting wires for electrical circuits.

JOHN McDOUGALL



**Machinist, Iron Founder,
Boiler Maker, etc.**

GENERAL AGENT FOR

**Worthington Pumps,
Waterworks Supplies, etc.**

MONTREAL, 26th November, 1894.

We take pleasure in announcing to our friends and patrons that we have been appointed by the firm of Messrs. Henry R. Worthington, of Brooklyn, N.Y., as their General Agents for the Dominion of Canada. We, therefore, would respectfully ask you to send your favors and orders for "Worthington" Steam Power and Electric Pumps for all purposes, Condensers, Water Meters and Repair Parts, direct to us after this date.

Your favors will always receive our very best and most prompt attention, and the goods will be up to the usual Worthington standard, and they will be charged at the lowest possible rates.

It is our intention to carry a stock of all the leading kinds and sizes of Pumps, and MESSRS. R. H. BUCHANAN & CO., of MONTREAL, and MESSRS. CRAIG, McARTHUR & CO., of TORONTO, will also carry stocks; and other sub-agents will be appointed in due course in the principal cities of the Dominion, and stock will be placed with some of them for the convenience of customers, thus insuring prompt delivery.

The reputation of the firm of Messrs. Henry R. Worthington as makers of Pumping and Hydraulic Machinery is world-wide, and stands foremost amongst all its rivals. It is, therefore, unnecessary for us, on our part, to give details and data to prove a fact that is so well known and acknowledged. We will do everything we can to uphold their high reputation and to continue the success of their goods in this country.

We solicit your orders for Pumps, Condensers, Water Meters, etc.

Estimates given for all kinds of Pumping Plants, etc.

We beg to remain,

Yours respectfully,

JOHN McDOUGALL.

P.S.—We take this opportunity of expressing our sincere thanks to our many friends and customers for the liberal patronage we have received from them during the past, and we hereby ask that it may be continued to us in the future, as we are able to render even better service than heretofore, from the fact that we are rebuilding and extending our works and putting in the latest improved and special machinery, so as to give greater capacity and improved facilities to meet the demands of an increasing business.

JOHN McDOUGALL.

- 46,202 A. H. Moore and G. Whitlock, both of Brooklyn, N.Y., process of making compound ingots
- 46,207 H. K. Knox, Vevay, Ind., car coupling
- 46,208 E. Wardle and J. H. Evers, both of Leeds, Eng., smoke purifier and draught increaser.
- 46,209 A. Oblasser, Paris, and C. Therey, Marseilles, France, storage electric battery.
- 46,210 W. H. Eckert, New York, telephone transmitter
- 46,211 Joshua Thomas, Cleveland, O., governor for feed pumps.
- 46,215 F. S. Carter, Burlington, N. J., electrical annunciator.
- 46,216 Beery Valve Co., Chicago, air-brake hose coupling.
- 46,219 J. M. Robbins and Hattie M. Pendery, both of Fort Worth, Texas, hydraulic dredging machine.
- 46,222 Canadian General Electric Co., Toronto, controller for electric motors.
- 46,227 R. H. Chase and J. J. Daly, both of Jacksonville, Fla., steering gear for vessels.
- 46,230 M. Hardsocg, Ottumwa, Ia., mining tool.
- 46,237 G. J. Altham, Swansea, Mass., governor.
- 46,241 Owen O. Jones, Poultney, Vt., elevated trolley carrier.
- 46,252 Julius Schirra, of Pittsburg, and C. Thiers and W. Sang, both of Braddock, Pa., nut lock.
- 46,256 Elijah Neff, Milford, Ind., pump.
- 46,266 Christian Black, Green Cove Springs, Fla., wrench.
- 46,278 R. Stewart Galbraith, Toronto, trolley wheel.
- 46,280 A. Vullier, Millis, Mass., machine die.
- 46,283 E. B. Parkhurst, Woburn, Mass., attachment for boilers.
- 46,284 A. G. Budington, Austin, Tex., metallic cross tie.
- 46,287 W. H. Bird, St. Thomas, Ont., railway switch.
- 46,294 M. Bouvier and J. Belair, both of Montreal, fire escape.
- 46,297 Jas. Morrison, Toronto, injector.
- 46,302 Jas. L. Kinsell and F. A. Leavens, both of Belle Plaine, Ia., car axle box.
- 46,307 N. E. Lister, Westfield, N. B., and W. LeB. Hannon, St. John, N. B., nut lock.
- 46,324 E. T. Swampscott and E. W. Rice, jr., Lynn, Mass., electric motor for street cars.
- 46,329 F. Knowlson and W. Curtis, both of Lindsay, Ont., car coupler.
- 46,336 A. H. Smith, London, Ont., trolley arm.
- 46,348 E. Nashold and H. W. Baskette, both of Chicago, self-locking cleat for electric wires.
- 46,354 Andrew Reed, Saginaw, Mich., air brake for railway trains.
- 46,361 Moses L. Rothschild, Chicago, air brake.
- 46,367 F. N. Denison, Toronto, electric brake.
- 46,372 John Hazlett, Kingston, Ont., steam boiler.
- 46,387 H. W. Reynolds, Geneva, N. Y., boiler.
- 46,390 F. Lepper and W. Wighton, both of Toronto, trolley wheel.
- 46,395 Elisha Gray, Highland Park, Ill., electro-mechanical movement.
- 46,400 C. A. Hussey, New York, incandescent electric lamp and socket
- 46,403 The Q. & C. Co., Chicago, railway tie plate.
- 46,408 Whitney Electrical Instrument Co., Saco, Me., electrical measuring instrument.
- 46,409 Canadian General Electric Co., Toronto, automatic switch for electric motors.
- 46,414 H. B. Arnold, Boston, Mass., method of treating garbage.
- 46,419 Bell Telephone Co. of Canada, telephone circuit.
- 46,420 Bell Telephone Co. of Canada, telephone transmitter, circuit and apparatus.
- 46,421 Bell Telephone Co. of Canada, telephone circuit.
- 46,422 Bell Telephone Co. of Canada, apparatus for suppressing telephonedisturbing currents.
- 46,438 L. H. Lloyd, Lincoln, Ill., motor for operating pumps.
- 46,441 J. A. Bidwell, Cleveland, O., device for separating the turnings from the finished screws in screw-making machines.

LAW BROS & Co, founders and machinists, Ottawa, advertise in this number some bargains in boilers and steam pumps. Any firm in want of such equipments would do well to write them.

J. BINGHAM, of Toronto, and P. M. Feeney, of Philadelphia, are the proprietors of the new saw works now being started at the Dominion capital under the name of the Ottawa Saw Works. Some machinery has been installed and the works are to be running this month.

A NEW match factory is being built at Buckingham, Que. The main building, which is 200 ft. long, is now in course of erection, and the factory is to be in operation about May next. New patent machinery, invented in Ottawa, is to be used in making the matches. The estate of McLaren & Co. is interested in the concern.

ALEX FLECK, proprietor of the Vulcan Iron Works, of Ottawa, has during the past year added considerable new machinery to his already well-equipped machine shop. Among other tools put in recently were a 60-inch radial drill, a 30-inch lathe and a 30 x 30 planer, all being of John Bertram & Sons' latest make. The Vulcan Iron Works have had a very busy year in general mill and special work. They have been putting in a good deal of machinery for the St. Anthony's Lumber Co.'s new mills at Long Lake on the Ottawa, Arnprior and Parry Sound Railway.

JUDICIAL SALE

—OF—

Hamilton Bridge Works

Pursuant to the Winding-up Order, and with the approval of the Local Master at Hamilton, **Proposals** will be received by the undersigned until three o'clock, p.m., **THURSDAY, 24th JANUARY, 1895**, for all the Stock, Plant, Machinery, Sidings and Real Estate belonging to the Estate of the Hamilton Bridge Company, Limited, Hamilton, Canada.

The Works are most favorably situated in the immediate neighborhood of the station of the Grand Trunk Railway at Hamilton, with sidings running through them. The Machinery is of new and the most complete description and includes as well all the appliances for ship building (for which there is also an excellent dock yard) while the Works themselves and Offices are admirably adapted in every way for the business, and are all in first-class order; the whole offering a most exceptional opportunity to purchasers. The estimated capacity of the Works is 5,000 tons per year.

The premises may be viewed and inventory seen upon application at the office of the Liquidator, No. 28 James Street South, Hamilton, Ont., from whom also any information regarding the Works and conditions of sale may be obtained.

Offers will be opened in the Public Office of and in presence of the Master in Chancery, at Hamilton, on Friday, 25th January, 1895, at 11 o'clock, a.m.

The highest or any tender not necessarily accepted.

For further information apply to

C. S. SCOTT, Liquidator,

Hamilton, Canada,

or to J. E. O'REILLY,

Local Master Supreme Court.

Robinson & Sadler, MANUFACTURERS OF
Oak Tanned Leather Belting,
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We make Belting for all kinds of work. In ordering state where belts are to run.