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CANADIAN
ELECTRICAL NEWS
AND
STEAM ENGINEERING JOURNAL

OLD SERIES, VOL. XV. No. 6
NEW SERIES, VOL. V.—No 2.

FEBRUARY, 1895

PRICE 10 CENTS
$1.00 PER YEAR.

CANADIAN

ELECTRICAL NEWS

AND

STEAM ENGINEERING JOURNAL.

VOL. V. FEBRUARY, 1895 No. 2.

THE FIRST CANADIAN ELECTRICAL JOURNAL.

THE fact is probably not very widely known that the publication of a journal devoted to the electrical interests was commenced in Montreal eleven years ago. Singularly enough it was called the "Canadian Electrical News."

For the benefit of our readers who are for the first time made aware of the existence of a Canadian electrical journal antecedent to the present one, and who may be curious to know what it looked like, we herewith present a fac-simile of the title page of the initial number reduced to one-quarter the original size, with the names of the publishers, Messrs. Hart Bros. & Co., and of Mr. John Horn, the editor, appearing thereon. The publication of an electrical journal at this early period, when the electrical industries, with the exception of the telegraph, were literally "in their infancy," was a task the magnitude of which the promoters of the enterprise seem not to have fully considered. The required amount of support in the shape of advertisements and subscriptions was not forthcoming, and with the sixth semi monthly number, the paper ceased publication.

Mr. John Horn, a well-known telegrapher of the early days, is still a resident of Montreal, and takes an active interest in everything pertaining to the application of electricity.

The following paragraphs, culled at random from the six copies of our predecessor, which happily have found their way into our possession, will doubtless have an interest for the "old timers" in the electrical field, and possibly also for those of more modern date:

Mr. Hugh C. Baker is Sup't of the Western Division of the Bell Telephone Co.

Mr. C. P. Sclater is Secretary-Treasurer of the Canada Bell Telephone Company in this city.

The Toronto branch of the Bell Telephone Co. of Canada is under the able management of Mr. Hugh Neilson.

Mr. George Black is the manager of the G. N. W. at Hamilton, Ont., a position he has ably held for many years.

Manager W. V Soper, for the Canada Mutual at Ottawa, is one of the best men that company has in its service

The Great North-Western Telegraph Company operate nearly 35,000 miles of wire, and are constantly adding thereto.

I. B. McFarlane is the Superintendent of the Eastern Division of the Bell Telephone Co of Montreal, whose usefulness is constantly extending

THE

CANADIAN ELECTRICAL NEWS

JNO HORN. EDITOR.

VOL 1 MONTREAL, MARCH 31 1884 No 1

WE BELIEVE THE TIME HAS ARRIVED FOR THE REGULAR PUBLICATION OF AN ORGAN DEVOTED EXCLUSIVELY TO THE LARGE AND GROWING INTERESTS OF THE

TELEGRAPH, TELEPHONE AND ELECTRIC LIGHT

AS WELL AS OF

ELECTRICAL PROGRESS

THROUGHOUT THE LENGTH AND BREADTH OF THE DOMINION

Having spent many years in the business as a practical operator and manager in this city and New York I hope from the knowledge and observation thus acquired to make the JOURNAL instructive, interesting, and valuable to the practical telegrapher, the electrician as well as to the man of science

We believe there are not less than five thousand electrical stations of various kinds, such as the Telegraph Telephone Electric Light Fire Alarm District Telegraph and Railway Companies, who, with their ten thousand employees, from the Gulf of St Lawrence to the Pacific Coast, have been so far unrepresented by any Journal of this kind

The Canadian Electrical News

Will consist of eight pages royal quarto and will be published on the 1st and 15th of every month. We shall endeavour to make it, in every respect a first class

TELEGRAPHIC AND ELECTRICAL NEWSPAPER.

All matters relative to **Electrical Science** will be discussed in a progressive independent and liberal spirit, and the efforts of the paper will be to aid the scientific, and contribute to the advancement of all those engaged in the profession

Correspondence from all parts of the Dominion or from the United States, or abroad giving such **Changes, Promotions, Incidents,** and **Items** of electrical interest, **Personals, Inventions** and other matters that may bear on the science, and especially those relating to the

TELEGRAPH, TELEPHONE, OR ELECTRIC LIGHT

are earnestly solicited

We hope, from time to time to illustrate with original engravings, any new and interesting inventions and other subjects pertaining to ELECTRIC SCIENCE

THE CANADIAN ELECTRICAL NEWS is the *only* paper in the Dominion devoted exclusively to the

TELEGRAPH, TELEPHONE, AND ELECTRIC LIGHT INTERESTS.

It will be issued at $1 00 per annum payable in advance

A limited number of advertisements will be inserted

Your subscription and cordial co-operation in furnishing us with all suitable items that may come under your personal observation is particularly requested

JNO. HORN, EDITOR.

All business communications, subscriptions or letters relating to advertising, should be addressed to the publishers

HART BROTHERS & CO.,
32 Victoria Square, Montreal

The Bell Electric Light Company have removed their head office from London to Toronto, and have also reduced their number of directors to three.

The Canada Electric Light Company, of Toronto, have had their tender of 62c. per light for 50 lights, recommended to the City Council for acceptance.

Mr Erastus Wiman, President of the G. N. W., has promised to distribute in New York 15,000 programmes for the St. Jean Baptiste festival next June

The Bell Telephone Co's exchange office at Toronto, which occupies the southern wing of the Mail building, was burned out on the morning of the 24th May.

Mr. H. P. Dwight, the General Manager of the G. N. W., Toronto, positively refused to produce the telegrams passing between the politicians in the bribery case now going on in this city.

We hear the trial test of electric lights by the two companies at Toronto is giving great satisfaction The three months experiment, we have no doubt, will end in a contract for their continuous use.

The number of telephone subscribers in the principal towns of the Dominion up to January, 1884, was only 3,256. It will thus be seen there is plenty of room for an extension of this exceedingly useful invention.

The average cost of a well-built telegraph or telephone line, say of No. 8 galvanized wire, with 35 poles to the mile, including the cost of setting the poles, stringing the wire and transportation, is about $165 per mile.

To the uninitiated we would state for electric light purposes the wire is a pure copper, No 6 size, with insulation of double braided cotton coated with white lead, making it impervious to the weather and absolutely safe to handle, especially in connection with the automatic cut-outs.

Wm. Mackenzie, one of Montreal's leading stock brokers and financiers, is noted as a keen, shrewd and cautious business man. He is also Secretary of the Stock Exchange. Many years ago he was an expert operator in the old Montreal Company's service.

The Toronto Electric Light Co has for officers Messrs E. Strachan Cox, President, John T. Beckwith, Vice-President, Robt. Myles, Secretary-Treasurer, and Mr. S. Hamburger as General Manager. We hope later on to say something more of the active operations of this Company.

The electors of Magdalen Island, in the county of Gaspe, and of the Island of Anticosti, in the county of Saguenay, vote by means of the telegraph at election of members for the House of Commons during periods when communication between the island and the railroad is wholly interrupted in consequence of the closing of navigation by the ice

The Royal Electric Company is about to be incorporated by the following gentlemen Richard W. Elmenhorst, President of the St Lawrence Sugar Refinery, Thomas Davidson, Manager North British Mercantile Insurance Company, E. S. Clouston, Manager of the Bank of Montreal, Gilbert Scott, of Wm. Dow & Co; James Crathern, of Crathern & Caverhill, M. Lee Ross, H E. Irvine, George R Robertson, and J Cassie Hatton, Q.C.

We have the pleasure to place before our readers a description of a Single Pole Quadruplex, which has just been invented by Superintendent B. B Toye, of the Great North Western Telegraph Company's service at Toronto We understand the patents have been applied for, as we are confident from the serviceable appearance of the innovation, that this new Canadian invention will be adopted everywhere in America and Europe

We should like to see an electrical society formed in this city from amongst the employees of the various companies. We feel quite satisfied much good would result from the monthly lectures on, and discussion of, subjects affecting the general interest of all. New York, Chicago, Cincinnati and other cities have such associations, and there is no reason why we should not organize. We shall be glad to receive any suggestions.

C. F. Sise, the General Manager of the Bell Telephone Company, is an excellent executive business officer, and has brought the extension of this organization to a very high state of efficiency. The general use of the telephone at Montreal compares very favorably with the other large cities of the universe. On the 1st of this month 1,090 Bell instruments were in use in this city, and by the 1st of May it is expected the number of subscribers will have increased to 1 200. The Company have a large and extensive staff of employees.

The Royal Electric Company prices average from $400 to $5,000 for each machine and from $65 to $80 for each lamp for street lighting. Lamps will burn some 7½ hours and some 14 hours. A single lamp is 1 200 candle power, or equal to 125 gas burners of 16 candle power each. The cost of lighting a square area by 100 gas burners consuming 6 feet per hour, which would be 600 feet per hour, or for six hours burning 3,600 feet at $2 50 per 1,000 feet, would amount to $8,85 and giving 1,600 candle power only. The electric lamps will light the same space for six hours at $1.50, giving 6,000 candle power, or lighting 4,400 candle power greater than gas for $7.35 less money.

Leonard Henkle, inventor and electrician, of Rochester, N. Y., says that he has negotiated for the purchase of land on the Canada side of the river and for power from the great Horseshoe Fall for the lighting of sixty-five American and Canadian cities, connected by means of underground cables with electric lights generated at Niagara. The plans are all drawn for ten hydraulic engines of 200,000 horse power each, and gigantic machinery That Henkle himself means business is attested by the fact that he will soon open an office on the Canadian side of the river, and endeavor to complete arrangements with capitalists, whom he expects will furnish $22,000,000 for the undertaking.

The suggestion in our last with regard to forming an Electrical Society in this city has been warmly commended by various members of the profession. The society should be in working order before the advent of the British Association for the Advancement of Science, which will meet at Montreal in August, 1884. If a few influential gentlemen will call a meeting at such time and place as would be most convenient for those desiring to attend same, an organization would be sure to result Who will make this first move? Remember Sir William Thompson and Mr. W. H. Preece are coming, and they should not find us unprepared to receive them. Some noted American members of the profession are also coming.

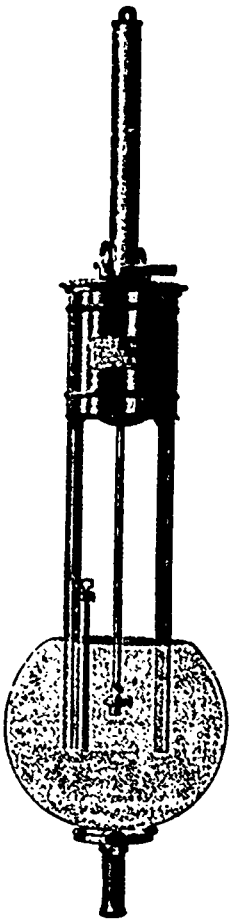
Mr. F. N. Gisborne, F.R.C.S., the able and energetic Superintendent of Government Telegraphs and Signal Service of the Dominion, delivered a very interesting lecture on the Origin and Development of Electrical Science" at Ottawa, under the auspices of the Literary and Scientific Society on the 21st of last month The chief feature of the lecture consisted of colored drawings expressly prepared by him for those uninitiated in electrical science, thus enabling all present to understand the general principles upon which dynamos, cable testing and duplex working, &c., &c., are based. The lecture was delivered without notes in a clear and pleasant off-hand manner. Not the least interesting part was that of describing the introduction of the electric telegraph into Canada in 1846, when Mr. Gisborne was an employee of the Montreal Telegraph Company, and who opened the first office in Quebec The discourse drew forth frequent applause and was a most comprehensive survey of the whole field of modern electrical application.

A WIRE-WOUND FLYWHEEL.

The following description of a heavy flywheel composed of wire appears in the American Manufacturer:—"Amongst the most recent and novel applications of wire, perhaps none has greater interest to the mechanical world than that presented by the new wire flywheel lately erected at the Mannesmann Tube Company's Works, Germany. Heavy flywheels driven at high velocities obviously present dangers of breaking asunder from the great centrifugal force developed. The wheel at the factory mentioned consists of a cast iron hub or boss, to which two steel plate discs or checks, about 20 ft. in diameter, are bolted. The peripheral space between the discs is filled in with some 70 tons of No. 5 steel wire, completely wound around the hub, and the tensile resistance thus obtained is far superior to any casting. This huge flywheel is driven at a speed of 240 revolutions per minute, or a peripheral velocity of about 2.8 miles per minute (250 ft. per second, approximately), which is nearly three times the average speed of any express train in the world. The length of wire upon such a constructed flywheel would be about 250 miles."

THE "WOOD" ARC SYSTEM.

THE Canadian General Electric Co. have, within the past year, placed on the market a complete line of arc apparatus of the well known "Wood" type. The selection of the "Wood" machine as their standard for arc lighting was only arrived at after a careful consideration of the requirements of the best arc practice and of the relative adaptability to the same of the different leading arc systems owned or controlled by the Company.



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Wood Arc Lamp

In the "Wood" dynamo it has been aimed to combine certain essential features of design and construction by which it is claimed a distinct superiority has been gained. The most salient point in the machine is its simplicity in design, combined with solidity of construction. To the design of the armature, always the weak spot in an arc machine, special attention has been paid. The insulation and ventilation are of the best, and the coils are easily and separately removable in case of damage. The automatic regulation is it is claimed the most perfect attainable, variations ranging from full load to one lamp, being handled instantly without sparking or perceptible change in the candle power of the lamps. A recent improvement has been the equipping of these dynamos with the standard Edison self-oiling ring bearing.

The lamps used with the system are the Company's improved standard C. K. single carbon lamp which with a ⅝ carbon is claimed to be admirably adapted for all night lighting, and for those cases in which a double carbon lamp is required. The standard "Wood" type is manufactured. Both of these types of lamp are designed to secure the greatest simplicity compatible with steady and reliable service. A simple clutch feed is used and the number of moving parts reduced to a minimum. The minor accessories of the system, ammeters, lightning arresters, cut-outs, hoods, hangerboards, etc., have all been carefully worked out with a view to combining in one system the various features which experience has shown to be essential to the satisfactory operation of a modern arc lighting plant.

ALTERNATORS IN PARALLEL.

A striking illustration of the tendency of alternators to keep in step, when they have once been synchronized and connected in parallel, occurred a short time ago at one of the power houses of the Ottawa Electric Company.

Two 750 light Westinghouse a. c. dynamos, with surface wound armatures, driven from the same countershaft, by separate pulleys, were furnishing current to a circuit of about 1200 lamps.

The machines ran in this manner for several days without anything unusual occurring. One afternoon, shortly after starting up for the evening run, the ammeter, which was connected between the machines, suddenly showed a higher reading than the ammeter on the line. This indicated that one of the dynamos was carrying all the load and was also sending some current through the other. The circuit was removed and both machines shut down. The switches between them were opened and it was then attempted to start again. As soon as the machinery was set in motion the cause of the rise in current between the dynamos became quite apparent—one of them and the pulley on the driving shaft to which it was belted stood still. The key had slipped out of the driving pulley and the dynamo, which had now become a motor, was driving the pulley instead of being driven by it But for the change in the ammeter reading the accident would not have been noticed—at least not until the heating of the armature carrying the load had attracted the attention of the dynamo tender.

OVERCOMING TROUBLE WITH A GRAMME RING ARMATURE.

DURHAM, ONT., Jan. 15, 1895.

Editor ELECTRICAL NEWS.

DEAR SIR,—I see in your last issue that W. B. S., Montreal, has had the same trouble with a Gramme armature that I had, so I thought I would let you know the cause of the trouble here. You evidently do not understand the spot where the breaking takes place. The leads are of course stayed by weaving with cord or some other substance. These leads are styled the commutator web. It is the projecting wires connecting the armature to the web that break. These wires are about one inch long, and are really a part of the armature. However, I found the trouble here was caused by the expansion bolts that hold the armature in its place getting loose. This of course would allow the armature to give a little, and the commutator and web holding firm, the consequence was that the whole or a large part of the strain of driving the armature was on the short wires, consequently breaking them. The only wonder to me was that more of them did not go. I took off the armature and tightened these bolts, making sure I got it true; since then I have had no trouble. I think the bolts were loosened by the vibration of the machine. I think W. B. S. will find that this is the trouble with his motor, and if after tightening the expansion bolts he makes sure the lock nuts are tight, will have no further trouble.

Yours truly,

L. O'CONNOR.

MUNICIPAL CONTROL OF ELECTRIC LIGHTING.

RENFREW, Jan. 14th, 1895.

Editor ELECTRICAL NEWS.

SIR,—I have gone very carefully over Mr. Fraser's interesting article in your issue of January, and fail to exactly understand the financial part at the close. At the prices he mention, that customers in Orillia pay for incandescent lights, the plant should be even more productive than he makes it to be. Thirty cents per month per lamp would be $3.60 per year per lamp, and an ordinary dwelling house with say 20 lights, would thus pay $72 per annum. Then the hotel keeper who pays 80 cents per month per lamp, would be $9.60 per annum per lamps and if he had fifty lamps (which is by no means a large number for a fair sized hotel) it would cost the proprietor 50 × $9.60, or $480.00 per annum for his lights. I cannot get such prices here, and am fully persuaded in my own mind that very few electric light men can.

I fail also to see just how he gets the yearly income of $5,468.22, as from the data he gives I make the income to be $6,720 per annum, thus:—

⅓ of 1400 = 466⅔ × 60c. × 12mos. = $3,360.00
⅔ of 1400 = 933⅓ × 30c. × 12mos. = $3,360.00
or an annual income of $6,720.00

Doubtless there has been some mistake in putting down the figures. Mr. Fraser no doubt will be able to explain. Would Mr. Fraser also state what the customers pay for the arcs? This is evidently a pretty good paying plant.

Please state also how you come to reckon $570 for carbons as an expense against incandescent lighting? Why charge all the amount paid to the engineer and fireman to incandescent work? A portion of these items are justly chargeable to arc, etc.

Yours, etc.,

A. A. WRIGHT.

MUNICIPAL CONTROL OF ELECTRIC LIGHTING.

CITY HALL, QUEBEC, January 16th, 1895.

Editor ELECTRICAL NEWS.

SIR,—I have read with much interest under the heading of "Central Station Types" in your paper, CANADIAN ELECTRICAL NEWS, Mr. G. White-Fraser's views on the comparative cost of electric lighting by and at the cost of a municipal body, as against the same service performed by a company, and quite agree with the writer that for a small town, and especially where the water supply is done by pumping and there is a small addition to the pumping plant and building—say a dynamo or two, an extra boiler and an engine, with a single extra hand in the way of an electro-mechanical engineer—the needful can be done at a slight advance on the first and yearly cost of pumping works alone. In large cities it is very much as on board of "His Majesty's ship Pinafore," where the admiral had to accommodate and care for his "sisters and his cousins and his aunts." Look at the "Tammany Hall" for proof of what I say: that in all such concerns, where, under municipal management, every councillor and alderman—in payment I suppose of giving his services free for the enlightenment of his fellow citizens—must have a finger in the pie, in the shape of a member of his family or some relation or friend or other appointed to swell the already overdone list of useless and ignorant hands altogether unsuited to the requirements of the occasion. Our corporation on several occasions wanted to take over our gas works and our Lower Town street railway, both of which concerns were and have been coining money; the first 33%, the other 22%. I as persistently opposed this, as there would have been no end to "dead heads" and other scoundrelism; but what I did and do advocate, sir, in the most forcible manner, is that on account of the sacrifices imposed upon a city in thus giving up its ways to telegraph and telephone and electric posts and wires, to street railways, to gas companies, etc., to dig up and impede, to the great inconvenience of citizens—what I say, I do recommend, is that all such companies be made to pay, not a fixed sum, not so much per post, not so much out of its profits which can not be got at, being always hidden under a bushel, but a percentage on gross receipts. Look at Toronto with its 12½ per cent. on its city tramways gross receipts—nearly $100,000 annually to that city. See how much richer Quebec would now be, if since the establishment of our gas works in 1847 we had had our share of the 33% profit which the company, not daring to own to, for fear of popular outcry, used to pay 8% dividends on the $100 shares, and advertised this in all the city papers to lead people to believe the company was only doing middling well; while the remaining $25 out of the $33 was put down to capital—¼ share per share per annum, one share additional every four years—a share that did not cost a cent, and on which the 8% dividend continued to be paid, or on each four yearly increase of an extra $100 share. Similarly with our street railway company we should have, now more than 20 years ago, stipulated for a percentage of its receipts, which, as I have said were 22% profit. A fixed sum to be paid by any company is absurd, and against the interests either of the one or the other. No company, no municipality can know, foresee exactly what profits a company will make on any plant and service. The fixed sum which our telephone and electric company pay here as a tax was in the beginning too high for the profit of the respective companies. At present these fixed sums are too low. They are to be increased, and the only honest and fair way of doing so—fair to the city and to the company—is a percentage on the gross receipts or on the profits, if these can be got at, which it is difficult to ascertain; whereas there is more difficulty in blinding people as to gross collection, which there are many ways to arrive at. I would therefore incline, except as Mr. Fraser says for small communities and therefore small plants, and when a company does not care for the slight profits to be made—and especially where there are pumping works and the same staff answer for both—that the electric lighting of such a small place even as Quebec, with its only 370 lights, continue with the present company, which gives entire satisfaction; but that on renewal two years hence, of our five years term of contract, we do stipulate for a share in the concern, and I would also advise my friend, the City Engineer of Topeka, Kansas, who for the last three years has been putting forth his best endeavors to reduce cost per arc lamp below $90, and has not yet nor will he succeed in doing so, until some cheaper process has been discovered of producing light, to wed his corporation to the better plan of doing the thing by contract with a company, paying the city a good percentage on the venture.

C. BAILLAIRGÉ,
City Engineer, Quebec.

A great deal has been published in engineering journals about scale in boilers, and yet very little has been said about the accumulation of it in feed and blow off pipes. There are men who maintain that scale can not accumulate in pipes in which the water is circulating constantly, but cases cited will show how fallacious such opinions are. As a matter of fact, these pipes often fill up in a remarkable way, the deposit choking them to such an extent that it becomes a source of positive danger.

CHARACTER SKETCH.

ROBERT F. EASSON.

"What is the use of a child? It may become a man." Franklin

From smaller beginnings, sometimes, than a grain of mustard seed, grow great things. When Galvani discovered that a frog's leg twitched when placed in contact with different metals, it could scarcely have been imagined that so apparently insignificant a fact could have led to important results. Yet, as Samuel Smiles has remarked, therein lay the germ of the electric telegraph, which to-day binds the intelligence of continents together, and seems destined speedily to "put a girdle round the globe."

A sketch of one who has given nearly half a century to the telegraph business, as has been the case with Mr. Robert F. Easson, of the Great North-Western Telegraph Co., is suggestive of the early trials and triumphs of telegraphy. Mr. Easson cannot go back, except historically in memory, to the rude methods of signalling adopted by the Roman generals who spelled words by means of fires on different substances. The beacon lights on the mountain tops in ancient days were, however, the precursor of the electric telegraph of to-day in all its completeness. Nor 50 years ago were the methods in vogue as crude as those described by Bishop Wilkins, when the custom of conversing at a distance with three lights or torches at night so used as to indicate the 24 necessary letters of the alphabet, was in somewhat general use.

ROBERT F. EASSON.

Robert F. Easson entered the service of the Montreal Telegraph Co., at Toronto, as messenger, in 1849, a period only four years later than that which marked the opening of the first telegraph business in which the Morse patents were used. He has, therefore, good claim to rank among the pioneers of that method of telegraphy which in late years has girdled the globe. From messenger boy in 1849 Mr. Easson was promoted, with little delay, to the position of book keeper. In 1852 he was an operator in the Toronto office, and the records show that he was one of the first operators to read by sound. Chicago became his place of residence a year later, where he was engaged by the late Mr. Ezra Cornell, who was largely interested in western telegraphs, to work as an operator in the telegraph office in that city. A little later he was sent to Laporte, Ind., In that journey the iron horse had not cut his way through the country as he has done to day, and Mr. Easson's drive from Laporte to Plymouth was right through the bush. Here he, in company with E. B. Stevens, of Chicago, opened a telegraph office, Mr. Easson remaining at Plymouth for about a month, teaching a young Hoosier to telegraph and then installing him in charge of the office.

Spending three or four months after leaving Plymouth in Logansport, Ind., in the fall of 1853 he had again returned to Chicago. For two years from this date he remained in the Chicago office and worked the old Speed-Cornell line, which ran through the woods and along the highways from Chicago to Detroit. The telegraph in those days had not cut any large figure in the commercial world. The entire staff of operators in the Chicago office did not exceed half a dozen, and when Mr. Easson left Chicago in 1855 there were not more than a dozen operators in that now great city. And yet some progress had been made in the decade from 1845 to 1855. The first telegraph line constructed on the Morse plan in 1845 was operated between Washington and Baltimore. The advertised tariff was, "for every four letters—one cent." The receipts for the first four days were one cent and the total income for the first ten days $3.09½.

In 1855 the subject of our sketch returned to Canada and re-engaged with the Montreal Telegraph Co., at Toronto, as an operator. His career from that date on was one of steady progress, and in 1859 we find him adding to his duties as an operator those of associated press agent at Father Point, Que., where the Canadian ocean steamers were intercepted and their news sent on by telegraph in advance of the steamers' arrival at Quebec. Once more he returned to the Toronto office, where he worked the Montreal circuit until about 1864, when he was *appointed chief operator, occupying this position until about* 1880. Mr. Easson's fitness for the position of press superintendent was shown in the fact that when the Great North Western Telegraph Co. assumed control of the Montreal and Dominion Telegraph Companies, he was appointed to take charge of the news gathering branch of the business, which had developed most successfully under the direction of General Manager H. P. Dwight. This position Mr. Easson occupies at the present time. His talents and training eminently fit him for the work. Of this every newspaper man throughout the country is prepared to testify; and no man is better or more favorably known, either in Canadian telegraph circles, or by the newspaper men of the Dominion, than "R. F. E.", the familiar business nom de plume of Mr. Easson.

Every one who has come in contact with Mr. Easson is prepared to bear testimony to his genial, kindly and courteous character. Among those who know him more intimately he is regarded as one of the best friends that any man can possess.

Robert F. Easson hails from the land of the hills and heather, having been born in Prinlaws, Scotland, June 14th, 1838, though he came to Canada when quite young; and attached as he is to the land of his birth, he is ever proud of the land of his adoption, and is one of its most worthy citizens.

NATIONAL ELECTRIC LIGHT ASSOCIATION CONVENTION.

FOLLOWING are the titles of papers to be read at the annual convention of the National Electric Light Association convention which will meet in Cleveland, Ohio, on the 19th, 20th and 21st inst.: "The Storage of Energy Essential to Central Stations, How it May be Accomplished and the Economies Resulting," by Nelson W. Perry. Professor Langley of the Case School of Science, and Professor Stine of Armour Institute, Chicago, will take part in the discussion. The topic, "How to Light Large Cities," will be discussed by Frederic Nicholls, Charles R. Huntley, Frank H. Clark, J. Frank Morrison, T. Carpenter Smith, George A. Redman, E. F. Peck, and others; "Some Economies in Electric Light and Power Stations," by Professor Edward Weston; "Arc Carbons and The National Electric Light Association Standard of Light," by L. B. Marks; "The Monocyclic System,' by Dr. Louis Bell; "The Correct Method of Protecting Electric Circuits," by W. E. Harrington; "The Evolution of Arc Lighting Machines," by C. N. Black. E. A. Leslie's paper, read at the Buffalo meeting, and entitled "The Operation of High Tension Currents Underground from a Physical and Financial Standpoint," will be taken up and discussed.

Mr. W. J. Clark, electrician, Trenton, Ont., has been committed for trial on a charge of having incited one J. J. Cooley to burglary, for the purpose of obtaining the cypher of the Brush Electric Co., in connection with the Toronto boodle inquiry.

The Stormont Electric Light & Power Co. will apply to the Ontario Legislature for an act to ratify and confirm an agreement made on the 18th January last, for the purchase of the Cornwall Gas Works, and for power to operate the same, and to increase the capital stock of the company.

Three-hundred subscribers of the Bell Telephone Co. had their connection with the main office cut off by the recent fire, and about a dozen telephone instruments were destroyed. As speedily as possible, the company intend to place their wires underground in the vicinity of the recent fire.

The Richmond Industrial Company, of Richmond, Que., is seeking incorporation to acquire the real estate, machinery and franchise of the Richmond Water Power and Manufacturing Company, Ltd. The capital stock of the company is to be $100 000, divided into 1,000 shares. The applicants are:—Messrs. Leonard Thomas, Melbourne; William Ewans Jones, Richmond; John Matthew Nunns, Henry Autisell Allen, Melbourne; Kelzer A. Cummings, Francis Henry Nunns, Coaticook.

THE ONLOOKER.

AN ancient writer has said: "I would do what I pleased, and doing what I pleased I should have my will, and having my will should be contented; and when one is contented, there is no more to be desired; and when there is no more to be desired, there is an end of it." The Onlooker thought of these words as he learned of the several suggestions made by Mr. Hamilton MacCarthy in a paper on "The Aesthetic Unity of the Fine Arts," read at a late meeting of the Canadian Institute. This well-known sculptor would have the people of Toronto "do away with the dangerous and unsightly trolley," because of the manner in which it mars the beauty of the city. The suggestion shows how directly the practical spirit of the age will come in contact with the sentimental. It would be a delightful thing for Toronto, and other metropolitan cities, if they could be planned on the lines of the artist and sculptor. But if these things were given the people, how much else would they be forced to forego? No boon is without its drawbacks. The telegraph, telephone, and electric system of transit are not an unmixed blessing, but who would be without them? The unsightly trolley, however, has done not a little to give to Toronto an aesthetic and artistic character. Were it not for this method of rapid transit the city would not be dotted with so many pleasant homes, laid out with skill and taste. The people by means of this quick method of propulsion are enabled to get out to the country, that spot which it is said God made, whilst man made the city. The suggestion is more practical that another method of electric locomotion should be adopted in place of the overhead trolley system. Science is working to day on the conduit system and some of the brainiest electricians have not abandoned the hope of a successful storage system for the largest cities. When these come Mr. MacCarthy's desires will have been met, and the advantages of the present will not have been sacrificed.

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When one talks of a "penny wise and pound foolish" policy, it is a mistake to suppose that the old adage can be applied only to domestic expenditures. The unsuccess in many lines of manufacture, and the trouble that comes to municipalities is frequently due to the narrow manner in which investments made are viewed. The other day the Onlooker was talking to the representative of a large electrical supply house, who had recently furnished an electric plant for an eastern municipality. Pursuing a cheese paring policy those interested had thought it wise to divide up the purchase, securing one part of the plant from one concern, and part from another, thereby saving, as they believed, a trifle. When everything was supposed to be ready for operation, it was discovered that things would not work satisfactorily. There was a fault somewhere, and after no little trouble it was ascertained that associated with machinery of the better class, there had been placed that of a commoner kind, and as a result the plant would not work. Someone had to be blamed for the trouble, and the man who did the best work came in for his share of it. Let it be said for this municipality, that finally they saw for themselves the mistake that had been made, and a plant perfect in all its details was secured and everything now goes on lovely. It may not be a matter of serious concern if the good housewife makes the mistake of buying shoddy for cloth or cotton for silk. It is not a killing affair, though it may drain her pin money a little. But it is hardly excusable when hard-headed business men, and especially those whose work is in the line of mechanics, allow themselves to be influenced in the securing of plant, that their experience and good sense ought to tell them can never give satisfaction. The poorly made machine, at the best, will give out in a little time, and the labor, expense and trouble of replacing the broken machinery has to be undertaken. An investigation made some time ago by an inspector of a boiler insurance company showed that the larger percentage of accidents caused by the bursting of boilers was due to the owners being satisfied with something cheap. The cheap and nasty, as a shop term runs, may not hurt anyone, when this rule is applied in the purchase of an article for individual wear, or the home, but the "cheap and nasty" in machinery may mean the loss of life, and the wreckage of valuable property. Moreover, when one sets up a shop or mill filled with machinery, he does not do this for the day only. Thousands of dollars are not invested in mechanical and electric plants as one might invest in a toy. The idea of permanency ought to be foremost in every such purchase. These ends can only be attained when the purchaser gets far away from the penny wise and pound foolish policy that controls too often men in their individual, as well as in their corporate, capacity. Better be sure than sorry.

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What is to be the future of the electric railway, is a subject that is commanding wide attention among press and people everywhere. The progress of electric propulsion has been on so wide a scale and taken altogether of so satisfactory a character, that those who indulge in prophecy are hardly to be kept within bounds in the optimistic pictures they paint of the future of this rapidly developing power. All this is cheering to the men who have given the best of brain and brawn to a consideration of this question. It occurs to the Onlooker, however, that it is worth while to get away from the heights a little and look at this matter in a more practical and business-like sense. For this is to be noted that the progress of electric power can only grow as it appeals to, and is capable of satisfying, the commercial needs of a community. Electricity is not only supplementing other methods of lighting, and doing this most successfully. It is, also, cutting into the corner that steam has held since the days of Watt, as the one great power for driving the machinery of the workshop; and as advancement is made in this direction it is a question whether ultimately, because of its cheapness and simplicity as compared with steam, it will not become the one practical power of the day for mechanical purposes. In neither of these instances, however, does it stir up the elements of opposition, as is the case when it is used as the propelling power of travel between municipality and municipality. Whether the electric road can engage in freight and passenger traffic without injury of the older railroads and all that this involves, is the burning question in electrical fields just now. It is useless for railroads, any more than gas companies, to close their eyes to the fact that electricity, in both cases, is on top. But without withholding one jot or tittle from the capabilities of electrical power, in a consideration of its application to railroading, questions of expediency come up for consideration. Some words of caution were printed in the ELECTRICAL NEWS a short time since, touching the wisdom of running electric roads parallel with the steam railroads now in operation. A Montreal journal has supplemented this thought with the remark that at least one place that helped an electric line to compete with a railroad got badly left. The electric railway had to go to the wall and the older railroad then stepped in and the rates for local traffic were advanced to recoup it for the loss by the competition. In certain parts of the United States similar difficulties have arisen, and it is pointed out how unwise is the tendency, which in some places is being carried to excess, of constructing electric lines in places where, as time will demonstrate, they cannot be operated at a profit. A writer in an engineering journal, discussing this phase of the question, takes the ground that nothing seems more certain than that for their own protection the steam railroad corporations will ultimately be compelled to secure control, directly or indirectly, of all electric street railways which seriously compete with them. In view of this possibility, not to say certainty, it would seem to be the part of wisdom for the municipal forces of towns to exercise a good deal of discretion in granting exclusive perpetual franchise for the occupation of their streets and roads by electrical companies. It is easily understood, with the developments of electricity as a method of railway propulsion, that steam railroads would grow alarmed and difficulties, which time would shortly wipe out, will be magnified. It has seemed to the Onlooker nevertheless, that with all the confidence that the student of electricity may have in the developments of the future, and he can afford to have big faith, there are yet phases of the question that call for caution and wise judgment. This one thought has suggested the present remarks.

It is said to be the intention of the Canadian Association of Stationary Engineers, to renew their application to the Ontario Legislature at its next session, to pass a law making it compulsory on all engineers in charge of steam plant to pass a qualifying examination.

It is the intention of the Corporation of Port Arthur, owners of the Port Arthur Electric Railway, to install and operate a 12,000 c.p. incandescent light plant by and in connection with the railway plant at an early date. The management of the road for 1895—6 is vested in Mr. N. P. Cooke, chairman of the Light Committee, and Mr. A. M. Gill, Chief Engineer.

CENTRAL STATION TYPES.

GEORGE WHITE FRASER

NO. III.—SMALL PRIVATE PLANTS.

THE small amount of business that is sufficient for the support of a paying electric light company, operating under favorable circumstances, is certainly surprising, and may well afford matter for serious consideration to small capitalists. At the same time, it must be admitted that the smaller the business, the more favorable must those circumstances be, and the more careful the consideration given to any particular case. The question of design assumes an importance in a small station which is well nigh predominant. In a station of any size, large or small, this question is, of course, a determining factor in the subsequent costs of operation, and resultant dividends; but, as first cost of plant and frictional and other losses do by no means diminish in the same proportion as the capacity, it requires very little demonstration that faulty or ill considered design of station and proportions of steam and electric machinery, has relatively a greater effect on a small plant than on a large one, in increasing operating and maintenance expenses, and reducing dividends. There is a very general impression among the non-professional public, and unfortunately also observable among persons connected with electric plants in a non-practical capacity, that the designing and operating of an electric lighting or railway plant is really the most simple thing in the world—that any person who is capable of buying a bag of sugar in the open market, and of exercising his judgment as to its quality, is quite equally competent to solve the various "simple" problems governing the design of an electric station; and as to operation of plant—"why what more is there to do than to shovel coal into a boiler and close a switch. The whole thing is as easy as rolling off a log." So it is, but it seems possible that the person who has studied rolling off logs, so as to get the greatest amount of exercise with the least personal exertion, and with the least damage to his clothes, will probably roll further and better than one who has devoted most of his life to some other pursuit.

The practice of electrical engineering as a profession is not sufficiently individualized; the lines of demarcation between it and the other branches of engineering are not distinctly enough laid out. On the one hand, we find purely civil engineers, and even land surveyors, whose technical training certainly does not necessarily qualify them to tackle electrical work; and on the other hand, mechanical engineers who are very close cousins to electrical men, but yet not actually qualified, are both and all, placed in charge of enterprises which not only involve the use of electricity, but in which electricity is the active principle, so to speak. The natural result of such short-sighted policy is that, while a piece of construction is probably very solidly and well done and calculated to last, it has cost thirty per cent. more than necessary; and a little criticism will show that the first principles of *electrical design* have been lost sight of, and the plant saddled with the irremediable results of inefficient machinery. All this is bad enough as it is. But when we find the ordinary business man in a small way entering the practical field, and buying a dynamo or engine as he would a new hat or a dog collar, and designing his own electric plant as he would the arrangement of his own store, the thing is raised from the ordinary to the sublime. The chances are that the resultant station or power house will present many valuable features (for all intelligent people can have good ideas, and work them out), but at the same time will not bring in dividends. There appears to be a very considerable misconception as to the *commercial* conditions of electrical enterprises, and also as to those conditions under which electrical enterprises will work to advantage. Any person of intelligence will at once admit that to run a successful dry goods or grocery business requires experience and a substratum of dry goods or grocery knowledge. Similarly with any other line of trade. It is not merely necessary to have a shop and stock. Assistants are required who must have had some training, a book keeping staff to keep track of everything, petty pilferings must be detected and stopped, and above all, there must be a *head*, to manage things, who is deeply versed in the details of the business, and who can buy in the best market and make the best use of his goods. The sooner electrical enterprises are placed on the same common sense basis, the better for both owners and consumers.

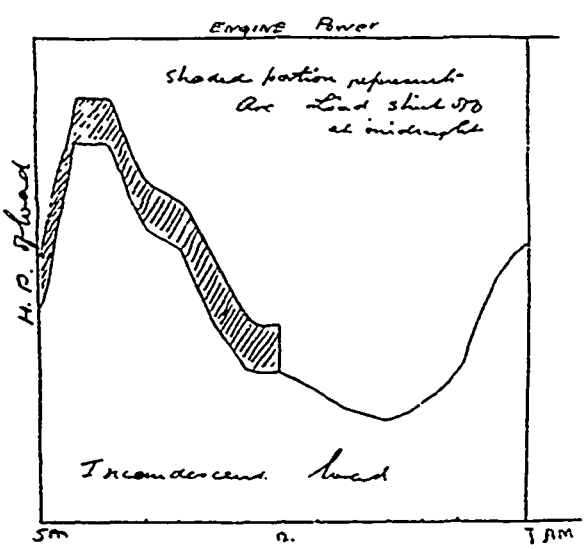
An electric light station is a store where electric light is sold. The machinery - waterpower or steam and electric - the stock; the engineer, linemen, &c., are the shopmen, chief engineer is the gentlemanly floor walker, and the superintendent the guiding intelligence who, let it be strongly emphasized, must be well up in all the details of the business. The secretary will be the book-keeping department. So far the analogy is followed, for all plants have some kind of engineer and linemen—or "Electrician"—as he is called (!) and a secretary. None but the large ones have a superintendent. It may be pertinent, at this point, to ask:—"Then who *manages* the plant? who is the experienced head, who cares for every department, and sees that the stock is purchased in the cheapest market—that none of it goes to waste or is pilfered, or is sold below its reasonable price? who is the guiding hand of the whole business, which hold the reins? Echo will faintly reply, "Who?" Possibly echo may suggest that the floor walker (engineer), who is a working mechanic with no technical training whatever, and but little general education, can be head too. Then, will this assistant, whose mental vision has for years been directed mainly towards keeping his bearings cool, and his steam gauge at 80 lbs.—will he be *capable* of choosing the really best market? Is his education sufficient? In a word, is it *possible* that a working mechanic, with a working mechanic's education, and opportunities for acquiring scientific knowledge, can "run" an electric plant, taking care that he does not burn too much fuel, or take too much steam, or waste steam, or waste electricity, or introduce too great frictional or other loads; and can he choose the really best incandescent lamp to run with his plant, and under its peculiar operating conditions; and so on through the numberless details that constitute efficient managing? And yet in a majority of medium and small sized plants in Ontario, that class of man is expected to generate good current, and at a price low enough to sell in competition with gas. He does so in many cases—but why? Because he runs with a bountiful water power or burns slabs and other cheap wood fuel. Whatever may be the class of fuel burned, it should be one of the objects of the management to reduce the consumption; whether it be coal at a high price, or cordwood at $1.00 per cord. An unnecessary consumption of 1 lb. per H. P. H., means an unnecessarily increased fuel bill, and just so much knocked off dividends. But is this kind of care taken? By no means; nor is the class of mechanic usually found running electric light stations qualified by knowledge or experience to undertake such management.

Then in the accounting department, in all stations, municipal or private, a set of books are kept, and very scientific looking reports are sent in daily by the engineer to the secretary. Therein are set forth the times of starting and stopping; quality of fuel burnt; maximum and minimum indication of the ammeter, and various other most imposing looking data. And what meaning has it all to the secretary? He doesn't probably know the difference between an ampere and a set nut, the engineer being likely equally well informed. His books, therefore, are simply a record of salaries, purchases, fuel expense, and income from rental of lights; and this service, which probably a clerk in a shoestore could perform equally well, is called "managing an electric lighting station"! Where is the classifying and analyzing of accounts? Where is the close scrutiny into the expenditure of every department? Where is the system by which alone wastes (steam, mechanical, electrical) can be traced to the causal defect, and the proper remedy pointed out? Why should electric lighting business not be managed on business principles? A teamster is not necessarily qualified to run a horse car line, nor a carpenter to conduct an extensive contractors' business. A man may be an excellent hardware man and yet he would run a restaurant to earth, simply because neither his professional training nor his subsequent experience has been in the catering line. Why therefore set a railway or sewerage engineer or land surveyor to design a plant? and why manage it afterwards by a committee consisting of a plain working mechanic and a book-keeper? Is a boiler a kind of nickle-in-the-slot machine, into which you throw fuel and get steam?—an engine room to be regarded as a kind of expensive barrel organ out of which an itinerant Italian can grind a tune just as well as a doctor of music?—while a whole electric lighting system is placed pretty much on the same footing as those glass case toys that are shown by sham seamen, into which a little dirty

ruffian drops a cent (perhaps a brass button), and in return the mechanism heaves a rolling ocean, and sets a number of jerky figures into spasmodic action. It doesn't matter who drops the cent, the street boy gets the same results as the educated passer by, and so it is apparently with electricity. The ordinary handy man who has run a saw mill, and can oil a bearing, is believed capable of properly, economically and efficiently managing an electric lighting station.

This question of the original design of a station and its plant is one the great importance of which is not sufficiently appreciated. It will be evident, however, on the slightest reflection, that the efficiency of the system, as a whole, depends ultimately on the preliminary consideration given to the *commercial* conditions under which the plant may be expected to operate. Take the familiar case of a large water power. It may be the best economy to use a large wheel, and waste considerable power in order to reduce line copper; or it may cost so much to develop the power, that less line loss and more copper may be the true economy. Who would think of using an expensive triple compound engine where the fuel was waste slabs, or a simple, single acting, low pressure one, with coal at $12.00? The whole thing comes down to dollars and cents eventually, and to a comparison of increased interest on first cost by using higher class machinery, with the decreased fuel and other expenses to be expected consequent on its more economical operation.

The *consideration of local conditions* should guide in the selection of a plant, not merely the fact that one engine is cheaper than this or that other one. When a light and fire committee is proposing to purchase a plant, do they take into consideration the probable *load line* of their station, and decide on the relative proportions of dynamo and engine, with the reference to that? They apparently do not. Similarly with private companies and individuals. There is an utter absence of all weighing of conditions, and careful consideration of particular details. The diagram gives the usual nightly load line of a small station, expressed in horse power—that is, the wattage of the electrical output—arc and incandescent. The line at the top shows the H. P. of the engine that runs it, at its normal rating. This diagram shows the winter load in the beginning



of January; the summer load will naturally be greatly less. It affords a good object lesson to anyone who is capable of reading it. And this sort of thing, which is common, is called "designing a station." The little town of Penetang affords an example of a successful little plant, which is managed with a good deal of common sense and enterprise. Its population is about 2,000, and its electric lighting is done by a private company. This company had the shrewdness to contract with the town to run its waterworks for it. It put up its own building, contiguous to the waterworks engine house, and agreed to run the waterworks plant, not including any of the outside or pipe work, for the same sum it had cost the town for the same service the preceding year. It is hardly necessary to point out that the advantages are to a great extent the same as those obtained in Orillia (described last number) by doubling up the same services. It is a most regrettable circumstance that the above diagram comes from this very plant, but the very evident loss in efficiency consequent on such questionable proportioning, was to a certain extent offset by the commendable policy of the company in securing the services of a qualified electrician at a regular good salary, to whom was entrusted the responsibility of installation. The policy usually is to give a contract for the installation of so many hundred lamps and the outside line work, trusting more or less to the contractor to do good solid work. Contractors are, unfortunately, contractors all the world over, and propose to make money, consequently work is not as well done in all cases as it is when supervised by a person whose interest does not lie in cheapening labor and lessening expenses. This little plant is good and solid, and does good work. The inefficiency of proportion is further offset by the low price of fuel $1.25 per cord for slabs—but it will always remain true that first cost was increased by the price of many horse power more than necessary, and that operating expenses will always, of necessity, include the fuel to overcome the frictional load of a very much too powerful engine, operating for a large proportion of its time at a very inefficient length of cut-off.

RULES OF THE CANADIAN UNDERWRITERS' ASSOCIATION.

THE Canadian Underwriters' Association has recently revised its rules for the installation of electric light and power. No very important changes have been made, but the present rules have been brought up to date and made very comprehensive. They are in harmony with the rules adopted by underwriters universally. The special requirements of the Association are as follows:

A certificate for all new work or changes in old work should be signed by the party installing or controlling any apparatus. The certificate should be sent to the Secretary of the Canadian Fire Underwriters' Association, Toronto.

This certificate is relied upon as a guaranty until the work can be inspected. Permits for the use of light or power may be granted as soon as the certificate is duly filed.

Blank certificates may be obtained by application to the Secretary of the Canadian Fire Underwriters' Association, Toronto.

All work should be inspected before any of it is concealed, and to this end notice of concealed work must be given this Association as soon as work is commenced.

The Canadian Fire Underwriters' Association reserves the right at any time to add to, change or modify the accompanying rules, and to enforce such modifications, changes, etc., as it shall deem necessary for safety; and it will use all reasonable efforts to promptly notify all electric light companies of any such change.

Any additional loading of wires, either in building as a whole, or in any department thereof, without previous notification to the Association such as is required, shall be deemed a sufficient cause for the suspension of any permit previously granted, until the same shall have been inspected and approved by this Association.

This Association reserves the right to disapprove of the use of any wire, switch, cut-out, or any device, or form of material, which it may consider inconsistent with safety from fire risk, even though it may be proposed to instal the same in conformity with these rules.

THE SMALLEST ELECTRIC BATTERY IN THE WORLD.

In contrast to the very large generators of electricity—battery and dynamo electric machinery in such common use to-day, it may be interesting to note, says the Manufacturer and Builder, what is perhaps the smallest electric battery ever constructed and no doubt also the smallest generator of electrical or mechanical energy. This battery was constructed some years ago by one of the electricians of the Boston Telephone Company, and consisted of an ordinary glass bead, through which two wires, one of copper and the other of iron, were looped and twisted so as to prevent their coming in contact. The wires acted as the electrodes, and all that was necessary to cause a current to flow was to place a drop of acidulated water in the bead. Certainly such a minute battery furnished but an infinitesimal current, but could be easily used in a delicate telephone. In fact it is said to have actually been used in signaling to a distance of nearly 200 miles.

COST OF ELECTRIC LIGHTING.

In view of the general interest which has arisen in the subject of the relative cost of electric lighting under municipal control and by contract, our readers will doubtless be interested in a perusal of the following statement issued by the Toronto Electric Light Co. to the citizens of Toronto:—

as given, the most marked feature is the difference between the estimated cost of operating a civic plant as made by Mr. McGowan, Secretary of the Fire Department, and the offer of the Toronto Electric Light Company to provide lights by contract. Mr. McGowan's estimate is $103.85, as against $74.82 by the Electric Light Company. A careful perusal of the figures will at once explain the apparent anomaly. Mr. McGowan has

ANALYSIS OF THE DIFFERENT ESTIMATES THAT HAVE BEEN MADE.

No.	Items.	City Engineer. 1300 Lights.		R. J. McGowan. 1300 Lights.		Bertram. 1300 Lights.		Chicago Municipal Plant, 1110 Lights.		Number Toronto Electric Light Co'y Employees for City Lighting.	Remarks.
		No.		No.		No.		No.			
1	Superintendent	..	....	..	$2500	..	$2000	..	$....	1	eer, $2108
1	Chief Engineer	..	$1500	..	2000	..	1200	..	10600	1	Waterworks Engin-
2	Assistant Engineers	..	2000	..	2000	..	1600	..		2	Asst. Eng. $1270 each
1	Electrician	..	1500	..	1500	..	....	..	....	1	
2	Dynamo tenders	..	1500	..	1500	..	1200	3	8734 75	4	
	Oilers	3	1800	2	1200	2	960	2	4560 70	1	
1	Dynamo cleaner	..	....	..	600	..	....	..	....	2	
	Firemen	3	2100	4	2800	3	1500	4	12659 92	5	Firemen at W. W'ks,
	Helper	..	....	..	500	..	....	..	7606 39	..	$788 each
	Trimmers	15	7500	20	11000	18	9000	25	13367 16	24	
	Patrolmen or Inspectors	2	1600	7	4200	2	1200	6	....	7	
	Foreman of Trimmers and Inspectors	..	....	1	800	..	....	..	....	1	
	Horse, wagon and driver for lamp department and keep	..	....	..	975	..	....	..	....	2	
	Linemen	2	1800	5	3000	..	1800	4	....	5	
	Team of horses, wagon and harness for linemen and keep	..	675	..	1000	..	630	..	....	1	
	Clerk hire and stationery	..	800	..	800	..	1000	..	....	..	
	Storekeeper	..	....	..	800	..	....	..	....	1	
	Machinists	1	700	3	2100	3	1500	3		5	
	Materials for repairs to dynamos, lamps, engines and boilers	..	....	..	3000	..	....	..	6374 81	..	
	Maintenance and renewal of tools, repair shop and linem'n	..	....	..	500	..	....	..	....	..	
	Globes	..	..	..	1950	..	4000	..	2253 67	..	
	Coal	..	39420	..	39420	..	16575	..	28509 87	..	
	Carbons	..	10409	..	14235	..	9031	..	9651 19	..	
	Oil waste, etc.	..	2000	..	2000	..	1200	..	....	..	
	Interest and depreciation	..	31020	..	31020	..	20000	..	....	..	
	Insurance	..	....	..	2100	..	1500	..	....	..	
	Taxes which the city would lose by taking the lighting from private corporation	..	....	..	1500	..	....	..	....	$3000	
	Rebates for lights accidentally out which contracting Co. forfeits	..	....	..	....	..	....	..	.. .	$1000	
	Incidentals	..	....	..	....	..	1500	..	2959 47	..	
	Cost per lamp per year	..	**$81.78**	..	**$103.85**	..	**$59.66**	..	*$96.64		

Cost per lamp per year of lights produced by Municipal Corporations in England, sent by *The Telegram's* special correspondent, November 15th, 1894:

Derby	£25	per year, or	$121 67
Dundee	25	"	121 67
Brighton	30	"	146 00
Blackpool	22	"	107 07
Manchester	..	"	131 40

OFFER OF THE TORONTO ELECTRIC LIGHT CO., $74.82 PER LAMP PER YEAR.

* Without interest or depreciation.

For the purpose of comparison the various estimates made by the city officials, and also the estimates made by Mr. Bertram, are tabulated on this opposite page with each item, so that it may be taken by itself and conclusions drawn. There are also given figures of the cost of street lighting by municipalities in England, which appear to be much higher than contract figures in this country, though supplies and labor, especially coal, are supposed to be much cheaper in England than here. The average cost when run by the municipality in England is $125.56 per lamp per year. A detailed statement is also given alongside the estimates for civic plant in Toronto of the cost of the municipal plant in Chicago, which is the only one of any size on this continent. It is said that the service in Chicago is mostly on underground wires. This is true, and the cost for interest would thereby be somewhat increased, though the cost of operating would, if anything, be less. But the figure given above is from the City Clerk's books and is for labour and material only, no charges for interest or depreciation, and amounts to the sum of $96.64 per lamp per year; with interest and sinking fund added, the amount would be $169.00 per lamp per year.

With respect to the estimates of Toronto officials and others made a fair and honest presentment and has based his figures for labor on the salaries and wages now paid by the city for similar services. Without taking up too much space one or two items selected from the whole will illustrate this. For instance, Assistant Engineers are figured by him at $1,000 a year each. The Assistant Engineers at the waterworks receive over $1,000 each. It is not likely that assistant engineers in one branch of the city's service would be content with less wages than their co-labourers on another branch, especially as the electric light work would be the more exacting of the two. Mr. Bertram only estimates assistant engineers at $800 each, which from a municipal standpoint is a fallacy. But does any one suppose that a private corporation or employer pays $1,000 for assistant engineer, or anything like it? Firemen the same. City firemen receive over $700 a year each at the waterworks, and Mr. Gowan is perfectly justified in estimating that sum. Any individual or company can hire all the first-class firemen they want for $500 to $550 per year, and so on through the entire list.

The figure of $74.82½ offered by the Toronto Electric Light Co. is cost price to them, and only made because they would rather keep their plant in operation than have it destroyed, and as shown above it will be cheaper for the city to accept the offer

rather than pay higher wages and have men in their own employ.

Mr. McGowan's report has been sneered at by the advocates of municipal control, but it has not yet been shown that one single item would cost the city less than his estimate. A comparison of a few of the items in the different estimates will be instructive and conclusive to a fair investigator.

COAL.—This is estimated by the City Engineer, using the same kind of coal as now used at the waterworks, and which if best for the waterworks should be best for the electric lighting service at $39,420 per year for 1,300 lights. Mr. McGowan accepts the engineer's figures and allowed the same $39,420. The city of Chicago used for only 1,110 lights, $28,509.87—and coal is cheaper in Chicago than in Toronto—yet Mr. Bertram says that the coal for 1,300 lights will only cost $16,575. This is manifestly an error, and either arises from an erroneous calculation of hours run, or an error in figuring. An ordinary engineer can calculate this, and to prove the statement the calculation is here given. One 2,000 c. p. arc light takes, including friction of engines, shafting, belting and dynamos and loss on line, one horse power. The number of hours per year run, according to the lighting schedule now in use, are 3,932, equalling 3,932 horse-power hours per light. This multiplied by 1,300, the number of lights, equals 5,111,600; multiplied by 2¼ pounds of coal per horse power hour, which is a very low figure, and which is given by Mr. Bertram himself, amounts to 6,390 tons. Now as the fires have to be banked every morning, or new fires built and steam got up at night, this would add at least 3 tons per day making a total of 7,485 tons. This, at the present contract price of $4.34 per ton, delivered, would amount to $32,484, or very near up to Engineer Keating and McGowan's figures, and over double the amount of Mr. Bertram's estimate. *This item alone would bring up Mr. Bertram's estimate to the contract price of the Toronto Electric Light Company*, or very near it.

TRIMMERS.—A good man can trim in all weather about 60 city lights per day, taking the year round, this average is not exceeded in any city where plant is operated municipally or otherwise. 1300 divided by 60 equals very nearly 22 men. This supposes them to work seven days a week, 365 days a year, no Sundays, no holidays—a dog's life—yet the City Engineer estimates fifteen! Mr. McGowan is nearer the mark with twenty; as a matter of fact the Toronto Electric Light Company employ on 1000 city lights, eighteen men, and give each of them a week's holiday in the year without the loss of pay.

INSPECTORS OR PATROLMEN.—These men are not, as has been erroneously supposed, intended to inspect other men. It is a technical name for men whose duty it is to cover the city during the night to look after the lamps and re-light or re-trim any that may be out, to report faulty lamps to be taken to the works for repairs the next day and replaced. It is a dangerous occupation and an unpleasant one, especially during bad weather. The men have to be trained and supplied with special appliances. It would be utterly impossible or unprofitable to attempt to train the whole police force, and have each man carry round the insulated stool necessary for safety, yet neither estimate of the Engineer or Mr. Bertram allows for sufficient men. They each allow 2 men without horses, and expect them to walk over 250 miles of city streets. The 7 men of the T. E. L. Co., some with horses, manage to see the whole of the present lamps every night. If the police were allowed to be used and the items of fines for lights out abolished, the Electric Light Company could afford to reduce their estimate by the number of men required for an efficient service.

GLOBES.—The City Engineer allows nothing at all for breakage of globes and renewal, which is a serious item in the catapult season. Chicago, for 1,110 lights cost $2,253.00 per year. The experience of the Toronto Company more than confirms this, and a duty of 30 per cent. has to be met besides, though Mr. McGowan allows only $1,950 in his estimate. Another item which costs over $1,000 is put down in neither estimate given, that is renewals of ropes, on which the wear and tear is great as they are continually exposed to the weather.

TAXES.—The Toronto Electric Light Co. will have to pay for taxes next year at 16 mills, 6,160 dollars, more than half of which is on plant used in city lighting, and which the city will lose on the establishment of a civic plant.

DEDUCTIONS.—Although the Toronto Electric Light Co. employ seven inspectors for night work, in place of two as estimated by Mr. Bertram, lamps are occasionally unavoidably out. The deduction last year amounted to over $1,000, which the city would lose in the event of establishing its own plant, and for which no allowance is made in any estimate.

GUARANTEE.—It is guardedly said by Mr. Bertram that he is prepared to guarantee a certain price. Mr. Bertram knows, as well as the most dull witted citizen, that if the city instal a plant and pay a quarter of a million dollars for it, *that they will run it themselves* and not farm it out—it would be stupid to do so—and therefore his imaginary guarantee is quite safe.

CONCLUSIONS.—That the figures given by Mr. McGowan as the cost of civic operation are quite correct, and are proved by the cost of municipal plants in Chicago, U. S., Derby, Manchester and other English towns, where the average cost is in excess of his estimate. That the Toronto Electric Light Co. being a private concern, can run the lights for considerably less, and offer to do so for 74.82 per year each and take the responsibility for deductions for lights out, suits for damages and depreciation of plant. It is manifestly in the interests of the tax payers that a contract should be awarded at the price offered, rather than $300,000 of their money should be sunk in a civic lighting experiment.

MOONLIGHT SCHEDULE FOR FEBRUARY.

Day of Month.	Light.	Extinguish.	No. of Hours.
	H.M.	H.M.	H.M.
1.....	P. M. 11.00	A. M. 6.20	7.20
2.....	" 11.10	" 6.20	7 10
3.....	" 12.00	" 6.20	6.20
4.....	.....	" 6.20	}
5.....	A.M. 1.30	.....	} 4.50
6.....	" 3.00	" 6.20	3.20
7.....	No light.	No light.	....
8	No light.	No light.	....
9.....	No light.	No light.	....
10.....	P. M. 6.00	P. M. 8.00	2.00
11.....	" 6.00	" 9.10	3.10
12.....	" 6.00	" 10.30	4.30
13.....	" 6.00	" 11.40	5.40
14.....	" 6.00	A. M. 1.00	7.00
15.....	" 6.00	" 1.00	7.00
16.....	" 6.00	" 2.00	8.00
17.....	" 6.00	" 3.10	9.10
18.....	" 6.00	" 4.10	10.10
19.....	" 6.00	" 5.50	11.50
20	" 6.00	" 5.50	11.50
21.....	" 6.00	" 5.50	11.50
22.....	" 6.00	" 5.50	11.50
23.....	" 6.00	" 5.50	11.50
24.....	" 6.00	" 5.50	11.50
25.....	" 6.00	" 5.40	11.40
26.....	" 6.10	" 5.40	11.30
27.....	" 7 00	" 5.40	10.40
28.....	" 8.00	" 5.40	9.40
		Total,	200.10

PERSONAL.

Mr. Wm. T. Jennings, of whom a character sketch appeared in the ELECTRICAL NEWS for January, has been elected third vice-president of the Canadian Society of Civil Engineers.

Messrs. A. E. Edkins and A. M. Wickens have been appointed representatives of the Canadian Association of Stationary Engineers on the Board of Management of the Toronto Technical School.

Mr. Frank Pitcher, of Stanstead, Que., has recently received the appointment of demonstrator of electrical engineering in McGill University, Montreal. Mr. Pitcher is an honour graduate of the University, and has had considerable practical experience as an electrical engineer.

Mr. Chas. W. Hagar, on vacating the position of manager of the Royal Electric Co., was presented by the officials and employees of the company with a complimentary address, accompanied by a handsome office desk and other fixtures. Messrs. F. Duffy and W. Darlington made the presentation.

Mr. L. M. Pinolet, late Treasurer of the Montreal Electric Club, left Montreal a few weeks ago for Newark, N. J., where he has accepted a position as assistant in the laboratory of the Moore Electric Mfg. Co. Mr. Pinolet has numerous friends in Canada, who will be glad to hear of his future prosperity.

It is understood that Mr. W. E. Davis, electrician of the Toronto Street Railway Company, will shortly leave Toronto to assume a position with the new company of which Mr. H. A. Everett is the promoter, at Detroit, Mich. *Rumor has it that Mr Davis is also about to enter into a life partnership* with one of Toronto's fair daughters.

Mr. Charles E. A Carr, late private Secretary to Mr H. A Everett, of the Toronto Railway Company, has been appointed manager of the London Street Railway, vice Mr. S. R. Break, who is to take the management of Mr. Everett's new company at Detroit. Mr. Carr, who has entered upon the duties of his new position, is said to be the youngest street railway manager on the continent.

The township council of Waterloo has passed a by law in behalf of the Berlin & Preston Street Railway.

The Court of Revision of the City of Hamilton placed an assessment of $85,000 on the underground mains of the Hamilton Gaslight Co. The company appealed against this assessment, arguing that the gas mains should not be assessed while the wires and poles of the electric light and telephone companies were exempt. Judge Muir held that gas mains were real estate, and as such were not exempt from assessment.

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STEAM AND ENGINEERING JOURNAL

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Correspondence is invited upon all topics coming legitimately within the scope of this journal

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A SUCCESSFUL working test of Gray's telautograph is reported to have taken place on the 15th of December over the long distance telephone line between Paris and London—a distance of 312½ miles—23 miles consisting of submarine cable and 5½ miles of buried conductors. Eighteen words were transmitted in 36 seconds. The writing as received in London is said to have been perfectly legible, though of ragged appearance.

THE first preliminary meeting of the Executive Committee of the American Street Railway Association, in connection with the annual convention of the Association to be held in Montreal next autumn, will take place at the Windsor Hotel, Montreal, on the 27th inst. It is expected that at this meeting a local committee will be appointed to further the arrangements for the convention. Mr. Granville C. Cunningham, manager of the Montreal Street Railway, is a member of the Executive of the Association, and is deeply interested in the success of the Montreal meeting.

IN Montreal, where the auer light first made its appearance in Canada, and where it came largely into use, its defects are becoming understood, and its popularity is said to be now on the wane. The opinion is freely expressed that after the burners have been for a time in use, the consumption of gas is almost if not quite as great as with the ordinary burner, while the color of the light changes from white to green. It is further stated that the atmosphere is heated and deprived of its oxygen to quite the same degree as when gas is burned in the ordinary way. The opinion which once prevailed that the new light would seriously affect, if not supersede, the incandescent electric light, no longer obtains. The fact that during 1894 the number of incandescent lamps in use in the city of Montreal increased by 13,000, is the best possible proof that the incandescent electric light is growing in popular favor,

IN response to our request for his opinion as to the soundness of the views expressed in the ELECTRICAL NEWS by Mr. George White Fraser on Municipal control of electric lighting in towns, Mr. J. J. Wright, manager of the Toronto Electric Light Co., writes: "The best answer I can give to the article in question is the recommendation of West Toronto Junction's Mayor to the Council, that if they can get their principal streets lighted by the company supplying Toronto at a reasonable rate, they close up their station and dispose of the plant if possible." We publish also expressions of opinion on this subject from Mr. A. A. Wright, of Renfrew, and Mr. Chas. Baillairgé, City Engineer of Quebec. The subject is an interesting and important one, and its thorough consideration at the present time is opportune and calculated to prove beneficial alike to electric lighting companies and municipal corporations. We therefore invite a free expression of opinion.

AS the result of recent interviews with a number of Canadian electric manufacturing and supply companies, it is learned that, considering the commercial depression which has prevailed for two or three years past, a very satisfactory business was done during 1894. The development of electric railways was somewhat hindered last year by the prevailing financial stringency, but a fair amount of work in this line was done, and the prospect is that many new enterprises will be carried out during the present year. Electric lighting, principally incandescent lighting, continues to grow at a surprising rate. The representative of one of the electrical companies expressed to the writer his opinion that this was due in some measure to the high price of coal oil in Canada. It is a well-known fact that the best grades of American oil, which is the kind most largely used, costs nearly four times as much in Canada as in the United States, the price here being 29 cents per gallon, as against 8 cents per gallon in the United States. It is not surprising that with so little difference in cost, the public should largely adopt incandescent electric lighting. In Montreal we learn that the incandescent lamp has come into use, not only in the residences of wealthy citizens, but also in the houses of persons of moderate means. The use of electricity for power has kept pace with its use for other purposes, and the number of electric motors manufactured and sold during the year was surprisingly large. Owing to the disposition of some of the smaller manufacturers to cut prices, there is little or no profit to the manufacturer in this line. This, however, is a condition of things which will probably adjust itself in the near future. It is impossible to construct and sell at the prices now accepted by these manufacturers, a motor which will combine in a satisfactory degree efficiency with durability. As soon as this fact becomes realized, as no doubt it shortly will, those who are responsible for reducing prices to the point where a satisfactory machine cannot be produced, will have to give place to the manufacturer who offers a good machine at a fair price.

OF special interest to Canadians, as being the invention of Mr. T. L. Willson, originally of Hamilton, is a new process for producing cheaply and conveniently an illuminating gas which gives a very brilliant and white light. The gas is nothing but the well-known acetylene, and the invention consists in the method of generating it. Commercially it depends upon the production of calcium carbide cheaply and in large quantities, and Mr. Willson discovered the means of doing this whilst working on the production of aluminium by an electric furnace. This furnace is a species of huge arc lamp. A carbon rod connected to one pole of a dynamo dips into a carbon crucible connected to the other pole, and the most refractory substances may be melted by the intense heat due to the current passing between rod and crucible. Subjected to this intense heat a mixture of coal dust and powdered burnt lime is converted into calcium carbide. The process of using this for gas making is simplicity itself. Water is decomposed by calcium carbide and pure acetylene produced. Calcium carbide is a solid easily transported, and it will be readily seen that an extremely simple gas machine, to slowly drop water on the solid carbide, is all that is required for gas making. Such a machine would be excellently adapted to private gas making. The point lies in the cost of the calcium carbide. One ton of carbide is obtained from a mixture of 1200 lbs. coal dust and 2000 lbs. burnt lime. The figures given for cost are:—

1200 lbs. fine coal dust	$2.50
2000 lbs. powdered burnt lime	4.00
180 electrical horse power for 12 hrs., using water power	0 00
Labor, &c.	2 50
Cost of 2000 lbs. calcium carbide	$15 00

These figures seem very close, but even if we double the total for the selling price, making the carbide cost $30 per ton to the consumer, the results are striking. One ton of carbide will produce 10500 cub. ft. of acetylene, which when burnt with a sufficient supply of air, gives the same illumination as 100,000 cub. ft. of ordinary illuminating gas of 22 to 25 candle power per 5 foot burner. Thus the cost of carbide sold at $30 per ton is only 30 cents for material, giving light equal to 1000 cub. ft. ordinary gas. In addition, the light given is of a much whiter quality. If this invention fulfils its present promise it is difficult to say what effect it will have on other illuminants. One point concerning it should be mentioned. Acetylene has a very disagreeable smell. The odour from the imperfect combustion of ordinary gas is due to the formation of acetylene. A leaky gas pipe would be intolerable.

THAT there is a great deal of ignorance displayed and nonsense talked about the "deadly trolley," is perfectly patent to the majority of sensible men, even though they are without the technical knowledge which would enable them to see exactly where the errors and fallacies come in. But amongst these same men there is undoubtedly a feeling, which sometimes finds expression, that although there is no real danger to the public to be apprehended now, the present safety is largely because the overhead construction work is new, and that with lapse of time there will naturally come a general deterioration in the strength of the overhead construction which will constitute it a serious menace to life and property. This feeling is honest and therefore deserves serious and respectful treatment. Such points as that the 500 volts of a trolley system are not really dangerous to life, it is not necessary to consider in this connection. Those who share the feeling referred to concede that, be that as it may, there is at any rate no danger when the overhead construction is kept in its proper place—overhead. What they fear is that in time it may tumble down. It is to this point and to these men that we address ourselves, and ask them to look at the matter from the point of view of how it would affect the street railways. The trolley wire is a vital point of the railway, and that it should be maintained in the best possible condition is of the utmost importance to the railway as a business concern. A car may break down and it can be pushed home by the next car. A dynamo or steam engine in the power house may give way—it can be put out of service for repairs. But with the trolley wire down, cars and power house are both useless; everything stops until it is repaired. That the railway is liable for damages caused, is the smallest guarantee the public has against neglect by the railway to avoid chance of damage. There is the greater guarantee that every minute's stoppage means a steady loss of income which can never be recouped, besides the prospective loss which always follows an unreliable service. The public has therefore the best guarantee against neglect by a corporation—however soulless and bodyless—that the consequences immediately touch that tenderer point than their conciences, their pocket. The object of the railway is to make money, and when well managed with that object, its first business interest is to keep the overhead work from tumbling down. Deterioration is inevitable, but not being built like the "wonderful one horse shay" it will not all give way together. A weak point develops first, showing faulty design or construction; with good business management it is promptly repaired, and not only it, but all other points in the system which have the same original defect. Thus before they have developed their inherent weakness, the defect is remedied by improved construction due to this experience. Applying this to all points in a well managed prosperous road, it follows that the construction improves with time, and that the longer the overhead work stays up, the stronger it becomes, through the repairs dictated by the railway's business interests. We have said a prosperous road. If not prosperous, repairs may be skimped and the management may be bad, and like other "lame ducks" it may become a nuisance to the community.

In consequence of the announcements that two large lines in the Eastern States are each to try working a branch on the trolley system, the customary unbalanced forecasts are being made of the time—always in the near future—when the steam locomotive will have disappeared from the trunk lines of the country, driven out by the trolley. This sort of thing is nonsense, but nonsense when often repeated is infectious, and it is just as well to keep steadily in mind what are the conditions which will make the trolley more economical than the steam locomotive. So shall we be better able to resist the assaults of the promoter, who armed with his charter and its stocking and bonding privileges, may seek our franchises and bonuses, sell us his watered stock, and leave us the poorer by his gains and the wiser by his incompetence or dishonesty. And these conditions in brief depend entirely on the volume of traffic per mile to be handled. If a road has one train a day it is obviously cheaper to use a locomotive to haul that train, even if the locomotive burns coal wastefully, than it would be to maintain a trolley line and a power station or series of power stations, in order to handle the transient load of the passing daily tram. On the other hand it is equally obvious that steam locomotives could not perform with equal economy, such constant services as is required on a large street railway. Somewhere between these two extremes lies the critical point where the whole cost of transport by steam locomotives equals the whole cost by trolleys. With greater than this critical traffic, trolleys are best. With less, they are unprofitable. Improvements in the economy of steam locomotives force this critical point up to a greater traffic volume. Improvements in the efficiency of generators, line and motors; reduction in their cost; the ability to use for electrical work the natural waterpowers; all operate to drive the critical point down to a lower traffic volume. Where is this critical point for the road in question? That is the essence of the whole matter put in a nutshell. A proved saving in coal, for instance, by the trolley is only a part, and it may be an insignificant part, of the question at issue. It might well occur that if the trolley system got coal for nothing, it would still be unprofitable as compared with steam locomotives wastefully using dear coal. The whole cost must be considered, including interest and depreciation charges on plant. It will then be found to hinge on the volume of traffic per mile. The ELECTRICAL NEWS will rejoice in all legitimate developments in the use of electricity, and legitimate developments are best advanced by sitting down hard on inflated or unfounded speculations.

THE CARE AND MANAGEMENT OF DYNAMOS.*

By H. Beck.

In considering this subject to night, my friends, I don't intend to go into the theoretical part or the construction of dynamos, but I intend giving a few pointers to any engineer who may some time or other have a dynamo or small electric plant under his charge.

The first thing that comes under our notice is the place for the dynamo to rest. It should be a dry, cool place, and free as possible from dust and, unless direct driven, should allow for a belt of proper length. The foundations also must receive our attention, and this is a most vital part if we wish to have as little trouble as possible. Concrete or stone may be used to advantage, or brick with cement as mortar, having a large stone placed as a top.

For large dynamos the bolts which hold the machine in place should be long enough to reach right down to the bottom and fix into iron plates built in, but for small dynamos these bolts may be set in place by lead in holes in the stone top of the foundation. If long holes are left in the foundation for the bolts, these holes should be filled in with cement after the bolts are in position. The bed for the dynamo must be quite level, and the armature shaft set properly parallel with the driving pulley.

Supposing our dynamo to be in position and the wiring all completed and everything in readiness to start, see that your connections are all secure and carefully examine your dynamo before starting it for the first time. Clean your journals and bearings, then see that your lubricators are all filled with oil. In oiling the parts of a dynamo (i.e., filling the oil cups) use nothing but copper oil cans. Turn your armature around slowly by hand to make sure that no loose wire or waste is attached to it, and that nothing catches. Then clean your commutator with the finest sand paper, and be sure that no copper dust is lodged between the bars. A good stiff brush will remove it.

See that the brush-holders are adjusted correctly and that the catches that hold the brushes from the commutator when not running, are in order.

Be sure your brushes are trimmed correctly. Some brush manufacturers supply their dealers with a special tool to guide the file in trimming the brushes, so if the engineer is fortunate to possess one of these he will have no difficulty.

Adjust the brushes firstly, so that they protrude at the proper length from the holders; secondly that they bear in a proper position, and that they press with a firm but moderate pressure on the commutator. After you have the brushes properly adjusted, raise them off the commutator so that the hold-off catches hold them. You can tell if the brushes are properly adjusted on the commutator by two arrows or some significant mark which the makers place on the dynamos. If these are not on the commutator, the rule is that the brushes bear on the directly opposite bars of a commutator, in a two-pole machine, but in a four-pole machine they bear on the bars that are a quarter of the circumference apart.

Start your engine, then release the catches of your brushes on the dynamo, close the switch on your dynamo, (if the dynamo is shunt-wound it will at once excite itself with the main switch open), look to your brushes and see if they spark. If there is any sign of sparking knock the brushes forward or backward until the non-sparking position is found. Then close your main switch and light your lamps.

Dynamos should be oiled every day and constant attention given to the brushes to see if they require to be fed forward or trimmed. No oil should be used on the commutator, (except arc light machines with special commutators), but use only vaseline applied with a cotton cloth (never use waste). Sparkless running is a matter that cannot be too strongly impressed on the engineer who has a dynamo under his charge. A dynamo, if properly attended to, will soon assume a beautiful chocolate-brown colored commutator surface, but the commutator, even of a good machine, may be ruined in a very short time by careless handling. If you allow the brushes to press too heavily your commutator will soon have ridges all around it and, if too light, the vibration will cause them to spark and the result will be, your commutator will be soon worn away in patches at the edges of some of the sections, and will lose its roundness of outline. If this ever occurs, there is only one remedy. Take off all the brush holders and amuse yourself by turning it down or filing it true; but this should occur very seldom. It is well for the engineer to acquaint himself with the positions of all cut-outs in his station, so that if any fuses "blow out" he can place them in himself and not have to send for an electrician to do so for him. If he follows these directions he will have no trouble. In every cut-out there are two binding-screws that the fuse connects; he should loosen these and take out the burnt pieces of fuse wire. Place one end of your fuse wire under one binding screw and tighten it (not too heavy or you will cut through your wire). With the end of your screw-driver push the other end of your fuse wire under the remaining binding screw. If your circuit is all right it will not burn out. If it does, you have either lamps turned on or else a ground or short circuit. The two latter will always blow your fuse but the former only sometimes (if the wire be very fine, say 1 ampere.)

In closing, let me impress upon the engineer in charge of electrical machinery to keep a "cool head." If anything goes wrong, do not get excited and lose your wits, but do everything quickly (if needed) and carefully. Again, keep all your machines thoroughly clean; dust your dynamos every day, and clean your brushes and commutators, where possible, every day; and last but not least, have a place for everything and keep everything in its place, so that if anything should occur that you would need any tool, you would know exactly where to find it without having to search for it.

*Paper read at open meeting of Kingston Association No. 10, C.A.S.E.

PUBLICATIONS.

In the February Arena, Henry Wood, writing on "The Dynamics of Mind," claims that as a matter is now held to be instinct with life, so thoughts are as much dynamic forces in life as any other of the phenomena of nature—electricity or magnetism, for instance.

The proceedings of the International Electrical Congress held in Chicago during the progress of the World's Fair in 1893, edited by Max. Osterberg, have been published in a volume of 500 pages by the American Institute of Electrical Engineers. A photogravure reproduction of portraits of the official delegates of this Congress forms a fitting frontispiece to the book. The thanks of the electrical fraternity is due the American Institute of Electrical Engineers for having undertaken and so successfully carried out this important work.

Application has been made for a charter for the Burlington and Lake Shore Electric Railway Company, to construct and operate an electric railway from a point within or near to the city of Hamilton, in the County of Wentworth, to the village of Burlington, in the County of Halton, via the south side of Burlington bay, and across Burlington Beach, or via the north side of Burlington bay, or both, with power to extend the same along the north or south shore, or both, of Lake Ontario. Mr. Maitland Young, of Hamilton, is the organizer of the company.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

Note. Secretaries of the various Associations are requested to forward to us matter for publication in this Department not later than the 20th of each month.

CARLETON PLACE ASSOCIATION NO. 16.

A very interesting meeting of this association was held on Jan. 5th. Three applications for membership were received. On the 19th January a special meeting was held to consider the advisability of renting a room to be kept always open for the exclusive use of the members, and to be supplied with suitable reading matter, etc. It has been decided to carry the idea into effect. The association is reported by A. M. Schofield, Recording Secretary, to be in a prosperous condition.

MONTREAL ASSOCIATION NO. 1.

The annual dinner of the above association was held in the rooms of the Society, 662½ Craig street, on the evening of Feb. 2nd. There were present nearly one hundred persons, among the visitors being Mr. E. A. Edkins, Provincial Deputy for Ontario. Following the repast the following toasts were given: "Queen and Country;" Steam Engineering," responded to by H. Cooper; "Manufacturing Industries," responded to by Messrs. Fisher and Green; "Sister Societies," responded to by A. E. Edkins and J. Marchand, president of St. Lawrence No. 2; "Brotherhood of Locomotive Engineers," responded to by Mr. Spencer; "The Executive Council," responded to by Past President T. Ryan and Provincial Deputy O. E. Granberg; "License and Inspection Law," responded to by Bro. A. E. Edkins, and "The Press." Recitations and songs were given by Bros. Nuttal, Edkins, Joly, O'Neil, Weaver and Nadin. Bro. Driscoll presided at the piano.

KINGSTON ASSOCIATION NO. 10.

A largely attended and most interesting open meeting of this Association was held in Fraser Hall, Kingston, on the evening of Jan. 15th. The proceedings were presided over by Mr. R. Ring, who stated that the meeting had been called for the purpose of making the public acquainted with the benefits conferred by the association upon engineers and steam users. During the two years that the Association had been in existence it had made about fifty members. Mr. B. W. Tolger and Mr. J. H. Breck were elected honorary members. The former advocated a law making it compulsory on those in charge of steam engines to obtain certificates of competency. Mr. Breck gave an address on "My First Knowledge of Steam." The balance of the programme was as follows: Paper on "History and Objects of the Executive," by J. Devlin; paper on "Principles of Pipe Boilers," by Mr. Doris; reading, H. Breck; paper on "Care and Management of Boilers," by R. Charlton; paper on "The Arc Lamp," by F. Simmons; paper on "The Pump," by H. Hoppers; song. Mr. Manning; paper on "Steam Heating," by W. Little; address on "The Order," by Mr. Wickens; paper on "The Dynamo, its Care and Management," by H. Buck; paper on "Belting and Lacing," by C. Asselstine; reading, Mr. Gilmore; paper on "Line Shafting," by A. Strong; paper on "The Engineer's Duty," by A. Donnelly: "Paper on "The Indicator," by H. Youlden.

WINNIPEG ASSOCIATION NO. 11.

The regular meeting of the above association held on Jan. 25, in room 19, Grain Exchange, was most enthusiastic and well attended.

There was no lecture, as the installation of officers and other business took the time and attention of the members.

The following is a list of the officers installed by the District Deputy, Bro. C. E. Robertson: President, Bro. G. M. Hazlett; Vice-President, Bro. John McKechnie; Recording Secretary, Bro. W. J. Edwards; Financial Secretary, Bro. Thos. Gray; Treasurer, Bro. J. Stuart; Conductor, Bro. W. F. Brown; Door Keeper, Bro. Robt. Sutherland; Trustees, Bros. Harper, Douglas and Whyte.

A very interesting paper was read from the Kingston Association, showing the work done by the C.A.S.E. there.

Regarding the progress and future prospects of the Winnipeg Association, the District Deputy, C. E. Robertson, writes the ELECTRICAL NEWS as follows: "Everything points to a very successful term, as the officers appointed are young and active, and showing great energy in the work of advancing this society. They have arranged to make themselves entirely independent by getting a meeting room of their own, and are in dead earnest to push the society."

MONTREAL JUNIOR ELECTRIC CLUB.

DEC. 31.—Paper on "Storage Batteries," by R. H. Street.

Jan. 7.—Paper on "Transformers for Medical Use," by W. T. Sutton.

Jan. 14.—The annual election of officers took place on this date, resulting as follows:—President, E. W. Sayer; Vice-President, Wm. T. Sutton; Treasurer, R. H. Street; Secretary, E. A. Brissette.

Dec. 21.—Paper on "Induction Coils," by E. W. Sayer.

MONTREAL ELECTRIC CLUB.

THE membership of the Club continues to grow, and its meetings are of a very interesting character. Additional interest would attach to the meetings, however, if a considerable proportion of the younger members would make an effort to overcome the diffidence which apparently prevents them from rising to their feet to express their opinions on the matters which come up for consideration. Just in proportion as these members seek to overcome their natural aversion to speaking in the presence of their fellow members will they derive personal benefit from their connection with the Club, and be the means of adding to the interest and value of the work which the society aims to perform on behalf of its members.

The following motion, introduced by Mr. Geo. H. Hill, has given rise to considerable discussion. Some of the members seem to think that the matter to which it refers is one which is beyond the scope of the society, while others believe that, unless the Club takes cognizance of such matters, it will be difficult for it to show proof of its *raison d'etre*. The resolution is as follows: "In the opinion of this Club the laws governing inspection of electric light wiring in Montreal are unsatisfactory, and that a fixed set of rules for such should be drawn up by competent persons, and insurance companies be called upon to enforce same, and make their rating accordingly."

The Secretary of the club writes: "Kindly insert the following notice in your valuable paper: The third annual meeting of the Montreal Electric Club was held on Jan. 7th. The Secretary's and Treasurer's report for the past year showed the Club to be in a flourishing condition. The membership is very good and there is a good balance in the treasury. The following were elected to office for the ensuing year. W. B. Shaw, Pres.; H. O. Edwards, Vice-Pres.; Cecil Doutre, Sec'y-Treas.; T. F. Pickett, W. Graham, J. A. Duglass, Committee of Management.

I am requested by the members of the Club to thank you most sincerely for your past kindness in publishing the papers read before the Club, and also Club notices."

TRADE NOTES.

The Sterling Co., of Chicago, have appointed Darling Bros., of Montreal, as Canadian agents for the Sterling Safety Boiler.

The Canadian General Electric Co., Ltd., have concluded an arrangement with the National Carbon Co., of Cleveland, by which they become sole Canadian agents for this well-known brand of arc carbon.

Mr. James Hardman, formerly representative in Toronto of Messrs. Robin & Sadler, leather belting manufacturers, Montreal, has transferred his services to Messrs Goodhue & Co., manufacturers of leather belting, Danville, Que. Mr. Hardman's headquarters are at 90 Bay St., Toronto.

Messrs. Robin, Sadler & Haworth, manufacturers of leather belting, who were among the sufferers by the recent Toronto fire, have advised their customers that the loss of their warehouse and factory on Jordan street, will in no way affect their business, as they have engaged other premises on the same street, and orders addressed to them as formerly will be promptly supplied from their factory in Montreal.

A meeting to complete the organization of the Packard Electric Company, and to decide upon the future location of the company, will be held during the present month. The authorized capital of the new company is $300,000. It is understood that two thirds of this amount has already been paid up. The company propose to engage in the manufacture and sale of all kinds of electrical supplies. There is a probability that the headquarters of the Company will be located in Ontario.

STEAM ENGINEERING.*

STEAM ENGINEERING has assumed such vast proportions as an agent of modern progress and civilization, that it has given birth to a profession the scope and functions of which are not yet very clearly defined. The engineer's duties, in the performance of his daily routine, involves the application of the laws of nature in various ways, to understand and explain which requires a wide range of scientific knowledge. While there are found to be in the profession men whose intelligence and acquirements would shed lustre on any calling, there are others who by their disregard of correct rules show that they are laggard in the acquisition of that real knowledge so essential to men in their profession. This is to be regretted, in view of the vast amount of property and the great number of lives entrusted to their care, both on sea and land.

Whenever an attempt is made to induce engineers to qualify themselves for their calling, it is met with the old-time question regarding the relative merits of theoretical and practical engineers and the comparative value of theory and practice. The practical man who has no theoretical knowledge scoffs at the theorist, and the latter sneers at the former. It requires very little experience on the one hand, and not much study on the other, to show that each is equally important, only in different ways. Both parties to the controversy should know that theory and practice make perfect. Theory with practical experience will, without doubt, enable men to excel in whatever work they may undertake. Therefore, it should be the highest ambition of engineers to combine theory with practice and prove the one by the other. This object may be effected by devoting a portion of their leisure hours to study, and by pursuing a systematic course of self-culture. Engineers whose early training has been neglected, and who are now debarred from the advantages of a good education, need have no cause for despondency, because the extra exertion and effort required to educate themselves will confer advantages of their own, which the routine work of a school cannot develop. Of course there are men in this, as in all other callings, who will fail, however much they may try to accomplish in the way of educating themselves. This arises from the fact that, though all men morally may be equal, intellectually they never can be. Consequently the ability of men to educate themselves varies in proportion to the amount of natural intelligence they possess. But in any case, study gives quickness of apprehension, enables a man to profit by all the recorded experience of others, develops accuracy, and, if properly directed, teaches men to qualify facts, make proper deductions and reason logically. The knowledge acquired from the study of books is of inestimable value to the young engineer; without it he can never be thoroughly qualified for the duties of his profession, since he will be lacking in certain definite information which can only be obtained from the use of books, and wanting which he is almost sure to be narrow-minded, very slow to receive new ideas and to estimate the proper value of old ones. Such persons, if occupying positions in which they exercise authority, are very apt to become intolerant of other people's opinions, and to assume that all knowledge begins and ends with them. One of the common excuses for ignorance is the old stereotyped expression, "I am too old to learn." Now, if this expression is made in sincerity, it is a great mistake, as it is a false pride which neglects an opportunity to learn because it came late in life, and it is a false fear which shrinks from an effort on account of its difficulty. One fact is very important and ought to be considered in this connection, viz., that knowledge throws light upon itself, and that it is the first step only that must be taken gropingly, as it were, in the dark; the bugbears in such cases, like shadows, disappear the moment they are boldly approached. Truths are, in the main, simple and easily to be understood, and are daily being brought more within the grasp of the most ordinary comprehension by means of good books, which may be had at a trifling cost.

It is frequently stated by members of this calling that they are no "book engineers," which statement betrays their ignorance of the manner in which some of the most valuable books on the steam engine originated. They were written by engineers of experience, who wished to advance their profession, and who thought that, if their predecessors could commence their studies in their younger days, they themselves might advance and improve still further, leaving the benefit of their experience to posterity. The art would therefore advance with the age.

As much information may be learned in a few weeks from the works which they have left us as took them years of observation and trial to ascertain. Most of the abuses connected with steam engineering have arisen from two causes, viz., avarice and ignorance; avarice on the part of owners of steam engines and boilers, who entertain the idea that cheap steam engines and boilers might be managed by a class of men who are willing to work for very low wages; and ignorance on the part of those who claim to be engineers, but who are only men of all work, or at best mere laborers in the treadmill of routine. It is evidently one of the greatest mistakes connected with the use of machinery to entrust its care and management to persons of inferior judgment, as a competent engineer, who could command good wages, would probably save three times the difference by his judgment and skill in its proper maintenance. If engineers wish to raise the standard of their profession to what it ought to be, and command remunerative compensation for their services, they may do so by educating themselves, and not otherwise. It will not do for them to shrug their shoulders and say, "I am a practical man," and reject theory, for it is a well-known fact that such men have become a nuisance in every branch of mechanics, being the least progressive, least enlightened and most stubborn in the assertion of their views, because their minds are cramped and will not allow of either the substitution or admission of ideas different from their own—however crude and primitive they may be. No man is practical unless he proves practice by theory and theory by practice, and attaches no importance to statements not sustained by facts.

One of these self-styled "practical" engineers was asked, "What is a vacuum?" His answer was that he thought it was foul air.

While I have endeavored to show you that book knowledge is very essential to young engineers, we must not forget the practical part as well. It is a common thing to see men parading good certificates, simply because they are good mathematicians' or theorists, while they have little or no practice. While this class of men should receive their due reward, it does seem unjust, in the awarding of certificates, to place them above men who have spent the greater part of their lives, and who have shown by their industry, truthfulness and sobriety, that they are reliable in every respect. These are nice points to decide, especially when it has to be done by one man, without, perhaps, very much practical experience.

The question is often asked, "Should an engineer be a machinist?" The answer I would give to that question is, "Not necessarily so." There is no need of a man learning two trades in order to follow one. Besides, experience has shown me that while a machinist may be the best judge of things that may transpire in relation to the repairing of steam machinery, he is nevertheless frequently less careful, less reliable, less ingenious than one who never learned a regular trade. An engineer should be possessed of natural talent, and should be ingenious and able to discover any defect that may take place in the machinery under his charge, and should be able to take up the lost motion, and take apart and put together any of the different parts of his engine.

The class of men known as engineers have conferred upon mankind the greatest boons, and the monuments which display their conceptions are indestructible as the firmament or the ocean. It cannot be said of the engineer, as has been said frequently of the lawyer or doctor, that if mankind could do without him it would be well for the human race.

*Paper by Mr. Gilmour, read on Jan. 15th at an open meeting of Kingston Association, No. —, C.A.S.E.

ROYAL ELECTRIC CO.

A number of important changes are taking place in the management of the Royal Electric Co., of Montreal. Mr. C. W. Hagar, who for ten years past has occupied the position of secretary and manager of the company, has resigned to enter into business on his own account. The directors of the company passed a resolution expressing their appreciation of services during the period he was connected with the company.

Mr. W. H. Browne, late general manager of the United Lighting Companies, of New York City, has been appointed general manager of the Royal Electric Company. He had barely entered on his duties when seen by a representative of the ELECTRICAL NEWS, and could therefore say but little regarding his future course of action. He intimated, however, that an energetic policy would be pursued, and that the public would have no reason to doubt the existence of the company of which he is the head. While the company would make an effort to secure a fair share of the electrical business, there was no expectation that they would get all the business, and he hoped to enjoy pleasant relations with business competitors.

Referring to the new factory now in course of construction, Mr. Browne said he hoped to see the building completed and the manufacturing plant removed into it before the first of April. In his opinion, the new factory when completed, would offer every facility for turning out work in the most expeditious and economical manner. He believed that the Stanley apparatus which his company has secured the right to manufacture in Canada, was fully up to date, and consequently they were starting out under most favorable auspices. Mr. J. A. Kammerer, who for several years has been the company's agent in Ontario, will occupy the position of general sales agent under the new régime.

The electric power station and plant at Merrickville, Ont., were destroyed by fire on January 10th.

FORETHOUGHT VS AFTERTHOUGHT.

By W. H. Wakeman.

It is said of some men that their "foresight is hindsight" and their "forethought always comes afterward." This is not a very handsome expression, but it answers the purpose very well in describing the characters referred to. When one of these men is put in charge of a steam plant, there is trouble almost continually, and the plant is frequently shut down, that his hindsight may be made use of and his lack of forethought made prominent. Such a man never makes it his business to inspect the lacings in his main belt at short intervals to see that it is in good order, but allows it to run as long as possible, and when all the machines in the factory are running, thus bringing a heavy strain on the nearly worn out lacing, it fails and the whole factory is shut down for about an hour while a new lacing is put in; or perhaps a part of the lacing gives way first and the belt is thrown to one side of the pulley, is caught by the floor or wall and badly torn, making it necessary to get a new piece and put it in, and as the job must be done in a hurry, there is no time to properly scarf, cement and rivet it, so that it is laced on, and ever afterwards there are two lacings to care for instead of one. It does not really need to be a very large factory to make such a shut down cost as much as is paid the engineer for a week's work, consequently a man who watches such things and avoids the shut down saves his employer many dollars.

It is a good plan to draw in pieces of old lacing over the new simply to protect the lacing which holds the belt together from wear as it runs over the pulleys. These pieces will then wear out first and so give warning, when they may be renewed and the others kept intact.

Such a man as forms the subject of this article, does not remove small accumulations of sediment from his sight-feed oilers, but waits until the dirt is about half an inch deep in them and the oil passages choked up with it, and as the bearings are not oiled, hot boxes are the result. He is then not slow in applying some heroic remedy and boasting of his skill in curing the evil. The flange joints in his cast iron main steam pipe are leaking drops of water while his engine is shut down, but he has not foresight sufficient to enable him to know that unless they receive proper attention, the packings will be blown out and it will be necessary to shut down to renew them.

If the packing around his piston rod begins to leak, he simply screws up the nuts which hold the gland in place, and when it leaks again he repeats the process, but does not heed the warning that new packing is needed, until some morning after starting up he finds that he can no longer stop the hiss of steam in this way, consequently throughout the entire day, at each revolution of the engine it sounds as if it were about a hundred geese in the engine room, and visitors and employes are not slow to take note of it and rate him accordingly.

This man has an injector in his boiler room which formerly worked very well, but of late it will break occasionally, and frequently he finds it difficult to make it start as it should. This tells him that it is becoming coated with scale on the inside. He should have foresight to enable him to determine that in a short time it will become so filled up as to make it useless, but he lacks this most desirable qualification, and when his pump is being repaired the injector refuses to work and he can not feed his boilers. To cover up his blunder he advances the idea that no injector will last long anyway, and that they fail without giving warning, when the truth is that they do give such warning, but he either does not understand the story they tell, or is too indifferent to profit by it. It matters little which it is, as the result is the same in either case.

With a man in charge who lacks foresight, when the girth seams on the under side of his boilers commence to leak, he does not look ahead and calculate what the result will be if this leakage continues, but proceeds to calk up the leaky seams, and continues the same practice that caused the trouble in the first place. He can not foresee that if he fills a hot boiler with cold water, severe contraction will be the result, or that if he feeds cold water into the bottom of a boiler while under steam pressure, the cold water will settle to the bottom and cause the seams to leak.

His boiler is badly scaled and he introduces some scale resolvent to remove it, but does not possess sufficient foresight to enable him to see that if his remedy is of any value whatever, it will throw down a large quantity of scale which will lodge on the parts immediately over the fire and prevent the water from coming in contact with the iron, the consequence being burned plates and leaky seams.

If a small hole appears in the blow-off pipe, he puts a slip patch over it to stop the leak temporarily, but does not have forethought enough to show him that if corrosion has weakened the pipe in one place it soon will be in others; but when this pipe fails and his boiler room is filled with clouds of steam and the boiler is unceremoniously emptied of its contents, his afterthought has a chance to secure a prominent position.

If an oil agent offers him a commission on all of the oil that he buys of a certain kind, he repeats the old axiom that "a bird in the hand is worth two in the bush," without taking into consideration the fact that he has made a wrong application of it. He can not see into the future enough to discover that he will soon be no longer a free man, but will be under obligations to those from whom he has taken bribes, forgetting that all of these deals are brought to light sooner or later and always to the disadvantage of those who are concerned in them. The engineer who is capable of getting out of scrapes in short order, often passes as a hero, while the unassuming engineer who is thoughtful, and by his thoughtfulness keeps out of scrapes, attracts but little attention and frequently fails to get as much credit as is really his due. When he leaves a situation where he has had but little trouble, and where shut-downs were few and far between, and is replaced by a man whose forethought comes afterward, the difference is often plainly to be discerned without the aid of a magnifying glass.

There is one more point which I wish to mention, as follows: When a man takes charge of a steam plant, he should have foresight enough to study out the characteristics of his employer, know just what his ideas are as far as possible, and then govern himself accordingly. By this I do not mean that he should sacrifice any of his own opinions or ideas which are proven to be correct, for this is not at all necessary, but he should adapt himself to circumstances and by skillful management of affairs, secure the respect and confidence of his employers.

PRACTICAL NOTES.

Nothing helps the introduction of a new machine or device among practical mechanics more than simplicity of design and the absence of numerous joints and pieces, which tend to shorten the life of the machine as well as impair its efficiency. Joints are good things to avoid where possible, as the inevitable wear is followed by lost motion, which affects the accuracy of the machine.

It is a bad practice to put an over-loaded belt down out of sight, especially where there is any inflammable material. The slipping of a belt on its pulley from overload is a good heat producer, especially if the belt hooks happen to stop in contact with the pulley. The writer saw a case of this kind several years ago, and the streams of sparks that came from that pulley rim would have done credit to a Chinese pin-wheel. Such occurrences are dangerous, and precaution should be taken to render them impossible.—Machinery.

A very bad habit in mills where there are large driving belts, is shifting belts with a square stick, no regular shifters being used. The result of this is the belts are more or less injured on the edges. All heavy machines should have shifters to act so that they shift the belt over steadily, not putting too much strain on the driving belt too suddenly. Two pieces of gas pipe just large enough to revolve on round iron supports, for shifters, will lessen the friction on the edges of heavy belts as these pipes revolve while the belt is being shifted. It effects a great saving in long driving belts; in fact, any belt at all, leather or rubber.

The transmission of power by ropes has been largely resorted to in England, the preference being given to what is known as the Lambeth cotton rope, which is made of four strands, the center or core of each strand being bunched and slightly twisted, the outside of the strand having a covering of yarns that are firmly twisted. The four strands are further laid with a core in the center to form a rope and twisted in the same way as any four-stranded rope. In this way a rope is formed possessing extreme flexibility, and the fibers will not break by bending when run on pulleys, the rope also standing elongation or stretching some 12 inches in a length of 50 inches before breaking.

WATER TUBE BOILERS.*

By M. R. Davis.

It is not my intention to discuss the merits of one particular boiler, but what I wish to do is to bring more fully before you the rise and growth of the coil boiler, and if possible to point out a few of the more important points, as gained from experience.

About Aug the 6th, 1791, the first patent was issued in this country for a water-tube boiler, and was taken out by a Mr. Rumsey. This we may fancy was rather a crude affair, but it was soon followed by the Barlow boiler in 1793, which, together with the Fulton, was put in use.

This was the pioneer of a great variety of boilers of this class. The records of the patents in this line alone would be a revelation to the average reader

The year 1807 brings to light another boiler of this class built by a Mr. Stevens, of Hoboken, N. J., who became interested in pipe boilers and built one to put in a steam yacht. This boiler was 2 ft. long, 15in. wide, and 12ft. high, and consisted of 81 in. pipes. We are not told how this boiler was made, but we may be allowed, from the proportions given, to judge that it was not of the type we would care to use to-day. We have very little in the history of the pipe boiler to interest us for nearly one hundred years, when in 1878, Mr Roberts, who has become famous for his great success in this line, built his first boiler at Red Bank, N. J. Mr. Roberts felt the need of something better than the market had yet supplied, and by untiring effort has succeeded in giving the world at least a stepping-stone on which to build what the engineering world calls to-day the water-tube boiler This boiler stands to-day side by side with our best pipe boilers

But we need not stop with this type. Look at the market to-day, and compare this class of boilers with the shell boilers. Where do they stand as regards variety? We are told, and there is every reason to accept it as a fact, that there have been patents issued on nearly 200,000 pipe boilers—coil or water tube boilers as you choose to call them.

Among the great variety we will name only a few of the most important types. We have the Roberts, Babcock, Root, Sterling, Heine, Alma, Seabury, Hazelton, Ward, Yerrow, Thorneycroft, Belleville, Mosher, Clark, Warrington, Worthington and many others. These boilers belong to a type which in the past few years has largely increased in this country, and not without reason, especially for marine service. A few of the above mentioned boilers are used only for stationary purposes.

American engineers are almost alone in the employment of water-tube boilers. Aside from the Yerrow and Thorneycroft used in England, they are practically unknown outside of American steam vessels—with one exception only. French engineers have recognized their value and have them of very high power in many deep water ships. Water tube boilers are absolutely safe from explosion, safe from disaster even if ordinary care be taken, and they stand abuse better—so far as immunity from costly repairs is concerned—than the shell boiler. A burned sheet in a shell boiler is a serious matter, a burned pipe in a water tube boiler, if such a thing should happen, is of no moment whatever. A fitter with a pair of pipe tongs can take out the old and put in the new one in a few hours—minutes sometimes—according to the location; but it takes days to repair a shell boiler. Water tube boilers stand getting up steam quickly much better than shell boilers. The latter are hot and cold in the wrong places, but a water tube boiler gets hot all over at once: all parts go together and expansion strains are reduced to nothing. The water in them circulates like the blood in a man's body—up one side and down the other—and it keeps on circulating all the while. There is no dead water in a water tube boiler; it is a constant wash of water over hot metal from start to finish.

You might ask me the question What is the difference between one water tube boiler and another? or in other words, What kind of boiler is the best to use? Since there are so many kinds, there are several ways of answering this question; and if you will follow me a little way in the matter I will try and point out a few types that are most popular.

We will commence with the pipe boiler, or that class made with the joints screwed together—made from lap welded pipe—for no other kind should be used This class is made in a great variety of shapes, and I may say here that they are like watches: if you get the right kind you will have something reliable, and if you get a poor one you would be better without it.

This class of boiler has been in use longer than any other class of water tube boiler, but the merits of the pipe boiler have been seriously affected by the use of bad material and unskilled workmanship. Pipe boilers have been made by men who knew little or nothing about a boiler or the hardships it had to stand: and this cause, if no other, has been the means of spoiling the merits of a first-class maker. I could call to mind instances where pipes have split with only a few days use—or weeks at longest—while good pipes, together with good workmanship, will stand the hardships of years.

One fault with some of the pipe boilers to-day lies in the fact that they have their cross section or up take pipes too flat over the fire. Such being the case and small pipes being used, they are very apt to sag, and in a short time something will happen which I will leave you to guess.

Some of our pipe boiler makers have recognized this fact and are remedying it by using short pipes and not driving the water so far through a short pipe: if, indeed, it goes through at all.

Among the water tube class we have a far greater variety and a far superior boiler You may say, "How is that? I thought pipe and water tube boilers were the one thing!" Not so, water tube boilers have no screwed joints, all screws are expanded into the main drums. This is one of the reasons why the water tube boiler is superior to the pipe boiler, and a great many pipe boiler makers call their boilers "water tube," because it sounds better, and is better.

The water tube boiler is doing to day what the pipe boiler never has done, or, indeed, never can do. The water tube boiler stands to-day at the head of all others in the eyes of the mercantile world. You say, "Why don't capitalists put them in use then?" I told you a little while ago that unskilled mechanics have placed this boiler where it is, but it has a bright future. Look over the commercial world to-day. What do engineers think about it? A few years ago some of them said, "Oh, it's no use; you can't depend on it; it will fail you when you need it most." It may fail you, but it won't blow up and kill all hands in the factory or on the ship; it will simply stop and you can see at once where the trouble lies. Neglect a shell boiler and see where you or the boiler will go.

I have seen pipe and water tube boilers red hot from top to bottom and cold water pumped into them, without even affecting them to any extent.

Other points about water tube boilers which commend them for general use in the manufacturing world, are, that they are light, take up very little room; are easy to manage; quick to get up steam, and easy to repair. You can put them down in the cellar or up in the garret; distribute them through a building and take up less space than with any other boiler.

For marine use this boiler stands at the head of all others to-day. It has been adopted by the principal naval powers of the world, after having been subjected to the most severe tests.

A number of ocean steamers have been equipped of late with water tube boilers, and the result has been entirely satisfactory.

Comparing the weight of a water tube boiler of the Babcock & Wilcox make with one of the Scotch boilers of same power, we have for the Babcock boiler 25 lbs per sq. ft. of heating surface, while in the Scotch boiler we have from 75 lbs. to 115 lbs. per sq. ft. of heating surface. Thus you see there is a great advantage in favor of the water tube boiler. We may use other comparisons which will convince still further that the water tube boiler as a marine boiler commends itself for use. For one comparison we shall take the Ward boiler, as representative of the water tube type, while the data for the fire tube or shell boiler will be representative of good modern practice, and in each case boilers of a size suitable for large steamers will be assumed:

Weight per sq. ft. heating surface of boiler without water, 27 lbs and 13 lbs. Weight per sq. ft. of heating surface of water in boiler, 15 lbs. and 1¾ lbs. Weight per sq. ft. of heating surface of boiler with water, 42 lbs. and 14¾ lbs.

It appears, therefore, that water tube boilers of this type or of such types as may be fairly represented by this boiler, are about one-third of the weight of fire tube boilers of equal heating surface. The water tube boiler is seen to be of about one-half the weight of the fire tube or shell boiler, while the amount of water contained in the former is inconsiderable in comparison with that contained in the latter. We could dwell on this point much longer, but as time will not allow we will simply draw your attention to a few points not yet mentioned. We would refer to such boilers as the Yerrow, Mosher (improved marine type), Seabury, Hazelton and a few others which have no bent tubes, but are made with thin steel tubing only. These boilers will stand hard service much better than that type made with bent pipes or tubes, and why? Because expansion and contraction are much more equally distributed, and over-straining is not so apt to take place when crowded. For example, we will take the Robert and the Thorneycroft; also the Mosher yacht type. All those are made with bent tubes, and have a tendency to straighten when crowding takes place. It has been found that in a certain boiler of the above class, the steam drum was raised by the straightening of the tubes. You can easily prove what I say to be correct by taking a rubber hose; bend it and turn a pressure of steam or water through it, and you will find at once the action of the tubes in some water tube boilers when under pressure.

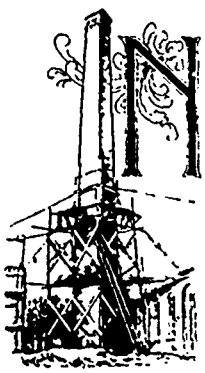
What do you think is the secret of the success of some of the modern fast steamers? While admitting the improvement in models, we say it is principally due to the boiler. They get more power with less weight with this boiler than with the old type—therefore, less displacement and greater speed. Look if you will at the Hornet, the Daring, the Ferret, the Hazard, all of which have attained a speed of 32 miles or more an hour; this was never done till water tube boilers came into use. Up and down our own shores we find such boats as the Fireen, Norwood, Buzz and a few others, which claim a speed of 28 to 32 miles an hour. Even at Kingston we have found the great advantage of using the water tube boiler.

I might go on discussing the water tube boiler, dwelling on many points, such as thickness of tubes, corrosion, cleaning and repairing, circulation and distribution of heat, but will differ, doing so to a future occasion.

*Paper read before Kingston Association No 10, C.A.S.E.

A considerable difference of practice appears to prevail among engineers in the matter of packing the stems of Corliss valves. We have seen the packing pulled out of the stuffing boxes of these stems, and found that in some cases as few as two pieces were used, and yet the stems did not let steam. We saw a valve removed a few days since and about a dozen pieces of packing had been removed before all was out. This, it seems to us, is a waste of packing, and might produce a considerable amount of friction on the stem. If the box is so deep that it requires an extra amount before the gland can take hold, it would pay to fill up that extra space with something else.

CHIMNEY 100 FEET HIGH STRAIGHTENED.



THIS corner is a view representing a brick chimney 100 feet high, which was pulled back into position from a point 28⅛ inches out of plumb. It is 9½ feet square at the bottom, 5⅓ feet square at the top, with a central flue three feet square. The estimated weight is 206 tons, and the chimney stands on a foundation 14 feet deep. The soil is affected by the rise in a river, and although two similar chimneys has been already built in the vicinity, no trouble had been experienced. When measurements were first taken the chimney was found to lean about 16 inches, and a few days later was 22 inches out of line. No particular change was noticed for four months, when it was found that the chimney was 28⅛ inches out.

A scaffolding was built about the chimney, and 42 feet above the stonework and 4½ feet below the center of gravity of the brickwork were placed eight oak timbers 6 inches by 10 inches by 10 feet. The timbers were used to spread the bearing of wire ropes over as large a section as practicable. Around the timbers were placed wire ropes, to which was fastened another wire rope 2½ inches in diameter, having eyes at each end, the lower eye being connected with a system of eleven pulleys secured at a point 78 feet distant and opposite the direction in which the chimney leaned. Cables with turnbuckles were placed at right angles to the main cable and a guard cable was placed in the rear. The earth was excavated on the high side of the foundation nearly half way around to the bottom, a depth of 13 feet, and the main cable put under strain by the pulleys. In three weeks the chimney was straightened 4 inches. A post hole digger eight inches in diameter was used to excavate eleven holes around the trench, which relieved the pressure of the earth, and by the following morning the chimney had moved back in place eight inches. By tightening the rope three times a day and digging additional post holes when necessary, the chimney was brought back to place in a few weeks. The holes were filled in with fine broken stone and gravel thoroughly rammed. The illustration is reproduced from Engineering News.

SPARKS.

It is reported that another electric light plant is to be installed at Renfrew, Ont.

It is reported that Frank Bryden of Toronto will install an incandescent lighting plant at Napanee.

Mr. F. Anderson has been appointed electrician of the Summerside, P. E. I., Electric Light & Power Co.

At Sorel, Que., the Bell Telephone Co. is reported to have reduced the rental of its instruments to $15.00 per year.

Mr. M. W. Corbitt has commenced business in Montreal under the registered title of the Montreal Electrical Supply Company.

The London Electric Co. has contracted to erect and operate 274 2,000 c. p. lamps. 260 of these lamps have been put in operation.

Mr. A. Rowan, of the Customs Department, St. John, N. B., has been appointed government inspector of electric meters in that locality.

The Thompson Electric Co.'s tender of $1,000 for a 50 arc light plant for Toronto Island, has been accepted by the city council of Toronto.

T. Belanger, of Montreal, has invented a three rail surface system which is designed to take the place of the overhead trolley electric system

A by-law recently submitted to the ratepayers of Stratford, authorizing the expenditure of $16,000 for a municipal plant, was defeated by a large majority.

It is said to be the intention of the Cookshire, Que., Machine Works Company, to go out of the electric lighting business and to dispose of their electric plant.

Application for incorporation is being made by the Dundas County Telephone Company, for the purpose of operating a telephone system at Chesterville, Ont.

Mr. P. S. Archibald, chief engineer of the Intercolonial Railway, discovered in a recent visit to Manitoba, that nearly all the small towns in the North-West are lighted by electricity.

Mr. H Calcutt, of Ashburnham, has applied for a patent for a combined water tube and tubular boiler, which it is claimed will effect a large saving in fuel, and where necessary will increase the boiler capacity.

Application for incorporation is being made by the Midland Electric Light & Power Co., of Midland, Ont. The capital stock of the company is to be $10,000.

The Crown Pressed Brick Co., of Ormstown, Que., have submitted to the Council of Huntingdon, Que., a proposition to light the streets of that place with electric light.

The London Street Railway Company has made a new offer for an electric franchise. It embraces seven tickets for 25 cents, and workingmen's tickets eight for 25 cents.

The Hamilton, Grimsby and Beamsville Electric Ry. Co. have been granted permission by the railway committee of the privy council, to cross the tracks of the G. T. R. Co. in Hamilton.

It is reported that in consideration of the sum of $20,000 in cash, Mr. W. S. Williams will relinquish his stock in the Montreal Park and Island Railway Co., and all other claims against the company.

The Toronto Street Railway Co. have suggested to the City Council that an electric fire engine be purchased, and have offered to supply free of cost the electricity required to operate the same within reach of their conducting wires.

It is reported that the owners of timber limits in the locality are considering the question of constructing an electric railway between Lake Temiscamingue and Lac des Quinze, by means of which to get lumber more easily to the Temiscamingue.

The Montreal Incline Railway Co., represented by Messrs F. B. McNamee and Wm. Mann, and the Montreal Street Railway Co., are each endeavoring to secure authority from the City Council to construct and operate an electric railway through Mountain Park.

The Town Council of St. Boniface has under consideration a by-law, which has received its first reading, for the establishment of an electric light plant. If the by law should pass the Council, operations will be commenced about the first of March.

The recently organized Ottawa Porcelain and Carbon Company have purchased a site for a new factory on Elgin street. The erection of the factory, which is to be 200 feet long, 150 feet wide, and three stories high, is to be commenced early in the spring.

The railway committee of the privy council has granted to the Montreal Street Railway Co., the privilege of extending their line along Etienne street, and of crossing the G. T. R. tracks, on condition that the company shall bear the cost of maintaining the necessary semaphores, gates and lights at the crossing. This will afford electric railway communication to the residents of Point St. Charles.

At a recent meeting of the town council of Kincardine the following resolution was adopted: That the council feel it their duty to tender their thanks to Mr. L. A. Campbell, foreman of construction for the Canadian General Co., on the incandescent electric light work for the very kind and courteous way in which he has at all times treated the committee and council, and for the very skilful manner in which the work appears to have been done, as evidenced by the satisfactory way in which the plant was started and is now working.

The annual report of the Montreal Telegraph Co., presented at the annual meeting of the shareholders held in Montreal on Jan 10th, showed Assets—Telegraph lines, $1,625,890; telegraph cables, $33,487.39; offices and equipment, $212,500; real estate in Montreal, Ottawa, Quebec and Toronto, $279,946.46; cash, other real estate, accounts receivable, etc., $101,853.19. Total, $2,253,677.04. Liabilities—Shareholders' capital, $2,000,000; dividend No. 122, payable 15th January, 1895, $40,000, unclaimed dividends, etc., $1,794.75. Total, $2,041,794.75. Excess of assets over shareholders' capital, $151,823 85. Contingent fund, $60,058.44. Total, $2,253,677.04. Mr. Joseph H. Joseph's motion that 3 per cent. of the available assets be distributed among the shareholders was ruled out of order. A motion by Mr. John Crawford that the directors consider the advisability of dividing among the shareholders the present contingent fund, was adopted. The old board of directors was re-elected. Mr. Andrew Allan was re-elected President.

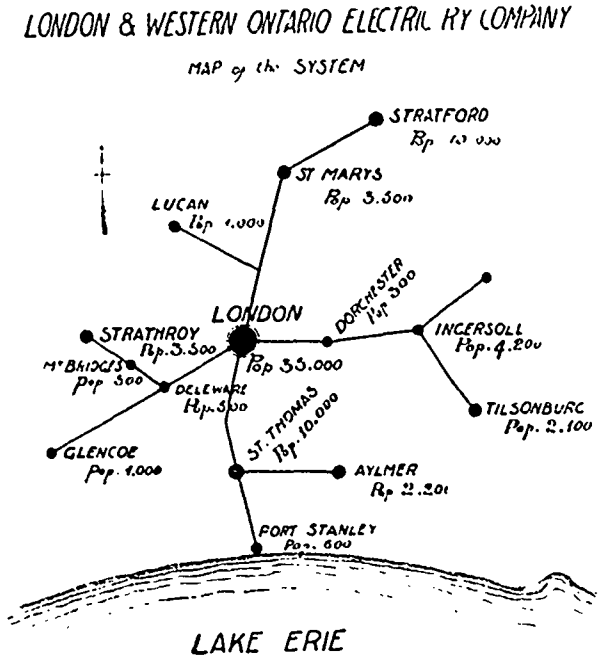
The third annual meeting of the shareholders of the Toronto Railway Company was held on the 16th of January. The annual report of the President and Directors for 1894 shows a net profit of $250,905, against $212,859 in 1893. The directors desire to explain their policy in expending their surplus earnings in the improvement of the property by stating that in the operation of a modern street railway they have felt it to be of the utmost importance that it should be sufficiently provided with electrical and steam power, cars, car houses, machine shops, tools and machinery, so that in the extensions of its system the bonds of the company, which can be issued at $35,000 per mile, would provide sufficient capital for its requirements. During the present year the directors have completed the purchase of the Toronto and Mimico Electric Railway and Light Company's property, and paid for it out of the surplus earnings of the company. The net earnings of this property have paid 5 per cent upon its cost, and a surplus of $2,502. The statistical statement shows the gross earnings for 1894 to have been $958,370, an increase of $58,138 over 1893. The operating expenses were $517,707, or $19,890 less than in 1893, leaving the net earnings $440,663, an increase of $78,028. Twenty-two million, six hundred and nine thousand, three hundred and thirty-eight passengers were carried in 1894, as against 21,215,010 in 1893. The operating expenses were 54 per cent. of the earnings, as against 59 07 per cent. the previous year. During the year $7,973 was paid out for injury and damages.

ELECTRIC RAILWAY DEPARTMENT.

PROPOSED LONDON AND WESTERN ONTARIO ELECTRIC RAILWAY.

NOTICE has been given that H A. Everett, E. W. Moore, T. H. Smallman, Greene Pack, S. R. Break and C. S. Ivey will make application at the next sitting of the Legislature of Ontario, to incorporate the London and Western Ontario Electric Railway Company, with power to construct electric railways as follows

(1 London to St. Thomas and Port Stanley, also St. Thomas to Aylmer ; (2) London to Deleware, Glencoe, also from Deleware to Mt Brydges and Strathroy ; (3) London to Lucan, St. Mary's and Stratford ; (4) London to Dorchester, Ingersoll, Woodstock, and also Ingersoll and Tilsonburg.



As will be seen by the accompanying map, this scheme proposes to make London the distributing point for Western Ontario, and these lines run through and tap one of the best sections of country in Ontario. The population served will be about 200,000 people, and the line to Port Stanley includes connection with the line of steamboats to Cleveland. This is one of the largest schemes of the kind proposed in Canada, and further developments will be eagerly looked for.

LEGAL.

GAUTHIER VS. THE MONTREAL STREET RAILWAY COMPANY.—The plaintiff in this case claimed $335 damages by reason of being knocked down and dragged along a considerable distance by a car of the company defendant, on the 7th October, 1893. He alleged that the injury was caused by the fault and negligence of the defendants. The defendants pleaded, first, a demurrer to one of the allegations of the declaration, to the effect that the company habitually ran its cars faster than is permitted by the by-law regulating the matter. The defendants further pleaded want of notice of action as required by the company's charter, and that the notice given was irregular. They further alleged that there was no negligence or fault on their part. The court maintained the demurrer on the ground that the fact, if proved, that the company habitually ran its cars faster than allowed by the by-law was not of itself a good reason for holding the defendants liable to damages in this case. The plea of want of notice was rejected, because notice had been given, and the defendants had not shown in what respect it was irregular On the merits of the action, however, the court was of opinion that the plaintiff had failed to prove that the injury was due to any fault or negligence on the part of the defendants. Although there was some evidence that at the time plaintiff was struck by defendant's car, the car was moving at too high a rate of speed, yet such excess of speed did not appear to have been the determining cause of the injury suffered by the plaintiff. On the contrary, the weight of evidence went to show that the injury was attributable to the fact that the plaintiff hurriedly endeavored to cross the tracks of defendants in front of the approaching car at a moment when, had he used the most ordinary prudence, and looked where he was going, he must have seen that such an attempt would result in his being struck by the car. The action was therefore dismissed.

HAMILTON RADIAL RAILWAY.

We present herewith an illustration of a proposed passenger depot to be erected in Hamilton by the Hamilton Radial Railway Company. The proposed site of the building is Cannon

PROPOSED DEPOT HAMILTON RADIAL RAILWAY

street, with frontages also on James and McNab streets. The building is to be constructed of brown sandstone, and is to contain commodious waiting and dining rooms.

SPARKS.

An agitation is said to be on foot at Owen Sound for the construction of an electric railway between that town and Meaford.

Mr. G. H. Campbell, the manager, is authority for the statement that considerable extensions will be made this year to the Winnipeg Electric Company's lines.

Mr. S. R. Break, the popular manager of the London Street Railway Company, has received the appointment of General Superintendent of the new electric railway at Detroit, and will enter upon the duties of his new position at once.

Incorporation is being sought for the Kingston and Gananoque Electric Railway Company to construct an electric railway between Kingston and Gananoque, with power to extend the same east as far as Brockville, and north to Westport.

The ratepayers of Burchton held a meeting recently and appointed a committee to obtain signatures to petitions for the extension of the Ottawa Street Railway to Hintonburgh, Skead's Mills, Birchton, Britannia, Deschenes and Aylmer.

The Toronto & Scarboro Electric Railway has passed into the hands of the Toronto Railway Co. The shareholders of the suburban line have accepted in exchange for their property Toronto Railway stock. It is understood that the new management will construct loop lines via Blantyre and Victoria Park.

At the annual meeting of the Hamilton, Grimsby and Beamsville Railway Company, recently held, it was decided not to extend the line to Grimsby Park at present, but to endeavor to secure a site for a park on the lake shore between Stoney Creek and Winona. The following officers were elected :—Directors, Messrs. C. J. Myles, Thomas W. Lester, John Hoodless, A. H. Myles, Walter Grieve, John Gage and Robert Ramsay. Mr. C. J. Myles was re-elected president ; Mr. T. W. Lester, vice-president ; and Mr. Adam Rutherford, secretary-treasurer.

At the recent annual meeting of stockholders of the Galt & Preston Railway, a statement was presented showing the total cost of the works to the present time to be $59,537.61, which is somewhat below the estimate. The earnings of the road to December 31st—being a few days over five months—was $5,980 27, which is considerably in excess of expectations. The running expenses for the same period, including interest, was $4,152.22. The directors have been instructed to apply for authority to increase the capital stock of the company to $100,000. In the event of this authority being given, the extension of the road to Hespeler will be undertaken in the spring The following gentlemen have been elected as the officers of the company for the ensuing year.—Messrs. Thomas Todd, President ; R. G. Cox, Vice-President ; Lutz, Secretary-Treasurer ; Directors, H McCulloch, D. Spiers, F. Clare, Preston J. D. Moore, M.P.P.; Auditors, J. M. Duff, J. M. Irwin.

INCANDESCENT LIGHTING ON THE METER SYSTEM COMPARED WITH THE CONTRACT SYSTEM.*

By G. L. Cole.

In taking up the subject of incandescent lighting on the meter plan, I shall state my own experience from the date of my going to the city of Beloit in September, 1893. At that time I found my customers divided, some on the contract and others using meters. Now the question arose, whether I should furnish this current on the European, meter plan—pay for what you receive—or the American plan by contract—take all you can get. Two questions came up for consideration in changing from contract plan to meter system. First—A considerable outlay in meters. Second—Would the additional returns warrant the change?

To compensate me for the extra investment in the meters, I charge meter rental, which pays a good percentage. As showing the additional profit in the meter over the contract system, I will give an example. I had a customer on the contract plan who was paying $3.50 per month for the electric current in his residence. I changed him to meter basis and his bills, run on the meter plan, for several months, were $53.49, an average of $7.64 per month. There is a good deal of satisfaction to feel that what current the customer uses I am receiving pay for, and not is wasted, as is generally done on the contract plan. When I furnish current on the meter plan and the customer leaves his residence for a short time, I make a minimum charge of $1 per month in addition to meter rental, while if this service were furnished on contract the usual cry would be raised, "We have not used the lights." Unless a discount were made dissatisfaction would arise.

Another advantage was that I could use a smaller transformer to supply the customer on meter plan than I could on contract plan, for I felt assured that the customer would not use at any one time the entire number of lamps wired unless for special occasions, when we could temporarily install a larger transformer. To illustrate: For a factory wired with 95 lamps I only use a 50 light transformer, and the bills run at 20 cents per 1,000 watts, $459.10 for eight months, an average of $57.38. Another example: We have 180 lights in one factory; these are only used until 6 P. M., so we put up a 50 light transformer, and from the same transformer we connect an additional 40 lights for a lodge room. Both of these customers are on the meter basis, and I will say that the income on the investment has been very satisfactory to me; and this manner of furnishing the current has given entire satisfaction to the consumer, for he pays for what he uses and no more. Another advantage is the large number of lights we can wire from a medium sized dynamo. I feel assured the customer will turn off all the lights he can possibly spare to keep his bills down as low as possible. I now have 3,300 incandescent lights wired, an average increase of 151 lights per month.

My dynamos are one of 750 lights and one of 1,000 lights. When I purchased the plant I found the entire number of incandescent lamps wired was 1,029, and the average daily load was 550. It is my opinion, based on former experience, that where there were 825 incandescent lamps wired entirely on the contract plan the average daily load was 450. This shows that over one-half the number wired were being used. On the meter plan I can calculate on about one-third the number burning that I have wired, or about 850 on an average for 10 hours.

Still another advantage is the profit in wiring residences, for I find that people will put in more lights when they are to be used on the meter system than they would when on the contract system, where the basis of furnishing current is so much per lamp. It follows that our customers feel better satisfied to have their houses thoroughly equipped with lamps from garret to cellar and in the stables as well, knowing that after they are once installed they are no expense to maintain unless they are used.

The following points are self-evident in favor of the meter. The station receives pay for current furnished; the customer pays only for the current received, service is more satisfactory to the customer because it is more complete, and investment under the meter system commands a larger field than is possible to obtain under the contract system. It stimulates economy on the part of the customer and induces study on the part of the owner. The meter system is eminently fair to both parties, and soon after installation commends itself to the public.

*Address at the meeting of the Northwestern Electrical Association, Milwaukee, January 6-18, 895

As the result of being caught in the driving belt of a dynamo, Mr. A. Ross, superintendent of the Oxford, N. S., Electric Light Station, recently sustained severe injuries.

On the occasion of his removal to assume the management of the Bell Telephone Company's exchange at Orillia, Mr. E. H. Farrow, who for five years has been manager of the Stratford exchange, was waited upon by a number of the subscribers and presented with an address expressing appreciation of the efficiency of the service under his management and regret at his removal, together with best wishes for his future success. Mr. Farrow's successor is Mr. John E. Bull, manager of the exchange at Orillia.

SPARKS.

A satisfactory dividend has been declared by the Hamilton Street Railway Co.

The passengers carried by the Kingston Street Railway Co. are said to number 8,000 per week

The city council of Hamilton gives notice of its intention to apply to the legislature to dissolve the perpetual charter of the local gas company, and to authorize the corporation to own and operate electric railways

Temporary telephone communication has been established between Three Rivers and Nicola, Yamaska, Drummond and Athabaska, Que. Early in the spring a cable will be laid across the river providing permanent communication

A dispatch from Nanaimo, B. C., states that an eastern syndicate has bonded the charter for a tramway between Wellington and Nanaimo, and that the city will be asked to guarantee bonds to the amount of $50,000 for the construction of the road.

Judge McDougall has reserved his decision in the case of the appeals of the Toronto Incandescent Electric Light Co., and the Toronto Electric Light Co., against the assessement of nearly one-million dollars imposed by the city on the plant of these companies.

Application is to be made to the legislature to incorporate the Delaware, Parkhill & Lobo Electric Railway Co., to construct and operate an electric railway between Delaware, Komoka, Poplar Hill, Fernhill and Parkhill, to Port Franks on Lake Huron

The officers elect of the British Columbia Marine Engineers' Association are as follows — President, W. Cullom, vice-president, James Lauderdale, secretary-treasurer, A. Goldlyn; board of directors, Alex. McNiven, James McArthur, John McGraw, R McGill, Charles McKechnie.

Messrs Colquhoun & McBride, of Berlin, will apply to the Ontario legislature for the incorporation of the Grand Valley Railway Co., which proposes to construct and operate a steam or electric railway from Berlin, southerly to Brantford, and north-westerly to Listowel, westerly to Stratford, or northerly to Elora.

The contract for carrying the mails between the Toronto post office and the railway station will expire on the 31st of March It is said to be the intention of the Toronto Street Railway Co. to tender for the contract, with the object of using electric mail cars similar to those which have been in use for some time past in Ottawa

The divisional court at Vancouver has allowed the appeal of Mr Bailey, a ratepayer of that city, against the Vancouver electric light by-law This by-law, it will be remembered, authorized the expenditure of $100,000 for the purchase of a city lighting plant, and the erection of suitable buildings for the same. Under this decision of the divisional court the by-law is quashed.

The Canadian Marine Engineers Association, have elected their officers as follows —President, O. P. St John, re-elected by acclamation, 1st vice president, E. J. O Dell, and vice-president, J. S. Adam council J. D. Banks, R. J. Garsall W. Harwood, J. Findlay, R. Hughes, treasurer, J. H. Ellis, re elected by acclamation, auditors S. A. Mills, D. L. Foley, inside guard, J. Hopkins