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# The Canadian Engineer

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## The Canadian Engineer.

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THE CONTRACTOR AND THE MERCHANT IN THE  
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### CONTENTS OF THIS NUMBER:

	PAGE		PAGE
A Method of Distribution ...	201	Kennedy's Maple Evaporator ...	206
Can. Association of Stationary Engineers ...	215	Mining Matters ...	223
Can. Society of Civil Engineers ...	217	Municipal Electric Lighting ...	209
Chrome Iron Mines of Quebec ...	204	Patent Review ...	225
Electric Flashes ...	211	Personal ...	224
Good Words by the Way ...	206	Railway and Marine ...	221
Hamilton, Grimsby & Beams- ville Railroad ...	205	Railway Building across Peat Bogs ...	197
Hartland, New Brunswick ...	204	Review of Metal Trades ...	205
Industrial Notes ...	219	Steam Pumping Machinery ...	214
		Water Power at Niagara Falls ...	198

### RAILWAY BUILDING ACROSS PEAT BOGS.

As referred to in our report of the Canadian Society of Civil Engineers, D. A. Stewart recently presented a paper on the subject of building railways across peat bogs or swamps, in which several valuable hints are given for railway work. He observes that in building railways over such ground, the method of construction will, in most cases, either be to form a raft of some kind on which the weight of the track and trains will be, as it were, floated over the yielding mass beneath, or to fill in hard material until a solid bank is formed from the bottom of the swamp upwards. If the swamp is at all deep the plan of filling in is both expensive and uncertain, so that the first method should be adopted whenever practicable, which will be the case almost always when the grade line can be kept down close to the surface of the swamp. When the swamp can be drained to a depth of from two to five feet, the cheapest and most convenient plan will be to cut side ditches on both sides of the road bed, with such off-take drains as may be needed to take the water out of the side ditches, and to use the material taken out of the side ditches to make a light embankment. The body of partially dried peat between the side ditches is then sufficient to carry the light embankment with the track and trains. In this way railways have been carried over swamps so deep and soft that one man could push a pole into the muck for twenty feet or more, and pull it out again. If the depth of peat is so small that the ditches reach the firm stratum beneath, the raft becomes a more or less yielding cushion under the track. The side ditches should not be less than three feet deep, but it is not advisable to make them deeper than five feet. Generally the

width need not exceed six or eight feet. A high bank is not advisable except where the grade line cannot be made low, because the additional weight only tends to sink it deeper. Banks made of muck should be covered on the sides and top with sand or gravel as soon as possible after the track is laid, as they tend to become wider as they settle. The surface of swamps being either level or only sloping gently, a surface line will always give easy grades, and the grade line should as nearly as possible be parallel with it, thus making the side ditches of uniform size. The swamp will settle as it is drained, and the bank as it becomes consolidated, but in ordinary cases no attempt should be made to raise them up to the original profile grades; the cost will be greater than any gain, and the additional weight may even cause the bank to break through the crust. When the swamp is too wet to allow of a bank of this kind and drainage cannot be got, and the grade line can be kept close to the ground, a raft may be made of logs or brush, or both, with enough peat on top to hold the track and keep the ballast from sifting through. In this case it would be better to take the peat or muck from some distance outside the ends of the logs, as by cutting the skin of the swamp close to the road its bearing power would be diminished. One tier of logs should be laid lengthways of the road, to help to diminish the undulations of the track under trains. The cross logs should be as long as can be conveniently got and handled, so as to distribute the weight over as wide an area as possible; but there is no gain in putting down more than two or three tiers of logs, as the weight will tend to sink the raft down, and the object is to carry the track over the crust of the swamp without breaking through. But when the crust of the soft swamp has been broken, and the hole has to be filled up, if timber is plentiful and convenient, it may be used simply as filling, and will have a certain advantage from its not being softened and dissipated by the water as earth or sand would be, and in deep bogs may form a submerged raft capable of carrying the required load. Mr. Stewart then goes on to consider the best course of action in the event of the bog being too soft to carry an embankment, of whatever light a nature it may be, or when the grade line cannot be kept near the surface. In such cases, there will usually be no better way than to fill in firm material until a solid bank is formed from the bottom up. In making estimates for this, not only should the bottom of the fill be assumed to be at the bottom of the soft material instead of the surface, but large additions should be made to the quantities so calculated, because the soft material, being displaced by the filling, will slip out sideways and carry portions of the latter with it. In many cases the division between the bog and the underlying material will not be distinct, but the one will merge gradually into the other, and in such cases the quantities of filling required will be correspondingly uncertain. The worst cases are usually where the soft muck is underlain by soft and slippery clay. It is a common practice to get the track over such places by using timber trestles,

leaving the permanent work to be done later ; but when this is done, careful soundings should be taken and the method of doing the permanent work and its probable cost fully considered. What the author says of the objection to heavy fillings across soft bogs applies even more strongly in the case of ponds or lakes with soft and muddy bottoms, which are virtually bogs covered with a certain depth of water.

descriptions are correct as to the details of the work as it exists to-day. Readers of THE CANADIAN ENGINEER will therefore be glad to have an idea of what has actually been done and of the plans upon which the water power of Niagara is now being developed, and for this we are indebted to DeCoursey May, the engineer in charge, and to recent sketches in the Buffalo Express.

The idea of diverting the waters of the Niagara river to commercial purposes is not a new one. As long



JUNCTION OF HORSESHOE TUNNELS.  
WATER POWER AT NIAGARA FALLS.

Accounts of the enterprise now being carried out to use the gigantic powers of Niagara Falls for commercial purposes have appeared from time to time in the scientific journals and newspapers, but since the first conception of this remarkable enterprise so many changes have been made in the plans that none of these

ago as 1847 it was proposed by General Peter Porter and Judge Porter, who used water-power there in a small way, and no doubt it came into the minds of many a visitor long before that date. In 1885 the late Thomas Evershed, of Rochester, an engineer on the Erie canal, suggested a water-power tunnel discharging immediately below the American Falls, and taking the water over a mile above the falls. It was proposed to have

branch canals or tunnels from this main feeder discharging into wheel pits along its length, but the use of turbines under a head of more than 100 feet, and the great cost of the work, staggered the courage of the promoters for the time, until the marked advance of electrical science showed how power might be utilized not only on the spot, but conveyed to distant points. Upon the plans of Mr. Evershed the Niagara Falls Power Co. was formed by citizens of Niagara Falls, but enough capital could not be raised, and the promoters had to look to the larger cities. At length the Cataract Construction Co., the present corporation, was formed, the leading men in which are Frank W. Hawley, of Rochester; F. L. Stetson, E. A. Wickes and W. B. Rankine, of New York. In July, 1889, a contract was made between the two companies for the construction of the works. They have now built a tunnel 7,000 ft. long, with a raceway sufficient for an intake of 100,000 horse-power. At the power house there are now nearly completed three wheel-pits with turbines of 5,000 horse-power each, though the plans provide for an early extension so that ten turbines providing 50,000 horse-power can be built. The wheel pits are 186 ft. deep and the shafts each 120 ft. long. These wheels have a balancing arrangement, by means of which there is only a difference of 2,000 lbs. weight between a full load and no load. The wheels are after a Swiss design, there being a double wheel on each shaft and the water entering from beneath, so that the wheel is lightened by the pressure of water, and when there is no load on, the weight of the shaft is held by a thrust bearing. No water falls on the shaft anywhere. The wheels are the most powerful ever built, the revolving parts weighing 70 tons each. The supply canal at its head is 300 feet wide and narrows down to 120 feet at the power house. The canal has gateways for twenty wheels. The tunnel into which the water discharges is horse-shoe shaped—as shown in the cut—and is 21 ft. high and 18 ft. 10 in. in its widest part. It has a downward slope of 4 ft. to 7 ft. in 1,000 ft., and the water rushes through it into the Niagara below the falls at the rate of  $26\frac{1}{2}$  ft. per second, or nearly 20 miles an hour. Actual work was begun in 1890, and from 300 to 1,500 men have been employed since. Nearly 345,000 tons of rock were removed, and debris has been used to fill up marshy land which can be utilized by the company.

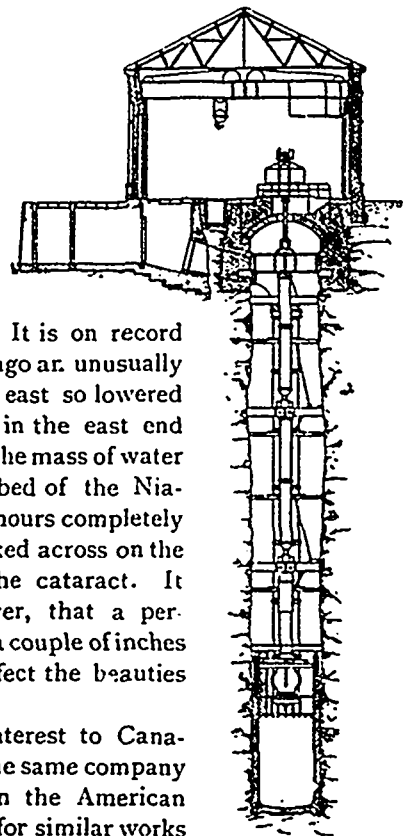
As our readers know, the company propose to supply the city of Buffalo with light, power and heat, and as soon as the transmission to that city is in successful operation they intend to convey electricity to Rochester, 60 miles away. This will be the longest distance to which the electric current will have been conveyed on a commercial scale, and the demonstration of its feasibility will at once settle the question as to whether electric power can be conveyed on a large scale to Hamilton and Toronto from the Canadian side of Niagara.

The dynamos by which electrical power will be generated from the water are the largest yet built. The dynamo for the Intramural Railway Co. at the late World's Fair generated 2,100 h.p., and was the most powerful till then built, but each of these machines will generate 5,000 h.p. They are of the Westinghouse type. The current will be generated at 2,000 volts and at the power house will be transformed to a voltage of 10,000 for transmission to Buffalo, a distance of 22 miles, where it will transform by step-down transform-

ers to any lower voltage required. The conductor will be a copper cable  $\frac{3}{8}$  in. in diameter, and it is estimated that the loss by transmission to Buffalo will not be more than ten per cent. The method of transmission will be by overhead wires, but it is contemplated later on to transmit through a subway. In fact an experiment is being made in this direction now. A subway of concrete has been constructed for the Pittsburgh Reduction Company, the next largest concern after the Niagara Falls Paper Company to build on the Power Company's property, and the subtle fluid will be carried through this tiny tunnel 2,500 feet to the point where needed. This subway is five feet in diameter and is a novelty in its way. The heavily-charged wires are strung upon brackets along the sides of the subway, out of the way of anyone passing through. The enormous voltage carried renders them very dangerous to the touch, and they are, therefore, guarded by strong screens.

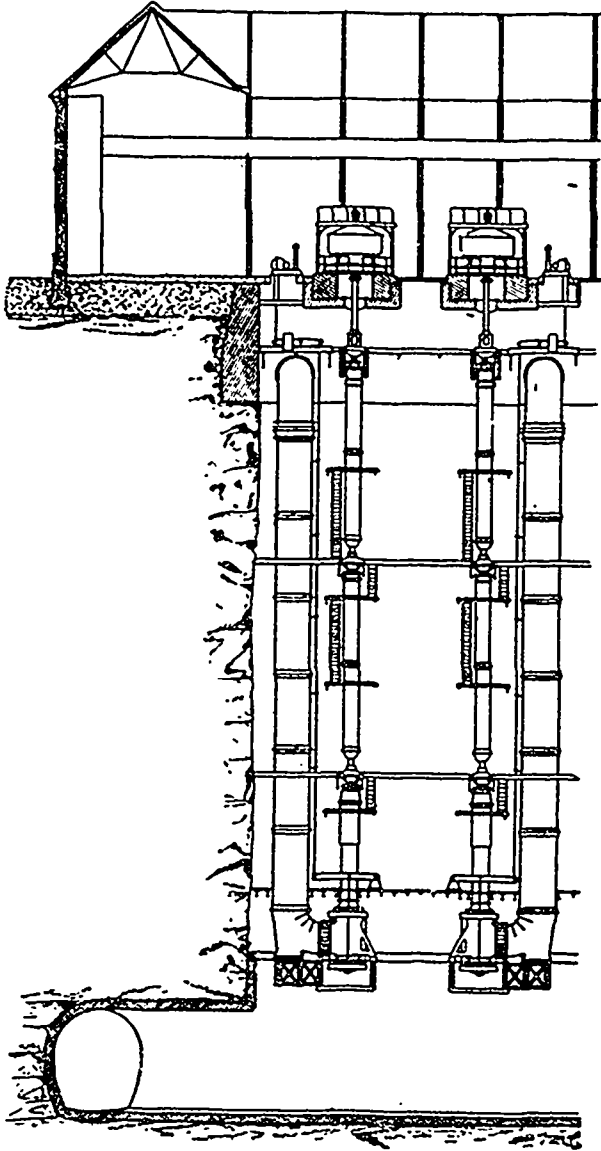
The effect which the diversion of so much water will have on the beauty of Niagara Falls has created more or less alarm throughout Canada, but Mr. May states that the full amount of the water his company propose to divert would only lower the falls by  $1\frac{1}{8}$  inches, while a continuous east wind blowing up Lake Erie will sometimes lower the Niagara 6 inches. It is on record that 40 or 50 years ago an unusually heavy gale from the east so lowered the volume of water in the east end of the lake, blowing the mass of water westward, that the bed of the Niagara was for several hours completely dry, and people walked across on the bed rocks above the cataract. It would seem, however, that a permanent lowering of a couple of inches would not visibly affect the beauties of the falls.

It is of special interest to Canadians to know that the same company owning the works on the American side have a charter for similar works on the Canadian side, upon which they propose to begin construction work in the coming spring. The charter granted to the Canadian Niagara Power Co. (under which title they will operate on this side) in 1892 confirms the 100 years lease granted by the Queen Victoria Niagara Falls Park Commission. Under this charter they are bound to produce power within three years. Nature better favors the construction of a tunnel on the Canadian side, and more is the pity that this franchise was not entirely in the hands of Canadian and English capitalists. At present a few minor stockholders give a native flavor to the Canadian scheme, but one cannot but admire the pluck of the Americans who have conceived and are so energetically carrying out so vast an enterprise. On the Canadian side the tunnel will require to be only 800 feet long, as against 7,000 feet on the American, while on the Canadian side they can also easily build two tunnels side by side, each



PENSTOCK AND  
SHAFTING

capable of providing 125,000 horse-power, so that the enormous influence of such a franchise can be easily understood, especially if they realize their prediction that power will be supplied at one-half the cost of ordinary water power and one-third the cost of steam at the same place. The company have shown their faith in the work by purchasing 1,500 acres of land there and expending between \$3,500,000 and \$4,000,000, and they have already formed what is to be a new town or city, called Echota, on the American side.



REAR VIEW OF PENSTOCKS AND SHAFTING

It was F. W. Hawley, one of the directors of the enterprise, who last summer carried out the experiment for operating the boats in the Erie Canal by electricity. Mr. Hawley's idea was to supply, during the winter months, electric light and heat over a wide area of country in New York State, and in the summer, when little light and heat would be required, to devote the electric energy to moving the canal boats, thus turning the power to account all the year round. He now considers the propulsion of canal boats perfectly feasible, and said in a recent interview with the *Rochester Democrat* :

"When the Niagara work is completed, and electric theories become established facts, there will be many generating plants erected. The water power now going to waste at many of the smaller falls will be utilized for local purposes. Sites will be chosen in the great coal fields where there is now no output on account of the impossibility of getting the product economically to the railroads, and countless dynamos will become in-

stinct with electric energy. In fact the 'electric age will open boundless fields for human effort and progress, and render it easier for the artisan, the mechanic and the laborer to acquire a competence.

"The introduction of electricity throughout the State of New York will mark an era of unparalleled advancement and improvement. The discovery of the possibilities of steam awoke the world from the long slumber of the Middle Ages. The advent of electricity will cause it to take gigantic strides onward. Compared to its subtle energy steam is but a blind and clumsy giant. It can reach out a million arms to turn the wheels and spindles of the commonwealth with a power as of countless genii."

This may be a rosy picture, but whatever is in store for the combination of water and electricity, no country in the world is favored like Canada. As we have two-thirds of the fresh water of the globe, so we have probably one-half of the water power of all the continents, and what industrial development this means, time and opportunity alone can tell.

MONTREAL is gaining quite a reputation as a convention city, and the engineering and kindred professions and trades have been especially favored during the past two years. The latest acquisition of this kind is that of the American Street Railway Association, which has decided to hold its next annual convention in Montreal on the 15th of October, 1895. The convention will last three days and it is expected that about 300 delegates will attend. There will be an exhibition of apparatus and inventions relating to electric and other street railways, and the proceedings will be varied by a banquet and by excursions in and about Montreal.

In the "post card correspondence" of the *Toronto Empire* a writer signing himself "Canadian Cement" makes a very just complaint against the Dominion Government for awarding a contract to a Belgian firm for 11,000 barrels of Portland cement for use on the Lachine Canal improvements. Owing to the stagnation in the building trades, the cement industry is more than usually depressed, and one would think that a Government so inclined to protection and paternalism would consider it a duty to award such a large contract at home, even if Canadian cement were a grade or two below the quality of the average imported article; but when it has been demonstrated by the fairest tests that some brands of Canadian Portland cement are far superior to the average foreign article, what shall we say of the patriotism which sends such an enormous order abroad, with the result of closing one or two of the Canadian works, and the stove mills, which are dependent upon them for the barrels needed? The act of the Public Works Department in this particular case is an outrageous injustice to the home industry, and we should like to know on what pretence it has been perpetrated.

LAST year two articles appeared in *THE CANADIAN ENGINEER* outlining a scheme for bringing water from Lake Erie to Hamilton, both for water works purposes and as a source of electrical power. These articles directed the attention of engineers and others to the possibilities of the scheme, and it has so far taken shape that two or three engineers, working on independent lines, have out-lined a plan for the work. One of these engineers is Wm. Golding, of New Orleans, who, it appears, as far back as March, 1888, made a formal proposition to the mayor of Hamilton, suggesting the scheme. His idea was to dredge the Grand River from its mouth back to

a point as near as possible to Hamilton, whence a canal would be cut to the brow of the mountain above the city. The total fall at Hamilton would be 333 feet, while the nett fall at Niagara, as the power is now utilized, is not much over 100 feet. The nett fall at Hamilton would be 320 feet, which Mr. Golding estimates would develop three times the power of Niagara from a given quantity of water. It is calculated that from a canal 100 ft. wide and 8 ft. deep, 100,000 horse power can be obtained, and total cost is put down at about \$3,000,000. One weak point in this scheme is that the draining of the Grand River at this point would deprive a number of industries of their riparian rights along the river to Dunnville, at its mouth, while the water of the Grand River could hardly be considered of a quality fit for domestic consumption in Hamilton. In fact such a canal could only be used for power purposes. Already application has been made for an Ontario charter for a company to construct a tunnel. The other plan is to construct an aqueduct or canal direct to Lake Erie, bringing the water under the bed of the Grand River. There are no insuperable engineering difficulties in the way of this scheme, and it is only a question of whether the annual revenue from the supply of power and water would be more than sufficient to pay interest on the outlay. It now appears that the Georgian Bay Canal and Power Aqueduct scheme will be given up, as the company are not prepared to yield on every point demanded by the Toronto city council. The *Toronto World*, comparing the two schemes, gives several good reasons why it should pay that city to derive its electrical power from Hamilton rather than from Lake Simcoe. The Lake Erie project would afford a magnificent drop and give enormous power, which would more than supply the needs of both Hamilton and Toronto, while the water of Lake Erie is as pure as that of Lake Ontario for drinking purposes. The engineering difficulties in the case can easily be got over; but the commercial success of either of these undertakings resolves itself into the question whether the interest on the cost of the undertaking, with cost of maintenance, would amount to more than the annual coal bill and maintenance of a steam plant. We hope to put before our readers some considerations on this subject in an early issue.

#### A METHOD OF DISTRIBUTION WITH EQUALIZATION OF POTENTIAL DIFFERENCE.

BY D. H. KEELEY, MEM. INST. E. E.

(A Paper read before the Canadian Electrical Association.)

Perhaps it wouldn't be a bad idea to preface what is to be submitted in this paper by a claim that the method of distribution, herein dealt with, affords an equalization of potential difference without increasing the volume of the total weight of conductor in any two-wire system; and that it affords the same equalization by the addition of only 25 per cent. more wire in any three-wire system, the importance of which latter feature might be emphasized by presenting a reminder of the fact that a three-wire system calls for a conductor that is only as  $\frac{3}{4}$  is to 1, compared with a system in which but two wires are employed. And since there are adaptations of the method to two different systems of wiring to be considered, it will be convenient to examine them separately after a general survey of the groundwork.

In view of the enormous saving of wire and of lamp life that could be effected by obviating the necessity for a multiplicity of circuits to satisfactorily supply various groups of consumers more or less irregular in their demands, the securing of a uniform E.M.F. at all points of a distribution system is manifestly desirable; and as from what has just been implied it would appear this desideratum can be economically attained, it is thought worth while to present the subject somewhat in the light of a theoretical study, in order that the writer's notions of what leads up to the practical

conclusions arrived at may be clearly conveyed. It will be well, therefore, to give some consideration to the principles involved.

The simple parallel or two-wire system is illustrated in Fig. 1. It will be seen on examination of this figure that the potential difference between the mains A B will fall, owing to absorption of E. M. F. in the mains, the further a given point along their length is removed from the source of current. Hence a lamp or other instrument connected in derived circuit across the mains at 3, 4, will be operated upon by a lower E. M. F. than one connected across the mains nearer the source as at 1, 2, would be.

To obviate this difference in fall of potential the simple parallel system is modified, as illustrated in Fig. 2, wherein one of the mains (B) is doubled back upon itself, and the connections are made between the single main (A) and the half of the doubled one (B) that is furthest from the source of current (V). Comparing this arrangement with that shown in Fig. 1, it will be seen that whereas in Fig. 1 a lamp or other instrument connected across the mains at 1, 2, being nearer the source of current as measured along the mains, will receive more E. M. F. than the one connected across at 3, 4, which is further away; the lamp at a corresponding point 1, 2, in Fig. 2, will only receive the same amount of E. M. F. as the one at 3, 4, because the same total length of conductor as measured along the mains is between them and the source of current.

Hence, with a conductor of the same sectional area connecting similar sets of lamps or other instruments at corresponding distances, it is evident that when the circuits are arranged in simple parallel, as in Fig. 1, the lamp in a derived circuit nearest the source will receive more current than the one furthest away; and when the circuits are arranged with the double main, as in Fig. 2, a uniform current will be supplied to the lamps in the several derived circuits, but this current will not be greater than what is received by the furthest lamp in the former case.

The only result obtained, then, by doubling the length of one of the mains, is the absorption of the E. M. F. that would otherwise operate in excess on any lamp or other instrument in circuit (derived) near the source of current. The additional length of conductor in this doubling of one of the mains is thus shown to be a mere dead resistance in the circuit. This dead resistance, with its attendant disadvantages, however, it will now be shown, may be eliminated by an adaptation of the fundamental principle that in a circuit supplied with E. M. F. from more than one source, the current or amperage developed at objective points in such circuit is proportionately contributed to from the several sources of the E. M. F. An exposition of this principle is afforded by Fig. 3, and it will facilitate explanation to regard the internal resistance of the regenerators V, VI, as negligible; and consider only what takes place in the mains A, B, and the lamps or other instrument connected across them at F.

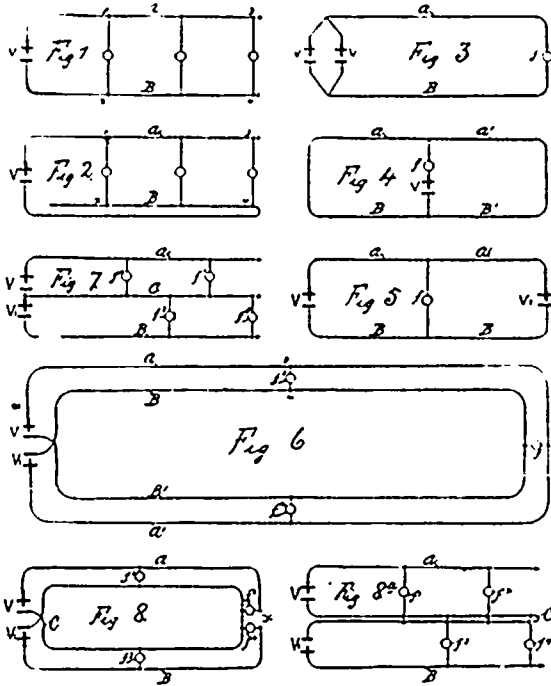
Putting the figures for the generators or sources of current V, VI, at 100 volts each, the total resistance of the mains A, B, at 1 ohm, and the resistance of the lamp, or other instrument through which the circuit is completed, at 99 ohms, the current developed with only one of the generators (V) connected in circuit, is  $\left\{ \frac{100 \text{ volts}}{99 + 1 \text{ ohms}} \right\}$  1 ampere, and its production (1 x 99) 99 volts is absorbed in the lamp or other instrument F, and (1 x 1) 1 volt is absorbed in the mains A, B. If, now, both of the generators V, VI, are connected in parallel, in the circuit as shown, the potential difference of 100 volts at their junction with the mains A, B, will remain unaltered. The current developed in the circuit, and the allotment of absorption, will therefore remain the same as before; but it is evident that in this case the work is shared by the generators V, VI. The output of each of them respectively is only half of what it would be were it acting alone, and the practical effect is the same as if the circuit resistances were doubled by the presence of the second generator.

Bearing this in mind, a further view of the fundamental principles involved will be found in a comparison of Figs. 4 and 5.

When a double circuit is arranged, as in Fig. 4, with a single source of current, V, it is evident that the current generated by V will circulate in both divisions of it; +V, F, A, B, V-, and +V, F, A', B', V-, and if the circuit wires A, B, and A', B', are alike, the amperage will be the same as if there were but a single circuit with a wire (A, B) of twice the sectional area of A, B, or A', B'.

From this it follows that when a double circuit is arranged, as in Fig. 5, with two equivalent sources of current V, VI, the resultant amperage manifested in the lamp or other instrument F, conjointly supplied by them, will be determined not by the separate resistances of the two divisions, but by the joint resistance of the circuit wires A, B, and A', B'. Hence with a double circuit so

arranged, the wires used need only have only half the sectional area of what would be required in a single circuit to produce the same result.



It is seen then with the aid of these figures, 3, 4 and 5, that in a double circuit supplied with current from two equivalent sources, the current emanating from either source is only half of what it would be were it operating alone in a circuit of the same resistance. It is further seen, however, that the halving of the E. M. F. from each source begins only at the point where the leads from the sources of current connect with the conductors in which the currents conjointly operate; hence, the half of the current is in each case transmitted by the full E. M. F. from its source. And it is also understandable from the foregoing that the total amount of absorption or drop of the E. M. F. in the leads, from the sources of current up to the point of junction with the conductors that convey the current of the lamps or other instruments, is determined by the joint resistance of these leads, and is, therefore, only half of what it would be were the current transmitted from one source alone

THE TWO-WIRE PLAN.

Now with these three conditions obtaining, it becomes practicable to arrange a complete system of distribution according to the plan of Fig. 6, and it is something remarkable to find, as will be seen from a merely superficial inspection of that figure, that the method thus evolved virtually consists in splitting the two mains of the simple parallel system described in Fig. 1, so that four wires, of the total sectional area of the two therein shown, are obtained, and these are so connected with the sources of current that an equalization of potential is secured throughout the system without involving the use of the additional volume of conductor comprehended by the doubling of the main B, in Fig. 2, that has heretofore been necessary to attain the same end. For, to follow up the examination, if, in Fig. 6, the point of junction of the leads from the sources of current, V, VI, and the circuit to be supplied, is taken to be where the lamp F is connected across, it will be seen that the + phases of the currents from V, VI, traverse the mains A, A', to the point 2, while the - phases of the currents traverse the mains B, B', to the point 1, and these + and - phases conjointly produce, through the joint resistance of A, A', on the one hand, and of B, B' on the other hand, a potential difference between the points 1, 2, that will affect the lamp or other instrument in derivation (connected across between the mains) at F, in precisely the same way and to the same degree that it would be affected were + and - phases received from V alone through a single pair of conductors, the sectional area of which corresponded to the combined sectional areas of A, A', and B, B', or twice the size of A, and twice the size of B. Again, if, in Fig. 6, the point of junction of the leads from the sources of current and of the circuits to be supplied, is taken to be where the lamp, F', is connected across, it will be seen that the difference of potential between the points 3 and 4 is the same as between 1 and 2, and obviously the same potential difference will be found everywhere throughout the system, because the conditions of the current distribution from each of the sources, V, VI, is precisely the same as that already described at length with Fig. 2, for the same total extent of conductor exists

between the points 3 and 4 and the sources of current, V, VI, respectively, as exists between the latter and the points 1 and 2. Hence, the effect of the currents emanating from the sources V, VI, is uniform throughout the mains, and the equalization of the difference of potential is rendered absolute.

THE THREE-WIRE PLAN.

It will now be in order to go on and find that what has been thus far under consideration as adapted to the two-wire system, is equally adaptable for current distribution according to the well-known three-wire system; thereby securing for it an equalization of potential difference at all points.

The distinguishing feature of the three-wire system represented in Fig. 7, as compared with the simple parallel, Fig. 1, is that in the three-wire system the current for a given number of lamps is transmitted in two circuits, each of them embracing half the number, whereas in the single parallel the whole number is supplied in one circuit.

As at present in operation, there is in the three-wire system (Fig. 7) a fall of potential all along the leads constituting the main conductors from the sources of current. In the figure (7) V, VI, are the two generators or sources of current connected in series between the mains A and B with a neutral return wire C common to them both. It will be understood without repetition, what has already been gone over, and that the action obtaining in either circuit is the same as what obtains in the simple parallel, Fig. 1, and what is needed to be introduced is the equalization of the potential difference between the mains as affected by the plan described with Fig. 2. This combination is effected in a practical way as represented in Fig. 8 [Fig. 8a shows electrically the same combination, but in a form that can hardly be looked upon as practically available], and it will readily be seen in view of what has already been established by the aid of Figs. 1 and 2, that the neutral return wire, although doubled, is still common to both circuits for the currents emanating from V, VI, while at the same time the lamps or other instruments, F<sub>1</sub>, F<sub>2</sub>, and F<sub>3</sub>, F<sub>4</sub>, are all equi-distant from the sources of current as measured along the conductors, and are therefore supplied with current at a difference of potential which is the same for all points of the system.

By this combination, therefore, the three-wire system is made to afford the same advantageous result as is attained by the other method of construction that has been considered, but it will be seen that it is arrived at in a distinctly different way in each case, and is due to the operation of two different principles underlying the problem of current distribution. For, according to the first method, each of the two sources of current contributes half of the resultant current operating in each and every lamp and other instrument embraced in the system, while according to the method comprehended in the three-wire system, each of the two sources of current separately supplies half the number of lamps or other instruments embraced in the system, supposing the total number to be evenly divided between the two circuits. At the same time it is seen that this combination whereby the equalization of potential difference is secured for the three-wire system, virtually consists in separating the sources of current, V, VI, and introducing between them (Fig. 8 or 8a) a loop constituting a return conductor common to both circuits, instead of having them joined directly in series (Fig. 7) and tapping the junction with a single conductor to complete the circuits as heretofore. And again it so works out that the arrangement of circuits shown in Fig. 8, while, as we have seen, depending on totally different conditions for its operation, is precisely the same as that shown in Fig. 6, excepting that the outer main, A, A', is cut or divided at the point X. This disruption throws each of the two sources of current, V, VI, into separate circuits, and obviously it is immaterial, as far as the operation is concerned, whether the sources, V, VI, are opposed or in direct series, but it is preferable to put them in opposition, as shown in the figure, in order to obviate the excessive potential difference that would otherwise obtain between the ends of the loop common to both circuits, and necessitate the doubling of its sectional area for a given drop in the E. M. F. transmitted. Similarly it is recognizable that the electrical conditions obtaining in the arrangement of circuits shown in Fig. 6 would obtain in the arrangement shown in Fig. 8a, if the extremities of the mains, furthest from the sources of current, in Fig. 8a were joined together. If so arranged, however, the circuits would evidently be complicated and unwieldy, whereas when arranged as shown in Fig. 6 and Fig. 8, the circuits according to both plans are simple and flexible and afford the greatest degree of convenience, in that two wires, leads or mains, may be carried from the sources of current in any desired direction through a given building or district and by another route returned to the sources of current, and these two mains may be

tapped at any number of points and the same potential difference will be found to obtain between them at all points, whether in close proximity to, or at the furthest distance from the source of current. Hence, there is hereby afforded a means for knowing at a supply station the actual conditions of supply at any moment in a given circuit; for, if an indicator of any suitable description is connected between the mains at the station, it will show the difference of potential obtaining, and if the circuit demands an increased current at any time, the fall of potential difference due to increased absorption of E. M. F. in the mains will be instantly shown by the indicator, which will necessarily be affected in a measure corresponding exactly to what is taking place at every point throughout the system. It will of course be readily conceived that as regards the sources of current, these may be of any form of direct current generator or may be the secondary wires of separate converters or transformers, or separate secondary wires on a single converter, the primaries or primary of which are or is in circuit with a source or generator of alternating currents; and that this method of circuit construction constitutes at once, in either of its forms, Fig. 6 or Fig. 8, a system for the distribution of current direct from a generating station, or a system for either primary or secondary circuits, or both primary and secondary circuits for alternate current distribution.

#### A STEP FORWARD.

Now, having got to the bottom of the whole idea and acquired an exact knowledge of the results attainable by an arrangement of circuits in either of the two ways described, we can rise to a proper appreciation of its utility, and the first question to be asked will naturally be: How is it this method of circuit construction has not been heard of in practice? Well, the fact of the matter is it hasn't had a chance to put in an appearance. In the shape here presented for consideration, it may not improperly be regarded as something brand new and original. It is offered in that sense. But the surprising fact obtains that one of the plans has already reached the hoary age of three years, for precisely the same arrangement of circuits as is shown in Fig. 6 is found to have been anticipated in a U. S. patent granted as far back as 1891. Unfortunately for its development, the plan as patented appears to have been arrived at along a line of reasoning different from that which has been followed in this paper, and the specification shows that the inherent virtue of the arrangement has been handicapped by a little over-dressing in the shape of a "preferred form" comprehending a cross-wire that practically relegated the improvement back to the operative conditions of the simple two-wire circuit. While this is to be regretted, it cannot be said to have done any more harm than a dam does to a river. Water eventually finds its level, even if driven to the opening up of new channels to that end, and in the same sense the attainable in our electrical field forces its way through our minds and brings whatever is of utility to the surface. That's how it comes about that inventions are re-invented and conceptions are re-conceived. In the present instance, the writer was for awhile under the agreeable impression that the method we have been examining according to both plans had been devised solely by himself, until it was found some of the ground had been already covered in the way that has been mentioned. However, it is hoped a step forward may be achieved. The opportunity to bring the matter to the attention of this useful and progressive association was embraced with grateful enthusiasm, and if this paper is provocative of any profitable discussion, whatever expectations are entertained of an early and widespread adoption of these plans will in all probability be realized.

Mr Campbell, in discussing the paper, said: Fig. No. 8 illustrates the same idea as No. 6 as adapted to what is known as the three-wire system. Are they both of the same size?

Mr. Keeley—They are all of the same size. The three-wire system is the adoption of two dynamos. If you were using the three-wire system and you increased the voltage to 200 volts, each machine giving 200 volts—

Mr. Campbell—Do you say 200 volt lamps?

Mr. Keeley—No, 100. It does not make a particle of difference.

Mr. Campbell—Whether this figure 8 is a two-wire system or three-wire system?

Mr. Keeley—It does not make any difference as far as voltage is concerned.

Mr. Campbell, after some discussion on the two and three-wire systems, claimed that figure 8 was an impracticable idea altogether, as it would take four times as much copper. In theory and practice it was all wrong, and not equal to No. 7.

Mr. Keeley claimed figure 8 was what he represented it to be.

He had made experiments carefully, and if it was followed out carefully it could not fail to act.

Mr. Campbell—Take Fig. 6; it would take more copper, and will not give as good distribution as the ordinary parallel system.

Mr. Keeley—It would necessarily have to be a better system. The idea is this, if we were going to supply a block in our immediate vicinity I should run my leads out of this side of the house and bring them in on the other side.

Mr. Campbell—If you could instal the plant and build the town around it that would be all right, I suppose. I am in the dark to see how figure 6 is a better distribution.

Mr. Keeley—Well, for instance, you have your station, and the places you are going to supply the current to are about a quarter of a mile away. Your view seems to be that you would be running out four wires and would be using more copper than the ordinary mains. What I say is that you have exactly the same amount of copper you have with your ordinary two-wire system. The highest difference of potential you can get at any point will be that from the first end of the circuit. As I have pointed out there in figure 2, you get the difference in potential, absolutely. In figure 2, you get the same potential difference between points 2 and 4 as you will get in figure 1 between the points 3 and 4. I have stated here that this difference of potential must necessarily involve that the current that is received in any one lamp is equal to that you can get at the furthest end of the circuit. Take figure 6, and supposing this is a direct current circuit we are considering. The sources of current D<sub>1</sub> in figure 6 are direct current generators for that matter. We will take one lamp placed across between 3 and 4. It is taking one ampere. Supposing we are going away around to F at the further end of the circuit, and we put on 100 lights, we will then have 101 amperes of current running through the circuit. It stands to reason that the electromotive force between those points is the same there with lamp F<sub>1</sub> whether we turn on that gang of 100 or turn it off.

Mr. Campbell—The current to run this 100 lamps has to run a greater distance than with a parallel system.

Mr. Keeley—No.

Mr. Campbell—100 lamps at F, and one at the other place; they are using 49 amperes at F. How does the current run from the dynamo to there and back again?

Mr. Keeley—50 amperes will run from B, and 50 from D<sub>1</sub>.

Mr. Breithaupt—I think we ought to have a blackboard at these meetings, where we could then discuss these matters thoroughly and all could see and understand.

Mr. Langton—If the lamp in figure 1 was a certain distance from the central station, say one mile, figure 5 would be the same lamp fed by two central stations two miles apart.

Mr. Keeley—One mile on each side.

Mr. Langton—Figure 6 would be that system folded together so as to consolidate the central station. It shows four wires to the lamp, distant one mile from the station. If these wires are of the same size as they are in figure 1, the loss would be one half and take twice as much copper. I cannot see any difference between this and a straight two-wire system.

Mr. Keeley—If you are sending four amperes along the line with a pressure of 100 volts, you have a certain drop in the mains. Supposing you cannot connect it up in accordance with Fig. 6, you are sending two along on one side and two on the other, and you have a certain drop along the mains. In each case the drop would be one-half. In Fig. 1, instead of having 4 per cent. drop you will have an 8 per cent. drop, whereas in the other you will have only 4 per cent. and take the same amount of copper.

Mr. Langton—Fig. 5 is simply a double system of Fig. 1, and Fig. 6 is Fig. 5 folded together. They have the same lamps, you have to send out the same current, and you use twice the length of wire of the same diameter, with consequently half the loss, or you use twice the length of wire of half the diameter with the same loss.

Mr. Keeley—I claim we have a marked saving in the wire. At the same time I admit that the total amount of copper used in the four wires would be equal to the total amount of copper in the two wires. Now, the question comes in, where is the saving? It is here. The statistics of the different general central stations, as I have been given to understand, is, that out of a total number of 1,000 lamps for which wires have been put in, there is only a demand at any one time for 450. You can put it at 55 or 60 per cent. It stands to reason, at that rate, that the greatest demand at any time is only 60 per cent. on the station for the total quantity of copper that has been put out; there is 40 per cent. lying idle. If you have a system by which you can start and give an equal potential throughout the entire town instead of having to run a multitude



of circuits for long distances, you can effect an enormous saving in running the wire from the station over your mains for a maximum of sixty per cent of the number of lamps put in. You save forty per cent. of the copper.

I have to thank Mr. Campbell for bringing out a point that should have been duly considered in my paper. The whole of what obtains in the operation of the circuit in Fig 7 has not been clearly set forth. The three-wire system, as represented in that figure, has been dealt with as if simply constituting two separate circuits, in the light that if one lamp alone is in circuit between A and C, the current operating it is derived from the source V alone, and if another lamp is put between B and C, it in like fashion gets its current from the source VI. But it should be recognized that in doing this we have doubled the E M F., and doubled the lamp resistance, while the other part of the circuit resistance remains unaltered. We know that the E M F absorbed in any part of a circuit is equal to the resistance of that multiplied by the current, and we can therefore double the E M F., and supply double the number of lamps without increasing the current in circuit. This is what is done in Fig. 7, when an equal number of lamps is put on each side of the neutral wire. So if, in the plan as laid out in Fig. 8, the sources of current, V, VI, correspond with those shown in Fig. 7, say 120 volts each, and if the volume of current to be distributed in each case is the same, it is true, as has been suggested, that for a given drop the leads in Fig 8 would have to be twice as heavy as those in Fig. 7, because the same amount of E. M. F as is absorbed in each of the separate circuits of Fig. 8 does duty for both circuits of Fig. 7, when there is an equal number of lamps on either side of the neutral wire, since the figure then represents what is practically a single round circuit, including the sources of current with the two groups of lamps in series, and there is no potential difference between the ends of the neutral wire. When this balance is disturbed, however, by an unequal number of lamps being put on the two sides, a potential difference is set up between the ends of the neutral wire, and the volts thus lost or absorbed in it have to be supplied from the source that is on the same side as the greater number of lamps. The drop on that side thus becomes greater than on the other, and the regulation of the supply is interfered with. Here then we find a tendency of the sources of current, V, VI, to operate in separate circuits in the same way as they would actually do if the lamps were placed on one side only of the neutral wire, and it might perhaps be better to permanently arrange them so. The system could be permanently balanced if it were practicable to altogether eliminate the neutral wire, or to go to the other extreme and reduce its resistance to nil. Without the neutral wire, however, we could not use the 100 volt lamps singly as at present, and 200 volt lamps are not yet available, so the next best thing is to reduce the interference of the circuits by making the resistance of the neutral wire as low as possible. It is to this end I fancy that in some instances the neutral is given three or four times the cross section of the outside wires, and a great deal further enlargement in the same direction would be perfectly rational, as can be seen, but when it comes to multiplying the total weight to an extent approximating that of the two-wire plan of distribution, the best course would be to lay out the wires in the way shown in Fig. 8, so as to secure not only immunity from interference between the circuits, but at the same time an equalization of potential difference throughout the whole. Now the entire argument I have advanced goes to show, I think, that we can obtain what is claimed at the outset of my paper, viz., an equalization of potential difference, with the same total weight of conductor and same drop as obtains in a single two-wire circuit, and the same result in a three-wire system with an increase of conductor that has been expressed as 25 per cent., but will have been understood to represent an increase in the proportion of  $\frac{2}{3}$  to 1.

#### CHROME IRON MINES OF QUEBEC.

The Quebec Mining Association paid a visit last month to the chrome iron mines now being worked at Black Lake, Que., and the following account of the mines is given by a Montreal *Star* correspondent:

About thirty years ago 11 tons were extracted from a pocket at Nicolet Lake, and in 1887 Dr. Reed sent 40 tons from the township of Leeds to Philadelphia. But in April last an active era began with the discovery by Mr. Nadeau and others of the Black Lake deposits, which mostly at present belong to the Coleraine Mining Company, consisting of Hon. Messrs. Chapleau, Lacoste and Desjardins, who have leased to, among others, Lambly & Co. Out of the latter's mine, opened since the first of May, 500 tons have been extracted and 270 tons shipped to Baltimore, these shipments averaging 50.3-10 per cent of pure chrome iron, realizing \$26 per ton

delivered in Baltimore. Very recently other discoveries were made on the adjoining lot owned by Dr. Reed, and eight different parties have just started operations in the immediate vicinity of Black Lake. Six different pockets have also been discovered near Little St Francis Lake, the largest chrome iron mine in the country, which is now being extensively worked by Messrs. Leonard, Morin and Labrecque.

Deposits have also been found at Bruches Lake, seven miles north-west of D'Israeli, at Lake Nicolet, Bolton, and at Wolfestown, but the indications are not as good, at least in point of quality, as in the places already mentioned. A great number of prospectors are scouring the country, and many other fresh discoveries will probably soon be reported. The product which is being shipped from Black Lake region, having an average percentage of 50.3%, is high grade material, which is in good demand at Baltimore and Philadelphia. This grade, after the serpentine ore has been eliminated, is used for the manufacture of bichromate potassium, which serves chiefly in calico printing, also for the manufacture of pigments, such as chrome green, orange and yellow, and also for the making of armor plates, electric batteries, chemicals and medicines.

The markets of the world, which now require from 15,000 to 20,000 tons annually of this material, have been chiefly supplied by the Turkish and Syrian ores, since 1858, when they were discovered in these countries by an American geologist. The quality there ranges between 50 and 54 per cent. Greece and Australia supply but a small amount of inferior quality. California ores being from 44 to 48 per cent., are not at all in demand at the present time.

A great deal of risk is involved in chrome iron mining on account of its existence in pockets only, which are not apparently connected in any way with each other. They are, however, found in close proximity in the Black Lake regions, where some pockets give surface indications of being very extensive.

#### HARTLAND, NEW BRUNSWICK.

Correspondence of CANADIAN ENGINEER.

Hartland has the most promising future of any village in New Brunswick. Though having only about 600 or 700 inhabitants, it is thoroughly alive and up-to-date. The people are proud of their little town, and have the utmost confidence in the success of its future. It has a number of valuable resources, which, if coupled with capital and enterprise, will soon build up a thriving town. Hartland is situated in the centre of the best farming county (that of Carleton) in the province. It occupies a beautiful site on the left hand bank of the St John river, 13 miles above Woodstock, the county town, and 140 miles from St John. Hundreds of carloads of oats, hay and other produce are shipped from here over the C.P.R. every season to the markets of St. John, Halifax and Boston, and to the Miramichi. The confluence of the Begaquima stream with the St. John is here, and affords an unequalled site for a milling privilege, which is being taken advantage of by Mr. A. H. Sawyer, an experienced lumberman, who is erecting a steam gang sawmill that will be capable of turning out 10 carloads of sawn lumber daily. He will employ nearly 100 men in the mill and a large crew of men in the woods. About 16 or 20 houses will be built next year for the employees of this mill.

There being an abundance of poplar and young spruce wood here, a wood pulp mill could be made a success. There is every requisite facility. Probably if the pulp were manufactured into the various commodities usually made from it, a ready sale could be found throughout the province, as nearly all the paper of every description used here comes from the Upper Provinces or the United States. All the wood pulp wares and utensils used here are from the E. B. Eddy Co., Hull, Que. Raw wood pulp can be shipped to Great Britain, France, or the United States cheaply, and no doubt would compete successfully with other countries. There are at present two such factories in the province, at Chat, Ham and Penobscis, the latter manufacturing its product into all grades of paper.

Being situated in such a fine farming section, a canning establishment would be a profitable investment. There are several factories in successful operation in the province, and Hartland possesses the best facilities of any place in the province.

All the brick used in the village has to be brought at least 60 miles, but there is an inexhaustible bank of clay of good quality for brick here, waiting for some enterprising company to manufacture.

Besides these, Hartland has a number of other natural resources of less importance, yet worth investigating. On account of the extreme cheapness of living, low taxes, excellent facilities for shipping, healthful climate, close proximity to the market of the

United States, and no mean market of our own, almost any other manufactures could be successfully established.

There is no bridge across the river at this point, a ferry being the only means of crossing. A large part of the farming population is on the opposite side, and the need of a bridge is great. Every effort is being put forth by the people to persuade the Government to construct a bridge. The growth of the town will be seriously handicapped until this convenience is built.

The St. John River affords a splendid means of transportation, but for lack of enterprise it remains undeveloped. The village is incorporated under Act of Provincial Legislature, 1893, for the purpose of taxing for water for fire protection and domestic use. A waterworks system, involving an expenditure of \$4,000, is being constructed. There are stores, apothecaries, tailors, milliners, dressmakers, butcher, tanneries, shoe and harness shops, barbers, physicians, etc. There is no bakery, laundry, jeweler, tinsmith or lawyer here. There are three fine church edifices, and public halls, fraternal societies, superior school, etc.

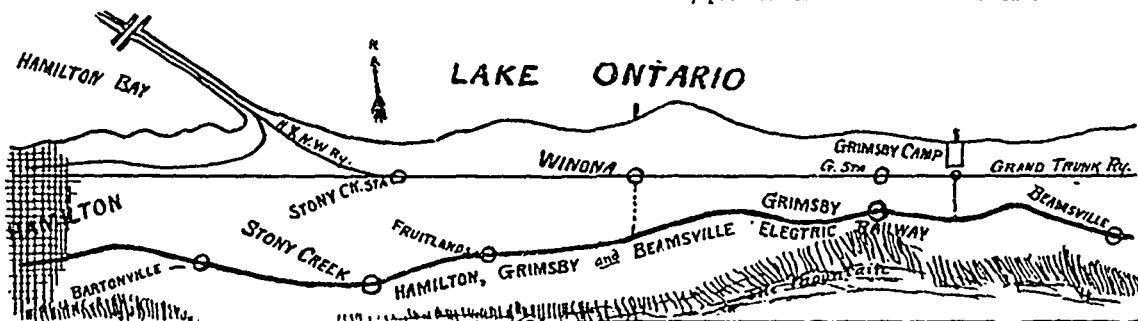
Hartland has every prospect of becoming the largest town in this or any adjoining county

FRED. H. STEVENS.

Hartland, N.B., November 1st, 1894

### THE HAMILTON, GRIMSBY AND BEAMSVILLE RAILROAD.

On the 17th ult. the new Hamilton, Grimsby and Beamsville Railway was formally opened by an excursion given by the directors to Grimsby, the present terminus of the line. The weather was delightful, and about four hundred people took advantage of the invitations. This new railway runs through a district of Ontario which is commonly called the "Garden of the Province." Settled by prosperous farmers since the beginning of the century, it has gradually attained a wide reputation as a fruit growing country, the peaches, grapes, pears, apples and other fruits of the Niagara peninsula having now a wide fame. With Lake Ontario on the one hand, and the "Mountain," over which the cataract of Niagara thunders, running parallel with the lake, the scenery has elements both of the grand and the picturesque. That a road drawing the trade of such a region and reaching the villages of Bartonville, Stony Creek, Winona, Grimsby, Grimsby Camp and Beamsville will prove to be a paying investment, THE ENGINEER has no hesitation in predicting, and the enthusiasm of the visitors who went over the new road on the opening day was well justified. Already a new post-office and village, called Fruitlands, about two miles east of Stony Creek, has come into existence, as a result of the opening of the road, and it



is probable that some of the park schemes that are talked of will now be carried out. The new line will give ready access to the markets of that enterprising city of Hamilton from points east, while at the same time the villages on the line will reap the benefit in an increase of summer visitors from the city. The run is now made from Hamilton to Grimsby in a little over an hour. The road will be twenty-two miles long in all when finished to Beamsville, and will give transportation facilities to a rural population of over twelve thousand. It runs along the main macadamized road from Niagara to St. Catharines, in many places skirting the foot of the mountain and affording delightful views. We have before given information concerning the construction of the line, and need only add now that the line is well equipped with freight and passenger cars, and has a fine steam power-house at Stony Creek. From estimates made of the receipts of the road we learn that the directors anticipate an annual traffic of at least 300,000 passengers at ten cents per trip, and that about 150 cans of milk per day will be brought along the route at 15 cts. per can, and 500 baskets of fruit for at least a hundred days at 5 cts. per basket. This with miscellaneous freight, mails and express business, will probably give a revenue of about \$50,000 per year to start upon. The accompanying map will show the position of the road, and its relation to Hamilton.

### REVIEW OF THE METAL TRADES.

MONTREAL, Nov. 2nd, 1894.

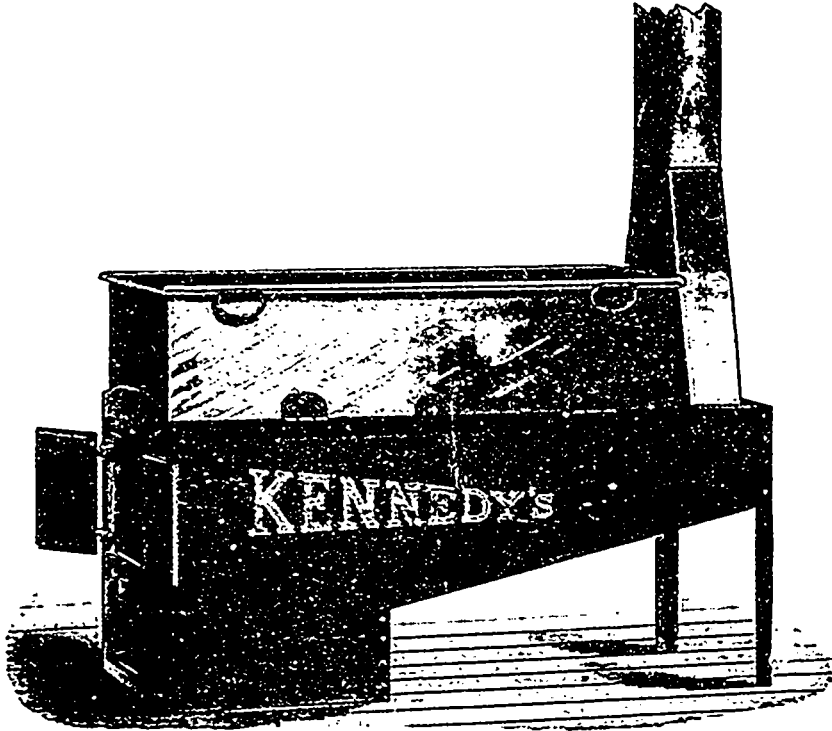
Dulness is the prevailing cry wherever we turn. There has lately been some little activity and signs that the cloud of depression was lifting, but these hopes have been shattered again, and we feel that the coming winter will not be characterized by any revival. There must, however, soon begin the dawn of brighter days, and let us hope that next spring will see improvements, before that we cannot expect much. The American manufacturers still continue to capture the bulk of the steel business. It is interesting but unsatisfactory to merchants here to watch the gradual diversion of this trade from England to the United States. A case in point will best illustrate at what low prices steel can be imported from across the line. We know of an instance where certain classes of steel are bought in Chicago, freighted to the Maritime Provinces, and after paying a duty of ten dollars per ton, the cost to the consumer is still below what he can purchase from our Canadian concerns or import from England. In Ontario, where the freight charges would be less, it is still more difficult to compete with the Americans. This is not only true of the raw material, but also of many kinds of manufactured steel, such as rake teeth, harrow teeth, and other parts of agricultural implements. These are being sold here at prices that are certainly extremely low, and it is difficult to say whether this condition is caused by dulness in the American markets (and when business there improves they will devote their attention to their own markets), or whether they have made a determined effort to capture the Canadian trade and have "come to stay." It remains a fact, however, that for a great many classes of steel the American market is ever so much cheaper than any other source of supply at the present time. The same condition exists in reference to many kinds of metals. Pig lead is now almost exclusively bought from the United States, except some small quantities of special brands. American brands of pig iron are also being much used here. This to some extent may be due to the coal strike in Scotland, which has prevented deliveries of Scotch brands and has increased the value also. A great advantage in buying in the American market is that they can give prompt deliveries, while it takes six weeks to two months and sometimes longer to fill an order in England. The values of Scotch iron and steel have dropped during the past two weeks, owing to the settlement of the coal strike. The dulness of the shipping interests shows the importations to have been very small. Nearly all countries have lately been upset by strikes, political strife, and other elements. It is gratifying to know, however, that many predict better times for next season. A lot of 600 tons

of No. 2 American pig iron was sold the other day to a large foundryman at nearly \$17.50. Bar iron trade is quoted steady at \$1.65. In tin plates there are a few sales at \$2.80 to \$2.85 for cokes, and some business in Canada plates at \$2.05 to \$2.07½, with smaller lots at \$2.10 to \$2.15. We quote prices as follows: Summerlee pig iron, \$20.50 to \$21; Eglinton, \$19; Carnbro, \$19; Ferrona, \$16.50 to \$17; Siemens No. 1, \$16.50 to \$17; wrought scrap No. 1, \$14 to \$15; bar iron, \$1.65 to \$1.70. Tin plates, cokes, \$2.75 to \$3; I. C. charcoal, \$3.25 to \$3.50; Canada plates, \$2.10 to \$2.15; terne plates, \$6 to \$6.25; galvanized iron, 4½c. to 5¼c. as to brand. Orford copper, 9½c. to 10c.; ingot tin, 16½c. to 18c.; lead at \$2.80 to \$2.85; and spelter at \$4 to \$4.12½; cut nails, \$1.70 to \$1.80.

THE new syndicate who now own the St. Thomas, Ont., electric street railway will ask for a franchise for the extension of the road on the following conditions. That after the expiration of the present lighting contract, a little less than two years, the company shall have the contract for lighting the city entirely by electricity at rates now paid the electric company for a portion of the city, 28 cents per lamp per night, the privilege to supply private consumers with electric light, the privilege to double track the road where claimed necessary, and commutation of taxes at \$60 a year, the present rate; four miles of track to be electrified before the franchise is confirmed.

## KENNEDY'S MAPLE EVAPORATOR.

Great strides in the maple sugar industry have been made during the last few years. Formerly, iron kettles hung on poles constituted the apparatus used to make maple sugar, and wooden troughs were used to catch the sap of the tree. Now tin buckets are used, and tin pans and evaporators to boil in, and fine wire and steel arches with smoke stacks for the fire.



We present to our readers illustrations on this page of Kennedy's Steel Arch and Combination Evaporator, one of the latest machines produced for maple sugar and syrup making, that is taking the lead in sugar producing localities. The arch is made of sheet steel, heavy angle iron corners and legs, cast front, pipe base and grates. All long arches have an adjustable truss brace on each side to prevent spreading, and the bottom is corrugated so as to prevent sagging. The arch is to be lined up on the inside with brick in such a manner as to leave a dead-air space between fire and the side of arch, keeping it cool and making it more durable. This is a peculiar construction not found in any other arch.

The evaporating pans consist of a front pan, having corrugations or pockets made up out of the whole sheet of tin—thus saving seams and increasing the heating surface nearly double—and a back pan having partitions crosswise, the object being to make the sap travel over a long boiling surface until it reaches the back end, at which there is a draw-off gate for removing the syrup when sufficiently thick.



This evaporator allows of shallow boiling, which is admittedly the only way to produce a light colored, good flavored syrup or sugar.

The larger cut represents Kennedy's Sugaring-off Arch and Pan, for reducing the syrup to sugar. It is constructed similar to the evaporating arch, and is a great labor saver, allowing sugaring off without disturbing the evaporating pans on large arch. These improved utensils, and everything used for the manufacture of maple

sugar and syrup, are manufactured by C. A. Kennedy, of Coaticook, Que., who is ready to give to those interested any particulars not fully made plain in this article.

## GOOD WORDS BY THE WAY.

It has been a great satisfaction to the publishers to receive so many voluntary expressions of good will since THE CANADIAN ENGINEER has been in existence, and it has been especially gratifying to find so many advertisers coming forward to give testimony to its value as an advertising medium. There seems to be a mutual confidence between the readers of THE CANADIAN ENGINEER and its advertisers, and we trust that by admitting only the better class of firms to our pages that this confidence will continue. We have published some of the letters received from our patrons and subscribers, and now give selections from those received this month:

ST. JOHN, N.B., Oct. 18, 1894.

DEAR SIR,—In reply to your recent favor you will please discontinue my ad., as it has already served my purpose. I have sold the device advertised. Am much pleased with paper, and will probably send you out of a pump, which I want advertised, some time within next ten days. Will give it three months' trial, and if as successful as last ad will gladly continue.

J. S. CURRIE,

Successor to F. W. Wisdom, Mill, Steamboat and Railway Supplies, St. John, N.B.

DEAR SIR,—Please find enclosed P.O. order, of \$1.00 for subscription to THE CANADIAN ENGINEER, with which I am very well pleased.

PETER M. DOWD,

Engineer Acadia Sugar Refinery, Moncton, N.B.

I must compliment you on the last issue of your paper. It is first-class.

A. E. EDKINS, Provincial Deputy C.A.S.E.

SIRS,—Enclosed please find \$1 for one year's subscription to THE CANADIAN ENGINEER. Wishing your bright journal a long life.

J. W. HAYWARD, Toronto.

W. R. BUTLER, Professor of Civil Engineering in King's College, Windsor, N.S., writes: "I think you are to be congratulated upon the success of your journal."

The number of THE CANADIAN ENGINEER for September devotes considerable of its space to an account of the recent meeting of the Canadian Stationary Engineers held in Toronto. It has a very nice photo-engraving of those who were present, and among the smiling faces are observed those of Messrs. C. J. Jordan, R. W. Green, and S. E. Cosford, of this city. Another well-known face, to the extreme left of the picture, is that of Mr. James Fax, the well-known comic singer. The number, on the whole, is a very interesting one.—*Guelph Mercury*.

M. F. WALTER has found that an alloy consisting of 95 parts of tin and 5 parts of copper adheres so tenaciously to glass that it may be employed as a solder to join the ends of glass tubes. It is obtained by adding the copper to the tin previously melted, agitating with a wooden stirrer, casting or granulating, and then remelting. It melts at about 360 deg C. By adding from a half to 1 per cent. of lead or zinc, the alloy may be rendered either softer or harder, or more or less easily fusible. It may also be used for silvering metals or metallic thread.—*Rev. Scientifique*.

The following is the formula given by *Science Illustrée* for a flexible substance as transparent as glass: Dissolve four to eight parts of pyroxylin in alcohol and ether in the proportion of a 1 per cent solution. Then add 2 to 4 per cent. of oil of rice or any other non-siccative oil, and 4 to 10 per cent of resin or Canada balsam. Coat a plate of glass, and dry in a warm current of air of 50°C. This will give a sheet of a durable, unbreakable, transparent substance, impervious to acids and alkalis, and less inflammable than ordinary collodion, and of any desired thickness or color. With zinc oxide it has the appearance of artificial ivory.

A METHOD of condensing the exhaust from a small engine is described by Mr. Wenham, of London, as follows: "I had to burn anthracite or smokeless coal, yet the exhaust steam up the chimney caused particles of iron to descend on to linen hung out to dry in a laundry next door. For this I was threatened with an injunction and damages. I, therefore, had to take immediate steps to get rid of the exhaust steam. Water was scarce and expensive, so I turned the steam into a disused rain-water well as a temporary expedient, this got rid of it for several days, till the ground got dry and hot; then the steam finally escaped up through five holes in a stone sink

in the corner of the building. Above this was a 5-inch wooden spout reaching to the roof; up this the steam was drawn by a strong draft, but I noticed that none came out at the top. It was all condensed, and fell in a shower out of the bottom of the spout, and drained back into the sink. As the wood was scarcely warm, I saw that external or surface condensation had nothing to do with the result; it was simply the rush of cold air mixing with the steam that condensed it. I then carried the suction of my feed-pump to the bottom of the tank, and for years fed my boiler with hot distilled water, very little extra being required to make up waste. The consequence was that my boiler was kept free from incrustation. Several engines that I afterwards erected were provided with this inexpensive arrangement, using ordinary stone-ware pipes to the top of the building, of course leaving the bottom open for the free ingress of air. The arrangement cost but little, and never caused any trouble. About sixteen cubic feet of air will be required to condense one cubic foot of steam."

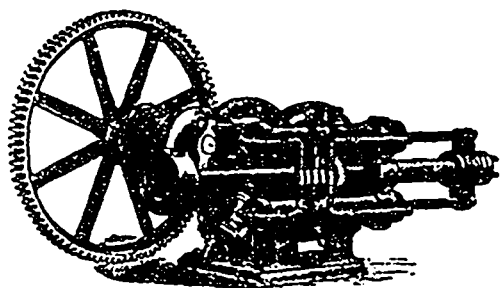
MOORE & WILCOX's fruit evaporating factory at Owen Sound, Ont., has been burned down, the loss amounting to \$11,000.

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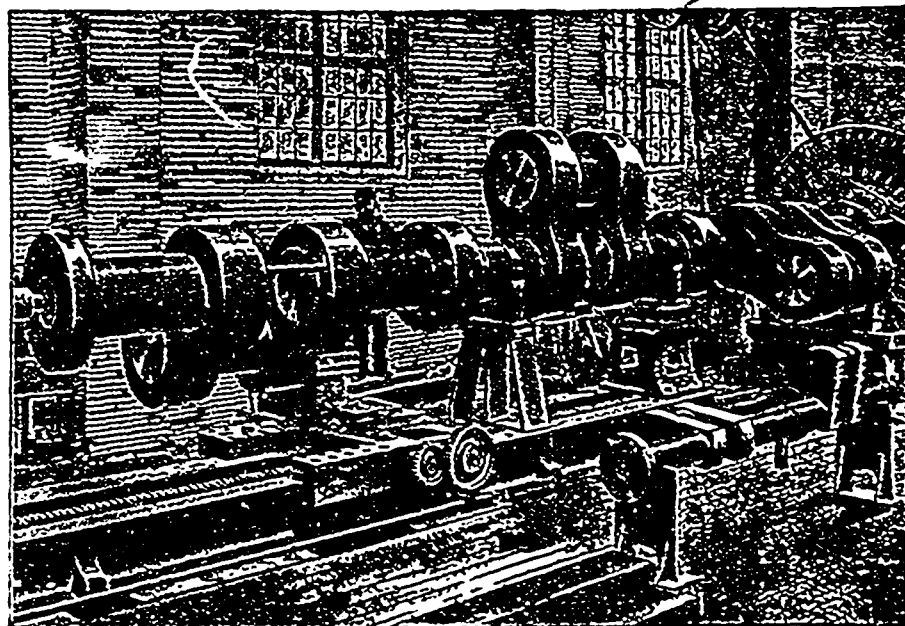
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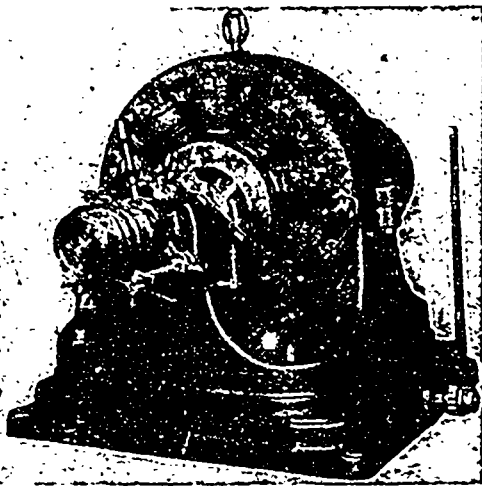
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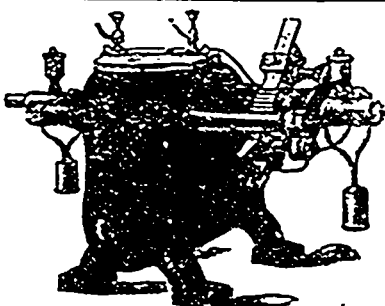
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# Electrical Department.

## MUNICIPAL ELECTRIC LIGHTING.\*

BY E. CARL BREITHAUPT, BERLIN, ONT.

The question of how industries that are to a greater or lesser degree carried on for the accommodation and benefit of the general public, can be conducted to the best advantage, has always been one of national economic import, and the idea that they should be owned and operated by the public body corporate is not altogether a new one.

The principle is enunciated by economists that industries of this nature, such as transportation, the transmission of intelligence, the supply of water, and of artificial light, are monopolies inherently and essentially; they are therefore classed as natural monopolies. All of these industries are primarily under the control of the State, and for this reason, it is claimed, they should be owned and operated by the Government.

The advantages claimed for such ownership are that the work would be more economically performed, the margin of profit which a private company derives from the business being saved to the public treasury, and that the service rendered would be a more efficient one. Moreover, it is held that private ownership of these industries encourages corruption, particularly among legislative bodies, and that under government ownership this would be done away with. To the public mind the word monopoly conveys the idea of an autocratic power which leads to abuse of privileges and advantages enjoyed, and consequent abnormal returns on capital invested. Prof. Richard T. Ely, of the University of Wisconsin, holds that private monopoly is a menace to the public, and that men are not good enough to be entrusted with such a despotism as that which monopoly confers.

It is the purpose of this paper to consider the question of Government ownership of natural monopolies only in so far as it concerns works for the supply of artificial light, and particularly such as is wholly for the public use, viz., the lighting of streets and public buildings.

It is proposed that these works be owned and operated by the municipal corporation, and many cities and towns have been considering the advisability of the plan. The question has been hotly argued on both sides, and it is to be regretted that these discussions are not always conducted in a fair-minded, liberal manner. Arguments advanced by men interested in private lighting companies are denounced by their opponents as prejudiced opinions; the cry of "Monopolist" is raised to enlist public favor on the side of municipal ownership, and the same offence is thus committed as is charged. It is but natural that persons having capital invested in any particular enterprise should strive to protect their investments, especially in a case of so serious a nature where the threatened danger means inevitable destruction. On the other hand, there is much to show that the arguments put forth by the advocates of municipal ownership are not always inspired by pure and unselfish motives. If these discussions are to accomplish any good the opinions advanced by either side must be

honest and unbiassed, and above all the facts and figures cited must be truthful, for the outcome of the case really hinges thereon.

The burden of proof lies with the advocates of municipal ownership, and the arguments in favor of their claim are identical with those of the complete scheme of government ownership.

Can a municipal corporation perform its own lighting service cheaper than a private company can supply it? Figures are given showing the cost of the service when the plant is owned and operated by the municipality, and estimates are made on the cost of building and operating proposed plants, nearly all of which are so surprisingly low that they must at once arouse suspicion in the minds of thoughtful men. According to these reports the cost of public lighting, where it is done by the municipality, averages about one-half of the price usually paid to private companies. One town in Illinois having 120 electric lamps on its streets, even reports that these cost nothing, that the expenses of operating are all paid by the profit received from commercial lighting. It is a significant fact, however, that these figures rarely represent the actual total cost. There is a tendency on the part of the advocates of municipal ownership to underestimate or entirely ignore any items which are not cash actually paid out, such as depreciation in value of plant due to wear and tear, and to the fact that new and improved apparatus and methods are constantly coming into use, interest on capital invested, insurance, taxes, and in some cases water supply. The town treasurer's statement of expenditures incurred in operation is often the only outlay considered, and even this may be incomplete since municipal authorities do not always analyze accounts so as to show a full statement for each department. Insurance and similar expenses may be debited to separate ledger accounts, and not appear at all in the statement of a particular department. Other items are charged to the department where they belong, but under the wrong heading. As a case in point, we may cite the financial statement of Toronto Junction for 1893. Under receipts and disbursements authorized by by-laws for issuing debentures on account of electric light construction, we find an item for rebuilding engine bed of \$162.93. This was a repair, and properly belongs to maintenance.

Now, it is plainly unfair to compare such figures with those paid to private companies and say that a municipality operating its own plant saves the difference. To compare results intelligently we must agree on a basis of comparison. If the price paid a private company is remunerative to them, it includes depreciation, interest, insurance and taxes, and we must therefore debit a municipal plant therewith. The municipality may for a number of years persuade itself to believe that these expenses are imaginary, but it must meet them in the end, and no matter to which account they are charged they are incurred by the lighting plant.

Mr. M. J. Francisco, now president of the National Electric Light Association, last year published a large amount of data on the cost of street lighting, which is of interest in this connection. He gives figures of muni-

\*A paper read before the Canadian Electrical Association.

icipal plants scattered over nearly the whole territory of the United States, and computes the cost per lamp, adding interest, depreciation, insurance and taxes; he states that the original reports signed by the city officials are on file and open to inspection by any person who may desire to test the accuracy of his figures. The most economical station cited is Marshalltown, Iowa, where 64 lamps of 1,200 nominal c.p. are lighted 300 nights each year until 12 o'clock, at a cost of \$51.87 per lamp. The plant is run in connection with the water works, and the cost of coal and labor is divided between the two departments. Of these 76 plants only ten show a cost of less than \$80 per lamp per annum; five of them using 2,000 c.p. lamps until midnight; one, 2,000 c.p. lamps until 2 o'clock a.m., and four using 1,200 c.p. lamps. The average price paid is \$116.46 per lamp per annum, and 5 6-10 cents per lamp per hour. Compare these figures with Canadian contract prices. In statistics compiled by the Citizens' Telephone and Electric Light Company, Ltd., of Rat Portage, Ont., and published last month, we find eleven towns and cities reported where a 2,000 c.p. arc light is furnished until midnight at prices ranging from \$45 to \$80, twelve towns and cities where a 2,000 c.p. light is furnished all night at prices ranging from \$65.80 to \$162, but only one of these, viz., Winnipeg, exceeds in price the average cost of \$116.46 for municipal plants as above stated. In the town of Arnprior a 1,000 c.p. light is furnished until midnight for \$54.75, the motive power being water and steam, while in Berlin the same light is furnished for \$45.

In a report to the Committee on Works by City Engineer Keating, of Toronto, dated May, 1894, Mr. Keating includes a table which he compiled from reports directly received, showing cost per annum for street lamps where the lighting is done by the municipalities.

NAME OF CITY.	LAMPS.		COST PER ANNUM.	
	Number	Candle Power	As given by Mr Keating	As given by Mr Francisco
Savannah, Mo. ....	25	1,200	\$25 00	\$150 00
Danville, Va. ....	90	1,200	44 00	53 90
Ashtabula, O. ....	70	2,000	90 00	117 85
Bay City, Mich. ....	181	2,000	49 00	92 65
Aurora, Ill. ....	119	2,000	68 00	117 33
Hannibal, Mo. ....	120	2,000	65 00	118 37
Ypsilanti, Mich. ....	88	2,000	34 67	97 73
West Troy, N.Y. ....	103	2,000	70 00	114 67
Easton, Pa. ....	113	2,000	77 95	147 22
Bloomington, Ill. ....	225	2,000	61 00	122 55
Lewiston, Me. ....	100	2,000	43 00	87 50
Topeka, Kan. ....	184	2,000	93 00	129 00
Bangor, Me. ....	156	2,000	45 00	91 30
Jamestown, N.Y. ....	140	1,200	50 00	69 24
Chicago, Ill. ....	1,112	2,000	96 64	194 89
Allegheny, Pa. ....	519	2,000	(59 54) (72 00)	92 15

\* Includes interest and depreciation.

Mr. Keating states there may be a difficulty in such cases in arriving at absolutely correct figures, and that an allowance should be made for interest and depreciation in order to arrive at a fair comparison. The figures he gives are so materially lower than those of Mr. Francisco that we can infer they do not include this allowance. I therefore reproduce them side by side in the above table to show the difference of results obtained by the two methods of computation and the unreliability of municipal reports.

The other data given do not agree in all cases. Mr. Keating's table contains some evident errors; e.g., for Savannah, Mo., he gives the total operating expenses as \$2,500.00, making a cost of \$100.00 instead of \$25.00 per lamp.

Again, Mr. Keating's estimate of running expenses is altogether too low, especially in the amount it includes for labor. The secretary of the Fire Department esti-

mates the annual cost per lamp for 1,300 lamps at \$103.85, while the price at present paid for about 1,000 lamps is \$108.58, leaving a difference of \$4.73 per lamp in favor of the city. This is certainly a small margin to warrant an investment of \$310,000, particularly as it is only an estimated margin.

The city of Philadelphia lately had under consideration the advisability of doing its own lighting. Chief Walker, of the Electrical Bureau, estimated the cost of 2,000 c.p. lights at 23 to 25 cents per night, but the Committee of Council after an investigation in which they took evidence from all available sources, figured the cost at about 43 cents, and recommended the council to abandon the plan.

In Topeka, Kansas, the work of street lighting has been done by the corporation for some time and the plant has been under the superintendency of careful, competent men. The City Engineer has compiled very complete returns covering a period of 38 months, according to which the average cost per lamp per annum is \$93, not including depreciation, taxes and water. It is admitted that the plant is not proving satisfactory and that the local companies would furnish the same light at a cost of 20 per cent. to 30 per cent. less.

The town of Seaforth, which until lately supplied its own light, reported in 1892 that they were satisfied the light could not be run as satisfactorily or as economically by the corporation as by a private company, though it was operated in connection with the water works. Now they report that they have just sold out to a private firm.

The *Electrical Engineer*, an independent electrical journal, has just published the results of an investigation made under its auspices on the cost of municipal lighting. In commenting thereon the editor remarks that "in no respect do these figures justify the statements that have been made as to the superior economy of municipal plants."

Can a municipal corporation perform its lighting service more efficiently than a private company can? A successful manager of a central station for the supply of gas or electricity must possess no small amount of general engineering ability. He must have a technical knowledge of gas and electric matters, as well as a thorough acquaintance with all the details of the plant under his charge. A municipal plant is managed by a committee of the council. When the size of the plant warrants it, a superintendent is appointed, otherwise the clerk or other town official, or the chairman of the committee has it in charge. In either case it is under the jurisdiction of the committee, a body of men who hold office for only one year, and who, while they are probably well versed in their own private business, usually have no knowledge of gas or electric light matters. Is it reasonable to suppose that a business will be better conducted so than under the management of men who devote their whole time and energy thereto?

Among the answers received by the writer in reply to enquiries regarding municipal plants, one states: "The greatest drawback to the town owning the plant has been too many bosses"; another quoted by the *Electrical Engineer* complains that everybody tries to run the plant, and says: "The mayor and committee, with the assistance of a leather-headed clerk, all dictate what shall be done and where the supplies shall be bought." Truly the lot of a municipal superintendent seems a hard one. The same writer says further,

"With eight years' experience, I would advise all towns to hire their light, which is by far the cheapest."

The question of economy and efficiency are interdependent. The managing committee of a municipal plant lacks the motive to effort, the incentive to economical operation and to close personal attention that a man finds in his own private business. Would you risk an investment in any industry under the management of a committee of a municipal council? If not, then why risk under such management an investment of funds which you must help to supply and in the expenditure of which you have therefore a personal interest at stake?

As to the claims regarding corruption.

The opportunities for corruption in connection with contracts between municipal corporations and private companies for the supply of light are very limited; moreover the prices paid for street lighting in Ontario are not near high enough to sustain a corruption fund.

In municipal ownership, on the other hand, there is a great temptation to crookedness. Mr. Francisco quotes an article from the *Forum* that of the members of a typical city council one-third will vote as they think, regardless of advantages, the votes of another third are merchandise pure and simple, and the remaining third are debatable men. This characterization may be somewhat severe; let us hope it is, but there are usually some men in a council who are not above accepting a bribe, and these always endeavor to get themselves appointed on committees having in charge the management of public works. The opportunities for dishonesty are apparent. Besides this there is invariably some preference shown in appointments to office. Mr. Francisco quotes an interview with an official of the Chicago municipal plant in which this gentleman complains that men in his department were turned off without cause to make room for favorites, and that there was "no possible way to get on the service without a political pull."

There are other additional arguments against municipal ownership of lighting plants. The function of a government is to regulate and control and to encourage enterprise on the part of its citizens by extending a protecting hand over the industries they establish. When a number of citizens band together, therefore, to carry on a business which is at best an uncertain one, one in which their works and plant are liable to serious injury from various causes, and in which they are not free to trade where and with whom they choose, but are restricted to localities—a business which confers a benefit to the community and which is already more or less subject to municipal and legislative control, then it is obviously unjust for the municipality to establish and operate a plant in opposition to that of the private company. If a municipal corporation decide to enter into a field of commercial enterprise in which some of its citizens are already engaged, it is only simple justice that it shall offer to take over their works and plant at a fair and equitable price.

Again, the wisdom of a municipality engaging in a commercial enterprise may be questioned; indeed it is a grave question whether the corporation has the moral right to risk the money of its citizens in an undertaking which is attended with such hazards, and in which the advantages to be gained are in any event small and uncertain.

Many cities and towns have been persuaded by incomplete reports and alluring estimates to undertake

the experiment, but it still remains to be proven that a municipal plant can supply a cheaper light than a private company. In towns which are not large enough to make the business remunerative, the installation of a plant by the corporation may be justified, because street lighting is a public necessity, but where private plants already exist that are able and willing to supply the municipality at a fair price, the outlay cannot be regarded otherwise than as an unnecessary expenditure and a waste of public money.

## Electric Glashes.

THE Seaforth, Ont., Electric Light, Heat and Power Company has been incorporated, with a capital stock of \$25,000.

THE Peterboro' and Ashburnham Street Railway Co. have re-elected T. E. Bradburn president, and F. Nicholls vice-president.

THE Galt, Ont., Gas Light Co. have purchased a 1,000-light incandescent lighting plant, and it will be in position some time this month.

A SYNDICATE of capitalists are proposing to build an electric railway from Hamilton, through Waterdown, to Schaw Station, on the C.V.R.

PART of the scheme of the company that is projecting the Hamilton and Guelph electric railway is to build a spur from Little's inn to Burlington.

A PARRSBORO', N.S., company will apply in the winter for a charter to put in and run an electric plant for light and power purposes in that town. Its capital is \$10,000.

THE Bell Telephone Co. are about to extend their line between Winchester, Inkerman and South Mountain to several points in Russell county and through Metcalfe into Ottawa.

CAPT DICKSON, till recently a director and secretary of the Galt & Preston Street Railway, is bringing an action against the company for \$3,000, which he claims as salary, and for services rendered.

THE electric railway is again talked of. A few days ago F. W. Colclough met some of the chief shareholders of the Winnipeg company and submitted facts and figures, and so the matter stands.—*Selkirk Record*.

SAMUEL BRAZIER, a commercial traveller, was jerked off the front platform of a Montreal street car on which he was standing and fell in front of the trailer, the wheels of which passed over his body. He was fatally injured.

THE Durham, Ont., *Review* calls attention to the advantages that village affords for the establishment of an electric light and power station, there being ample water power at Aberdeen, Glenrodden and Hayward's Falls near by.

NEGOTIATIONS are practically completed for the transfer of the Toronto and Scarboro' Electric Railway to the Toronto Street Railway Co. The transfer will be brought about by an exchange of stock, the Toronto company giving four of their shares for every five of the Scarboro'.

SAULT STE. MARIE has sold its power canal to an American syndicate for \$260,000, about the same amount as it cost. The new owners are now about to spend half a million dollars in putting in a new electric light plant for street lighting, in improvements in the water system, etc., etc.

THE Ottawa Electric Co., formed by the amalgamation of the Ottawa Electric Light Co., the Chaudiere Electric Light & Power Co., Ltd., and the Standard Electric Co., Ltd., of Ottawa, last month issued \$320,000 first mortgage bonds, at 5 per cent., principal to be payable October 1st, 1904.

THE case of Lavoie v. The Ottawa Electric Street Railway Company has been settled between the parties, the defendants agreeing to pay \$750. The action was for damages sustained by young Lavoie, a boy of about eight years of age, by having his two feet cut off by one of the company's cars.

THE Montreal Street Railway Company have declared another half-yearly dividend of 4 per cent., a surplus of \$37,000 being carried forward to credit account. The number of miles run during the year increased over 29 per cent., and the number of trips over 30 per cent., and the total number of transfers granted increased nearly 25½ per cent.



RADNOR FORGES, Que., the seat of the Canada Iron Furnace Co.'s iron works, is now lighted by electricity.

EDWARD MAHER was attempting to stride across from a trailer to a trolley car on the Montreal street railway last month, when he missed his footing and fell under the wheels of the former. He died within a few minutes. Maher had only recently been taken under probation by the company as a conductor, but was off duty at the time of the accident.

IN spite of the decision of Summerside, P.E.I., council not to put in an electric lighting plant, an energetic effort is being made to form a local company for the purpose of lighting the town. The capital is placed at \$10,000 and provisional directors have been appointed as follows: President, T. B. Grady; Secretary, L. Morris, an effort will be made to instal a plant before Christmas.

THE Buckingham, Que., Electric Railway, Light & Power Co. are applying for incorporation with a capital of \$100,000. They will build an electric railway from the mouth of the Du Lièvre river to the village of Buckingham, and also carry on a general electrical business. The applicants are A. McLaren, Buckingham; T. Kennedy, Ottawa; E. S. Leetham, Ottawa, T. Wells, Buckingham, and H. Aylen, of Aylmer.

IN addition to the facts stated last month in connection with T. Viau's project to construct an electric railway from Hull, Que., to Aylmer, the following particulars may be given: A company with a capital of \$25,000 has been formed, under the name of the Hull Electric Company, the applicants being T. Viau, J. R. de Martigny, and Stanislas Aubry, all of Hull, Que.; C. L. de Martigny, of St. Jerome, and A. Bourgeau, of Montreal.

A YOUNG man named Deguire was instantaneously killed last month in Montreal owing to touching a live wire. One electric light wire had crossed another, and after burning itself into two, fell to the ground, hissing and leaping. Deguire tried to put it out of the way, seized it with his right hand, and, according to the spectators, immediately sprang into the air with a shriek of pain and then fell to the ground dead. He leaves a widow.

L. P. PELLETIER, Quebec; J. J. T. Fremont, P. B. Dumoulin, B. Leonard, J. U. Gregory, and E. Pacaud, all of Quebec, and Philippe Landry, of Villa Mastai, are applying for incorporation as the Quebec City and District Railway Company. They want a charter to construct and operate railways and electric lines in the city of Quebec, and also in the counties of Quebec, Portneuf, Montmorency, Levis, Bellechasse, Dorchester, Beauce, and Lotbiniere.

FOLLOWING on the assignment of the Kay Electric Works, Hamilton, last month, a meeting of the creditors was held on the 19th ult., at which those representing about two-thirds of the liabilities, after discussing the statement, unanimously agreed to accept 33 1/3 per cent on the liabilities, payable in three equal instalments, with interest at 6 per cent. per annum, at sixty days, five months and eight months. The last payment to be secured satisfactorily.

P. R. RANDALL'S project to construct an electric railway between Port Hope and Bewdley seems to be gathering more definite shape, much of the right of way having already been obtained. Track-laying will probably begin in the spring. The Peterboro Electric Railway Company have agreed to extend their railway below the locks, so as to connect with steamboats running between there and Bewdley, the terminus for the proposed new line. A branch will probably be built to Cobourg.

A DAM on the Gould Creek, at Cobden, Ont., gave way on the 10th ult., carrying away the electric power house and sweeping it for nearly a mile into Muskrat Lake, dropping the machinery out on the way. The night watchman, James Garneau, was in the building at the time of the accident and had a miraculous escape. He did not get out of the flood till he was carried into deep water two miles from the dam. He was considerably bruised by stray timber and had one knee dislocated. The dam had only been completed a couple of days and belonged to Alex McLaren, who intended to supply light to the town.

LAST month an interesting judgment was given in a legal case having its origin in a fire brought about by an electric light wire. In 1892, a building at Richmond, Que. partly occupied by the Bell Telephone Co.'s exchange office, was burned down, owing to the crossing of one of the company's wires by an electric light wire. Another tenant, whose property was destroyed in the fire, received his insurance from the Stanstead and Sherbrooke Mutual Fire Insurance Co., but the latter brought an action against the Telephone Co to recover the amount, \$1,900. Judgment was given against defendants as they were held to be responsible for the outbreak of the fire.

NEW clocks are being placed in the cars of the Montreal Street Railway Co.

W. PETERS is installing an electric lighting plant in his saw-mill at Parry Sound, Ont.

THE St. John, N.B., Street Railway Co. opened the greater portion of its line for traffic on the 25th ult.

A. J. NELLES, of Brantford, Ont., has been appointed manager of the Hamilton, Grimsby & Beamsville Electric Railway.

PART of the machinery for the Montmorency Electric Power Company's St. Roch plant has arrived and been put in position.

THE Sackville, N.B., Electric Light and Telephone Co. have just put in a new alternating current dynamo capable of supplying 600 lights.

PORTAGE LA PRAIRIE, Man., Electric Light Co. are putting in an additional plant, which will increase the lighting capacity by about 1,200 lights.

THE Colonial Telegraph and Telephone Co. (Ltd.), Niagara Falls, have been incorporated. They will construct and operate telephone and telegraph lines, and will have a capital of \$25,000.

THE new electric railway from Niagara Falls town, Ont., to Lewiston will be built next spring. The president of the company which will take the work in hand is Capt. J. M. Brinker, of Buffalo.

H. BOYD has purchased the electric light and power plant formerly owned by McMillan & Oliver at Carberry, Man., and will carry on, in addition, a general machine and engine repairing shop.

AN employé of the Citizens' Light and Power Co., Montreal, was engaged in repairing an electric lamp, when he received such a shock that he fell to the ground and died a short time afterwards.

TORONTO city council are making arrangements for the electric lighting of the Island. They have already received two or three offers, and have requested the Reliance Company to remove their plant.

TRENTON, Ont., has passed a by-law granting \$6,000 for the construction of an electric power-house at the dam on the river, north of the town. It will supply light, and power for manufacturing purposes.

THE electric lighting plant which is being put in at the head of Sissiboo Falls, N.S., pulp mill will probably be utilized for supplying light for the town of Weymouth, also.

TORONTO city council have decided to ask the Judge of the County Court to hold an enquiry into the charges of "boodle" which have been made against certain aldermen in connection with the tenders for electric lighting.

THE Mattawa, Ont., Electric Light, Heat and Power Co. have purchased the water right belonging to McCool's mill. They will now have at their disposal the whole force of the Mattawa River, with a fall of from 13 to 15 ft.

LOUIS PARE, of Granby, Que., who owns several of the telephone lines in that vicinity, is now negotiating for the purchase of the telephone plant of St. John's, which he would connect with the "Merchants'" system of Montreal, on the latter's completion.

ROBT WELSHMAN, a clothiers' salesman, was riding a bicycle in Hamilton in too close proximity to the electric line, when he was struck by a car and knocked down. His chest was completely crushed in and death was almost instantaneous. He left a widow and two children.

THE South Shore Electric Company, St. Lambert, Que., are applying for incorporation, with a capital of \$25,000. The applicants are L. Tourville, Montreal, A. Hardie, Longueuil, W. B. Powell, St. Lambert (manager); H. Williams, St. Lambert (secretary), J. Horsfall, St. Lambert, F. Thompson, Montreal, and G. T. Burnett, Montreal.

AN old lease having been discovered for a railroad right of way along the river bank at Niagara Falls in which there is a provision that the line should pay to the village the yearly sum of \$10,000 as rental, the council now declare their intention to test whether this clause cannot be made to apply to the Niagara Falls Park and River Railroad as well.

FOR the past ten or eleven years Mr. A. Johnson, head of the Johnson Electric Co., and formerly manager of the Ball Electric Co., has had charge of the lighting of the Toronto Industrial Exhibition, a service that has been ably performed. At the last exhibition Mr. Johnson showed a 1,000-light alternating dynamo, a direct current incandescent dynamo, a Wagner high efficiency transformer, and fan motor, high voltage step-up and step-down transformers for power transmission, and arc dynamos. He also showed a sample of the Garton lightning arrester, and a special transformer for physicians' cautery work.

THE Montmorency Electric Power Co. set up one of its new dynamos for winter use a few days ago.

HUTTONSVILLE, Ont., Electric Light Co. is contemplating purchasing a new alternating current dynamo.

THE Galt and Preston Electric Street Railway Company will apply to the Legislature for power to increase their capital stock from \$50,000 to \$100,000, and to extend their line through Waterloo to Hespeler.

THE Toronto Electric Motor Co., 107 Adelaide street west, Toronto, are extending their premises to double their present size. These extensions are now being made, and when finished more hands will be taken on.

A COMPANY has been formed at Ottawa for the construction of an electric railway from Ottawa to Brockville. The power will be obtained from water-power at Ottawa, Manotick and one or two other points along the route.

PREPARATIONS are being made in Stratford, Ont., for the immediate erection of a large fire hall, in which will be installed the projected electric plant for the lighting of the municipality. This plant is to be put in at a cost of \$12,000.

JAS. DUNSMUIR, John H. Turner, Thos. B. Hall, F. W. McCrady, R. Menaugh, and Clinton Graham Ballentyne, all of Victoria, B.C., are engaged in floating a company in Hawaii to be known as the Honolulu Electric Railway and Power Co. (Limited), the first object of which will be to construct an electric system in that town. The capital is stated to be \$625,000.

As mentioned in our editorial pages, application is to be made at the next session of the Ontario Legislature for an Act to incorporate the Hamilton and Lake Erie Power Co., with the object of bringing water from Lake Erie, through the counties of Haldimand, Lincoln, Welland and Wentworth, to Hamilton, for water supply purposes and to generate electrical power. The solicitors for the company are Biggs & Lewis, Toronto.

MRS. AGNES HARTFORD is suing the Holmes Electric Protection Co., the Bell Telephone Co and the Toronto Electric Light Co. for \$25,000 damages for injuries owing to the falling of a live wire on King street west, Toronto. F. J. Cross, electrician to Cooper's Institute, New York, stated under examination, in this case, that he thought the system of insulation in vogue in Canada was not high class.

SEVERAL Hamiltonians, including J. W. Gage, Dr. Griffin, Dr. Bingham, and Myles Hunting, have been on a visit to Detroit investigating the Harris system of operating street cars in which they are interested. This system does away with poles and all overhead construction work, and the visitors were fully satisfied with it, and convinced that before long it would finally supersede the trolley system altogether.

THE Hamilton by-law, voting the Toronto, Hamilton & Buffalo Railway a bonus of \$225,000, was passed on the 11th instant by a majority of 279. There was a fairly large poll, and the contest was keenly waged throughout. The contract for building the line from Cainsville to Hamilton has been already awarded to Brazey Bros. & Co., Chicago, who agree to have grading completed by December 5th. Rails will be procured from England.

THE Hamilton and Dundas Street Railway Co propose, for a bonus of \$25,000 from Dundas, to convert their line into an electric road, with rails and roadbed heavy enough for steam trains. They would then run freight trains from the junction with the Toronto, Hamilton and Buffalo Railroad to Dundas. The bonus will be returnable to the town in second mortgage bonds. Mr. Osler also asks for a free grant of land for any additional track required, and a free site for a freight shed.

E. FRANKLIN CLEMENTS and others are applying to the Dominion Government for charters to confer power to build and operate an electric railway between St. John, N.B., and Yarmouth, N.S. The route proposed is from Yarmouth, following the shore to Weymouth, thence to Truro, Amherst, and into New Brunswick. Tidal water power is to be utilized, and it is hoped by the promoters, to reduce the expense of operating the road to one-half the usual cost of such lines.

W. F. FORSYTH, president of the Hamilton Electric Radial Co., on behalf of that company, has bought out the Niagara Central Railway, the price being \$400,000. The Radial company will make the thirteen miles of road between Niagara Falls and St. Catharines the first part of its system, and the first work will be to continue it into Hamilton. Seventy-two pound rails will be used, and the motors will be 40 tons, giving 500 to 1,000 horse-power. The next branches to be proceeded with after the above are those to Guelph and Galt.

THE Exchequer Court have decided against the Toronto Street Railway Co. in their suit against the Government to have \$56,000 which they had paid in customs duty on steel rails, refunded to them. Judge Burbidge held that the evident intention of the Government was to make such rails dutiable, and gave judgment for the Crown with costs, but the company was given a month to apply to have their entries brought under "unenumerated" list, which entitles them to a lower rate of duty.

As will be noted by his card in this issue, George White Fraser has opened offices in the Imperial Loan building, Adelaide St., Toronto, as consulting engineer and electrician. Mr. Fraser has been a practical electrician for many years, and has attained a reputation as an electrical engineer such as very few men of this continent have achieved. For six years he was with the Thomson-Houston International Company as the chief engineer, and was sent to the West Indies to make plans for and erect the largest electrical plants established in those islands. He was afterwards selected to go on a similar mission to Japan, where most important works were contemplated, but changes in the political situation there altered his plans, and he decided to return to Canada. He has had great experience in the designing and planning of central light and power stations and street railway work, and has been frequently called in as an expert in such works. Inasmuch as the work of an able engineer often saves a new company serious financial losses, and is the means of avoiding many mistakes in matters relating to construction and maintenance of works, there ought to be a good field in this country for the work that such a man as Mr. Fraser is qualified to do, and his qualifications as an engineer as well as an electrician should be a guarantee of success in his present venture.

THE Halifax *Chronicle* thus refers to the electrical exhibit of John Starr, Son & Co., at the recent exhibition in that city: "It is, perhaps, the most comprehensive exhibit in its line ever shown in Canada, and reflects much credit on that enterprising firm. The firm have their own dynamos (Lahmayer), run by a Robb engine. It is a 300 light machine and there are between 200 and 300 lights in the circuit, the lamps being the famous Starr lamp. Directly in front of the exhibit is a show board with the name of the firm in letters formed with 56 lamps, and when lighted it looks very pretty. Then there is an illuminated star with the word 'Starr' in the centre. The exhibit embraces electric self-winding clocks, which never need to be wound by hand, and which do their own winding every half hour; the 'Unique' telephone, of which the firm makes a specialty, and which are used for exchange, warehouse, private or other purposes; a portable desk telephone; the watchman's detector, which is claimed to be the only one made which the watchman cannot beat; an elaborate display of electric measuring and testing instruments, fan motors for large buildings or for ordinary shops or rooms; display of electric bells and electrical house fittings; electric light supplies and tools, curling tong motor, an article which should be popular with the ladies; portable electric lamps of neat design; case of telegraphic apparatus etc. The electric switch board exhibited is a superior one. Each circuit is under separate control. The telephone switch board is the firm's own manufacture. The principal point of note about it is that it is impossible for the shutters to fall unless a call is made. It is a very compact arrangement. Recently this firm supplied a board of the same kind, for 20 subscribers, to the Ontario Government, which is for use in the insane asylum at Mimico. They also supplied the telephones for the same."

## The Bell Telephone Co. of Canada, Limited

MONTREAL

Manufactures and has for sale every description of  
**Telephonic and other Electrical Apparatus**  
Line Material and Supplies

Will furnish tenders for supplying Warehouses, Public Buildings,  
Hotels and Dwellings with

Private and Local Telephone Systems, Burglar Alarms,  
Hotel, Elevator and other Annunciators, Hotel Room  
and Fire Calls, Electric Bells, Push Buttons, etc.

Will also furnish tenders to cities, towns and villages for

**FIRE ALARM AND POLICE PATROL SYSTEMS**

Catalogues will be furnished on application.

SALES

DEPARTMENT

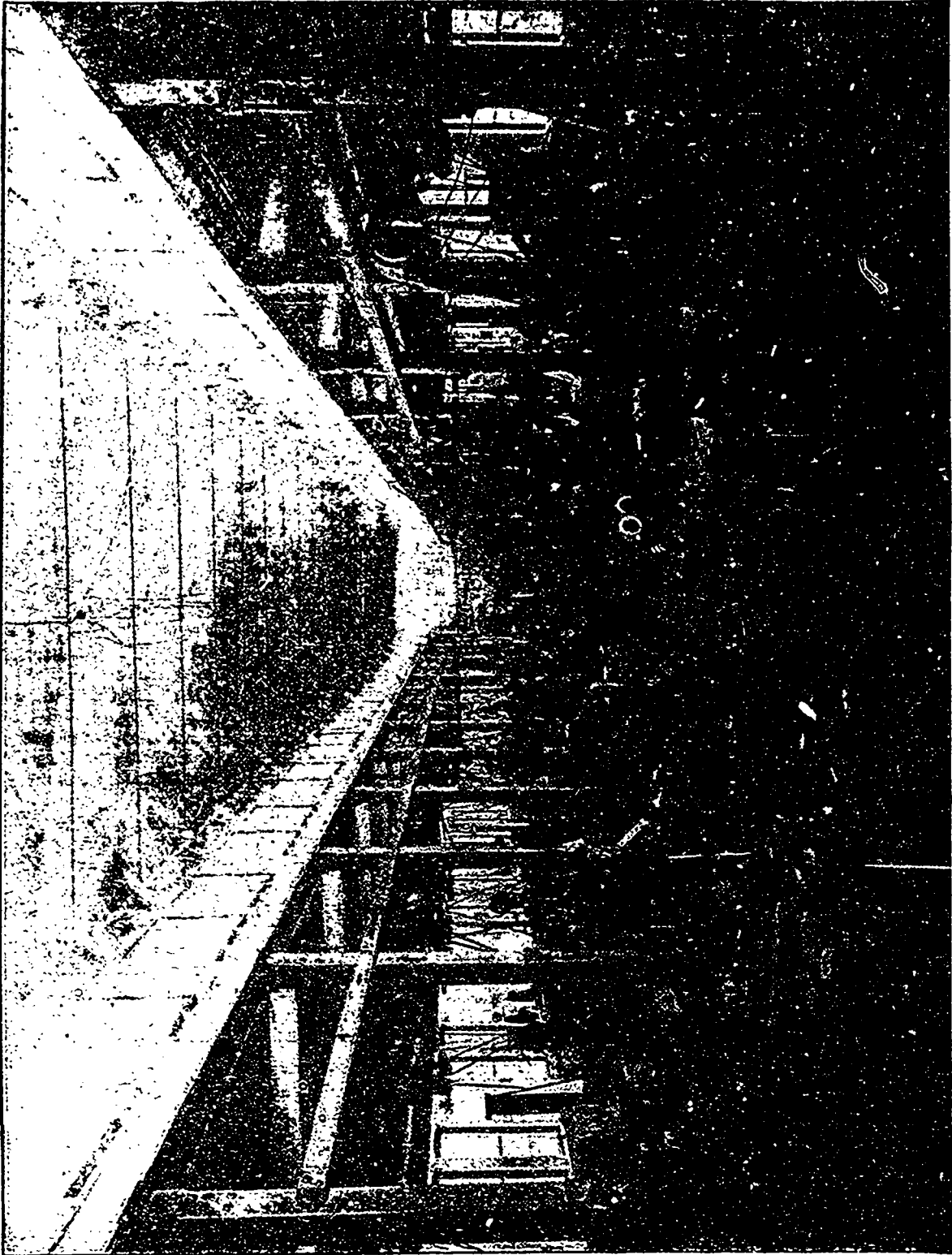
MONTREAL—Bell Telephone Building, 567 Aqueduct St.  
TORONTO—Bell Telephone Building, 37 Temperance St.  
HAMILTON—Bell Telephone Building, Hughson St.  
OTTAWA—Bell Telephone Building, Queen St.  
QUEBEC—Bell Telephone Building, St. John and Palace Sts.  
WINNIPEG—Forrest Block, Main St.

### STEAM PUMPING MACHINERY.

ITS MANUFACTURE IN CANADA AT THE WORKS OF THE NORTHEY MANUFACTURING COMPANY AT TORONTO.

With the steady and persistent growth of manufacturing in Canada has sprung up in the various provinces, notably in Ontario, Quebec and Nova Scotia, a corresponding extension of the home manufacture of pumping machinery. Prominently may be mentioned the important and large establishment operated by the Northey Manufacturing Co., Ltd., at Toronto, for the production of

with special and general tools for the manufacture of pumping and general hydraulic machinery. The tools used are all modern, and include duplex boring machines, gang millers, horizontal and vertical boring machines for large work, heavy planers, milling machines, lathes and the usual complement of tools used in modern machine work. At one end of the main shop is the tool room, where a large number of hands are constantly employed in the production of special tools, jigs, gauges, etc., required for the purposes of the business. The engine supplying power is located at end of the centre bay in machine shop, and drives two shafts run-



NORTHEY MANUFACTURING COMPANY'S WORKS—INTERIOR VIEW.

pumps, two excellent views of which are produced in this number. The Messrs. Northey commenced business in Hamilton as far back as 1842, and in 1852 the works were removed to Toronto. The rapid extension and success of the business, however, necessitated its incorporation into a stock company, and this was established in 1892, under the name of the Northey Manufacturing Company, Ltd.

The machine shop, 250 feet long and 75 feet wide, is divided into three bays, the centre one of which is used for travelling crane, surface railway and heavy tools. The two outer bays are equipped

with special and general tools for the manufacture of pumping and general hydraulic machinery. The tools used are all modern, and include duplex boring machines, gang millers, horizontal and vertical boring machines for large work, heavy planers, milling machines, lathes and the usual complement of tools used in modern machine work. At one end of the main shop is the tool room, where a large number of hands are constantly employed in the production of special tools, jigs, gauges, etc., required for the purposes of the business. The engine supplying power is located at end of the centre bay in machine shop, and drives two shafts run-

ning entire length of each side bay, leaving centre clear of shafts and belting, and free for the erection of machinery, and the operation of overhead crane. Testing tanks are conveniently located below floor level, and are supplied with cold and hot water, to allow of thorough tests of pumps for the various duties required. A test pressure is put on all pumps very much in excess of that which they are required to work under, and each machine is shipped in perfect working order, and requiring no further adjustment.

The building shown in left foreground of engraving is the pat-

tern shop, which is thoroughly equipped with power machinery for wood working. Adjoining the pattern shop are the public and private offices, and draughting-room, the latter is fitted with drawing tables, cabinets for finished drawings, and for supplies, and complete equipment for the making of blue prints. The main and private offices are spacious rooms, handsomely furnished, and finished in natural woods. The main office is provided with a large plate glass window, with cut glass heading, which commands a view of the entire length of machine shop. At the further end of main building are the boiler house, smithy and brass foundry, all specially adapted to their purpose.

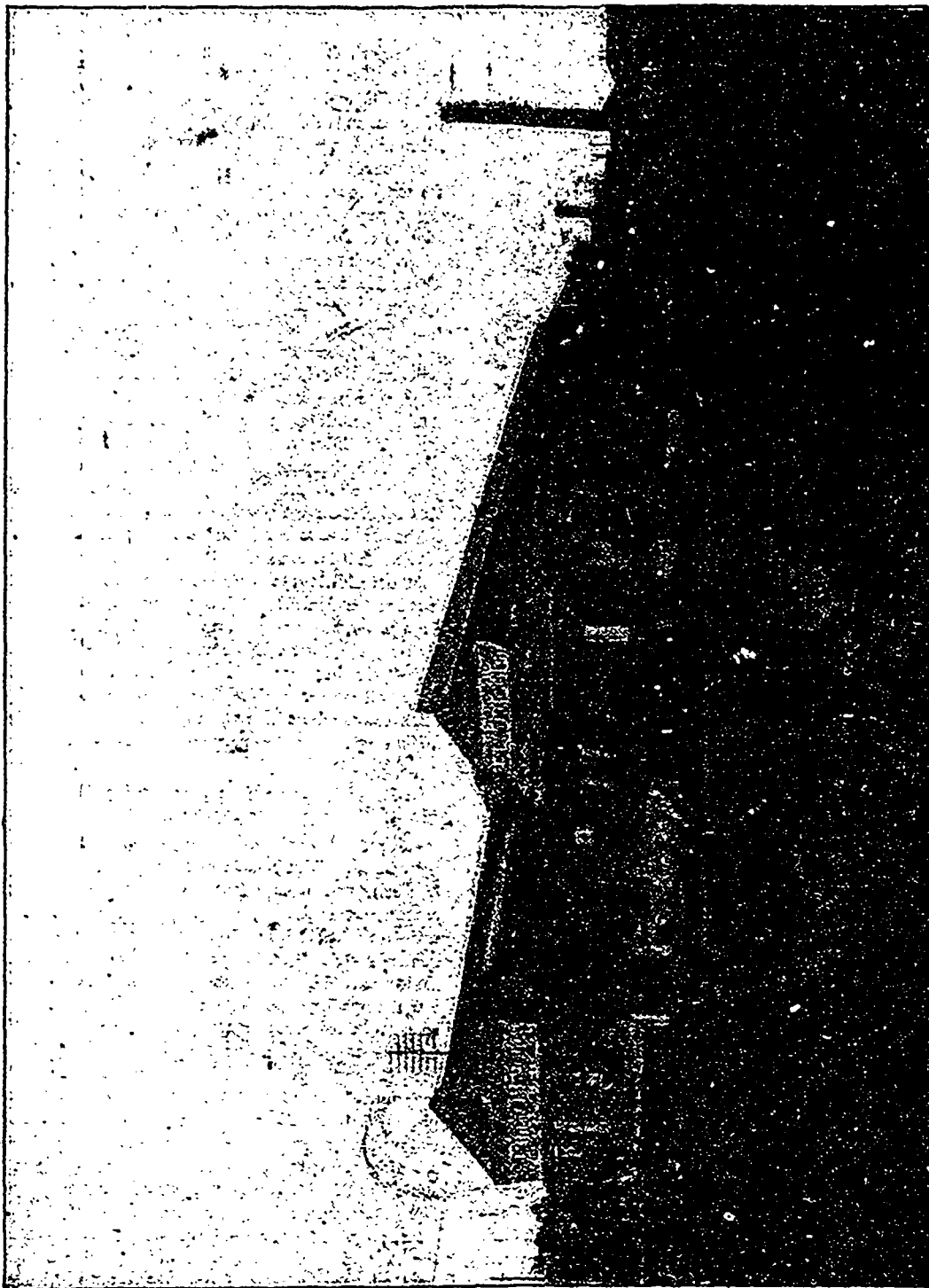
A very marked characteristic of the works is the ample light obtained at all points by the judicious arrangement of skylights and windows, and the shops being lofty and well ventilated, pre-

order for important pumping machinery for some of the large Canadian mines, and for numerous manufacturing concerns. They make a specialty of pumps of all classes, and up to the largest sizes.

#### CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

TORONTO BRANCH NO 1—WINTER PROGRAMME.

The above association has held two successful meetings during the month, Bro. E. J. Philip in the chair. Two proposals for membership; one candidate initiated. Interesting discussions have taken place on the tubing of boilers, from drawings prepared by Bro. A. E. Edkins; also on electricity and slide valve engines. Toronto No. 1 is growing rapidly in membership. The Educational



NORTHEY MANUFACTURING CO.'S NEW PUMP WORKS—OUTSIDE VIEW

sent a marked contrast to the old-fashioned, dingy and crowded quarters so frequently considered quite suitable for machine shop premises.

The Northey Manufacturing Co's shops were erected from special designs prepared by Mr. E. J. Lennox, of Toronto, and are consequently very fully adapted to the requirements of the business. The firm's trade has experienced a healthy and continuous growth, their pumping and other machinery being universally recognized as quite equal to standard English or American makes. We are pleased to note that they have lately been entrusted with

Committee reported that during the coming winter papers will be read the first meeting in the month, as follows: In November, on "Mensuration," by Bro. E. Philip. In December, on "Boiler Setting," by Bro. G. Gilchrist. In January, on "Safety Valves," by Bro. W. G. Blackgrove. In February, on "Belting," by Bro. G. Fowler. Other papers will be announced later on. Discussions will also take place on lectures to be published in *Power*.

W. G. BLACKGROVE, Cor. Sec.

INTERESTING PAPERS READ IN HAMILTON.

Bro. Wm. Norris, corresponding-secretary of Hamilton Branch

No. 2, writes as follows: At the regular instruction meeting a very interesting time was spent, and a valuable paper was read by Mr. McKinley, chemist on "Boiler Compound", also one by Bro. G. W. Mackie on the "Rivals of the Steam Engine." We intend having a series of these meetings through the winter, and the committee in charge is likely to make them a grand success. The following is Mr. McKinley's paper:

In considering the value of boiler compounds two things should always be known—first, the nature of the scale, second, the chemical and solvent action of the mixture on that scale. The scale on the boiler represents the insoluble part of the total solid of the water used, with the suspended mineral and vegetable matter. As these insoluble salts differ both in quality and quantity in various waters, so must the quantity and amount of the scale for need vary. In some districts the amount of insoluble solids in a water will be represented by from 2 to 5 grains per gallon, others from 20 to 25 and even higher, thus showing that it is unprofitable to use the same amount of boiler compounds in all localities. It may be supposed that scale is formed only by precipitation from the evaporation of the water, to such an extent that all the total solids are thrown out of solution, but the precipitate begins to form long before this. When a solution containing the insoluble salts of lime, carbonate hydrate and sulphate is raised to the boiling point, approximately half of the salts are precipitated without any evaporation, because the lime salts are much less soluble in boiling than in cold water. Hydrate lime soluble in cold water, 750 parts hot, 1,650 parts; sulphate lime soluble in cold water, 400 parts hot, 500 parts; carbonate lime soluble in cold water, 23,000 parts hot, 40,000 parts. There is no doubt that most of the scale is formed during the night when the water is in a quiet state, as it then has a better chance to become firmly attached to the flues and sides of the boiler. The chemical nature of the scale for the Hamilton district may be represented by: Carbonate of lime, 65 per cent, carbonate of magnesia, 20 per cent., sand 3 per cent; sulphate of lime, 4 per cent., oxide iron and alumina, 2 per cent.; invisture, 6 per cent.; total, 100. In a boiler or series of boilers using, say, 1,000 gallons of water per day, the deposit would be for Hamilton district 9,000 grains of one pound, or in one week six pounds. There can be no doubt that in blowing off most of this is removed, but the layer in immediate contact with the metal is not disturbed. In a boiler with thick, hard scale, the cheapest way to remove it is with a chisel or instrument for the purpose, then follow with a good compound. In a clean boiler a good compound should prevent the precipitate from settling into a hard state and prevent it from growing. It must be remembered that it is easier to prevent a precipitate than to dissolve one when formed, and also in a hard slate-like scale only the surface is acted upon; while the precipitate is suspended it is subjected to the full action of the solvent. A boiler compound may have a three-fold action, a slight chemical, a solvent and a mechanical action. This slight chemical action may change some of the salts and thereby retard the formation of scale; but in the majority of cases the solvent and mechanical action are the two important factors. The best solvents are caustic soda, chloride, ammonia, hyposulphite soda, chloride soda and sulphate of ammonia. The best mechanical agents are bark extracts, molasses and glycerine. In all probability the most effectual work of a compound is to keep the precipitate from settling hard. Suppose you have a week's precipitate or seven pounds in the boiler, and you have used through the week four gallons of a compound, carrying eight pounds of caustic soda, chloride soda, etc. These salts having a strong affinity for water, keep the precipitate soft, so it is readily detached when blowing off. If the precipitate consists of clay and sand, with a small percentage of lime, salts, bark extracts and molasses are the most satisfactory things to use. When the water contains carbonate of lime I would not advise using carbonate of ammonia or soda in the compound, as carbonate of lime is very insoluble in water containing alkali carbonates, the solubility being about one in 65,000 parts. I submit the following formulas for compounds. No. 1—Caustic soda, 30 pounds, (salt) chloride soda, 30 pounds, oak bark extract, 5 pounds; water, 15 gallons. Use two gallons twice a week. No. 2—Chloride ammonia, 10 pounds, molasses, 50 pounds, water, 10 gallons. Use two gallons twice a week. In the discussion that followed Mr. McKinley said that he thought there was no composition with which a boiler could be painted to prevent scale from adhering; also that sal soda (washing soda) helped rather than prevented scale. G. W. Mackie's paper was then read on the "Rivals of Small Steam Engines." The rivals mentioned were the gas or explosive engine, compressed air motor and electric motor. He explained their action and relative cost per indicated horse power per hour.

CARLETON PLACE AND PENETANGUISHENE MOVING.

Bro. A. E. Edkins writes, under date 27th October:—

"I have for some time been in communication with engineers in Carleton Place with a view to starting a branch of the C.A.S.E. there, and I am pleased to be able to report that on October 20th a meeting of engineers was held in Cliff's Hall, and the advisability of forming a branch association was fully discussed. A committee was appointed to interview all engineers in the vicinity and ask them to attend a meeting to be held October 27th for the purpose of organization. I am expecting to receive the names of charter members shortly, and it is very probable that Carleton Place, No. 16, will be instituted about the same time as Brockville, No. 15.

"The engineers of Penetanguishene are also thinking of organizing. I saw Bro. Coady a few days ago, and he has been up there talking to them, and we expect soon to see an association there.

"ALBERT E. EDKINS,

"Prov. Dep. C.A.S.E."

#### THE BROCKVILLE BRANCH.

Before THE CANADIAN ENGINEER goes to press next month, I hope to be able to report the organization of new associations in Brockville and Carleton Place. I have visited Brockville a number of times, and often tried to interest some of the engineers in forming a branch of the C.A.S.E. there. I was there on business about the latter part of August, and met Mr. W. F. Chapman, chief engineer for the Brockville Carriage Company (whose kindness to the writer will never be forgotten), and I took the responsibility of inviting him up to Toronto to attend the convention, which he did. On returning home again, he at once commenced work in earnest, and, after a few communications with him in reference to organization, I was most pleased to receive an application for a charter. I am just in receipt of a full list of officers and members from Mr. James Aikins, the secretary-elect of the new association. The association will start with sixteen charter members, composed as follows: W. F. Chapman, president; George Whitney, vice-president; James Aikins, recording secretary; Chas. Bertrand, financial secretary; A. H. Franklin, treasurer; Edward Devine, conductor; Albert E. Henry, doorkeeper; M. Turkington, J. Grundy, E. Carr, trustees; James Runnings, R. Turkington, W. Robinson, James Window, W. Stanley Beaverstock, and D. G. Donovan. Several other engineers in the vicinity have signified their intention of joining the association when it is organized. Brockville Association No. 15 will be a valuable addition to the order, and under the direction of their worthy president, Bro. W. F. Chapman, its success is fully assured. I am pleased to see the name of A. H. Franklin among the officers as treasurer. Bro. Franklin is a veteran engineer of over forty years' standing, and at the present time is chief engineer in the Brockville water works. I shall be glad to hear from engineers in other towns where there is any prospect of starting associations, and will give them the necessary information with pleasure.

ALBERT E. EDKINS,

Prov. Dep. for Ontario, 139 Borden-st., Toronto.

#### SECESSION IN MONTREAL.

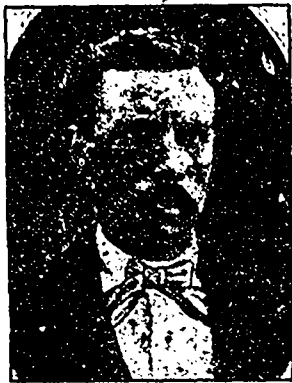
A meeting of St. Laurent Branch, Montreal No. 2, was held on 29th Oct., to discuss matters of difference that have lately arisen between some members of this branch and the executive. The executive president, John J. York, presided. It appeared that a majority of the members of this branch wished to form a mutual benefit association as a part of the existing organization, but this subject was discussed at the recent convention in Toronto, and it was the opinion of the majority that it would be unwise to make such a departure from the primary idea of the association as a means of education and mutual improvement. At the present meeting the members who wished to form the mutual benefit association insisted on carrying out their plan, and the result was a secession of those members. Mr. York expressed his great regret at their action, and thought that the seceding members would find they were throwing away the substance for the shadow in withdrawing from the community of engineers and embarking in a scheme of doubtful financial advantage. Some ten or eleven members announced their intention of remaining faithful to the association, and they retained the books and property, so that "St. Laurent No. 2" still exists, and will no doubt attract a number of new members, while, perhaps, regaining some of the seceding ones, as experience may show what advantages have been lost. Very few expressions of unfriendly feeling found utterance from the seceding members, who have quietly formed themselves into a "Société Mutuelle d'Ingenieurs Mecaniques de la Province de Quebec" (Mutual Society of Mechanical Engineers of the Province of Quebec). It may be stated that both the seceding and remaining members of this branch are French-speaking.

At the last meeting of Montreal No. 1 it was announced that preparations are being made for a series of lectures on subjects connected with steam engineering, to be given at intervals during

the coming winter S. C. Stevenson, secretary of the Council of Arts and Agriculture of Quebec, is interesting himself in the matter, and it is proposed to have part of these lectures in English and part in French. Three gentlemen have already promised papers, and it is hoped that the programme with dates of the lectures will soon be ready for publication.

A. C. McCallum, of the Wm. Hamilton Mfg. Co., Peterborough, is giving a series of lectures to the Peterborough branch C.A.S.E. on the indicator. These lectures will be very instructive.

At a meeting of the Kingston branch on the 17th ult., H. Breck, jr., read a paper on the "A.B.C. of Electricity," with special reference to the electric magnet in relation to the permanent magnet. Four new members were initiated.



THOS. P. THOMPSON, of Kingston, who has been appointed by the Dominion Government as steamboat inspector of boilers and machinery for Lake Ontario and adjoining waters from Cornwall to Port Hope and Peterborough, was born in Quebec, and is widely known on the Canadian lakes and rivers. He was for a number of years mechanical superintendent of the St. Lawrence Steam Navigation Co., whose boats ran on the St. Lawrence and Saguenay. Before this he was with the Gulf Port Steamship Co., of Montreal and Quebec, as chief engineer. He also spent a considerable time on salt water. In 1890 Mr. Thompson went to the Richelieu and Ontario Navigation Co. as mechanical superintendent, in which capacity he had the mechanical supervision of all the boats from Toronto to the Saguenay. As mentioned last month, his successor is Gilbert Johnston. In accepting the Government appointment, Mr. Thompson was the recipient of the following resolution passed by the board of directors of the R. & O. N. Co.: "That this company regrets the loss of the services of its late mechanical superintendent, T. P. Thompson, consequent on his accepting the position of steamboat inspector at Kingston. The company desire to record its appreciation of Mr. Thompson's valuable services during his connection with the company, and trusts that his future advancement may be as great as they feel his qualifications deserve."

#### CANADIAN SOCIETY OF CIVIL ENGINEERS.

The first meeting of the present session took place at the society's rooms in Montreal, on Thursday, the 11th October, President Peterson in the chair.

The first business transacted was the appointment of scrutineers for the balloting for new members, the result being as follows:—

NEW MEMBERS.—John Edington, Moncton, N.B.; J. F. Gardin, Vancouver, B.C.; David W. Robb, Amherst, N.S.

Transfer from class of associate member to class of member: Aquilla O. Graydon, London, Ont.; John Hislop, Newhall, Cal.; C. M. Odell, Mabou, C.B.; E. A. Rhys-Roberts, Hamilton, Ont.

Transfer from class of students to class of associate members: Wm. Newman, Windsor, Ont.; J. R. Pedder, Toronto.

Students.—C. J. Armstrong, Montreal; Sydney M. Johnson, Stratford, Ont.; J. G. H. Purves, North Sydney, N.S.; E. A. Sullivan, Sault Ste. Marie, Ont.

The question of a new building for the Canadian Society of Civil Engineers was then brought up for discussion, some members favoring the erection of an entirely new building and some the enlargement of the present one.

A resolution was brought forward by Mr. Sproule, seconded by Mr. Irwin, that the council should call a meeting to obtain authorization enabling them to act in the matter of buying a lot, and to transact any other business relating to permanent quarters for the society.

A paper by D. A. Stewart on "Building Railways across Peat

Bogs or Swamps" was then read, further references to which are made elsewhere.

Mr. Peterson related how once, in order to see how much weight such a soil would bear, a disc was made, and put down in the ground at a certain depth, the amount being calculated from that. In most cases the weight had forced it down to rock-bottom. There must be several such interesting experiences among engineers in various parts of the country, and he wished they would relate them for the benefit of the society.

Another meeting was held on the 25th ult., President Peterson in the chair, when there was a large attendance.

Several donations of books were announced by the librarian.

A letter was read from Mr. Willis Chipman, drawing the attention of the society to an advertisement which had appeared in some of the newspapers to the effect that engineers were invited by the chairman of the Water Committee of St. Lambert (opposite Montreal) to tender plans and information with regard to a system of water works and drainage for that village, and requesting them to state what their terms would be in the event of acceptance of their schemes. Mr. Chipman stated that he had noticed with regret that some engineers in this country were in the habit of accepting work of this character, which he thought unprofessional in the extreme. He would like the society to express an opinion on the subject.

Mr. Sproule remarked that the actual facts of this case were even worse than were apparent in the advertisement. From what he had heard on the best authority, he gathered that the chairman of the Water Committee had very little idea of paying for any suggestion they might receive. The consequence was that half a dozen engineers might spend time and money in preparing plans and yet no remuneration was likely to reward them for their trouble. He did not say that such possible unprofessional conduct on the part of engineers was intentional; more probably it would be done unthinkingly, without knowing that it was discountenanced by the society.

Mr. Irwin did not see what steps could be taken by the society in the matter.

Mr. Peterson remarked that it was a subject of the highest importance, and thought there ought to be a definite expression of opinion by the society against such conduct. Such a course on the part of the society would tend to elevate the society to a higher standard, and the public would gain the idea that if a civil engineer were a member of that society, he could always be depended on. He had always felt the fact keenly that, whereas members of other professions—doctors, lawyers, etc.—had work come to them without asking, engineers had to seek work. That state of affairs was not as it should be.

Mr. Sproule thought that not only would the proposed decision of opinion benefit the engineers themselves, but it would also be an advantage to the municipalities. The case of architects, who often submitted designs without receiving fees, looked similar, but it was not really so, for whereas in planning a building there were a hundred and one ways of doing it, in a system of waterworks it would generally be found that there was one right scheme, and one only.

After some further discussion, a committee was appointed to draw up a brief resolution on the subject.

Mr. H. Irwin then read "Notes on some Retaining Walls in Montreal," in which he endeavored, with the aid of several diagrams, to trace the causes of a few failures in such walls. The paper contained a large amount of valuable information, but was of such a nature as not to admit easily of condensation.

Mr. Heckman said the paper was evidently one which had taken a great deal of time and trouble to prepare, and he moved that Mr. Irwin should receive a vote of thanks.

The discussion on Mr. D. A. Stewart's paper on "Building Railways across Peat Bogs or Swamps" was then taken up.

Mr. Cyril Smith spoke of some methods of unloading material for filling in trestle-work.

Mr. Irwin related a case in Montreal in which a large building had been erected on grass sod and greasy clay.

Mr. M. J. Butler thought it best to leave the surface of boggy ground practically undisturbed, merely laying the timber irregularly across.

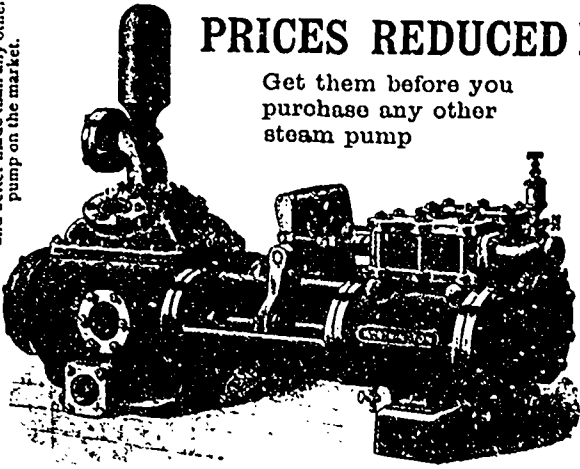
Pres. Peterson thought it would be a good plan, seeing the interest and importance of the question under discussion, to gather information from non-resident engineers. The engineers all along the C.P.R., for instance, could relate many instances of trestle-work being laid at various spots under great difficulties, and sometimes under circumstances necessitating great rapidity.

It was resolved to do this, and postpone further discussion till another meeting.

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*HARVEY GRAHAM, Secretary*

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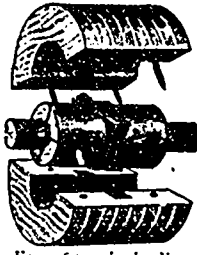
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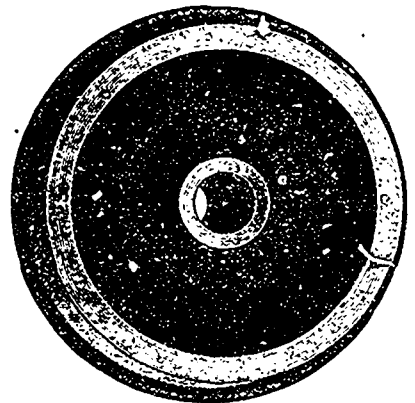
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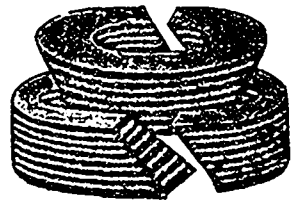
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## Industrial Notes.

THE new grist mill at Lanark is completed and the machinery is being put in.

THE Sydney, N.S., *Advocate* suggests the erection of a roller flour mill in that town.

E. S. BURTON and W. R. Miller are starting a silver-plating works in Belleville, Ont.

A NUMBER of new hydrants are being set up at Amherst, N.S., for fire protective purposes.

A NEW Roman Catholic Church is to be erected at St. Paul de Chester, Que., at a cost of \$30,000.

A NEW bridge is to be built next spring over the river at Bracebridge, Ont., at a cost of \$25,000.

THE new Valley Foundry, owned by Joseph McAfee, Paradise Row, St. John, is now in working order.

As the result of the establishing of a creamery in Renfrew, a butter tub factory will likely be established in that town.

THE machinery for the new saw mill at Virden, Man., is being placed in position, and the mill will shortly be in operation.

A BY-LAW authorizing the expenditure of \$120,000 in widening Queen street subway, Toronto, was carried by a large majority.

W. H. TODD's carriage and blacksmith shop at Goodwood, Ont., has been destroyed by fire. Loss \$10,000. Insurance \$4,000.

E. BOUCHER, hardware merchant, Sherbrooke, Que., has assigned on demand of James Robertson, Montreal. Liabilities, \$11,000.

THE Altona, Ont., Farmers' Elevator Co. (Ltd) has been incorporated, with a capital stock of \$5,000. An elevator will be erected shortly.

THE machinery for the smelting works at Hamilton is now arriving from Philadelphia. The work of erecting the plant will now commence.

THE contract for building the new academy building in Lunenburg, N.S., has been awarded to Mr. Treen, of North Sydney, C.B., the price being \$23,000.

THE Ontario Wind Engine and Pump Company, Toronto, has been incorporated. Capital stock, \$40,000. It succeeds the late Ontario Pump Company.

C. St. JEAN, architect, Montreal, calls for tenders for the construction of a 5-storey stone workshop for the Deaf and Dumb Institute, Outremont, Que.

MCINTYRE & CAMERON's grist mill at Clarence, Ont., has been totally destroyed by fire, which originated in the engine-room. Loss, \$5,000; partially insured.

THE Northern Elevator Company's elevator at Portage la Prairie, Man., has been destroyed by fire, together with 20,000 bushels of wheat. Loss \$25,000.

THE Toronto *World* is agitating for the removal of the present St. Lawrence Market building in that city and the construction of another, furnished with greater conveniences.

ST. HENRI, Montreal, council have agreed to continue the exemption of the Williams Sewing Machine Co.'s works from taxation for an indefinite period. Since starting, the company has paid out \$900,000 in wages.

THE mayor of Leamington, Ont., and Charles Coultis, G. F. Cronk, W. J. Smith, and James Baker, councillors, have been appointed a committee to ascertain the expense of running the water-works and the electric light plant together in that village.

W. C. WHITE's boiler-making factory, Montreal, has been destroyed by fire, together with some valuable patterns. Loss, \$7,000; mostly insured. The Glasgow lead works, occupying the front part of the building, were badly damaged. Cause of fire unknown.

J S PLAYFAIR & Co. have purchased the large saw-mills at Midland, Ont., and have signed a contract for ten years to supply to a Saginaw, Mich., man, 20,000,000 feet of lumber annually. The planing mill and box factories at Midland will probably be reopened immediately.

WM BROWN, carriage hardware merchant, Toronto, has assigned to E R C Clarkson, as the arrangement made with his creditors a few months ago could not be carried out owing to dullness of trade. Liabilities \$30,000, with assets about the same or slightly greater.

A NEW bridge is to be built over the river at Byron, Ont.

THE Metallic Roofing Co., Montreal, are thinking of removing their factory to Toronto.

MR. DUMAS, of Upper Grand Anse, N.B., is building a starch factory at Lower Grand Anse.

J. E. TANGUAY, Quebec, is engaged in preparing plans for the proposed new Quebec city hall, which is to cost \$125,000.

THE bridge across the Bonneau River, at the head of Golden Lake, is now completed, and traffic is daily passing over.

WARDEN, KING & Co., Montreal, have been awarded the contract for supplying three furnaces for the basement of the City Hall.

THE Toronto Glass Co will erect a new furnace for flint glass if the city council will exempt it from taxation for a term of years.

A. CHARLEBOIS, Ottawa, has secured a contract for the erection of a two-storey convent in Hawkesbury, Ont. The price is \$4,000.

WEALE & BRAKIE, Welland, Ont., have the contract to build the new St. Patrick's Church at Niagara Falls, the price being \$20,000.

D. HOLLAND, Moncton, N.B., has secured the contract for roofing the Parliament buildings at Fredericton, N.B., with sparham cement.

A COMPANY has been formed for the purpose of building and operating a giant-powder factory on Slocan Lake, near New Denver, B.C.

BROWN & TURNER, who have the sub-contract for supplying the curbing for Hamilton streets, have put up a planing plant to facilitate the work.

A RUMOR has it that the water power at the outlet of Knowlton Lake, Que., is to be utilized, and that one or two factories are shortly to be erected.

ACTION is being taken in the Montreal courts to invalidate the recent deal by which the Consumers' Gas Co. was absorbed into the Montreal Gas Co.

MARK's carriage factory at Moncton, N.B., has been destroyed by fire. Loss, \$12,000; insurance, \$4,000. No. 1 Fire Hall, close by, was damaged by fire and water.

THE Richmond, Que., Water-Power Co. think of starting a factory for the manufacture of wooden and leather trunks, in which from 20 to 40 hands will be employed.

THE Ontario Natural Gas Co., Kingsville, have arranged to supply Detroit city with gas by way of pipes laid under the Detroit River. The work will cost about \$50,000.

THE village of Shediac, N.B., is putting in a water service for fire protection purposes, the supply being obtained by windmills from Barachois, about two miles distant.

MONTREAL Masons, amid great rejoicing, last month laid the corner-stone of the new Masonic Temple to be erected in Dorchester street. It is hoped to complete the building by April next.

THE new machinery for the Lake of the Woods Company's barrel factory at Keewatin, Ont., is being placed in position. It is of the best design, and will greatly increase the mill's capacity.

J. A. MCMURTRY, hardware merchant, St. Thomas, Ont., has assigned. The unsecured claims amount to between \$12,000 and \$14,000, and the secured claims to \$8,000 or \$9,000. Assets about \$11,000.

AN American firm of bicycle manufacturers propose to establish a branch factory in Hamilton, and are asking the city council to secure stock to the amount of \$150,000. It is not likely the city will bite at the bait.

THE Toronto Machinery Supply Co. is the name of a new company starting business in that city. The manager is A. J. Lindsay. They will deal in general machinery and supplies, both new and second-hand.

A. W. GLASSFORD, brass goods and plumbers' supplies, Craig street, Montreal, has held a meeting of his creditors at which he makes an offer of 33 $\frac{1}{3}$ % in the dollar. Glassford represents the James Morrison Co. of Toronto.

GEO SNOWBALL, of the Snowball Wagon Works, St. George, Ont., is thinking of removing his factory to Hamilton. He would employ from thirty to fifty men all the year round, and asks for cheap water and for exemption from taxation.

THE Crown Pressed Brick Co. (Ltd), Ottawa, have received letters of incorporation. Capital stock, \$100,000; the company will manufacture and deal in bricks, terra cotta ware, fire-clay goods, tile, drain pipes and pottery of all sorts.



THE new bridge at Nithville, Ont., is reported finished.

THE Auer Incandescent Light Co. are forming a local company in Winnipeg.

THE Hantsport, N S, Foundry and Machine Co. are winding up their business

R McDougall & Co., Galt, are building a three-storey addition to their pump and furnace works.

A BY-LAW has passed at Bowmanville, Ont., granting a bonus of \$5,000 to the Dominion Organ and Piano Co.

THE Safe Lock, Metal, Shingle and Siding Co. (Ltd.), Smithville, Ont., has been incorporated Capital, \$3,000

THE Montreal Paper Co, whose mills are located in Sorel, have failed. Liabilities, \$7,000 A winding-up order has been issued

BROWN, MUNRO & Co, agricultural instrument makers, Wolfville, N S., have assigned. Liabilities and assets each about \$15,000.

THE Phoenix Printing Ink Co, Montreal, has been incorporated for the purpose of manufacturing printing and lithographic inks, etc. Capital stock, \$20,000.

HALIFAX city council last month summarily dismissed the whole fire department, owing to the refusal of the Union Engine Co. to obey an order of the council.

EFFORTS are being made to keep the axe factory of E Broad & Son, in St Stephen, N.B It is proposed to operate the factory under a joint stock company.

DARLING, SPRATT & PEARSON, architects, Toronto, are preparing plans for the rebuilding of St. Andrew's Church, Beleville, Ont., which was recently destroyed by fire.

THE Pictou, N.S. Iron Foundry Co. are endeavoring to dispose of their business, which includes general foundry and machine work, boilermaking and blacksmithing.

DUROCHER Bros., machinists of Cornwall, Ont., have put in a new 30-inch iron lathe from John Bertram & Sons, Dundas. Mr. Durocher says it does its work in fine style.

THE James Smart Manufacturing Co Brockville, Ont, have taken over the Brockville Wringer Co.'s stock, and will in future carry on the latter's business as part of their own

KNIGHT & LOWE's saw-mill at Fourth Chute, Ont., has been burned down, together with some valuable machinery which had lately been put in Loss, \$11,000; insurance, \$4,000

THE Georgian Bay Portland Cement Co. (Ltd.), Owen Sound, has been incorporated. Capital stock, \$95,000 They will manufacture and deal in cement, putty, whiting, bricks and drain-tiles.

THE Canadian Fire Extinguisher Co. are applying for incorporation, with a capital of \$50,000. The applicants are J. S. Bousquet, Moses Davis, O Marin, G. Hughes, L. Rolland, and N. J. Cote.

THE St. Catharines *Journal* reports that Battle & Newman have been awarded the contract for taking down and rebuilding the piers at Port Dalhousie The cost of the work will be between \$60,000 and \$70,000, and will take two to three years to complete.

H M SMALL and H. B. Teed, manufacturers of asbestos soap and soap powders, Baldwinville, Mass, are establishing a branch factory in Yarmouth, N S The local business will be put in charge of S P Hall, of Yarmouth.

BISHOP BOND, A F Gault, F W. Thomas, all of Montreal, and J. B Forsyth, Quebec, are applying to the Legislature for authority to erect and maintain in Montreal a charitable church institution, to be known as "The St Andrew's Home"

WITHROW & HILLOCK's planing mill and refrigerator factory at Toronto was damaged by fire, on the 28th ult., to the amount of \$10,000. No insurance. The fire is supposed to have been of incendiary origin. The assignment of the firm was noted last month.

JOHN AYLESWORTH, inspector of roads and bridges for the Ontario Government, has visited the site of the proposed Howe Island bridge, near Kingston, and it seems likely if the Dominion Government will agree to build the bridge, that the Ontario Government will give a grant in aid of its construction.

It was reported last month that Mr. Birkett, of the Kingston Locomotive and Engine Works, was going into the manufacture of bicycles, but that gentleman has relinquished the design in favor of the Kingston Vehicle Co. who are now putting in a complete bicycle plant, which will be operated in connection with their new carriage works. They expect to be in full working order in December.

WITHROW & HILLOCK, lumber merchants and refrigerator-makers, Toronto, whose failure to come to an arrangement with their creditors we announced in last number, have assigned now to A. A Wright, secretary of the Victoria Lumber Co

TORONTO city council have awarded the contract for 1,000 ft. of "Baker Fabric" fire hose, at 85 cents per foot, to the Gutta Percha and Rubber Mfg Co, Toronto, and another for 1,000 ft of "Paragon" hose at the same price to the Toronto Rubber Co

THE Sherbrooke, Que., Gas and Water Company have declared a half-yearly dividend of 3 per cent. R W Heneker has been re-elected president of the company, T J Tuck, vice president, and Andrew Sangster has been elected superintendent, and E. F. Waterhouse, secretary-treasurer.

JOHN PUGSLEY has purchased the building and plant of the Napanee, Ont., Pulp and Paper Company, both at Napanee and Fenelon Falls, and, after extending and improving the properties, will re-commence operations. A new bleaching house is being erected at the Falls now

THE Maritime Auer Light Co (Ltd.) are applying for incorporation, with a capital stock of \$40,000. The promoters are W. H Thorne, W. C. Pittfield, S. Hayward and F. Pittfield, all of St. John, and Arthur O. Granger, of Montreal The company's offices will be at Fairville, N B

IN the Moncton Gas and Water Company arbitration case, the arbitrators took a middle ground between the offer of the city and the demand of the company The latter wanted at least \$700,000 and the city offered about \$240,000, whereas the arbitrators adjudged the value at \$343,000

TWEED, Ont, village council have given a contract to the Waterous Engine Co., Brantford, for a fire engine. The matter of fire protection has been under discussion since last July, when a conflagration caused a great deal of damage in the village owing to the absence of proper apparatus

THE committee of the city council appointed to go into the question of the lighting of the city by the corporation, have recommended that in case the city undertake the lighting the tender of the Bertram Engine Works Co. be accepted for the triple expansion engines required.

THE Reid Bros.' Manufacturing Co. (Ltd.), Toronto, capital stock \$50,000, have been incorporated for the purpose of manufacturing billiard and pool tables and supplies, bowling alleys, cricket bats and balls, lacrosse sticks, lawn tennis, rackets, etc., also the Reid Bros.' patent bent rim wood split pulley.

A SKATING rink 70 x 170 ft. has been put up at the Rockwood Asylum, Kingston, for the benefit of the patients A new infirmary has also just been finished. It is a handsomely finished edifice of stone, 48 x 70, with a wing 23 x 53, and two stories high The equipments are of the most modern order

COSSITT Bros., Brockville, have now got in swing with the manufacture of the McCormick harvesting machinery, for which they are sole representatives in Canada They have made extensions to their premises and put in new machinery, including a double surface planer from Galt.

A. J. MADDEN, of the United Marble Mfrs.' Co., Chicago, will organize a Canadian company for the purpose of starting branch factories at Hamilton, Ont., and in Albert county, N.B The process employed in this manufacture is to harden and polish gypsum until it becomes very similar to Italian marble, but it is stated to be cheaper than wood.

THE Queen City Oil Co., of Toronto, are steadily increasing their shipments of oil to Australia, where their products bring 5d. more per gallon than other oils for agricultural machinery purposes. The company's general business has increased largely over that of last year. They now have offices and barrelling stations at Ottawa, Montreal, Hamilton, Fort Erie and Brockville.

SOME American capitalists propose to establish a large pulp and paper mill at Notre Dame des Anges, on the Lower Laurentian Railway. It is reported also that an English syndicate is about to erect a still larger mill of the same nature a few miles west of the above, on the projected Great Northern Railway.

A STATEMENT read at a meeting last month of the Ontario Forge and Bolt Co., Swansea, showed the firm's direct liabilities to be \$36,148; indirect, \$2,743; secured, \$57,497; and preferred, \$8,469; total, \$104,860. Assets amount to \$73,784, besides encumbered assets of \$271,084, which it is thought will not realize more than \$100,000. Among the creditors (direct) are McDonnell Rolling Mills Co., Toronto, \$5,832; Bank of Montreal, \$4,950; and Ontario Rolling Mills, Hamilton, \$7,238.

DAVID WALKER and R. McKenzie are making preparations for building the projected new \$1,000,000 hotel in Toronto.

THE Ross-McLaren Lumber Co., Victoria, B.C., have contracted to supply 100,000,000 feet of lumber for the South African market.

PROF. GALBRAITH has concluded a 48-hours' test of the new "Blake" pumping engine at Toronto, the capacity of which is 10,000,000 gallons. The test was satisfactory, the result showing above the duty and capacity contracted for.

TORONTO city engineer recommends the widening of Queen street subway to a full width of 66 ft. throughout, and also the widening of Dufferin street, on the south of the subway, to the same width, at an estimated cost for the two of \$130,000.

THE Record Foundry and Machine Co.'s works, Moncton, are rushed with orders, and the output of stoves is very large. Business at the Montreal office has grown so large of late that E. Peters, of Moncton, has been appointed assistant manager to Mr. Atkinson in the former city.

BOSTWICK'S steam saw mill at Salmon River, N.B., has been destroyed by fire, the cause of which is unknown, though it is attributed to spontaneous combustion. Loss, \$12,000; insured for \$7,500. A large amount of valuable machinery was destroyed or irretrievably damaged.

THE Springdale pulp mills, situated at Springdale, Kings county, N.B., are in operation after being idle several years. The new proprietors are T. F. A. and H. J. Webb, of Holyoke, Mass. Eighteen hands are at present employed in the mills, but this number will soon have to be increased.

THE firm of Stirling & Brownley, manufacturers of the famous "Brownley Injector," St. John, N.B., have dissolved partnership, and the business will be carried on in future by Mr. Stirling under the name of W. H. Stirling, brass founder and finisher, and manufacturer of the Niagara Injector.

THE students of the Toronto Technical School had a fine exhibit of their work in mechanical drawings and designs at the Toronto Industrial Exhibition. This night school, which is situated in Queen's Park, opposite the head of McCaul street, is doing a noble work for young men, and the fall and winter session, which opened last month, bids fair to be the best since it started.

A NEW boot and shoe factory has been established in St. John, N.B., by Cathers Bros. & Co. Men's, women's and misses' boots, shoes and slippers, will be made, and the firm will also manufacture felt goods. The factory is equipped chiefly with American machinery. Benjamin Cathers, who has had some ten years' experience in the leading factories of the United States, is in charge of the new firm.

THE municipal council of Beamsville, Ont., has drafted a by-law to raise \$13,000 to build a reservoir at the mountain, to be fed by springs and piped from the reservoir to the village. The movers are quite enthusiastic, and think that if put through Beamsville will have one of the finest waterworks systems in Ontario. The proposed scheme for supplying water by windmill and tanks has been abandoned.

THE affairs of the firm of Doty Bros. & Co., whose insolvency was recently noted, are in a very queer condition, and the ordinary creditors will be thankful if they get anything out of the estate. It appears that A. R. Williams, a second-hand machinery dealer, has somehow got possession of a considerable portion of the assets which it was thought would have been shared among the creditors; and although it is said that his possession of these assets could be successfully contested in law, it is a question whether it is worth their while to fight the matter out.

THE Hamilton Bridge Co. has assigned to C. S. Scott, official receiver. There has been a good deal of friction lately among the directors, and the immediate cause of the assignment was a judgment for \$10,000 obtained by A. T. Wood, one of the directors, against the company. The capital stock of the company is \$100,000, of which \$60,000 is paid up. At a meeting the other day it was decided to finish some large contracts at present in hand, including a number of bridges for the C.P.R., and then to wind up the estate.

IN the Yarmouth, N.S., gas case, arising out of the amalgamation of the Yarmouth Gas Co. and the Yarmouth Electric Light Co., judgment has been given in favor of the plaintiffs, and against the directors, for \$248,000. The plaintiffs were shareholders of the Gas Co., and claimed that the directors had fraudulently procured a controlling interest in the gas stock and then purchased the electric light plant, owned by themselves, at an exorbitant price, the result of which was that the plaintiffs' interest in the stock and property of the Gas Company was lost to them.

THE Bowman Hardware Company, Hamilton, who have been in difficulties for some time, have now assigned to C. S. Scott. The liabilities, which include a chattel mortgage of \$22,000, amount to \$39,924. The nominal assets are \$59,899, of which \$17,774 is in book debts. Individual members of the company offered to purchase any of the claims at 46 cents on the dollar, and several creditors accepted the proposition.

THE Hamilton Times of Oct. 31st had an item to the effect that Whipple & Cooper, iron and brass founders, had issued a writ against the Bank of Hamilton for \$2,000. The action was the outcome of difficulties over the payment of notes. The plaintiffs claim that on placing a draft with the bank for collection, the latter applied the proceeds to the account of another party to the draft, and then to reimburse themselves for previous indebtedness incurred by plaintiffs, entered suit against the latter. As the result of the entering of this suit, Whipple & Cooper's creditors descended upon them, and they were forced to assign.

THE leather belting firm known as the Howarth Belting Co., Toronto, of which G. T. Howarth was the head, has been amalgamated with the old established belting firm of Robin & Sadler, Montreal and Toronto. The latter firm's Toronto office will now be in Jordan street, the headquarters of the Howarth Belting Works, the Bay street office being given up. No firm is more widely or more favorably known throughout Canada in the belting line than Robin & Sadler, while the absorption of the more local business of Mr. Howarth will give increased strength to the new company's position in Ontario. The style of the firm will now be Robin, Sadler & Howarth.—*Canadian Journal of Fabrics.*

WE mentioned last month that the Wm. Hamilton Manufg. Co., of Peterborough, had received a contract for the engines for Victoria B.C., Electric Lighting Works. This will be a Payne automatic Corliss engine of 350 horse power; the cylinders will be 14 and 26, with 20-inch stroke, and are timed to run at 200 revolutions per minute. Boiler pressure will be 125 lbs., and the engine will be supplied with a Northey duplex condensing pump. Salt water will be used for condensing purposes. The two boilers are horizontal tubular ones, 16 feet long and 60 inches diameter, having each 80 three-inch tubes, and will be connected by a steam drum, but will be so placed that they can each be worked independently. The line shaft will be connected directly to the engine shaft, on which are pulleys for running the motors. The engine is guaranteed to regulate within 1 per cent. The fly-wheel weighs 12,000 lbs. This engine is of the type illustrated in this firm's advertisement in THE CANADIAN ENGINEER.

THE Kerr Motor Co., of Niagara Falls, Ont., report a large sale for their water motors. They have just issued a new catalogue giving particulars of their motors and ventilating fans. We notice that the publishers of the *Leamington Post* have put in one of these motors, of which they write as follows: "It was with considerable anxiety we made the change from steam to water power, but after testing it all the way from 20 to 90 lbs. water pressure, we are perfectly satisfied with it. Our system of water works, being direct pressure on the mains, gives us any required pressure. The usual amount is from 35 to 45 lbs. With the latter pressure we can run all three presses at any required speed. The space taken up by the little motor is only 1½ by 2½ feet, and the jet of water required is from a ¾ inch nozzle. It gives better satisfaction in every particular than steam, and every newspaper office where plenty of water is available, with sufficient pressure, should have one."

## Railway and Marine News.

THE Montreal Transportation Co. have a new large building at their dock in Kingston.

THE survey for the extension of the St. Croix & Penobscot Railway is now being made.

WORK has commenced on the line between Five-Mile Point and Nelson, B.C., and will probably be completed this fall.

THE head offices of the Hereford Railway Co., at present located in Cookshire, will shortly be removed to Sherbrooke.

THE preparatory work necessary for starting a direct steamship line between Lunenburg and Boston is well under way.

THE Government dredge has made Seeley's Bay one of the best harbors on the Rideau River. It is now at work at Westport.

THE first vessel to enter the Canada canal at Sault Ste. Marie was the tug "J. G. Rooth," owned by the contractors, Hugh Ryan & Co.

A PONTOON belonging to the G.T.R., and moored to a wharf at Quebec, sprang a leak last month and partially sank. Loss about \$3,000.

QUEBEC Board of Trade have petitioned the Government and the city council for a bonus of \$250,000 in aid of the Parry Sound Railway.

A TRAIN on the Q.M. and C. railway last month was derailed owing to cows getting on the track between Ste Anne and St. Joachim. Three men were killed and several injured.

THE C.P.R.'s new line between Mattawa and Temiscamingue is rapidly approaching completion, and it is expected that before Christmas trains will be operating as far as Kippewa Lake.

THE Montreal and Lake Maskinonge Railway, which starts from St. Gabriel de Brandon and meets the C.P.R. at St. Felix de Valois, is advertised to be sold by the sheriff on December 7th.

THE Bangor and Aroostook Railway Co. expect to have the track laid as far as Cariboo by December 1st. The work of building a 1,030 ft. bridge across the Aroostook is being proceeded with.

THE steamship "Prince Rupert," just completed on the Clyde for the C.P.R. Co. and originally intended to ply between Vancouver and Victoria, has been sold to go to China for transport service.

THE work on the new Union Station, Toronto, is sufficiently advanced now to give people a good idea of what it will look like when completed, although it will scarcely be fully completed before next summer.

THE following have been elected officers of the Great Northern Railway: President, P. Garneau; vice-president, John Sharples; directors, Frank Ross, V. Chateauvert, T. H. Dunn, J. C. Eno, and S. Peters.

HON. MR. BOWELL is looking into the question of establishing direct steamship service between Canada and Cape Colony. It is suggested that such a line could be incorporated with the present West Indian service.

THE Hughes Car Ventilating Co. (Ltd) has been incorporated with a total capital stock of \$500,000. They will acquire the Samuel Hughes patents for the heating and ventilation of cars, carriages, steamships, etc.

THE Hudson Bay Railway Co. are petitioning the Dominion Government to guarantee the bonds of the railway at 3½ per cent. If this is done, the promoters say capital can soon be obtained for the work of construction.

EMANUEL ST. LOUIS, the contractor, was arrested under the charge of obtaining money from the Government under false pretences, in connection with the Curran Bridge contract, Montreal. The case is now pending.

THE I.C.R. blacksmith shop at River du Loup, Que., has been burned down, eight engines being destroyed, including two fine Mogul locomotives. Loss \$200,000. The fire originated from a spark falling in a heap of old waste.

THE steamers "Cibola" and "Chicora," of Toronto, have been in the dry dock at Kingston undergoing the inspection required every two years by the American Government regulations for steamers plying to United States ports.

WM. STUART, C.E., obtained judgment in a Toronto court the other day against James Conmee, ex-M.P.P., and G. H. Middleton, for \$250 and costs, representing a balance due plaintiff for railway work done in the vicinity of Port Arthur.

A SCHEME is advocated for forming a joint stock company, to include all the steamship owners from Lindsay, Ont., to Lakefield and to run during the summer tourist season a line of boats between those two towns, and another between Lindsay, Fenelon Falls and Cobocok.

MR. COLLIER, of St. Catharines, has bought the steamer "Garden City" for \$44,000, including the ownership of the wharf in that city, and it is stated that she will be taken off the Toronto route next year, and replace the "Columbian" on the Buffalo and Chippawa line.

THE P.E.I. Government last month attached the steamship "Florida," of the Plant Line, for causing damage to another steamer and to the wharf at Charlottetown. Security was furnished in a few hours and the boat was allowed to proceed as usual till the case comes to a hearing.

THE Toronto, Hamilton & Buffalo Railroad Company are now asking Ancaster, Ont., for a bonus of \$10,000 and eight miles of right of way. Dundas town council has agreed to grant a bonus of \$25,000 under certain conditions. The company, however, has not seen fit to accept these conditions.

THE Montreal Transportation Co. will probably construct a dry dock next to their shipyard at Kingston, Ont.

THE C.P.R. will extend a branch line to Sault Ste. Marie, Ont., Rapids, and will build docks along the river shore.

H. A. CALVIN, of Garden Island, is establishing a railway transfer ferry between Kingston, Ont., and the island.

CHAS. D. MAZES, president of the United Counties (Que.) Railway, says that work on the line is progressing very favorably.

THE Dominion Coal Co. have given the contract for constructing a pier at Louisburg to Ronald Gillis, Halifax. The price is \$70,000.

J. R. BOOTH has purchased a fine \$15,000 site in Ottawa, to be used for the workshops of the Ottawa, Arnprior and Parry Sound Railway.

LINDSAY, Ont., town council has repealed the by-law passed a little while ago which granted \$25,000 to the Lindsay, Bobcaygeon & Pontypool Railway.

J. R. BOOTH, the Ottawa saw-mill owner, will probably, next season, put a large steamer on Chats Lake, to ply between Arnprior and Portage du Fort.

ON the 27th inst. a by-law will be presented in Ramsay, Ont., for the purpose of granting a bonus for the projected railway between that village and Carp.

OWING to the depression in the shipping business, the Allan and Dominion lines will, during the winter, lay up all their steamers excepting those engaged in carrying the mails.

THREE hundred men are now at work on the Coast Line Railway between Yarmouth and Lockeport. All the culverts and abutments of small bridges along the line are already completed.

D. McLACHLAN & SONS, St. John, N.B., have been awarded by the Marine Department a contract for making three horizontal fog alarm boilers. Two are for Halifax and one for Partridge Island.

D. McVICAR has completed his purchase of the Skyline mine, Kootenay, B.C., for \$100,000. The terms are \$10,000 down, the same amount for the next three months, and the balance in three equal quarterly payments.

EDWARD NEW, the contractor who has in hand the grading of the new incline railway in Hamilton, expects to have it completed by Christmas. The directors have not decided yet whether to use electricity, steam, or gas as a motive power.

A PARTY of capitalists have been looking over the ground lying between the western end of the Port Arthur, Duluth & Western Railway and the northern terminus of the Duluth and Iron Range line, with a view to building a link to connect the two.

THE St. Lawrence Yacht Club had erected, last summer, a substantial new guard pier at Dorval at a cost of over \$4,000. It is 500 feet long, and the contract was executed by Alex. Jeffrey, of Montreal. This club are preparing to build a new club house next year.

THE contracts for the Coastal Railway, the narrow gauge line from Yarmouth to Shelburne and Lockeport, N.S., has been formally ratified, the Provincial Government giving a subsidy of \$2,200 a mile. The capitalists in this company are chiefly Philadelphia men.

THE Department of Marine and Fisheries have decided to raise the lighthouses at Fort William, Ont., about ten feet higher, putting new foundations beneath them and making other improvements. The channel in the harbor is being both widened and deepened also.

A FEW days ago a large party went over the Montfort Colonization Railway, the newly completed line starting from Montford Junction, north of St. Jerome, the object of which is to open up the rich country north of Montreal. The visitors were well satisfied with what they saw.

THE Wentworth Navigation Co. are applying for incorporation for the purpose of running steamships between Quebec, Chicago, Duluth and Owen Sound. Capital stock, \$1,500,000. The applicants are W. P. Bull, Frank Byrne, J. Berkinshaw, M. N. Merry and W. T. Merry, all of Toronto.

THE case of the Queen vs. Quebec Central Railway Company, in which the Provincial Government sued the company for \$5,921.55, being ¼ per cent. per annum on moneys which had been advanced in the form of subsidies, has been dismissed by Chief Justice Casault, on the ground that the statute does not fix the amount of the tax, but merely establishes the outside limit of such taxation, if there be any, there thus being, in cases where such amount has not been stated, no legal obligation to pay any percentage.

THE C. P. R.'s gross earnings for the nine months ending with Sept. 30th were \$13,086,983.31; working expenses, \$9,078,022.76; net profits, \$4,008,960.55. The net profits for the corresponding period of last year amounted to \$5,296,779.53, thus showing a decrease for the present year of \$1,287,818.98.

WHEN the steamer "Atlantic" broke her crank shaft, and knocked out her engine head last month, the Bertram Engine Works Co. were called in to make the repairs. The engine was sent down to Toronto, the broken parts replaced, the machinery refitted, and the steamer was on her route again inside of three weeks.

THE Dominion Government have given the contract for 4,300 tons of steel rails for the I. C. R. to the Cockrell Works, Belgium, through their Montreal agent, C. J. De Sola. The price is about \$20 per ton delivered. Three thousand tons will be used on the main line, one thousand on the P. E. I. branch, and three hundred tons on the Windsor branch.

THE Secretary of the Railway Department, Ottawa, is calling for tenders (which will be received up to the 17th inst.) for the construction of about 5½ miles of the Simcoe and Balsam Lake division and 3½ miles of the Peterboro' and Lakefield division of the Trent Valley Canal. An accepted bank cheque for \$7,500 must accompany the tender for each section.

THE Government harbor improvements at Port Dover, Ont., are well under way. The Ontario and United States Transportation Co. and the G.T.R. will spend about \$60,000 additional in improvements. Two immense transport vessels, for carrying coal from Conneaut, Pa., to Port Dover, are now being built at a cost of \$250,000 each.

A SCHEME is on foot to amalgamate the interests of all the steamship lines running from New York and Boston to points in Maine, New Brunswick and western Nova Scotia, and to extend the same to Rockland, Bangor, Bar Harbor, Eastport, St. John and Yarmouth. Wharf accommodation has been secured wherever necessary and good rail connections are assured.

THE claim of the Hereford, Que., Railway Co. on the Quebec Government for \$42,000, which the former had paid out to discharge the debts of the defaulting contractors, Shirley & Co., to the laborers and storekeepers, which money the Government retained out of the additional subsidy of \$54,000 granted for the last eighteen miles of the road, has been dismissed by the Supreme Court on appeal.

THE Exchequer Court some time ago gave judgment in the case of Gilbert Bros. vs. the Queen, in favor of the plaintiffs, the amount of judgment to be fixed later. This amount, which it will be remembered, was claimed by the contractors owing to the work of deepening the Galops Rapids being found to require more excavation work than was called for by the contract, has now been fixed at \$149,941, with interest at 4 per cent. from April 1st last.

WALKEN & WALKEN, Kingston, acting for the bondholders of the Kingston & Pembroke Railway Co., have succeeded in obtaining a judgment to enforce payment of the interest due on their bonds, which amounts to about \$75,000. Joseph Bawdon, of Kingston, has been appointed receiver, with power to pay all expenses in connection with the operation of the line. The road has virtually been in the hands of the bondholders for a considerable time.

THE Collingwood *Bulletin* says the new steamer for the G. N. Transit Co. is to be built at that port. The Collingwood Dry Dock Co. have been awarded the contract. The new steamer will be built from a model prepared by Manager Andrews, of the Dry Dock Co. Her dimensions will be 225 feet over all, 35 feet beam, 208 feet length of keel and 12 feet depth of hold. The engines will be built by John Inglis & Son, of Toronto, from designs prepared by Logan & Rankin, of Toronto. It is expected that the keel will be laid about the 15th of November. The building of this steamer will give employment to a large number of men during the winter.

It will be a surprise to most people outside of Montreal to learn that the Canada Shipping Co., otherwise known as the Beaver Line of steamships, is going into liquidation. The company was organized in 1868 by Wm. Murray, of Montreal, who established a regular line of vessels between that city and Liverpool. The fleet was at first composed of sailing vessels, but in 1875 steamers were put on, each steamer being named after some Canadian lake. The fleet consists now of the "Lake Ontario," "Lake Superior," "Lake Huron," "Lake Winnipeg" and "Lake Nipigon." As is well known, the shipping trade has been very dull for the last two years, and the decline of the company's interests was probably hastened by the death of its projector about three years ago. There are about 150 shareholders in the company, the majority being residents of Montreal. The company has not paid dividends since 1890. There are some hopes of a re-organization later on.

## Mining Matters.

THE Tobique Valley, N.B., Mining Co. have just put in a stamp mill.

THE owners of the O. K. claim, near Nelson, B.C., are putting in a stamp-mill and other machinery.

J. F. BURR has discovered a fine ledge of galena on the "Cottonwood" claim, close to Nelson, B.C.

THE gold digging fever is now operating in the vicinity of Savage's Island, says the Truro, N.S., *Daily News*.

TEN tons of ore from the bottom of the main shaft of the Eureka Mine, Wine Harbor, N.S., gave 30 ozs. of smelted gold.

ROBT. STEVENSON left Montreal last month with a carload of machinery en route to Granite Creek, B.C., where he has a gold claim.

WHILE developing the "Lardeau" mine, the miners struck a fine body of solid ore 5 ft wide, a sample of which showed 3,312 ozs. to the ton.

THE Britannia Mining Company, of Nova Scotia, is hard at work on their bonded property, the "Little Mamie," near Anns-worth, B.C.

A PARTY of experienced miners are on their way from Honduras to British Columbia, where they have heard of the rich finds in Cariboo district.

A WELL-DEFINED ledge of galena ore has been discovered near Moyer Lake, East Kootenay, averaging about 60 ozs. in silver and 65 per cent. lead.

PROSPECTORS are boring for coal on the McLean farm, near River Dennis. A valuable find of flint sand has been found recently in the same vicinity.

PROSPECTORS are examining the tract known as "The Rocks," a little north of Carp, Ont., from which good specimens of iron ore and mica have been taken lately.

J. KING has twelve men at work on three tunnels at the "Fisher Maiden," situate between Four Mile and Cody Creeks, B.C. The ore runs from 500 to 1,500 ozs. silver to the ton.

J. & C. RUSSELL's galena and silver mine on Calumet Island, Ont., yields 197 ounces of silver to the ton, and 77 per cent. lead. Some specimens show also 35 per cent. of zinc.

THE "Highland" mine is reported as about to start up again. Samples taken from several piles of ore on the dump give returns of 42 to 60 ozs. in silver, and 65 to 82 per cent. of lead.

MAYOR LEE, of Kamloops, B.C., says the galena claims, known as the "Ironclad" and "Lone Prospector," on Mosquito Flat, equal in appearance the best in the Kootenay district.

SAMPLES from Capt. La France's claim on the east side of Kootenay Lake, B.C., show \$214 in gold. The ledge is 20 inches wide, and the outcroppings can be traced for 1,500 feet.

J. PETERSON and G. L. Rice have made a valuable silver strike about three miles from Sheep Creek on the Salmon River, B.C. It shows a nine-foot vein similar to ore on the "Silver King."

Two wealthy St. Catharines, Ont., manufacturers are reported to have been in the Medicine Hat district lately with the intention of putting in an expensive equipment on a mining claim there.

THE owner of the "Little Phil" and "Black Diamond," in the Ainsworth district, are erecting ore houses and bins, and will shortly ship ore. The joint tunnel in these mines is making rapid progress.

C. J. WELDON, a California prospector, has applied for a lease for some land near Sussex, N.B., where manganese ore has been discovered. Mr. Weldon intends to carry on operations as soon as possible.

M. BRATON, J. W. Thomson, R. Williams, J. Burns and Alex. Simms own a group of seven claims in the Lardeau country showing ore averaging over 300 ozs. In the spring they will erect buildings for the storage of ore.

THE Dominion Coal Co. has given Mr. Falconer, of Hopewell, N.S., a contract for building ten dwelling houses and a number of kitchens at Bridgeport, N.S. Mr. Falconer has a contract to build a church and manse at the same place.

E. CROCKETT reports that the galena in the Nettie L. and May Be (Lardeau) at a depth of ten feet changes to grey copper, and shows every indication of being extremely rich. Assays show the ore to carry \$49 in gold to the ton.

## Personal.

B. J. SAUNDERS, C.E., has been appointed engineer of Brockville, at a salary of \$1,000 per year

D. W. ROBB, of the Robb Engineering Co., Amherst, N.S., has been on a business and holiday trip to British Columbia

We notice that John Northey, of Northey, Ltd., Toronto, steam-pump manufacturers, is registered at the Hotel Metropole, London, Eng

F. E. HANDY, late electrical engineer on construction of the Hamilton, Grimsby & Beamsville Railway, has left on a visit to England with Mrs. Handy

THE recent destruction by fire of Marshall & Tew's mills at Plattsville, Ont., so affected the mind of Mr. Marshall that he has been removed to the asylum

JOHN RENNIE, chief engineer of the Laurentide Pulp Company's mills, Grande Mere, Que., was accidentally drowned there a few days ago. He leaves a wife, but no children

CHIEF BENOIT, of the Montreal Fire Department, was last month prostrated by a severe attack of cerebral meningitis, but we are glad to hear that his usual robust health is rapidly returning.

E. F. HEAD, of Rat Portage, Ont., has been appointed assistant-engineer and secretary to W. G. Motley, the well-known mining engineer and geologist, of London, Eng. He will leave shortly for the Old Country.

PROF. CHAS. CARPMARL, superintendent of Toronto Meteorological Observatory, died last month. There was some talk of the observatory being about to be removed to Ottawa, but we understand the Government have decided to leave the matter as at present.

H. E. SUCKLING, who, since 1886, has been assistant treasurer of the C.P.R. at Montreal, has been appointed treasurer of the Minneapolis, St. Paul, and Sault Ste. Marie Railway Co. Mr. Suckling will leave Montreal to take his new position in Minneapolis in two or three weeks.

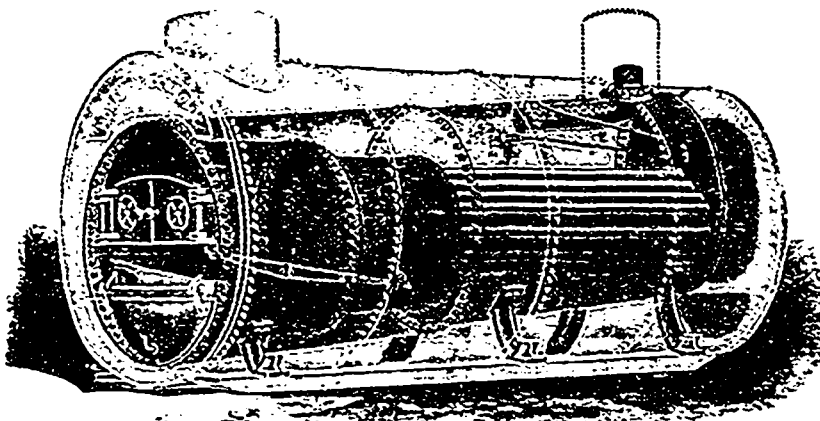
CAPT THOS. HARBOTTLE, inspector of hulls for the port of Toronto, died suddenly of heart failure a few days ago at the Custom House. He had spent a large portion of his life at sea, and had held the position of inspector since 1882. Capt. Harbottle was 68 years of age, and leaves a widow and twelve children

OUR readers will one and all regret to hear of the ill-health of J. J. Lanning, the well-known and popular assistant general manager of the Grand Trunk Railway. Owing to the strain of constant, untiring work in his department, he was obliged, for the benefit of his lungs, to go to a mountainous region. Mr. Lanning chose Asheville, North Carolina, and we are pleased to be able to state that here he is rapidly regaining his strength. We sincerely trust that this will continue, and that within a very short time his Montreal friends will see him again among them completely recovered.

ROBERT OWENS KING, son of R. W. King, C.E., head of the firm of R. W. King & Co., Toronto, has resumed his studies at McGill University, where he is taking the Science Course, in preparation for the electrical engineering profession. Our young friend

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**GERMAN PATENTS.**

Compiled at the patent and technical office of Brockhues & Co., Cologne, for THE CANADIAN ENGINEER. Information referring to these lists given free of cost to our subscribers.

- Furnace; W. Büttner, Gummersbach, Rhenish Prussia.
- Iron supports for ceilings; A. Chocarne, Paris.
- Adjusting mechanism in spring balances; Mrs. Lina Koch, Hanover.
- Method of manufacturing a voluminous smokeless gunpowder; Max von Förster, Berlin.
- Hot water stove; W. Blossfelds, Leipzig Keudnitz.
- Gas air-heating stove, with closed fire-place; Franz Lönholdt, Frankfort-on-the-Maine.
- Copper packing-ring for valves; Jos. Moravely, Gratwein.
- Boring apparatus for pipes under pressure; F. A. Hille, Goslar a. Harz.
- Jacquard machines for colored double plush; Emil Claviey, Chemnitz.
- Type-rod writing machine; M. F. Sebalot and wife, Dr. K. Bier, née Wiegler, Frankfort-on-the-Maine.
- Attachable break; H. Büssing, Brunswick.

*The Patent Review.*

- 45,602 Angus Cameron Gordon, Rochester, N.Y., railway time signal.
- 45,604 David Wm. Brunton, Aspen, Colo., car coupler.
- 45,606 James McGee, Houston, Texas, car brake.
- 45,607 A. E. Trivittick, St. Henri, Que., street-cleaning apparatus.
- 45,613 Ray Gaul, Brooklyn, N.Y., apparatus for producing a draft in smoke-stacks, etc.
- 45,614 George H. McAlpine, Concord, N.H., fire or waterproof paint.

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- 45,617 James Hargreaves, Liverpool, Lancaster, Eng., apparatus for the electrolysis of chlorides and other salts.
- 45,619 Jacob S. Shoemaker, New Lothrop, Michigan, road cart.
- 45,621 Anson M. Howard, New Haven, Connecticut, adjustable shafts.
- 45,622 Harvey Copley Goodgion, New York, folding square
- 45,623 Wm. Henry Judson, Toronto, Ont., car fender.
- 45,630 Robert Sampson, Quebec, Que., plumbers' test pump.
- 45,631 Lovren E. Hague, Greenville, Penn., injector.
- 45,632 Daniel Hunt, Round Grove, Missouri, car coupler.
- 45,636 James E H Paddon, Montreal, method of and means for preventing the clogging of ventilators
- 45,638 Charles F. Fogg, New York, air compressor.
- 45,639 Thomas Craney, Bay City, Michigan, water purifier.
- 45,642 Henry C. Mitchell, Toronto, boiler cover
- 45,646 Carl Hoepfner, Giessen, Germany, process of and apparatus for the production of nickel, etc
- 45,647 Daniel D. Wilson, Toronto, Ont., hand fire extinguisher.
- 45,652 Charles W. Patton, Ohio Falls, Indiana, car coupler.
- 45,653 John J. Shainer, Clint, Tex., car coupler.
- 45,654 James F. McElroy, Albany, N.Y., rotary engine.
- 64,659 Lawrence Curtin, Toronto track cleaner
- 45,661 Joseph J. Dresdond, Detroit, Mich., steam injector
- 45,663 David S. Hunton, Martinsburg, Iowa, car coupler.
- 45,664 Hubert T. Chalifoux, St. Hyacinthe, Quebec, hay press
- 45,669 J. Alexis Robillard, St. Andrew's, Que., gate hinge.
- 45,671 James S. Johnson, Almonte, Mich., pipe coupling
- 45,673 Robert Lundell, Brooklyn, N.Y., electric motor.
- 45,676 Omer Sevigny, St. Guillaume, Que., car coupler.
- 45,678 Benjamin M. Whitlock, New York, car coupler.
- 45,680 Henry J. Bechtel, Brantford, Ont., bicycle.
- 45,683 Henry Green, Hartford, Conn., incandescent electric lamp.
- 45,684 Stephen McLaughlin, Debert Station, N.S., nut lock.
- 45,686 Geo. H. Millen, Hull, Que., crimped paper bag.
- 45,687 George H. Millen, Hull, Que., paper for carpets, linings, wrappers, etc.

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**RIDOUT on PATENTS** The pioneer treatise on the Patent Law of Canada, by John G. Ridout (late C.E.) of the firm of Ridout & Maybee, Solicitors of Patents, 103 Bay Street, Toronto. Price—Cloth, \$3.50; Half Call, \$2.00. Home and foreign postage, 11 and 12 cents.  
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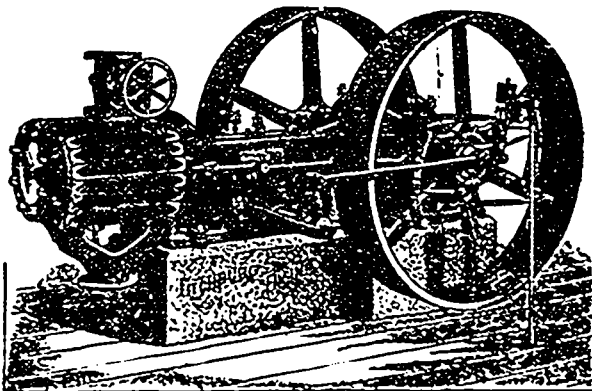
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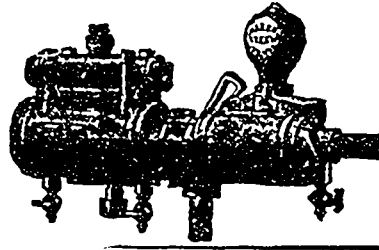
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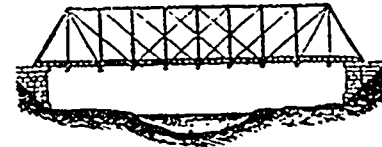
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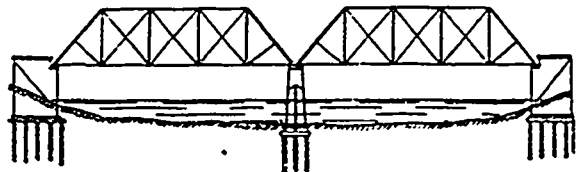
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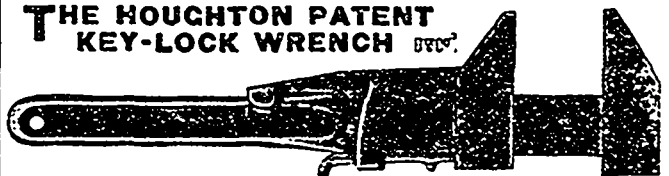
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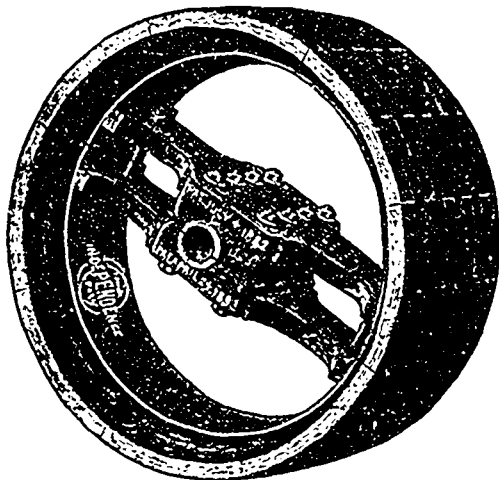
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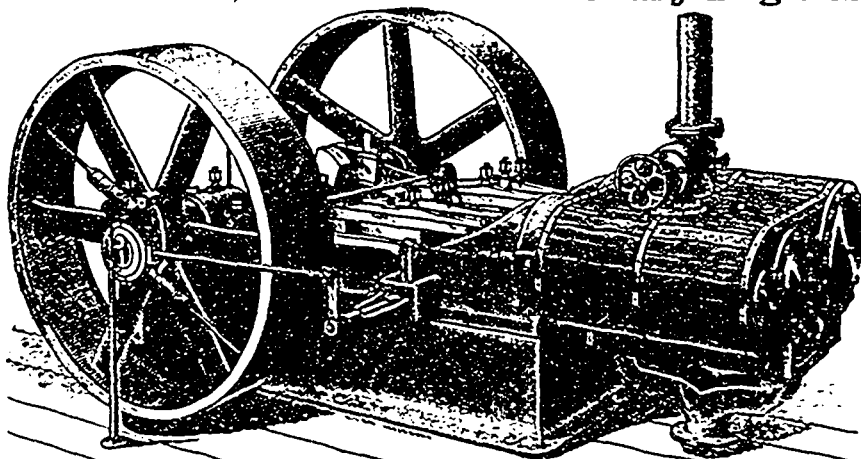
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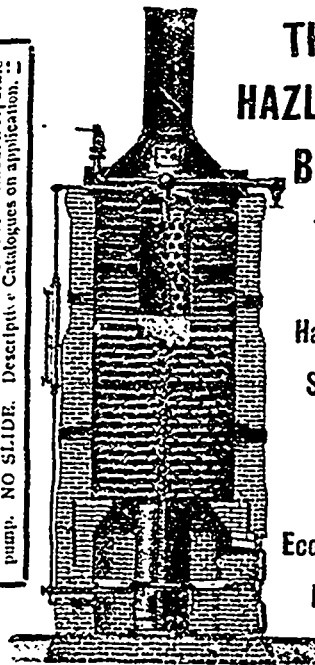


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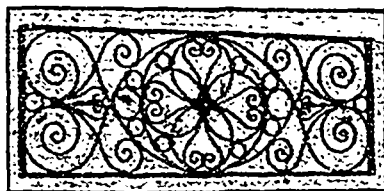
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