

Technical and Bibliographic Notes / Notes techniques et bibliographiques

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

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

- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- Additional comments:/
Commentaires supplémentaires:

- Coloured pages/
Pages de couleur
 - Pages damaged/
Pages endommagées
 - Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
 - Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
 - Pages detached/
Pages détachées
 - Showthrough/
Transparence
 - Quality of print varies/
Qualité inégale de l'impression
 - Continuous pagination/
Pagination continue
 - Includes index(es)/
Comprend un (des) index
- Title on header taken from: /
Le titre de l'en-tête provient:
- Title page of issue/
Page de titre de la livraison
 - Caption of issue/
Titre de départ de la livraison
 - Masthead/
Générique (périodiques) de la livraison

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

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

CANADIAN

ELECTRICAL NEWS

STEAM AND ENGINEERING JOURNAL

OLD SERIES, VOL. XV.—No. 6.
NEW SERIES, VOL. VI.—No. 12.

DECEMBER, 1896

PRICE 10 CENTS
\$1.00 PER YEAR.

W. A. JOHNSON ELECTRIC CO'Y TORONTO

Two Phase or Single Phase Slow-Speed Alternating Current Generators for Light and Power—50 to 1200 h.p.
Alternating and Direct Current Motors.
Multipolar Direct Current Generators—35 to 2,000 h.p.—for Lighting, Railways and Power.
Walker Spring Mounted Railway Motors—25, 30, 50, 75, 100 and 125 h.p.
Manhattan Enclosed Arc Lamps—(One arc lamp across 110 volt circuit burns 150 to 200 hours, consuming only 12 inches of solid carbon $\frac{1}{2}$ " dia.)
Keystone Incandescent Lamps. Iron Clad Rheostats.

Manufacturers and Contractors
for Complete Installation

WAGNER TRANSFORMERS

NOT THE CHEAPEST, BUT THE BEST

Competitive Tests prove it the closest regulating, most efficient and most durable Transformer made.

STANLEY TRANSFORMERS

The Standard of the World for

Incandescent Lighting

Operating Motors

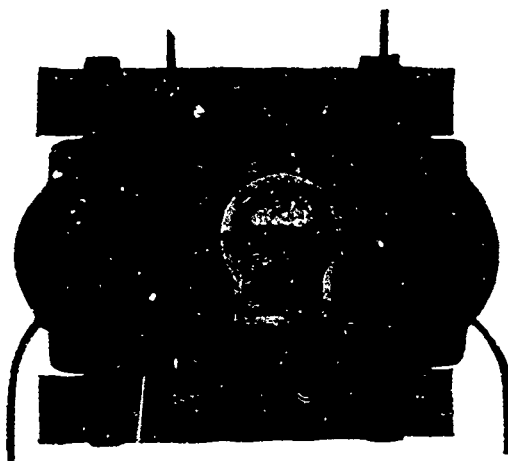
Arc Lighting

Power Transmission

INCREASE

STATION

CAPACITY



DIMINISH

OPERATING

EXPENSES

We furnish a Guarantee of the EFFICIENCY and REGULATION of each Transformer and will Insure them for one per cent. per annum.

THE ROYAL ELECTRIC CO.

MONTREAL, QUE.

Western Office—TORONTO, ONT.

E. CARL BREITHAAPT
CONSULTING
Electrical Engineer
MEM. AM. INST. E. E.
Electric Lighting and Railway Work
BERLIN, ONT.

SEND TO
H. W. PETRIE FOR CATALOGUES
OF
NEW & 2ND HAND MACHINERY
TORONTO CANADA

FIRE PROOF
ROOFING
METALLIC ROOFING CO.
TORONTO

FIRSTBROOK BROS.
King St. East, - TORONTO.
MANUFACTURERS OF
TOPPINS,
SIDE-BLOCKS
AND **CROSS-ARMS.**
WRITE FOR PARTICULARS.

If you want to
SELL ANYTHING
to the wholesale and retail hardware merchants and manufacturers
ANYWHERE
in Canada, you can reach them through the
CANADIAN HARDWARE MERCHANT
J. B. MCLEAN CO., LTD.
PUBLISHERS
10 FRONT ST. E. TORONTO.

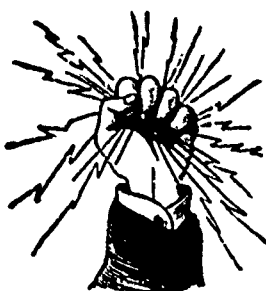
Your Stomach Distresses You
after eating a hearty meal, and the result is a chronic case of Indigestion, Sour Stomach, Heartburn, Dyspepsia, or a bilious attack.
RIPANS TABLETS
Promote Digestion, Regulate the Stomach, Liver and Bowels, Purify the Blood, and are a Positive Cure for Constipation, Sick Headache, Biliousness, and all other Diseases arising from a disordered condition of the Liver and Stomach. They act gently yet promptly, and perfect digestion follows their use.
Ripans Tablets take the place of an Entire Medicine Chest, and should be kept for use in every family.
Price, 50 Cents a box. At Druggists, or by mail, RIPANS CHEMICAL CO., 10 BRUNN ST., NEW YORK.

EUGENE F. PHILLIPS, President.

JOHN CARROLL, Sec. and Treas.

EUGENE F. PHILLIPS ELECTRICAL WORKS
(LIMITED)

MONTREAL, CANADA



BARE AND INSULATED ELECTRIC WIRE

Electric Light Line Wire
Incandescent and Flexible Cords

RAILWAY FEEDER AND TROLLEY WIRE

Americanite, Magnet, Office and
Annunciator Wires

Cables for Aerial and Underground Use.

U. S. Factory: AMERICAN ELECTRICAL WORKS, Providence, R. I.
New York Store: P. C. ACKERMAN, Agent, 10 Cortland Street.
Chicago Store: F. E. DONOHUE, Agent, 241 Madison Street.

ELECTRIC REPAIR & CONTRACTING CO.
623 LaSalle Street, - MONTREAL.

ELECTRIC APPARATUS OF ALL KINDS REPAIRED ON THE SHORTEST NOTICE.
T. & H. Arc Amatures a Specialty. Armatures Rewound for all Systems.
GEO. E. MATTHEWS, Manager. Write for Prices.
10 years Foreman of the Royal Electric Co. Armature Winding Department.

COLLYER & BROCK

Electrical Engineers and Contractors

Estimates Furnished on all Electric Installations

MONTREAL, CANADA

ELECTRICAL ENGINEERS

No. 9 Cheneville St.
MONTREAL

Fred. Thomson, late chief electrician of the Royal Electric Co

Electrical Supplies of all Descriptions.

FRED. THOMSON & CO.

Correspondence Solicited. . . .

Complete Plants Installed.....
ARMATURES REWOUND
Royal T-H Arc a Specialty
Dynamoes and Motors Repaired

It pays to advertise in the CANADIAN ELECTRICAL NEWS.

DODGE

Split Friction Clutch Pulley and Cut-Off Coupling.

Special Dynamo and Motor Pulleys, High Class Hangers, Floor Stands, Self-Oiling Bearings, Shafting, &c.

Prices and Information on Application.

DODGE WOOD-SPLIT PULLEY CO.

Office: 74 York Street,

TORONTO

Electrical Supplies . . .

TELEPHONE
TELEGRAPH
ELECTRIC LIGHT

Write for Illustrated Catalogue.

John Starr, Son & Co., Ltd.

Mfrs. and Dealers in
ELECTRICAL SUPPLIES

Box 448 * Halifax, N. S.

Advertise in the CANADIAN ELECTRICAL NEWS. It will pay you.

The New Line of . . .

"NEW AMERICAN" TURBINES

Heads the List

FOR Power . . . Economy of Regulation
Best Part Gate Results

- ◆ Steadiness of Motion
- ◆ Ease of Regulation
- ◆ Freedom from Trouble of Any Kind
- ◆ and is WITHOUT A RIVAL for Electrical Purposes

37 WHEELS SOLD IN 1895 WHICH ARE DEVELOPING OVER 11,000 H.P.

High Class Gearing,
Shafting, &c., to correspond
with Water Wheels.

Wm. Kennedy & Sons

OWEN SOUND ONT.

VULCANIZED FIBRE CO.

ESTABLISHED 1873.

SOLE MANUFACTURERS OF

HARD VULCANIZED FIBRE

In Sheets, Tubes, Rods, Sticks and special shapes to order. Colors, Red, Black and Grey.

SEND FOR CATALOGUE AND PRICES.

THE STANDARD ELECTRICAL INSULATING MATERIAL OF THE WORLD.

Factory: WILMINGTON, DEL.

OFFICE: 14 DEY ST., NEW YORK.

The National Electric Co.

EAU CLAIRE, WIS.

THE NATIONAL ALTERNATOR

for Beauty of Design, Completeness of Construction and Electric Efficiency.

takes the Lead. No Shut-Downs; Parts in Duplicate; over Four Hundred in operation, in every State in the Union, South America, Japan and British possessions.

Send for Prices and Testimonials.

CANADIAN OFFICE:

J. W. SKINNER

MITCHELL, ONT.

.... TO

Central Station Managers

HAVE YOUR GENERATOR OR TRANSFORMER Plants remodelled and put on a paying basis. You do not know how much coal is being wasted in inefficient machinery, or poorly arranged distribution systems until you investigate. Write to the undersigned for information that you will never get from manufacturing companies, as to improved methods and fuel-saving devices.

GEO. WHITE-FRASER

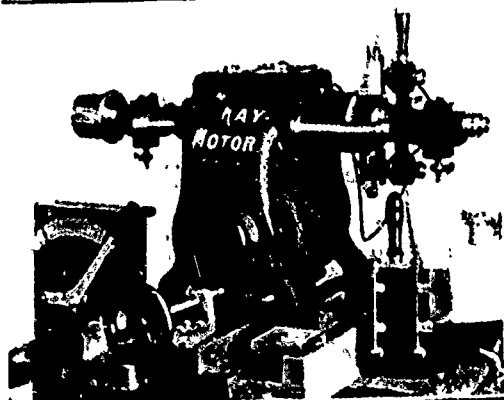
MEM. AM. INST. ELEC. ENG.

18 Imperial Loan Building, TORONTO

Consulting Electrical Engineer

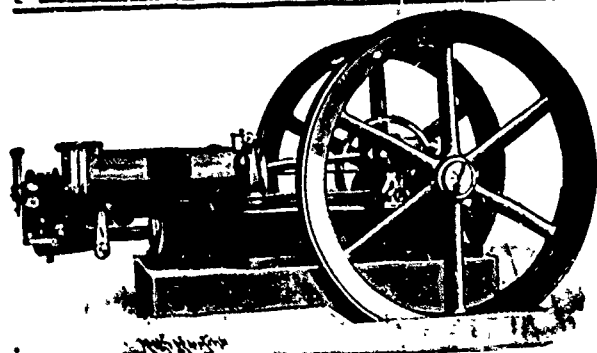
Kay Electric Mfg. Co.

255 James St. N., HAMILTON, ONT.
58 Adelaide St. W., TORONTO, ONT. Telephone 1214.



We are prepared to furnish—
Dynamos of any capacity for any voltage, either compound or shunt wound.
Motors from 1-8 to 40 h. p., either series or compound wound.
Elevator Motors of all sizes.
Alternating Dynamos from 300 to 1000 lights.
Transformers of any capacity from 5 to 125 lights.
Electro-plating Dynamos, any capacity.
Electrical Experimenting in all its branches.

WRITE FOR PARTICULARS AND ANY INFORMATION REQUIRED.



GAS ENGINES

Of from 1 to 600 Brake Horse Power, for electrical Industrial and other purposes.

MANUFACTURED BY

FRIED. KRUPP GRUSONWERK, Magdeburg, Germany.

JAS. W. PYKE & CO., Montreal, Que. Representatives for the Dominion of Canada.

Particulars on Application.

STEAM PUMPS

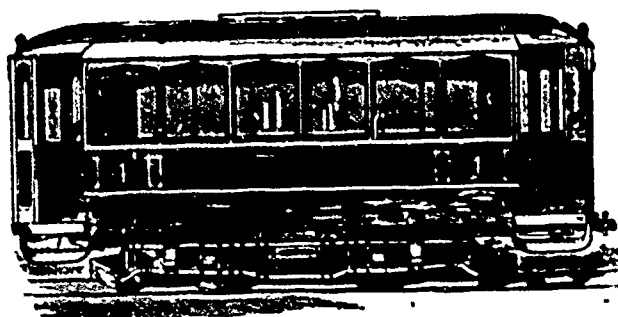
DUPLEX
SINGLE
TRIPLEX

For All Duties

NORTHEY MFG. CO., Ltd., TORONTO

The Laurie Engine Co., Montreal

← SOLB AGENTS FOR PROVINCE OF QUEBEC →

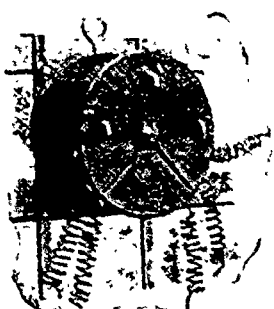


FINE . . . ELECTRIC Street Cars

.... OUR SPECIALTY ...

We also manufacture Horse and Trail Cars of every description.

PAGGERSON & CORBIN ST. CATHARINES, ONT.



TRANSFORMERS

We have the largest and most thoroughly equipped factory in America devoted exclusively to the manufacture of Transformers. . . .

THE "SIMPSON" TRANSFORMER has by long odds, by merit only, won the first place over all other transformers, and is in use by more companies than any other make in this country.

G. T. SIMPSON . HAMILTON, ONT.

CANADIAN
ELECTRICAL NEWS
 AND
STEAM ENGINEERING JOURNAL.

Vol. VI.

DECEMBER, 1896

No. 12.

THE ONTARIO ELECTRIC AND ENGINEERING COMPANY.

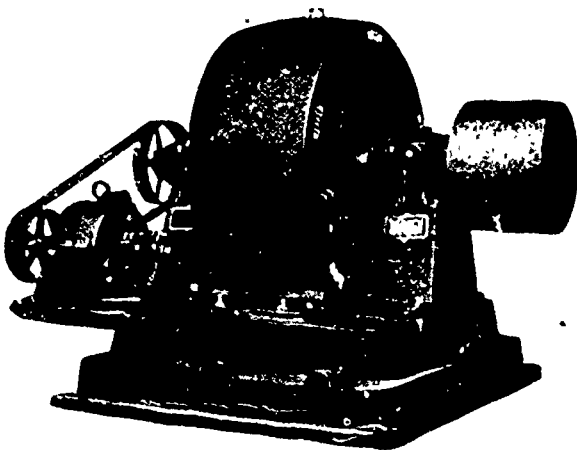
As a sign of the times and increasing prosperity in the industrial world, after a season of comparative inactivity, perhaps nothing is more encouraging than to note the appearance, from time to time, of new commercial enterprises springing up in spite of the blue ruinist's cry of hard times and keen competition.

It may be that, like ourselves, the promoters of these concerns hold their own opinions as to the time when best to launch out, and no doubt they have also the conviction that after a lengthened period of depression there must always come a revival in business.

Referring more particularly to the electrical industry, we note with pleasure the arrival into the Canadian field of the Ontario Electric and Engineering Co., Ltd., recently organized for the purpose of carrying on a general electric contracting, supply and repair business, with commodious headquarters at 77 to 81 Adelaide street west.

It is intended, we understand, to pay special attention to repair work, which feature will no doubt commend itself to central station men, who even with the best of good luck may sometimes require the quick co-operation of a well-equipped machine shop and competent engineers.

The secretary-treasurer, Mr. W. Heathcote, who for



60 K. W. SINGLE PHASE WARREN ALTERNATOR.

some years held a responsible position on the engineering staff of the Canadian General Electric Co., Ltd., is a gentleman of sound business experience and executive ability, who will doubtless perform his duties with credit to himself and profit to the company.

The position of chief engineer is held by Mr. Hazen Ritchie, A. I. E. E., a graduate of the Royal Military College, Kingston, who has had several years' experience with the larger companies both in England and on this continent.

The sales department will be in the hands of Mr. J. J. Ashworth, so well and favorably known to the electrical public as having been on the agency staff of the C. G. E. Co. since its inception, having only severed his connection to identify himself with the new enterprise.

We illustrate on this page a single phase alternating current dynamo which this company are now placing on the Canadian market. It is of the inductor type, with stationary armature, and, it is claimed, combines all the qualities of durability, slow speed (that of a 60 k.w. be-



ROTOR OF WARREN DYNAMO.

ing only 720 r. p. m.), good regulation, and high efficiency. The manufacturers are the Warren Electric Co., of Chicago, Ill., for whom the Ontario Electric and Engineering Co. are acting as sole agents for Canada. Sales are reported good, although the machine has been but a very few weeks before the public.

The company are also sole agents for the Eddy Electric Manufacturing Co., of Windsor, Conn., the well known makers of direct current machinery in all sizes.

The fact of being in a position to place apparatus of such high grade on the market, and having on its executive and engineering staff, men, each a specialist in his particular line, augurs well for the success of the company.

QUESTIONS AND ANSWERS.

C. L. F., Parry Sound, Ont., writes: I enclose three pieces of wire, viz., No.'s 18 iron, 18 and 16 copper magnet, American wire gauge. Will you please tell me what size they are in B. & S. gauge?

ANSWER. - American wire gauge is the same as B. & S. Gauge. Of the three pieces of wire, the long brown one is .033 in. = B. & S. between No. 18 and 19; the very small white insulation is .005 in. = B. & S. No. 36; the short piece is .064 in. = B. & S. No. 14.

A correspondent in an Eastern Ontario city writes: "I believe that you can, better than anyone else, favor me with a definite opinion as to the outlook for college graduates in the field of electrical engineering, and from what I can judge it is the most promising of all professions at the present time, and I would like to know, with some degree of certainty, whether the field is already over supplied, as is claimed in some quarters, or whether the fault of non-success experienced by some

technically qualified men is properly attributable to their own lack of energy, or, say, want of the exercise of common sense in casting about for employment?

ANSWER. — We sorely know what opinion to express in reply to your enquiry. We have talked this subject over a number of times with men occupying leading positions in the electrical business, and the general opinion appears to be that the outlook for young men in this calling is not as promising as a great many people appear to imagine. If you look over the electrical field at the present time you will see that the number of really good positions, in this country at least, are very limited. We know of several qualified electricians formerly occupying good positions, who, having lost them, have found it impossible to secure others equally remunerative. We do not pretend to know all the circumstances in connection with these cases, and consequently are not able to say that these persons have not, in some degree, themselves to blame for the position in which they find themselves at present. The electrical business in this country appears to be at a point where it is very difficult indeed to estimate its future development, hence the difficulty of expressing an opinion on the subject of your enquiry. If the electric railroad continues to develop as it has done during the past five years, there should be a considerable number of openings for young men in that field. This applies also to the distribution of power by electricity over long distances. If the distribution of power in this manner is found to be commercially practicable and advantageous, it will probably lead to the establishing of quite a number of large power stations at certain points throughout the country, where water power is available, and in such power stations the services of one or two first class electricians will be indispensable. With regard to the electric lighting business, a great many of the men in charge of central stations at the present time have not had proper training for the position, and are consequently lacking in efficiency. Unfortunately, the owners of stations do not appear to realize, as they should, the necessity of employing properly qualified men and paying them satisfactory salaries. Until the owners of stations come to realize that a poorly qualified superintendent is dear at any price, there will be few openings in this direction for the services of properly qualified young men. We are not without hope, however, that the business will ultimately be placed on a proper footing and will be conducted more in accordance with the best known principles of business management. When that time arrives the number of openings for competent young men will be increased. This is the situation as it presents itself to us at the present time. What new developments in the use of electricity may be forthcoming in the near future it is impossible to know.

POWER DEVELOPMENT AT NIAGARA FALLS.

By F. C. ARMSTRONG.

THE delivery in Buffalo on the 15th of November last, of the first thousand horse power out of eight thousand which the Cataract Construction Company are under contract to supply to the Buffalo Railway Co., marks the completion of an important stage in this notable enterprise. No undertaking in recent years has attracted the attention of the engineering and industrial world to so great a degree as the now accomplished "harnessing of Niagara"; and no undertaking of a certainty has had to win its way to a signal success in the face of greater difficulties and more discouraging and persistent prophecies of failure. Although so much has been written from time to time during the progress of the work that the

electrical public, at any rate, are pretty well conversant with its history, a brief recital of its main points may not be out of place at the present moment.

From the day when Father Hennepin in his *Nouvelle Decouverte* first published to the world a description and sketch of the mighty cataract, the Falls of Niagara have held their place as the great natural wonder of America, the main objective point on this continent of the globe trotter and the wedding tourist. It was not to be expected, of course, that the utilitarian spirit of recent years would be satisfied to find scenery alone in what was plainly meant for water power. Some early attempts at utilization were made, and the present Niagara Falls Hydraulic and Land Company is a development from the first hydraulic canal constructed between 1853 and 1861. In both Canada and the United States, however, a strong and wide-spread feeling existed against any further disfigurement of the naturally charming surroundings of the Falls which culminated in the nationalization for park purposes of the lands enclosing them on both sides.

In 1889 the Cataract Construction Company was organized to carry out the plans for power development worked out by Thomas Evershed. These embraced mainly the taking of the necessary water supply from the river by a short canal at a point one-and-one-half miles above the Falls, its delivery at this point, where the erection of the necessary buildings would not be objectionable from an aesthetic standpoint, into a wheel-pit 178 feet in depth, and its discharge through an underground tunnel into the river at a point directly below the upper Suspension Bridge, the capacity of the tunnel being fixed at 120,000 horse power. The personnel of the company, of which Mr. E. D. Adams was president, Mr. W. B. Rankine secretary, and Messrs. D. O. Mills, J. Pierrepont Morgan, W. K. Vanderbilt and J. J. Astor, members of the Board of Directors, was a sufficient guarantee that the capital necessary for an undertaking of such magnitude would be readily forthcoming.

As general consulting engineer the company retained Dr. Coleman Sellers, the hydraulic and electrical portions of the work being placed respectively in the hands of Mr. Clemens Herschel and Professor George Forbes, of London, England.

In 1893 the International Niagara Commission, composed of Sir William Thomson (Lord Kelvin), Dr. Sellers, Col. Theodore Turrettini, Professor Mascart and Professor William Unwin, were invited to examine existing methods and select plans for the detail apparatus required in the development and transmission of the power. For the turbines the design submitted by M. M. Faesch & Piccard, of Geneva, Switzerland, was selected. For the transmission, as might have been expected, electricity was finally adopted, though not without a careful examination into the merits of compressed air, hydraulic tubes and rope transmission.

Regarding the position taken by Lord Kelvin, Prof. Rowland and other authorities consulted, toward the particular electrical system and type of generator ultimately used, a somewhat acrimonious discussion has since been carried on. It seems fairly clear, however, that to Professor Forbes is due the credit of insisting on the employment of alternating instead of direct currents—a choice of which no one would to-day gainsay the wisdom in view of the different uses requiring widely varying voltages for which the current is now being required. A second point on which Professor Forbes was exposed to attack was his advocacy of a comparatively low frequency. Here again the advantage obtained of greatly lessened inductive loss on the long distance transmission lines, added to the much greater suitability of the low periodicity for rotary transformer work, has been amply sufficient to demonstrate the correctness of his judgment. The umbrella shaped type of generator adopted, with an external revolving field and stationary armature, which has proved itself admirably suited for the requirements of a large fly-wheel effect and light revolving weight, is substantially the design submitted by him as consulting engineer to the manufacturing companies. In this connection it may be added that whatever estimate is to be placed on Professor Forbes' work for the Cataract Company, he is certainly entitled to respect for the courage with which he has always been ready to defend his convictions. The Partisan dart which he discharged at his critics and detractors in his famous article in "Blackwoods," affords sufficient evidence on this point.

The first of the three five thousand horse-power generators forming the original order given to the Westinghouse Electric Manufacturing Company, was started up on the 5th of April, 1895, and shortly afterwards the regular supply of current to the amount of 2,000 h. p. to the Pittsburgh Reduction Company for the manu-

facture of aluminum was commenced. To the electro-chemical group of local users of the new power there has since been added the Carborundum Company, which produces in the electric furnace, from carbon, in one of its many metamorphic conditions, an abrasive claimed to be superior to emery.

A preliminary installation for the manufacture of carbide of calcium uses at present 1,000 horse-power. This amount will undoubtedly be greatly increased should acetylene gas in the future become something less of an ignis fatuus and more of a practical illuminant. Other local applications of the power are, with synchronous motors, to operate the generating plant of the Niagara Falls Electric Light Co., and with rotary transformers in supplying current at 500 volts for the Buffalo & Niagara Falls Railway.

It is as marking the satisfactory commencement of the second stage in the distribution of the power in which its successful transmission over considerable distances is the problem to be worked out, that the thousand horse-power already laid down in Buffalo becomes of the first importance. The difficulties to be overcome are not, of course, of an engineering nature, since several transmissions on a large scale over greater distances have been for some time in operation. The question has been whether electric power generated under the conditions which obtain in the Cataract Company's plant can be sold at a profit in Buffalo at prices as low as those at which steam power can be produced under the absolutely favorable conditions existing at that point. Comparative estimates made by the most capable engineers have differed regarding this all-important matter to a curious extent. The result, as indicated by the contract entered into with the Buffalo Railway Company for 8,000 horse-power delivered, at a price stated to be \$36.00 per horse-power per annum, would seem to show that the Cataract Company's officials and one of the most important of their prospective customers, have been able to arrive at a mutually satisfactory basis of price for the transmitted electric power where the circumstances governing its previous production by steam were such as to render possible the very highest economy.

It seems reasonable to estimate the amount of power which will be disposed of in Buffalo within a year at not less than 15,000 horse-power, and in view of this and other increasing demands, an additional order has been placed with the manufacturers for five 5,000 horse-power generators, which will bring the total generating capacity of the plant up to 40,000 horse-power. For the transmission to Buffalo, which has been carried on under the plans of the General Electric Company, a line potential of 11,000 volts is now being used, but this will be doubled to 22,000 volts later on, in order to keep the copper cost and energy loss within reasonable commercial limits. The three-phase system is used for the transmission instead of the two-phase, on account of the very considerable saving effected in copper. At the sub-station in Buffalo the current stepped down to 2,000 volts is carried through underground cables to the Railway Company's power house, where, after further stepping-down, the General Electric Company's rotary converters change it from an alternating to a direct current at the standard railway voltage.

The commercial success, now practically assured, of the transmission to Buffalo, entails of course the extension of the company's field of operations in this direction over a wide area. Just where the commercial limitations which will govern in the matter will fix the point beyond which Niagara power cannot be profitably delivered, would be at this moment a very unsafe matter on which to hazard a definite opinion. It should be kept in mind, however, that the completed scheme of the Cataract Company involves the development of 200,000 horse-power on the American and 250,000 horse-power on the Canadian side of the Falls, to find a market for which will require a transmission radius considerably in excess of 100 miles.

The other important power development already referred to—the Niagara Falls Hydraulic and Land Company—will, along with various projects now under consideration on the Canadian side, be more fully considered in a subsequent paper.

The Minister of Education has promised to provide for the sustenance of the Toronto Technical School in case the city provides a permanent building therefor.

The Metropolitan Street Railway Company have extended their line to Richmond Hill, and are considering the further extension of the line to Lake Simcoe, in which case a new power house will probably be erected at Newmarket or Aurora. The present power house near Mount Pleasant will be improved.

TRADE NOTES.

The Canadian General Electric Co. are supplying a 1,000-light standard single phase alternator to Victoriaville, P. Q.

A large engine for the St. Thomas Electric Light Works was recently supplied by Cowan & Company, of Galt, Ont.

The Ontario Electric and Engineering Co., Toronto, have sold a 500-light alternating plant for lighting the town of Newcastle, Ont.

The Canadian General Electric Co. have been awarded a contract for a 500-light incandescent plant for the town of Alvinston, Ont.

P. McIntosh & Sons, of Toronto, have installed in their factory a 300-light incandescent plant supplied by the Canadian General Electric Co.

The Almonte Electric Light Co. have added to their plant a 600-light incandescent generator manufactured by the Canadian General Electric Co.

The Canadian General Electric Co. are installing a 500-light single phase standard alternating plant for a local company recently organized in Embro, Ont.

The Toronto office of the J. C. McLaren Belting Company, of Montreal, has been removed to 69 Bay street. Craig, McArthur & Co. are the representatives in this city.

Messrs. Coristine & Co., of Montreal, have installed a 55 k. w. direct current incandescent generator of the Canadian General Electric Co.'s moderate speed multipolar type.

The Canadian General Electric Co. have closed a contract with the Canada Paper Co. for a 1,000-light incandescent generator of their latest multipolar steel type, with iron-clad armature.

The Electric Repair and Contracting Co., of Montreal, are at present busily engaged in rebuilding motors and generators damaged by fire which took place recently on the premises of the Montreal Park & Island Railway Co.

The St. Catharines Electric Light & Power Co. have placed an order for a 2,000-light standard single phase alternator with the Canadian General Electric Co. The 60 k. w. machine of the same type which they have been operating up to the present has proved insufficient in capacity to meet the growing demands of their business.

The Fraserville Co., Ltd., of which Mr. John MacFarlane, of the Canada Paper Co., Montreal, is president, are installing a complete 750-light alternating plant in the town of Fraserville, Que. The entire contract has been awarded to the Ontario Electric & Engineering Co., Ltd., who will install for the generating plant one of their 45 k. w. single phase "Warren" alternators.

The Berlin & Waterloo Railway Co. have just placed in service two new vestibuled cars, having a length over all of 27 feet 6 inches. These cars are exceedingly handsome in design and finish, solid mahogany being used throughout for the interior fittings, and embody important improvements in various details. They were constructed at the Peterboro shops of the Canadian General Electric Co.

Owing to the rapidly increasing demand for their goods, the Kay Electrical Mfg. Co., of Hamilton and Toronto, will shortly commence the building of an addition to their factory. The following is a partial list of their more recent sales: Kemp Mfg. Co., Toronto, 2 motors; H. R. Cuddon, St. Catharines, 1 motor; M. Hutchinson, wood yard, Toronto, 1 motor; A. Moore, Toronto, 1 motor; Aylmer Electro Plating Co., 1 dynamo; Steel Clad Bath & Metal Co., Toronto, 1 4-pole motor; Wheeler Brush Co., Toronto, 1 motor; Leitch & Turnbull, Hamilton, 3 motors, for elevator purposes; A. R. Williams, Toronto, 3 motors; Davis & Henderson, Toronto, 2 motors; Mr. Garner, Toronto, 1 motor; Mr. Enright, Toronto, 1 motor; Mr. Bomberg, Toronto, 1 motor dynamo; H. C. Hunter, Dundas, 1 4-pole 400-amp. dynamo; Haskins Wine Co., Hamilton, 1 motor; McPherson & Glassco, Hamilton, 1 motor; Munderloh & Co., Montreal, 1 dynamo; J. Turner & Son, Toronto, 1 motor; Wm. Beers, Toronto, 1 motor; T. Bell & Co., wood yard, Toronto, 1 motor; Barber Bros., Georgetown, 1 30-h. p. 4-pole motor; H. & F. Hoerr, Toronto, 1 motor, 15 h. p.; Ontario Agricultural College, Guelph, plant for light and power; Small & Fisher, Woodstock, N. B., 1 dynamo; A. Laidlaw, Toronto, 1 motor; Mr. L. Williams, Toronto, 1 motor; John Forman, Montreal, 3 motors; Wilson Pub. Co., Toronto, lighting plant; T. E. Brandon, Toronto, 1 motor; Davison & Holmes, Toronto, 1 motor; Bennett & Wright, Toronto, 2 4-pole motors; Diamond Machine & Tool Co., Toronto, 1 electric plating dynamo. This firm have also sent 10 electric machines to the North-west and British Columbia.

THE YOUNG MAN'S CHANCES IN THE ELECTRICAL FIELD.

IN view of the opinion which seems largely to prevail that electricity is the thing to which young men should now turn their attention with the best hope of reaping satisfactory results from their labors, the editor of the *ELECTRICAL NEWS* deemed it advisable to solicit opinions on the subject. For this purpose the following letter was recently addressed to a few persons prominently identified with the electrical interests:

DEAR SIR, To assist me in answering frequent enquiries as to the possibilities for qualified young men in the various departments of electrical work, I have thought it advisable to endeavor to obtain an expression of opinion from a number of persons qualified to advise on the subject.

The enquiry may be briefly put thus:—"What are the chances of the young man who graduates as an Electrical Engineer in comparison with the young man who enters any of the other professions or commercial life?" I would esteem it a favor if you would kindly give me an expression of your views on this matter in time for publication in the *ELECTRICAL NEWS* for December

C. H. MORTIMER.

We trust the appended replies will be of assistance to parents and young men who find themselves face to face with the problem of choosing in what direction life's efforts should be expended:

Mr. Granville C. Cunningham, manager and chief engineer of the Montreal Street Railway Company, writes: "At present there seems to be more opening in electrical engineering than in any other professions in this country. Of course the success of a man largely depends upon himself. There is little doubt, I think, but that electricity, during the coming years, will have large developments in this country."

The manager of another important electrical company, who requests that his name be omitted, writes:—"Replying to enquiry contained in yours of 28th inst., it is common knowledge that every profession, trade, and calling is overcrowded, but that there is room at the top for persons of exceptional ability, is well known, and any person of even more than average ability will succeed fairly well whether he be on a farm, in commerce, or in professional life. What then are the chances of a young man of more than average ability who graduates as an electrical engineer, in comparison with those of a young man of equal ability who enters one of the other professions, say law or medicine? Let us see how the matter stands in Toronto. There are in round figures 500 lawyers. We will not be far out in saying that the number who possess more than average ability and who have established a practice is about 150, and these have incomes of \$1,000 a year and upwards. Are there ten electrical engineers in Toronto earning this amount?"

"There are lawyers in Canada making eight and ten thousand dollars per year and some as high as fifteen and twenty thousand. How many electrical engineers in the country are making half of the lowest figure?"

"What is true in law holds equally so in medicine. There are about 400 doctors in Toronto, and judging by the houses they inhabit and the style of their living, the average income of an established doctor of more than average ability must at least be as great as that of his legal brother.

"The man of less than average ability has neither room nor place in any profession. He may graduate as an electrical engineer, but will end up in attending a dynamo or stringing wire at forty or fifty dollars a month. The time spent at college would have been better employed in getting a practical mechanical education or a sound business training.

"I have no desire to discourage persons from going into a business employing electricity. The prospects of a bright intelligent young man would be at least as good as they would be in any non-electric business, but I feel that our schools and colleges are turning out a hundred electrical engineers for every vacant position in the country. What is to become of them? Electricity does not spell any royal road to fortune."

Mr. Wm. H. Browne, general manager of the Royal Electric Co., Montreal, writes: "In reply to your enquiry as to what are the chances as an electrical engineer, compared with other professions or commercial life, I presume the answer would be that on the average the electrical engineer would be likely to do as well as the average man in other professions or commercial life.

"In electrical work, as in all other work, the most room is at the top, but it is quite likely that for some time to come the electrical engineer who can be at the top may not be as financially successful as his corresponding member of the legal or medical profession or the commercial man.

"The field for opportunity for clients is necessarily, at present, much more restricted in the electrical line than in the other professions or commercial life, because the industry is new, but there is no doubt that the growth of the electrical industry, by reason of the increase of the application of electric power, will very largely increase, and within a few years will require the talents of the best members of the profession, and those who may be capable of meeting these requirements will, no doubt, do as well as the best members of other professions.

"In my judgment, one of the greatest needs of the electrical business of this country to-day is the employment in all operating electrical plants, of thoroughly well qualified young men, graduated as electrical engineers.

"I have frequent applications in our business here, from parents of young boys, sixteen to eighteen years of age, to take them into our shops and teach them the electrical business.

"The impression appears to prevail, that this is all that is necessary to make competent electrical engineers.

"I am obliged to refuse all such applications and advise such parents that if their sons have special aptitude and inclination for mechanics, that they be sent to some good college to receive a thorough complete course in electrical and mechanical engineering, for the two are almost necessarily bound together, and after graduation, to seek occupation practically, either in the operation of an electrical plant or in a manufacturing establishment.

"The electrical engineer requires special qualifications to fit him for his profession and there have been many who have graduated as such who have probably made a grave mistake, by reason of not possessing the special aptitude and talents."

Prof. Galbraith, Principal of the School of Practical Science, Toronto, writes: "Your question is not an easy one to answer. It seems to me that it is well to assume that all money-making occupations, businesses and professions are full. This being the case, success will depend largely on the special fitness of the candidate for his chosen vocation. Natural capacity for one's work, supplemented by education and training ought, other things being equal, to ensure a reasonable amount

of success. There is always room at the top ; to get there, however, requires special qualifications as well as opportunities. The man who takes an interest in his work for its own sake and not simply for the money which he may make from it, will not be discouraged by hard times, and will in all probability work his way through life more cheerfully than the man who values his occupation simply by the dollars and cents he may make out of it. A young man ought not to select his profession simply because at present business in it is good, nor ought he to reject a profession for the opposite reason. He ought to remember that his choice is not only for the immediate future, but for life, and that during his life ups and downs may be many and not far between."

Mr. G. J. H., manager of an Electric Light and Power Co., writes : "Complying with your request of the 28th November, will say that your enquiry covers quite a lengthy opinion.

"The comparison between a young man graduating as an electrical engineer with a man entering a commercial life, can be made as follows: The man entering a college course to qualify for an electrical engineer has before him, I think, a four years course. He enters at the age of 18, and say he gets plucked two years out of his course, which would bring him to the age of 24 when he qualified, he then really has to make a start in life, or in other words hang out his shingle that he is ready for business, unless he happens to be fortunate enough to secure a position with some reliable firm. If not, he may plod along for a couple of years, very often receiving smaller wages than the ordinary mechanic who has served his time at the bench. In this connection there comes to mind the cases of two personal friends of mine; the first graduated as an electrical engineer from McGill about a year and a half ago; he went to one of the largest cities in the States, and at the present time is drawing the heavy salary of \$1.50 a day. The other, now out of college some time, secured the appointment of Construction Superintendent on an electric road, and after giving the company the benefit of his college education as an electrical engineer in overcoming technical difficulties and systematizing the whole road, was politely dismissed, to be replaced by a man that could never know as much as this engineer had forgotten, but it was a question of a few dollars a year in salary. As a rule you will find that college graduates expect to start their professional career at very large salaries. This is one of the greatest mistakes these graduates could make. When it comes to closing an engagement they prefer to hold off for several months, than close at a fair salary. As a consequence you will find college graduates filling commercial positions, for which purpose their college education is of very little use, to say nothing of the four to six years of their life that has been to all commercial purposes lost. I do not refer particularly to electrical graduates, as I could record several similar instances as applied to civil engineers. As you are well aware college education can never do a young man any harm, provided he can afford to take a course and spend the required time.

"As a rule a young man starting a commercial life would be about 15 years old, and would have from 15 to 24 to make a mark for himself, the ability to do which must naturally depend largely on himself. Provided he starts with a reliable firm, displays any ability,

or is at all industrious, he is almost certain to secure advancement, and in time, no doubt, will be given a position of trust, and by the time his friend had graduated at 24, the commercial man would have better prospects than the graduate.

"This is the age of development in electricity, and I think if I had a boy of 15 or 17 I would prepare him to take a course to qualify as an electrical engineer, but as we all know there are so many different opinions on the bringing up of boys, that it is a matter that would take hours of discussion."

Mr. E. Carl Breithaupt, Consulting Electrical Engineer, Berlin, Ont., writes : "Replying to your enquiry of the 28th ult., as to the relative chances of a young man who graduates as an electrical engineer as compared with one who enters any other profession or commercial life, it seems to me that such a comparison is not altogether a proper one to make; a man must have a very particular fitness to make a success in any profession, and especially do I think this is the case in the three Engineering professions, the Civil, Mechanical and Electrical. If a boy shows aptitude and fondness for engineering work, is willing to work very diligently, and willing to don a suit of overalls and perform heavy manual labor at any time he may be called upon, either day or night, I think his chances as an electrical engineer are as good as those of any other calling in life. There is one thing, however, that must be remembered, viz., that very few engineers in any one of the three branches named have become very wealthy in the practice of their profession. Engineering work must be considered more as a labor of love than one for financial gain."

Messrs. Ahearn & Soper, Ottawa, write : "Replying to your favor of the 28th ultimo, asking what are the chances of the young man who graduates as an electrical engineer in comparison with the young man who enters any of the other professions or commercial life, we think his chances are now about equal. A few years ago his opportunity for obtaining employment might have been better, but electrical engineering today, like other professions, seems to have been overdone."

Mr. George White Fraser, Consulting Electrical Engineer, writes : "In answer to your enquiry of date 30th, now as to the prospects of young men entering the electrical engineering profession in Canada, I would say: At the present moment there is practically no electrical engineering in Canada. When persons are contemplating an enterprise involving the use of electricity for lighting, power or railway purposes, the last man they think of consulting is an electrical specialist. This is due apparently to the fact that, first, the general public seem to think that they know enough about it to do without advice; second, the manufacturing companies naturally do all they can to discourage the idea of consulting competent engineers in independent practice, and offer to do all engineering themselves free of charge. The general public accept this seemingly generous offer, shutting their eyes to the rather obvious consideration that this engineering has got to be paid for somehow, whether done by an independent person, or one employed by a manufacturing company, and that the engineering of the latter is necessarily biased in favor of the "system" exploited by his company; third, there have been no competent electrical engineers doing business until quite recently—the only persons in that

line having been more entitled to the name of 'electrical mechanics' than of 'electrical engineers' being able merely to make repairs and do small wiring jobs. Of course we have many instances of civil, hydraulic and mechanical engineers, and architects, and even land surveyors, who, without the slightest right to do so, have called themselves electrical engineers, and freely advertise their specialties as being electric railways, electric lighting, etc., and actually get work in those lines which they simply hand over bodily to the manufacturing company of their choice; and fourth, that a great deal of such electrical work as there has been, has been more or less of a pettifogging character—municipal deals, small lighting plants, and so on. I think, however, that a different notion is taking hold of the public, that is rather encouraging to the independent engineer. In the first place, happily, these small plants are about all sold now, and people are getting a little less confident as to their electrical attainments. The evolution of machinery from the old D. C. or single phase alternating type to the latest polyphase development, with all the latest storage battery, inductor type, direct connected side issues, has rather brought electrical engineering, as such, to the front; and as the public begin to read a little more, and hear a little more, and find out that electricity is not "in its infancy," nor yet a matter of unspeakable mystery, but a science to be studied and understood; a profession clearly distinct from civil or mechanical, or hydraulic engineering, and vastly different to architectural or land surveying, so do they think more of obtaining advice from electrical men—more especially as the number and variety of different types of machinery offered to them increase to their great perplexity.

"Briefly—I think that most of the small work is done. During the next several years large works will be promoted—large railways, power schemes, electrolytic plants, etc.; the men interested in them are business men who will not submit to the dictation of any manufacturing company, but retain outside independent engineers, knowing very well that electrical specialists can attain better results than the most experienced general practitioner. Therefore I think there is plenty work to do for electrical engineers who will vigorously insist on recognition, who will keep themselves absolutely free of the influence of any manufacturing company and who will keep themselves abreast of the times. It will be a hard fight, for we have many antagonists: we have the inertia of an ignorant public, the animosity of powerful manufacturing companies, who, in my own experience, will go to any length to persuade customers against calling in independent advice; and we have the jealousy of the other branches of the great engineering profession, who do not care to see electricity defined as a specialty for which they are not professionally qualified. I, personally, shall be glad to welcome any accession to the ranks of the independent electrical engineering profession in Canada, and think that success is a matter of determined effort and co-operation."

Mr. C. E. A. Carr, manager of the London Street Railway Co., writes: "In reply to your inquiry of the 28th November, I should think the chances of success in the electrical field were much better than in any other, for the reason that the uses of electricity are daily becoming broader, which is not the case, in so marked a degree, in any other profession."

Mr. R. A. Ross, mechanical and electrical consulting engineer, Montreal, writes: "Replying to your enquiry as to what are the chances of young men who graduate as electrical engineers in comparison with those who enter the other professions or commercial life, I should say, that without doubt at the present time electrical engineering is overcrowded, and will probably always remain so for the following reasons:

"To a new profession there is always a rush, and in this case the influx has been particularly large, because of the rapid expansion of electrical enterprise, necessitating a large amount of engineering supervision, which has become unnecessary as the enterprise settles down to a rigidly economical basis.

"Again, civil engineering has long been recognized

as an overcrowded profession, and the tendency of those contemplating entering the engineering field has been to avoid the civil and enter the new and rapidly expanding electrical field. This result has obtained in spite of the fact that although there is room for a civil engineer or two in every county, there is not room for an electrical engineer in a dozen counties. Further, electrical engineering will always attract to itself more than its legitimate share of students because of its novel attractiveness, and will tend to remain crowded. A glance at the list of students now entered in electrical engineering at our colleges will give eloquent testimony to above opinions."

Mr. James Milne, Lecturer in Electricity, Toronto Technical School, writes: "The great trouble in these days, I think, is in giving the young man the impression that if he receives a university training and graduates as an electrical engineer, that his services will be in demand, and that he will be looked up to by every one in the business, while the man who has been less fortunate as regards his education, but serves an apprenticeship to some trade, will be inferior in every respect.

"I believe in giving a fair education to all, but after that education has been attained the best thing that can be done is to learn a trade, and in learning that trade care should be exercised in the selection of the proper place.

"A young man who serves his apprenticeship in a small place, that is in a place where there is a scarcity of tools, etc., will in most cases turn out a better workman than the one who serves his time in a very large concern. In the smaller place ingenuity has to be exercised to get the various job done with the tools that are at hand, while in the large place special tools are ready made for almost everything. Therefore, in this respect the proper place to serve an apprenticeship is where a turn at everything may be got, such as pattern-making, fitting, turning, armature winding, etc., etc., and finishing up with the drawing office. This is what a complete apprenticeship should comprise. In these large manufacturing concerns where premiums are paid for instruction, the chances of knowing something at the end of the time are very slim indeed. There is one good thing about the arrangement, however—the money is generally thrown away by those who can afford it, and benefits the electrical concern, but whether or not it benefits the other party is a secondary consideration.

"In the smaller place the young man gets a fair insight into everything, and gets accustomed to the use of tools, and by and by is sent out to do various jobs and gain valuable knowledge and experience, and in a comparatively short time becomes a first-class practical man.

"Our learned brother, the electrical engineer, who has just graduated, finds that before he can be of much use he must gain practical knowledge, and to do this he has to get into some shop. Now here is where the sticker is; he has been led to believe that he will not have to soil his hands, and that his brains will do it all. He never made a greater mistake in all his life.

"For some unknown reasons, parties in charge of shops or branches of any manufacturing concern will almost invariably refuse to employ these graduates, even although their services are offered gratis, and it is right here where our premium system comes in. They pay the money for instruction, and simply put in the necessary time, and that is about the end of it.

"Our man who has served his apprenticeship in the small concern and spent his spare time in reading up, sees an advertisement which reads something after the following: 'Wanted—a good man to take charge of an electric light plant—apply at so and so.' He, of course, applies, and in his application he states his experience, etc., together with all the rest of his redeeming qualities. For the situation we have 100 applications, 99 of which are from electrical engineers, graduates of some university. The parties to whom the applications have been sent read all the applications and comparing all their good points decide to give the situation to our practical man. This, I think, is pretty nearly the universal experience.

"When we bear in mind that what might be termed 'good jobs' are very scarce, and in Canada there

probably are about a dozen of them, which at present are all filled, the chances of an opening are very slim indeed, unless by some unforeseen calamity, such as a death, and the chances of our electrical engineer dying are probably about the same.

"There can be no doubt, however, that exceptionally smart men, no matter what profession—be it electrical, mechanical or otherwise will make their mark, but this does not mean that our fortune favored electrical engineer will in very many cases knock out our man with the more practical ideas.

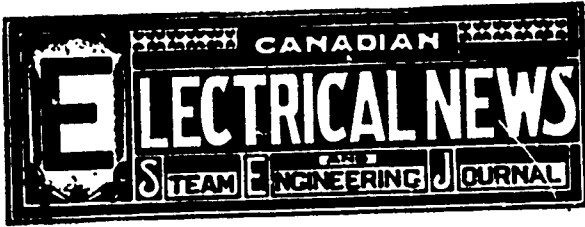
"It appears to me that if this education business is forced much higher that premiums will soon have to be offered for ordinary working men. If some manufacturing concern were to start up, say in the electrical business, and several foremen were required, I know I am correct when I state that every foreman would be selected from the ranks of those who have graduated (?) in the shop, and should it happen that say a superintendent or engineer was required to supervise the whole engineering part, you will find that the man appointed will be also a thoroughly practical man, with, however, a good technical education.

"To finish up with, I would like to state that if any young man is an aspirant for some fine job—nothing to do and big money for it—let him keep out of the electrical business, and more especially the lighting and power part of it. Without exception it is the most aggravating, most tantalizing and thankless of all, and an eternal source of worry from early morn to late at night, which accounts for those in this part of the business being old men long before their time."

Mr. J. J. Wright, manager Toronto Electric Light Co., writes: "At the risk of being considered somewhat of a pessimist, I am compelled to take a view of the question that I am afraid will not suit the sanguine enthusiast who considers that "electricity is only in its infancy" and that there are unbounded possibilities in the business for those who study electricity. The difficulty is that the field—in Canada, at least—is extremely limited. There are perhaps a dozen positions in the entire Dominion that it would pay the enterprising young electrical engineer to aspire to, and, unlike a mercantile business or the profession of physician or lawyer, they are not likely to materially increase. For instance, in each large city we have one street railway company and one, or at most, two, electric light companies. As these cities increase in size and population they will require, or rather, there will be room for, more lawyers and more doctors to maintain the present ratio, but when they are twice the size there will be but the one street railway and the one electric light company—if, indeed, these have not amalgamated and still further reduced the meagre opportunities. In the mercantile business or the legal or medical profession, or in the many branches of trade or commerce, an enterprising young man who has gained the requisite knowledge and saved a few dollars may enter and may hold his own with the best, and there is something lacking if he does not make a mark. At any rate, he has an equal chance with the rest to reach the top of the tree. But, no matter how smart he is as an electrician, if he feels the irksomeness and limitation of a subordinate position, he cannot start an electric light company or a street railway company of his own—at least, not often, and if he waits for the manager, or the superintendent, or the electrician of his local company to die or to hang himself, he has at least the satisfaction of knowing that the chance of survival is about equal, if indeed he does not starve to death in the meanwhile. There are but two manufacturing concerns in the country of any size who make a specialty of electrical apparatus. Let us say that one or two more come into existence. They have each their staff of "electricians," who supervise the construction and installation of apparatus, and these concerns are already capable of considerable increase in their output without any further skilled help as 'electrical engineers.' As electrical installations increase, as no doubt they will, especially in railway work, it follows that the increase in men employed will consist of the rank and file of intelligent mechanics and laborers, whose functions will consist simply in handling the apparatus put in

their hands—mechanics who will be perfectly competent to repair and operate the machinery, and laborers, firemen and oilers, whose wages will run from a dollar to two and a half dollars a day. The 'electrical engineer' does not appear to come in it at all. When I mention lawyers and doctors I do so, not that I advise a young man to take up these professions—because they are admittedly overcrowded—but as an illustration; simply to show that in similar professions there are opportunities for the clever man to rise to the top if he has the qualifications; whereas it matters not how great the qualifications if there are no opportunities or openings for their exercise. As a matter of fact, most of the professions appear to be overcrowded. The mistake of parents generally arises from their desire to see their sons do better than they themselves have—at least in appearance, and to have them rise in the social scale. The money they are expending in over-educating their boys for a struggle in an unremunerative profession has been made by every-day plain and prosaic hard work, but work that has borne excellent fruit. There is many a farm acquired in this way that to-day is mortgaged to the hilt to pay for the university education of a boy who was considered too good for his surroundings and who was not satisfied with plain honest work like his father did, though that work would have brought him independence and comfort instead of the worry and strife that is necessary even to wrest a moderate living in the midst of the fierce competition of professional life. I believe that if a tithing of the same training and ability, method and scientific knowledge required for this were applied to the operations of the farm, that the results in wealth, comfort and happiness would far transcend the best that can be gleaned in the care-strewn paths of professional life.

"I am afraid I am making this letter somewhat long, and getting a little off the track of the 'Electrical Engineer,' but holding the position I do, and being brought into contact as I am every day with many who have the idea that electricity is the coming thing and who want to learn electricity with a view of being as it were 'in the swim,' I cannot refrain from giving expression to my views. In one of your articles in the November issue of your paper you voice the complaint of an electrical man who kicks about this very thing. Because the country plant wants only a skilled laborer to look after its meagre apparatus, and cannot afford a school-taught electrician with a stand-up collar, he considers it a grievance. The fact is that the lot of the electrical operator is not a happy one, and not nearly as desirable as the ordinary observer who sees no further than the outside glamour is apt to think it is. The farm-laborer has a picnic in comparison. If he has to rise at day dawn, at any rate he gets his sleep at night—night with the electrical man is his time of greatest tension. There is no let up Sunday or week day, holidays as well; life, as Mr. Mantalini would say, is 'one deuced horrid grind.' The running of a high tension station is a hot, dirty, and to some extent, dangerous job, and the most of the work is done while the rest of the world are enjoying their relaxation from toil. Competition with other methods of lighting compel the station manager to exercise the most rigid economy. Therefore his work is subdivided and specialized. It is a 'one man one job' business. He wants a man to do one thing AND TO STAY AT IT. Therefore the young man who wants to learn the whole of it stands little chance. A modern electrical installation cannot be a training school or there would be an end of efficiency. It is often a matter of wonder to me what is to become of the comparatively large number of graduates in electricity and electrical engineering that are yearly turned out from our educational institutions. There will undoubtedly be a few who will drop into positions that will from time to time be available. More who will be compelled to work with the rank and file whose numbers can be recruited equally well from our Schools of Science, or from the grease pot and wiping rag, but the majority will be compelled to remain in a state of 'innocuous desuetude' and vegetate upon the wealth of their parents till some other career opens out to them."



PUBLISHED ON THE FIFTH OF EVERY MONTH BY

CHAS. H. MORTIMER,

OFFICE: CONFEDERATION LIFE BUILDING,
Corner Yonge and Richmond Streets,

TORONTO, CANADA.
Telephone 2362.

NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2209.

ADVERTISEMENTS.

Advertising rates sent promptly on application. Orders for advertising should reach the office of publication not later than the 25th day of the month immediately preceding date of issue. Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach the office as early as the 2nd day of the month.

SUBSCRIPTIONS.

The ELECTRICAL NEWS will be mailed to subscribers in the Dominion, or the United States, post free, for \$1.00 per annum, 50 cents for six months. The price of subscription should be remitted by currency, registered letter, or postal order payable to C. H. Mortimer. Please do not send cheques on local banks unless 5 cents is added for cost of discount. Money sent in unregistered letters will be at sender's risk. Subscriptions from foreign countries embraced in the General Postal Union \$1.50 per annum. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for if so stipulated by the subscriber, but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

Subscribers may have the mailing address changed as often as desired. When ordering change, always give the old as well as the new address. The Publisher should be notified of the failure of subscribers to receive their paper promptly and regularly.

EDITOR'S ANNOUNCEMENTS.

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

The "Canadian Electrical News" has been appointed the official paper of the Canadian Electrical Association.

CANADIAN ELECTRICAL ASSOCIATION.

OFFICERS:

PRESIDENT:

JOHN YULE, Manager Guelph Light & Power Company, Guelph, Ont.

1ST VICE-PRESIDENT:

L. H. MCFARLANE, Manager Eastern Department, Bell Telephone Company, Montreal.

2ND VICE-PRESIDENT:

E. C. BREITHAUP, Electrical Engineer, Berlin, Ont.

SECRETARY-TREASURER:

C. H. MORTIMER, Publisher ELECTRICAL NEWS, Toronto.

EXECUTIVE COMMITTEE:

GEO. BLACK, G. N. W. Telegraph Co., Hamilton.

J. A. KAMMERER, General Agent, Royal Electric Co., Toronto.

K. J. DUNSTAN, Local Manager Bell Telephone Company, Toronto.

A. M. WICKENS, Electrician Parliament Buildings, Toronto.

J. J. WRIGHT, Manager Toronto Electric Light Company, Toronto.

ROSS MACKENZIE, Manager Niagara Falls Park and River Railway, Niagara Falls, Ont.

A. H. SMITH, Superintendent G. N. W. Telegraph Co., Toronto.

JOHN CARROLL, Sec.-Treas. Eugene P. Phillips Electrical Works, Montreal.

C. B. HUNT, London Electric Company, London.

F. C. ARMSTRONG, Canadian General Electric Co., Toronto.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

President, JAMES DEVLIN, Kingston, Ont.
Vice-President, E. J. PHILIP, 11 Cumberland St., Toronto.
Secretary, W. F. CHAPMAN, Bruckville, Ont.
Treasurer, R. C. PETTIGREW, Hamilton, Ont.
Conductor, J. MURPHY, Montreal, Que.
Door Keeper, F. J. MERRILL, Ottawa, Ont.

TORONTO BRANCH NO. 1.—Meets 1st and 3rd Wednesday each month in Engineers' Hall, 61 Victoria street. John Fox, President; Chas. Mowley Vice-President; T. Eversfield, Recording Secretary, University Crescent.

MONTREAL BRANCH NO. 1.—Meets 1st and 3rd Thursday each month, in Engineers' Hall, Craig street. President, John Murphy; 1st Vice-President, J. E. Huntington; 2nd Vice-President, Wm. Smyth; Secretary, R. Archibald Veck; Treasurer, Peter McNaughton.

ST. LAURENT BRANCH NO. 2.—Meets every Monday evening at 43 Boesecours street, Montreal. R. Drouin, President; Alfred L. tour, Secretary, 306 Delisle est, St. Cuneoade.

BRANDON, MAN., BRANCH NO. 1.—Meets 1st and 3rd Friday each month in City Hall. A. R. Crawford, President. Arthur Fleming, Secretary.

HAMILTON BRANCH NO. 2.—Meets 1st and 3rd Friday each month in Macrae's Hall. Wm. Norris, President; E. Teeter, Vice-President; Joe Inneside, Corresponding Secretary, Markland St.

STRATFORD BRANCH NO. 3.—John Hoy, President; Samuel H. Weir, Secretary.

BRANTFORD BRANCH NO. 4.—Meets 2nd and 4th Friday each month. J. B. Forsyth, President; Jos. Ogle, Vice-President; T. Pilgrim, Continental Cordage Co., Secretary.

LONDON BRANCH NO. 5.—Meets on the first and third Thursday in each month in Sherwood Hall. G. H. Risler, President; D. Campbell, Vice-President; Wm. Meaden, Secretary-Treasurer, 533 Richmond street.

GUELPH BRANCH NO. 6.—Meets 1st and 3rd Wednesday each month at 7:30 p.m. H. Geary, President; Thos. Anderson, Vice-President; H. Flewelling, Rec.-Secretary; P. Ryan, Fin.-Secretary; Treasurer, C. F. Jordan.

OTTAWA BRANCH NO. 7.—Meet every second and fourth Saturday in each month, in Borbridge's hall, Rideau street; Frank Robert, President; F. Merrill, Secretary, 352 Wellington street.

DRESDEN BRANCH NO. 8.—Meets 1st and Thursday in each month. Thos Steeper, Secretary.

BERLIN BRANCH NO. 9.—Meets 2nd and 4th Saturday each month at 8 p.m. J. R. Utley, President; G. Steinmetz, Vice-President; Secretary and Treasurer, W. J. Rhodes, Berlin, Ont.

KINGSTON BRANCH NO. 10.—Meets 1st and 3rd Thursday in each month in Fraser Hall, King street, at 8 p.m. President, F. Simmons; Vice-President, J. W. Tandin; Secretary, A. Macdonald.

WINNIPEG BRANCH NO. 11.—President, G. M. Harlett; Rec. Secretary, J. Sutherland; Financial Secretary, A. B. Jones.

KINCARDINE BRANCH NO. 12.—Meets every Tuesday at 8 o'clock, in McKillop's block. President, Daniel Bennett; Vice-President, Joseph Lighthall; Secretary, Percy C. Walker, Waterworks.

WIARTON BRANCH NO. 13.—President, Wm. Craddock; Rec. Secretary, Ed. Dunham.

PETERBOROUGH BRANCH NO. 14.—Meets 2nd and 4th Wednesday in each month. W. L. Outhwaite, President; W. Foster, Vice-President; A. E. McCallum, Secretary.

BROCKVILLE BRANCH NO. 15.—Meets every Monday and Friday evening. President, Archibald Franklin; Vice-President, John Grundy; Recording Secretary, James Aikins.

CARLETON PLACE BRANCH NO. 16.—Meets every Saturday evening. President, Jos. McKay; Secretary, J. D. Armstrong.

ONTARIO ASSOCIATION OF STATIONARY ENGINEERS.

BOARD OF EXAMINERS.

President, A. AMES, Brantford, Ont.
Vice-President, F. G. MITCHELL, London, Ont.
Registrar, A. E. EDKINS, 88 Caroline St., Toronto.
Treasurer, R. MACKIE, 25 Napier st., Hamilton.
Solicitor, J. A. McANDREWS, Toronto.
TORONTO—A. E. Edkins, A. M. Wickens, E. J. Phillips, F. Donaldson, J. Bain.
HAMILTON—R. Mackie, T. Elliott.
BRANTFORD—A. Ames, care Patterson & Sons.
OTTAWA—Thomas Wesley.
KINGSTON—J. Devlin, (Chief Engineer Penitentiary), J. Campbell.
LONDON—F. Mitchell.
NIAGARA FALLS—W. Phillips.

Information regarding examinations will be furnished on application to any member of the Board.

CENTRAL stations are regarded as very poor risks, generally, by the fire insurance companies; and no wonder. In very many cases an electric lighting business is undertaken as collateral to a planing or saw mill, and the building containing the electrical machinery is added in the form of a small shed, to the mill. The leads from the machine to the outside lines are looped about anywhere, and very inefficient precautions are taken against bad grounds on the machine or switchboard. Now conditions that increase the fire risk, are very favorable for expensive leaks and wastes of current, so that any precautions taken to lessen the risk are of double benefit as tending to lower the operating costs as well. Insurance people are apt to be very cautious and conservative when dealing with electricity, and often impose conditions that seem to be unnecessarily strict; but then they are in a position to more or less dictate terms; and as a matter of fact, the method of making installations in smaller towns is apt to be very lax.

Polyphase Electric Railways. THE application of alternating currents to street railway purposes has long been a problem that now seems to be in a fair way of being solved. The advantages of high voltage transmission are too obvious to require any mention, and would be of special importance in the development of many country railway systems, the length of whose routes, however, would necessitate a very large expenditure for feeder copper on the usual 500 volt system, apart from the complication introduced by the double trolleys and overhead work required by any polyphase motor when used for traction purposes. The fact that induction motors, as now constructed, are built for only one efficient speed has been regarded as an insuperable obstacle to their use on cars. This,

however, is not so very serious a difficulty after all, for on country routes where stops are infrequent, and at certain definite places only, it is not required to vary the speed, except, of course, on starting, and perhaps on very sharp curves and crossings of roads. This condition has actually been met in practice, by the expedient of so constructing the motor as that certain poles can be cut in or out, thus causing the rotor to travel at a less or a greater angular speed. Rumors are current of satisfactory results having been reached by experimenters in this field; and we may reasonably expect within the next very few years to have polyphase railways running with commercial success.

The Steam Plant in Central Stations.

We have lately presented in our columns, a paper on the subject of steam engine indicators and the advantages to be derived from their frequent use. The steam part of an electric power house is one that receives but little attention very often from the owners of such plants, and their ill success is due, in great part, to this laxity. We have lately had occasion to critically examine indicator cards taken from a number of engines of different makes that have been continuously in use for a number of years, and if all our readers had the same opportunity of seeing the results as we have, we believe the use of the indicator would be much more frequent than it is. There seems to be an opinion among the smaller steam users, that once an engine has been put in—there is an end of it. They conclude that iron and steel last for ever; that there is no wear and tear; and that if the engine is properly oiled up by a \$1.00 a day mechanic, it requires no further attention. We desire to most emphatically protest against this idea, and urge our readers to keep a constant watch over the performance of their engines. Valves will inevitably wear, pistons have an unfortunate habit of abrading, and the result is some inefficiency of steam use that consumes more fuel than would otherwise be necessary. There is no more useful—we might say essential—instrument in a power house than an indicator, nor is there one that is more seldom found. An intelligent man with an indicator and voltmeter and ammeter can, in the course of a month, learn more about the economical generation of electricity, and the manufacture of dividends, than a whole year of study in mathematical works for which his technical education is not sufficient.

Improved Methods. It is exceedingly interesting to observe the growth of electrical enterprises in Canada during the last few months.

Not only is this evident in the number of new enterprises inaugurated, but in their varied character; and more especially in the fact that considerably more attention is being paid to the preliminary engineering than used to be the case. It seems to be more generally recognized that electric lighting is a business by itself, and deserves careful attention as such. The "survival of the fittest" principle has also been exemplified in the fact that there really seems to be less poor machinery on the market, and more satisfactory apparatus. The purchasing public are becoming more awake to the fact that machinery should not be selected on the basis of its price only, but also in consideration of its inherent electrical and mechanical excellence, and that there is sufficient difference between good and poor machinery, to more than

counterbalance a considerable difference in first cost. We have also observed that there is a greater variety in the types of machines—both steam and electrical—purchased than used to be; and the reason for this seems to be that purchasers are beginning to rely less on their own ideas as to what is best, and to advise with independent authorities. The first result of this course has been that a better all-round class of construction has been undertaken; and the second that purchasers have not been limited to one or two makes of machine, but have felt less hesitation in purchasing in the open market.

CONCENTRATION and improvement are the most marked evidences of electrical progress. Within the last few months many electrical companies have been making great steps in those directions, and, we are glad to learn, always with satisfactory results. It is very interesting and instructive to note the particular lines along which such new dispositions seem to be principally made, and their perfect similarity should give good forethought to electrical men who desire to keep their places in the front rank of intelligent operators. Investigation into the operating economies seems to have had a large influence in suggesting changes; first, in an entire reconstruction of distributing systems, lines and transformers; next, in the substitution of a few large generating units of modern make, for many small units of a type which, although representing the best that could be made some years ago, has been proved wanting. Next we have observed an encouraging tendency to build new power houses and to pay considerable attention to their designing for convenience and efficiency; and lastly, and, we think, best of all, there is an increasing demand for a better educated and more capable class of operator. We take some credit for having in a measure influenced this improvement. During the past eighteen months we have repeatedly called attention, both editorially and through papers by competent authorities, to the many important subjects for investigation by enterprising electrical men. It would be greatly to the interest of the whole electrical generating industry, if they could arrange to tackle central station problems as an association instead of as individuals. The suggestion has been made that there might with advantage be established under competent direction, a central station laboratory, in which accurate tests could be made of the quality of lamps, transformers, carbons, wire and electrical supplies of all kinds. We would be glad to have opinions on this subject.

PERSONAL.

Mr. A. S. Colpitt has been appointed city electrician for Halifax, N. S.

Mr. A. E. Edkins, Registrar of the O. A. S. E., has recently returned from a trip to England.

Hon. Louis Tourville, who was largely interested in the Tourville Electric Light Co., of Louisville, Que., died in Montreal early in November.

On the 25th of November, Mr. Adam Rutherford, secretary-treasurer of the Hamilton, Grimsby and Beamsville Railway, was married at Grimsby to Miss Marie Nelles, of that town. Rev. C. R. Lee officiated.

It is stated that Mr. Romaine Callender has gone to England to commence a telegraphic business between that country, France, Germany, etc., and the United States. Mr. Callender is said to have invented a new system of telegraphy, making it possible to turn out over half a million words in less than 28 seconds.

SOME ELECTRICAL INDUSTRIES OF ST. CATHARINES.

SITUATED on the old Welland canal, the city of St. Catharines is provided with a water power such as few cities in Ontario can boast of. Each lock is harnessed to furnish power to some industry, and flumes run in all directions to convey the water to turn the wheels of commerce. In electrical enterprises the city occupies a prominent position, having a first-class electric street railway, lighting station, and a number of other electrical industries. The street railway is known as the

PORT DALHOUSIE, ST. CATHARINES AND THOROLD ELECTRIC STREET RAILWAY.

Although not yet reaching Port Dalhousie, its extension to that point is now under way. It performs the functions of a freight and passenger service, the freight being carried by flat cars. The line extends from St. Catharines to Thorold, passing through Merritton. A branch also runs to the cemetery outside of St. Catharines.

Fifteen years ago Dr. T. S. Oille (now president of the Niagara Central Railway) organized a company to operate a horse car railway between St. Catharines and Thorold. This was operated successfully until 1887 when Mr. E. E. Smith gained control of the road, and converted it into the first electrical road in Canada. It was of the Van Depoele system, the trolley travelling on top of double trolley wires, and being connected to car by a flexible rubber covered cable.

During the past spring the road was converted into an up-to-date electrical railway, under the supervision of the present owners, Messrs. Dawson & Symmes, who are practical electricians. The conversion of the road from the old Van Depoele system to the modern equipment has placed St. Catharines alongside of her sister cities.

The machines in the power house were overhauled and a new C. G. E. generator added. A new electric water governor of Mr. Symmes' design does admirable service, as the route is so hilly and tortuous that a governor is indispensable.

The track, eight miles in length, is single, and is laid with 56 and 66 pound rails. The overhead construction is No. 0 trolley wire and 000 feed wire. There are no rigid brackets.

The rolling stock consists of eight Patterson & Corbin cars. Three are closed and three open motor cars, the other two being trailers. The motor cars are equipped by the Canadian General Electric Co.

The offices and barns are on the main street of the city. The barns are well equipped with tools, by means of which the company are enabled to make nearly all their repairs.

Like many other street railway companies, a park is controlled by the company. It consists of six acres, well situated and nicely wooded.

The road has improved wonderfully under the management of Messrs. Dawson & Symmes, and is one of the best equipped in the province.

ST. CATHARINES ELECTRIC COMPANY.

The city is supplied with electric light by the St. Catharines Electric Company, the superintendent of which is Mr. McNaugh, who has a wide experience in electrical matters. Over a thousand incandescent lights are in use, also 75 arcs, 62 on the streets and 10 in business houses, three being used for lighting the plant itself.

The plant is situated on the old canal, a considerable distance from any other buildings, thus lessening the fire risk. It is in charge of Mr. Chas. Steel, who has been with the company for many years.

A heavy head of water operates two water wheels of 135 h.p. and 100 h.p. respectively. These wheels each turn a shaft 30 feet in length and five inches in diameter. One shaft drives the C. G. E. 1000 light alternator and exciter and a Minneapolis water wheel governor, while the other drives the three 35 light Royal arc machines. The current of the alternator is controlled from a skeleton C. G. E. switch-board, with its complement of instruments, etc. On the wall near the arc machines are the arc instruments, complete with lightning arrestors, etc.

Over the wheel room, which is in the annex, is the repair shop and lamp testing room, well supplied with requisites.

One interesting feature noticed was an alarm bell, which is rung by the person approaching the front door. As he approaches within a few feet of the door he necessarily steps on the platform, underneath which are metallic plates which come in contact and form a circuit on which is a bell in the dynamo room.

COOK & SONS' ELECTRIC POWER PLANT.

Within the last few years, the use of electric motors for operating small plants has become so important that the above named firm, who owned a valuable water site and building on the old canal, decided to put in a generator. The head of water of 12 feet turns two Little Giant turbines of 96 h.p. each, which together operate a shaft 30 feet long by 4½ inches in diameter, on which is a fly-wheel 7 feet in diameter. A belt from this fly-wheel drives a 100 K. W. C. G. E. generator. The current is directed by a frame switch-board, on which are C. G. E. instruments, except a direct reading Weston volt meter. The instruments consist of an ammeter, a circuit breaker, a volt meter, a rheostat, and two lightning arresters. The wheels are controlled by a hand regulator, which is a greater economizer than an electric governor, as the latter uses up too much current for a small machine. Over twenty-five patrons are supplied with power from motors of from 1½ K. W. to 24 K. W. The noted street car builders, Messrs. Patterson & Corbin, use a 12 K. W. motor, and Cook & Son use a large motor in their planing mill.

Messrs. Cook & Son intend catering for lighting patronage, and a 1000 light alternator will be in operation at an early date.

THOROLD ELECTRIC LIGHT COMPANY.

The suburban town of Thorold, connected by the street railway, is lighted by the Thorold Electric Light Co., whose plant is also located on the old canal. From an 11 feet head two wheels are turned, one a Little Giant and one a Leffel of 60 h. p. each, which in turn operate a 25 foot shaft. From this shaft are driven a 600 light C. G. E. alternator and exciter and two 25 Ball arc machines. A C. G. E. skeleton switch-board with its full equipment of C. G. E. instruments is connected to the alternator. To the Royal arc machines are connected Ball arc instruments, which are fastened on the wall.

Below the dynamo room in the basement are the wheel pits, and down there Mr. Jas. McGill, jr., the electrician, has a dark room where he finishes his photographs, for Mr. McGill is an enthusiastic

amateur photographer. In the rear of the dynamo room is a well equipped repair shop. In this shop are piled, ready for shipment, boxes of Mr. McGill's patent wire connector, which was described in the columns of this journal some months ago.

The proprietors of the plant are Messrs. John McGill, sr., and John Battle, the latter being also the proprietor of the Thorold Cement Works. Their business has been quite successful, and larger machines may shortly be put in.

Prominent among the other electrical concerns of St. Catharines may be mentioned the Packard Electric Co., Patterson & Corbin, and T. L. Wilson's acetylene gas works, descriptions of which will probably be given in a future issue.

THE ALLISTON MILLING COMPANY.

The above company some time ago secured control of the Alliston flour mills, in which was located the electric lighting plant. Finding that the dust arising from the manufacture of the flour had a bad effect

on the successful working of the electrical machines, they decided to build a separate building for the electric plant. This building is a red brick cottage structure, 32 x 40 feet. It is divided into three parts, one for the boiler, one for the engine, and one for the dynamos. Through the wall next the mill runs a shaft, which, when water is high, can run both the mill and the dynamos, or when the water is low the engine can run both the mill and the dynamo.

In the mill are two Little Giant water wheels, one of 25 h.p. and the other of 40 h.p. These wheels can be connected to the 12 foot shaft entering into the dynamo room when required.

In the boiler room is an 80 h.p. Osborne-Killey boiler, supplying steam to a 75 h.p. Osborne-Killey engine. The engine and a hot water heater occupy one room. The water goes to the boiler at 205° Fahrenheit. A plugger pump is connected to the fly wheel.

The machines in the dynamo room are, first, a 500 light C. G. E. alternator with exciter, 700 lamps being installed throughout the town; second, a Reliance arc machine of thirty-five lights capacity, twenty-two of which are in use—eleven commercial and eleven on the streets. On the C. G. E. skeleton switch-board are the instruments of both machines.

The dynamo room is lighted by an arc light, and the other two rooms and the mill by incandescent lights.

It is probable that waterworks machinery will be placed under the building, which, if installed, will necessitate an addition to the building.

RECENT CANADIAN PATENTS.

MR. Ferdinand de Camp, of Berlin, Germany, has been granted a patent, No. 53,449, for a furnace and apparatus for burning coal dust, which consists of the combination with a coal dust feeding device of a fan so arranged as to propel the coal dust together with air into the furnace, and a rotary shifting cylinder to uniformly distribute the same, also of an arrangement which closes the issue of the coal dust hopper in such a manner that the coal dust taken up by the conical portion of the worm from the hopper is conveyed to the cylindrical enlarged portion in a loose condition for further conveyance.

A patent has been granted to Joseph Hardill, Benson French, and R. T. Harding, all of Stratford, Ont., for a steam engine, with cylinder provided with two pistons and rods, and a suitably operated valve whereby steam is directed against the outer ends of faces of the pistons to force them inwardly, and at the end of the inward stroke is admitted into the cylinder between the pistons to force them outwardly. It is claimed to

consist of a combination of the cylinder, the piston and piston heads having movement therein, the steam chest, elongated parts connecting the central portion of the chest to the cylinder, the valve provided with double ports designed to co-act with a central port and elongated ports, the exhaust port in the valve designed to connect with the central port, etc.

The Bell Telephone Company, of Montreal, have been granted a patent, No. 53,605, for a telephone key-board, also for a keyboard apparatus for telephone switchboards.

A patent for converting simple into polyphase alternating circuits has been granted to Charles S. Bradley, of Avon, N. Y. It consists in the combination with a simple alternating current circuit, of a plurality of transformers supplied thereby, means for creating a difference of phase in the several transformers, and interconnections for combining the displaced phases to produce a resultant phase, and a plurality of coils in inductive relation to the several phases, said coils being connected in series relation.

The longest commercial distance at which the long-distance telephone is now operated is from Boston to St. Louis, a distance of 1,400 miles. The line is almost twice as long as any European telephone line.

It is reported that the construction of the Huron and Ontario Electric Railway is to be commenced at once. The road will extend from Kincardine and Goderich via Walkerton to Eugenia, the junction town, thence north to Meaford and south to Port Perry. A meeting of the provisional directors will be held in a few days to ratify the agreement with the contractor.



THE ALLISTON MILLING COMPANY'S BUILDING.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

NOTE.—Secretaries of Associations are requested to forward matter for publication in this Department not later than the 25th of each month.

ANNUAL DINNER OF TORONTO NO. 1.

THE annual dinners of Toronto Association No. 1 have become to be looked forward to by the members and their friends with much anticipation and interest, and each year their growing popularity is shown by an increase in attendance. This year it was the tenth annual banquet, and was held on Thanksgiving eve. The scene of the festive gathering was the Palmer House, and the spacious dining-room afforded ample accommodation for the guests, who numbered about 200. The tables permitted of all being comfortably seated at one time, which was a marked improvement over former years. The ten large electric light chandeliers, each decorated with four union jacks, presented an attractive appearance. The arrangements were complete and well carried out.

The duties of Chairman devolved upon Mr. John Fox, President of the Association. To his right were Mr. John Yule, President of the Canadian Electrical Association, Mr. E. H. Keating, City Engineer, Ald. McMurrich, and Prof. Galbraith, Principal of the School of Practical Science. On his left were Dr. Orr and Past-Presidents Wickens and Lewis.

The visitors from outside places were Messrs. R. C. Pettigrew, Treasurer of the Executive Committee, and R. Mackie, Treasurer of the Ontario Association, both of Hamilton; G. M. Hazlett, President of Winnipeg No. 11, and W. L. Oathwaite, President of Peterboro' No. 14.

The Chairman read letters of regret from the following persons: Messrs. R. J. Fleming, Mayor of Toronto; O. P. St. John, President Marine Engineers' Association; A. Ames, President Ontario Association; James Devlin, President Executive Council; John Galt, C. E., Mechanical Engineer; and J. C. Robb, of the Boiler Inspection and Insurance Company.

The supper provided was of excellent quality, and such as would satisfy the appetites of the most ravenous. The menu was as follows:

MENU

OYSTERS.

New York Counts (Raw au Leman).

SOUP.

Cream of Oyster.

FISH.

Boiled Sea Salmon, Hollandaise Sauce, Parsienne, Celery, Hors d'Oeuvres, Pickled Beets, Pemmie de Terre, Red Cabbage.

BOILED.

Sugar Cured Ham, with Spinach, Leg Southdown Mutton, Caper Sauce.

ROASTS.

Suloin Beef, Yorkshire Pudding, Spring Duck, Apple Sauce, Young Turkey, Stuffed, Cranberry Sauce, Haunch Venison, Red Currant Jelly.

COLD MEATS.

Tongue, Pigs Feet, Lambs' Tongues, Head Cheese.

VEGETABLES.

Tomatoes, Green Peas, Boiled and Mashed Potatoes.

SALADS.

Chicken, Celery, Hehemian.

PUDDINGS.

English Plum, Brandy Sauce, Baked Coconut, a la Creme.

PASTRY.

Apple, Mince, Lemon.

DESSERT.

Charlotte Russe, Lemon Sponge.

JELLIES.

Champagne, Strawberry, Sherry Wine.

FRUIT.

Florida Oranges, Bananas, Snow Apples, Green Tea, Black Tea, French Coffee, Crackers and Cheese.

Shortly after ten o'clock, after an hour or so had been spent in disposing of the viands, the Chairman addressed a few words of welcome to the guests, and proposed the toast of "The Queen," which was responded to by the singing of the National Anthem.

After a song by Mr. Grant, Mr. A. M. Wickens was called upon to respond to the toast, "Canada, Our Home." He referred to the large number of men of stability to be found in Canada, who, he said, were proud to call themselves Canadians wherever they went. He hoped that, instead of having five million people in Canada, we would shortly have twenty millions.

Ald. McMurrich, in the absence of the Mayor, acknowledged the toast of the city of Toronto. He came to the city over 52 years ago and had enjoyed every day since. He was interested in the success of the Stationary Engineers, and fully recognized the benefits to be derived from such an association. Their positions were among the most responsible which any person could occupy.

A song by Mr. Blackgrove was followed by the toast, "The Manufacturers," coupled with which were the names of Mr. John Main, of the Polson Company, and Mr. Weeks, of the Weeks-Eldred Company. Each spoke of the kindly feeling which existed between the manufacturers and the engineers. Mr. Main thought the prospects for the coming season were promising, and hoped soon to observe the return of good times.

A song by Ald. McMurrich was well received, after which the toast of the "Educational Interests" was proposed by the Chairman, to which Prof. Galbraith, of the School of Practical Science, and Dr. Orr, of the Technical School, responded.

Prof. Galbraith was pleased with the success of the Engineers' Association. It had begun in a small way, and for a time was not particularly prosperous, but was now assured of success. He stated that of late much attention had been given to the relative merits of low speed and high speed engines, but the problem had as yet never been satisfactorily settled. Electricians were now making engines half way between high speed and low speed. He referred to the recent experiments of Dr. Jakes, of Boston, who had endeavored to produce electricity by means of ordinary combustion, doing away with both the steam engine and the boiler. He stated that the experiments were not considered successful. In his opinion the only hopeful way by which the steam engine could be done away with in operating electrical machinery was by the use of the steam turbine, which was as yet only in its infancy. Late developments along this line strengthened this conviction, and so far had met with a moderate degree of success. By this method the steam from the boilers was blown into a turbine, thereby causing the turbine to revolve. He could not understand how it would be possible to do away with the boilers also. In his closing remarks he stated that we required a little more imagination among our technical teachers. We had always looked up too much to other countries.

Mr. Charles Palmer then voluntarily favored the company with a song of his own composition, entitled, "My Own Irish Love," which received a very hearty encore, as did also his response.

Dr. Orr was called upon, and spoke especially in regard to the Toronto Technical School, which, he said, had been an unprecedented success. In five years the number of pupils in attendance had grown from 246 to

1310. This in itself proved conclusively that the educational system of Ontario had not met the requirements of the country. Mechanics must be educated in this country as well as elsewhere. Germany had superseded England in manufacturing industries as the result of her thorough technical schools, and he believed we should have primary technical schools in every manufacturing centre in Ontario. He was pleased to learn that it was proposed to introduce manual training in our public schools. At present our children were educated only for one course—a non-productive course, and no one could make a good mechanic without a thorough knowledge of mathematics. The Toronto Technical School had of late been the subject of much adverse criticism, of which he thought it was entirely undeserving. Taking the statistics in connection with education in Toronto, it was shown that 34,000 pupils were attending the public schools, 1,300 the High schools, and 1,310 the Technical School. The cost per pupil in the public schools was \$19, in the High schools \$31, and in the Technical School \$6. He thought this clearly showed that the money given to the Technical School was well and profitably spent. This school, he said, had been established largely as the result of efforts on the part of members of the Canadian Association of Stationary Engineers, in conjunction with Mr. John Galt, C. E. He wished the Association continued success.

A song by Mr. Ferrier followed.

The names of Mr. E. J. Philip, Vice-President, and Mr. R. C. Pettigrew, Treasurer, were coupled with the toast of "The Executive." Mr. Philip said that the Executive had brought up many new schemes, and were extending the field of the association. Two new branches had been started during the year. He hoped that they would shortly succeed in obtaining a license law, which he considered an absolute necessity. A thorough engineer required as much knowledge as any other profession, yet they had no law. There were plants in Toronto where hundreds of people were working above the boilers, which were in charge of incompetent and unreliable men. Their efforts to secure legislation had been defeated in the Ontario House, and now they proposed to endeavor to get an act through the Dominion Parliament.

Mr. Pettigrew referred briefly to the advantages to be gained by employing a licensed engineer.

A song by Mr. Blackgrove, entitled "Remember You Have Children of Your Own," was much appreciated.

The next toast was "Sister Societies."

The first speaker was Mr. John Yule, President of the Canadian Electrical Association. He congratulated the engineers upon the apparent success of their association, and thought their object was a worthy one and deserving of support.

A recitation was given by Mr. Post, and Mr. George Mills, President of the Brotherhood of Locomotive Engineers, spoke on behalf of that organization, which, he said, had been in existence for 33 years. It was first started in Rochester with twelve men, but now had a membership of 35,000. They had a Legislative Board both for Ontario and the Dominion, of which he was chairman.

Mr. A. E. Edkins represented the Ontario Association of Stationary Engineers, which, he said, was the outcome of the labors of the Canadian Association. Four

years ago a Board of Examiners was appointed to issue certificates, and he had just had the pleasure the previous evening of issuing the 650th certificate. Much credit was due the association for raising the standard of steam engineering over what it was fifteen years ago. Many engineers had been better fitted to fill their positions by the efforts put forth to qualify themselves to pass the examinations. During his visit to England he had been struck with the technical schools there, and had the pleasure of visiting the Birmingham Technical and Art School. In their efforts to secure legislation, he said the engineers should receive the support of steam users, and pointed to the advantages which would accrue. The English law did not require an engineer to hold a certificate, but steam users were compelled to employ a competent person and to have their plants inspected once a year. The owner is held responsible for any accident, and is therefore interested in preventing the same.

At this stage Dr. Orr proposed the toast of Toronto No. 1, to which Mr. James Huggett and Mr. Wickens responded. Mr. Huggett referred to educational matters and to the new library which had been commenced, while Mr. Wickens, in showing the advantages to be derived from the association, pointed out that many engineers had been thus enabled to double their salaries in a few years.

After a response to the toast, "Visiting Brethren," by Mr. Robert Mackie, of Hamilton, another song was rendered by Mr. Grant.

Mr. Hazlett, of Winnipeg, was also called upon. He stated that in Winnipeg they had a law relating to the inspection of boilers, and had tried to get a bill passed licensing engineers.

The hearty reception given to the toast of Mr. Fox, President of Toronto No. 1, was acknowledged in a few well-chosen remarks, and after "The Press" had been duly honored, and responded to on behalf of the Canadian Engineer and the ELECTRICAL NEWS AND STEAM ENGINEERING JOURNAL, the singing of "God Save the Queen" closed the evening's programme.

To the committee in charge of the arrangements is largely due the success of the banquet. Messrs. Thos. Eversfield, G. C. Mooring, A. M. Wickens, John Fox, J. Marr and J. Bain were the members thereof. Mr. R. G. Stapells presided at the piano.

TORONTO NO. 1.

At the regular meeting of the above association, held on Wednesday, the 2nd inst., one candidate was initiated. After the transaction of routine business, Bro. E. J. Philip gave the first of a number of short talks on "Natural Philosophy," which was greatly appreciated, and for which he received a hearty vote of thanks from the members. Another talk will be given at the next regular meeting, at which it is hoped a large attendance will be present.

LONDON NO. 5.

Our association met on the 19th ultimo and re-organized, with the following members as officers: G. B. Risler, Advertiser office, president; D. Campbell, Pottersburg, vice-president; W. Meaden, secretary-treasurer, re-elected; Duncan McKinley, recording secretary; Wm. McLean, guard. It was decided at the meeting to permit engineers to join before the first of January next at a lower rate. Some consideration was given

to the Scranton Correspondence School. Our meetings are held on the first and third Thursdays in each month in Sherwood Hall.

D. MCKINLEY, Rec.-Secretary,
292 Ridout street.

HAMILTON NO. 2.

At the last regular meeting a paper on "Heat," which will be found printed in this number of the NEWS, was read by Mr. James Gill, B. A., of the Collegiate Institute. As the result of an interview by the officers of the association with the School Board, that body has agreed to stipulate that in future engineers in steam heated schools must hold at least a 3rd class certificate. Quite a number of new members have been received into the association recently.

JOSEPH IRONSIDE, Secretary.

KINGSTON NO. 10.

At the last meeting of Kingston Branch No. 10, it was decided (by a standing vote of the members present) to change the meeting nights from the 1st and 3rd Tuesdays to the 1st and 3rd Thursdays of each month, the next meeting night occurring on Thursday evening, December 3rd, 1896.

Very truly yours,
JOHN McDONALD, Secretary.

98 Clergy Street.

BROCKVILLE NO. 15.

SIR, - Since our last report we have removed to new rooms more suitable for our association. When any of our brother engineers come to Brockville they will find our rooms on the second storey of Richard's Block, on King St. The attendance at the meetings is good and one new member has been initiated.

JAS. ATKINS, Recording Secretary.

PRESENT STATUS OF THE DISTRIBUTION AND TRANSMISSION OF ELECTRICAL ENERGY.

Mr. Louis Duncan, President of the American Institute of Electrical Engineers, concludes a paper on the above subject, with the following summary of conclusions:—

My conclusions, subject always to the influence of local conditions, are as follows:

1. In both direct-current lighting and traction systems, where the power is generated in or near the area of distribution, it is best to use one station situated at the most economical point for producing power.
2. In the case of the traction systems, when the economical area of direct distribution is passed, boosters should be employed directly or in connection with batteries, to a distance of 10 or 12 miles from a station, and beyond this rotary transformers, whether with or without batteries, should be used.
3. In the case of direct-current lighting systems, the energy should be transmitted to storage batteries situated at centres of consumption either directly or by means of a rotary transformer and distributed from them.
4. Where batteries are used, it is best to place them at the end of feeder wires to obtain the advantage of a constant load on the wire.
5. The best system for the long-distance transmission of energy, for general purposes, is the three-phase alternating system.

6. Commercial transmissions are in successful operation for distances of 35 miles and for voltages as high as 15,000 volts.

Experience with these plants shows that the transmission to 50 miles, with a pressure of 20,000 volts, is practicable; beyond these limits the transmission would be more or less experimental.

MR. O. E. GRANBERG,

DISTRICT DEPUTY FOR QUEBEC, C. A. S. E.

In the portrait appearing below is presented the countenance of Mr. O. E. Granberg, District Deputy for Quebec for the Canadian Association of Stationary Engineers. Mr. Granberg was born in Norway, Europe, in 1852, and came to Canada in 1860. At 12 years of age he entered a blacksmith shop, where he remained for three years, and later served three years in a machine shop. After working some time in the foundry and pattern shops, he went to New York and worked for some years in different engine and boiler works, returning to Canada in 1875. He was then employed in erecting engines, boilers and machinery in



MR. O. E. GRANBERG,
District Deputy for Quebec C.A.S.E.

mines, and shafting, gearing and machinery in manufacturing establishments. After having fitted up machinery in a cotton mill, he was employed as chief engineer and master mechanic for some years, and was subsequently made manager of the mill. He gave up that position for the one he now occupies, that of Inspector of the Boiler Inspection and Insurance Company of Canada, which he has occupied for over six years.

Mr. Granberg holds first-class engineers' papers, and is a qualified and authorized boiler inspector and examiner of engineers and firemen, as per Industrial Establishment Act of the Province of Quebec. He received the appointment of Examiner of Boiler Inspectors from the Lieutenant-Governor of the Province of Quebec in 1894, and has been a member of the Canadian Association of Stationary Engineers for five years, in which organization he is very popular.

WORDS OF APPRECIATION FROM THE FAR NORTH.

Mr. E. B. Congdon, Fort Macleod, N. W. T., in renewing his subscription to the ELECTRICAL NEWS, writes: "I enjoy the paper so much that I would not like to have it discontinued."

HEAT.*

By JAMES GILL, B. A.

It was with some diffidence that we agreed to read this paper before you, knowing, as we do, that you are all practical men and that our knowledge for the most part is but theoretical. However, we will go on the assumption that most teachers take, that you know nothing about the subject.

Our first question with regard to heat is, what is it? In past time it was considered a material substance that entered into a body, and by its presence there rendered the body warmer; its absence left the body cold. There was this difficulty, however, in supposing heat to be a material substance, in that the body when warm weighed no more than when cold. Sir Humphrey Davy melted two blocks of ice by rubbing them together, and concluded that heat was not a material substance, but a form of motion. Heat is generally understood at the present time to be due to the motion of the molecules of a body. These molecules are in constant motion, and when their motion is quickened the body becomes warmer; when their motion is retarded the body becomes colder.

In the next place let us inquire into the ways of producing heat. We will place down six ways of obtaining heat:

1st. From MECHANICAL ACTION as shown in friction. You are all acquainted with the result of rubbing a button of brass on your coat-sleeve. It used to be a common trick with school boys to rub the button for some time and then place it on the back of a play-mate's hand. It had about the same effect as the sun's rays through a lens. Also the Savage of the Isles of the Sea was accustomed to produce fire by rubbing two dry sticks together.

2nd. PERCUSSION—As shown in placing a piece of lead on an anvil and hammering it. It soon becomes quite hot. The lead bullet after striking the metal target is too hot to pick up.

3rd. COMPRESSION—As shown in placing a piece of tinder in a tube in which a tube moves up and down. The mere shoving of the piston downwards is enough to ignite the tinder.

4th. CHEMICAL ACTION—Wherever chemical action goes on heat results. Pour some sulphuric acid into a vessel of water and then place your hand against the outside, you will find that the vessel is warm. Again the heat in the human body is maintained by chemical action.

5th. HEAT FROM THE ELECTRIC CURRENT—If you take several cells and connect for battery purposes, and then hold in your hand the two terminals of the positive and negative poles, you will soon find them too hot to hold. You have no doubt heard of a whole meal being cooked in Ottawa by means of heat obtained from the current.

6th. RADIANT HEAT—As obtained from the sun. The sun radiates heat on all sides, and this is borne to us through the ether which is supposed to fill all space.

The first three of these classes may be placed under the one head of "mechanical action."

Then let us notice the effects of heat applied:

1st. EXPANSION—As shown in a bar of metal placed rigidly between two fixed supports and heated. The bar bends and twists out of the straight.

2nd. CHANGE OF STATE—As shown in a block of ice to which heat is applied. It is first converted into water, and then if sufficient heat be applied, into steam.

3rd. CHANGE OF TEMPERATURE—Which we measure by means of the common thermometer.

We would like you to notice here the difference between temperature and quantity of heat. A cup of water and a pailful of water may be at the same temperature, but the pailful has the greater quantity of heat because it has the greater amount of mass. Again, we would notice that there is always present a tendency to equalization of temperatures. This takes place in three ways:

1st. RADIATION.—If I light a fire in the stove here it soon makes itself felt throughout the room, by radiating heat in all directions.

2nd. CONDUCTION.—Place in the fire one end of an iron bar and it will not be long before you are unwilling to keep hold of the other end. This is due to the molecules of the bar conducting the heat from the end in the fire to the end held in the hand.

3rd. CONNECTION.—This is the warming of a room or house by the bodily movement of a heated substance, such as is shown in the warming of buildings by hot air. The air is heated at the furnace and moves bodily from there to the rooms of the building.

Physicists are in the habit of using certain units in which to ex-

press amount of heat. One of these units is the amount of heat needed to raise one pound of water through one degree Fahrenheit. By means of these units a relation between heat and work can be expressed. First a definition of work: If one pound of matter be raised vertically against gravity through one foot, one foot-pound of work is said to be done, or if a body be drawn through one foot against a resistance from friction of one pound, one foot pound of work is said to be done. It is found from careful experiments that one of the above heat units is equivalent to 772 foot pounds of work. You are also acquainted with the unit used in expressing rate of doing work, viz., the horse power. One horse power is equivalent to 33,000 foot pounds of work per minute.

Just here we might give the method of finding the horse power of an engine: Find the area of the piston head in square inches and multiply by the length of stroke doubled and by the number of revolutions per minute, and also by the pressure in lbs., which product divide by 33,000, and the answer is in horse power. Thus, if effective pressure of steam be 60 lbs., diameter of piston 14 inches, length of stroke $2\frac{1}{2}$ feet, and revolutions 70 per minute, then the horse power of engine will equal

$$\frac{(14 \times 14 \times .7854) \times (2\frac{1}{2} \times 2) \times 70 \times 60}{33,000}$$

But the all important point with the engineer is the conversion of heat into work. Where heat is applied to water it confers upon the steam which is produced the power of doing work, such as driving the piston from one end of the cylinder to the other against resistance. For example, the heat energy of the boiler in the engine is transferred into mechanical motion. The steam is admitted to the cylinder, and by means of its expansive force drives the piston to the other end, then by a special movement of slide valves caused by the eccentrics, the steam is allowed in at the other end of cylinder and the piston moves in the other direction, and so the motion is maintained. Work is done by the steam during its admission into the cylinder, and also by expansion after its admission.

Steam in its expansion obeys the well known law of Boyle, viz., that if the temperature be kept constant the volume of a given body of gas varies inversely as pressure, density and elastic force. If the steam be allowed to enter at full pressure of 80 lbs. for say one fourth the stroke, and is then cut off, the piston will have to be forced to the other end by the steam working expansively.

What is known as back pressure must be taken into consideration in finding the work done. The back pressure is usually fifteen pounds to the square inch in a non-condensing engine, so that the steam in cylinder must not be allowed to expand so far as to bring its pressure down to that amount. The relation between pressure and volume in a given body of gas may be very easily shown to the eye by a graphic representation by taking horizontal lines to represent volumes and vertical lengths to represent pressure, but it seems to us that you are better acquainted with what is called technically the "indicator diagram" than we are.

Up to this point we have been reasonably sure of our ground; it appears to us that so far as the practical working of a steam engine is concerned, we have more reason to learn from you than you to learn from us.

GOOD NEWS FOR MACHINE WORKMEN.

THE Royal Electric Company, of Montreal, has recently closed several extensive contracts for large electrical machinery, which will keep their factory occupied night and day for more than a year, and necessitate a large increase in the number of their employees. They are advertising for a number of mechanics, to whom good wages will be paid.

They have added to their machinery equipment recently some of the largest tools of their kind in Canada, such as planers, boring mills and drills, and need men experienced on such tools. This is a hopeful evidence of improvement in Canadian manufacture and industry, the greatest part of their work being required for water power developments and railroad purposes.—Evening News, Nov. 25th, 1896.

The Kay Electric Co., of Hamilton, have requested that the 25 per cent. duty on soft copper wire be removed.

Messrs. James Whitecomb, of Toledo, and James A. Bailey, of Detroit, are looking around for a suitable site in Canada for the establishment of carbon works.

* Paper read before the Hamilton Association C. A. S. E.

ELECTRIC LIGHT INSPECTION STATISTICS.

The annual report of the Commissioner of Inland Revenue for the Dominion, for the fiscal year ending June 30th, 1896, contains the first statistics compiled relating to the inspection of electric light meters under the provisions of the Electric Light Inspection Act, which went into operation in June of last year. The report states that offices for testing purposes have been fitted with the necessary apparatus at Windsor, London, Toronto, Hamilton, Belleville and Ottawa, in Ontario, at Montreal, Quebec and Sherbrooke, in Quebec, and at St. John, N. B., and Halifax, N. S. A set of Lord Kelvin's absolute standard apparatus, both for the measurement of current and potential, is being placed in position in the standards branch at Ottawa by Mr. O. Higman, electrical engineer of the department, which, it is expected, will prove of great value to electric lighting companies as a convenient means of standardizing their measuring instruments.

The total revenue during the year from registration and inspection of meters was \$8,681.25, and the expenses of the department \$6,693.23, a large portion of the latter being for permanent equipment.

It will be observed by the accompanying table that 3,705 meters were inspected, of which number only 110 were rejected, while four were verified after the first rejection. In the city of Ottawa there are the largest number of meters, 938, while Montreal has 626, Hamilton 537, and Toronto 345.

STATEMENT SHOWING THE NUMBER OF ELECTRIC LIGHT METERS VERIFIED, REJECTED AND VERIFIED AFTER REJECTION.

Districts.	Number.	Verified as coming within the error tolerated by law.			Rejected			Verified after first rejection as coming within the error tolerated by law.		
		Correct.	Fast.	Slow.	Un-sound.	Fast.	Slow.	Correct.	Fast.	Slow.
		Belleville	233	56	125	52				
Hamilton	517	149	98	285			5			
London	351	118	158	85						
Ottawa	938	166	32	149	19	33	19			
Toronto	345	4	319	32						
Montreal	626	83	232	307	1	1	8			
Quebec	216	30	99	87	4	1	2	1	2	
Sherbrooke	6	1	1	4						
St. John	166	35	71	78			1			
Halifax	257	140	58	47			8	3		
Totals	3,705	772	1,513	1,310	32	39	35	2	2	

The following statement shows the electric light companies registered under the Act during the year, together with the number of lamps operated. Each arc lamp is reckoned as equal to ten incandescents:

STATEMENT SHOWING THE ELECTRIC LIGHT COMPANIES REGISTERED UNDER THE ELECTRIC LIGHT INSPECTION ACT DURING THE YEAR ENDED 30TH JUNE, 1896.

FROM WHOM COLLECTED.	NUMBER OF LAMPS.		
	Arc.	Incan-descent.	Totals.
Trenton Electric Company	51	103	633
R. R. Casement & Co., Madoc			
W. H. Pearson & Co., Belleville	40	400	800
Corporation, Town of Picton	21	300	510
Stormont Electric Light and Power Company		1,300	1,300
Vankleek Hill Electric Works		500	500
Village of Alexandria		400	400
Kingston Light, Heat and Power Company	105	2,000	3,050
Napanee Water and Electric Light Company	33	31	34
Light, Heat and Power Company, Lindsay	100	4,000	5,000
Port Hope Electric Light and Power Company	37	450	487
Bowmanville Electric Light Company	46		46
Peterborough Light and Power Company	118	1,000	4,180
Corporation of Campbellford	22	409	629
Lakefield Electric Light Company	20		200
Fenelon Falls Electric Light Company	5	270	320
Village of Coburne Electric Light	27	17	287
Coburne Electric Light and Power Company	30	600	990
W. C. Harrison, Electric Light, Hastings	8	132	212
W. J. & H. W. Fooks, Electric Light, Norwood	25	119	359
Milbrook Electric Light Company	7	400	470
Brookville Electric Light and Power Company	34	1,600	1,940
Morrisburg Electric Light (A. H. Merly)		600	600

FROM WHOM COLLECTED.	NUMBER OF LAMPS.		
	Arc.	Incan-descent.	Totals.
Gananoque Electric Light and Water Supply Company	16	1,600	1,760
Kempville Electric Light Company		380	380
Merrickville Electric Company		300	300
Prescott Electric Light Company	16	750	910
Ingersoll Electric Power and Light Company	60	2,531	2,531
Brantford Electric Street Railway Company		250	1,230
Woodstock Electric Light, Power and Street Railway Co	68	2,200	2,700
Grand and Water Company, Simcoe	36	235	585
Paris Electric Light Company	45	400	850
Norwich Electric Light	15	32	182
Port Rowan Electric Light Supply	20	74	424
Tilburg Electric Light (F. J. Barkey)	31	142	472
Port Dover Electric Light Syndicate	8	80	160
Hamilton Electric Light Company	450	8,000	12,500
Dunnville Electric Light Company	35	38	388
Niagara Falls Electric Light, Heat and Power Company	50	1,440	1,940
Hagersville Electric Light Company	20	5	205
Welland Electric Light Company	30	500	800
St. Catharines Electric Light and Power Company	68	900	1,580
Cayuga Electric Light and Power Company	9	359	449
Thorold Electric Light Plant (Jas. McGill)	30	375	725
J. W. VanDyke Electric Light Plant, Grimsby	8	800	800
Corporation of the Town of Niagara			
London Electric Light Company	350	5,155	8,655
Sarnia Gas and Electric Light Company	57	240	770
St. Thomas Gas Co., supplying Electric Power and Light.	55	137	687
Fitzgerald & Sauermann Electric Light Company, Watford	14	50	190
Fremant N. Saylor, Strathroy	20	51	341
Petrolia Electric Light, Heat and Power Company	30	770	1,070
Hamilton & Prout, Forest	17	50	220
W. W. Gordon, Glencoe	25	50	300
H. C. Baird & Son, Parkhill	26	75	335
Aylmer Electric Light Company	38	52	432
Stratford Gas Company	140	300	1,700
Clinton Electric Light Company	31	500	810
Cook Brothers Electric Light Company, Hensall		240	240
Corporation of the Town of Mitchell	47	430	830
Seaford Electric Light, Heat and Power Company	10	500	1,100
Palmerston Electric Light Company	19	340	530
Exeter Electric Light Company	10	700	340
Town of Goderich	24		240
St. Mary's Electric Light Company	33	650	980
Wingham Electric Light Company	50	600	1,000
Blyth Electric Light Plant (John B. Kelly)	17	140	310
Brussels Electric Light Company	4		220
People's Electric Company, Windsor	1	2,580	2,600
Hiram Walker & Sons, Walkerville		1,200	1,200
W. A. Johnson & Co., Dresden	26	27	287
Smith & Anderson, Blenheim	10	79	269
J. & W. McMaster, Ridgeway	44	10	450
Wm. Laing, Essex	15	12	362
Tilbury Electric Light	30	15	345
Electric Company, Amherstburg		500	500
Chatham Gas Company	63	775	1,495
Wallaceburg Electric Light Company	40	12	452
Leamington Electric Light Company	21	206	416
Geo. Munro, Thamesville	7	175	245
Ottawa Electric Company	500	50,000	55,000
Albert MacLaren, Buckingham		550	550
A. W. Wright & Co., Renfrew	20	800	1,000
Markay & Guest, Renfrew		1,140	1,140
Citizens' Electric Light Company, Smith's Falls		1,000	1,000
Smith's Falls Electric Light Company	20	2,000	2,200
Carleton Place Electric Light Company		800	1,070
Almonte Electric Light Company	28	2,200	2,480
Pembroke Electric Light Company	37	2,500	2,800
Arnprior Electric Light and Power Company	47		470
Perth Electric Light Company		1,200	1,200
Perth Electric Light Company, of Perth		300	300
Star Electric Light Company, of Eganville		300	300
Guelph Light and Power Company	100	1,400	2,400
Galt Gas Light Company	70	25	725
Berlin Gas Light Company	36	156	516
Waterloo Electric Company	24	81	321
Howe & Leighton, Harrison	30	20	320
Jacob Morley, New Hamburg	22	50	270
John Shearer, Villages of Blair and Preston		300	300
A. Groves, Fergus	35	700	1,050
Coley & Collins, Mount Forest	13	400	530
James Fenwick, Preston	30	20	320
James Fenwick, Hespeler	24	38	275
Incan-descent Light Company, of Toronto		30,000	30,000
Toronto Electric Light Company	17,500	50	15,050
Milton Electric Light and Power Company	19	236	426
Harrise Electric Light Company	47	2,500	2,970
Town of Orillia	43	2,000	2,430
Benetanguishene & Midland St. Rail'd, Light & Power Co.	14	1,200	1,240
Midland Electric Company	35	500	850
Creemore Electric Light Company		135	135
Joseph Knox, Stayner	4	400	440
Glen Williams Electric Light Company	15		450
W. J. Fletcher, Electric Light and Power Station, Alliston	20	350	550
Light, Heat and Power Company, of Newmarket	15	400	550
Hutton Electric Light Company, Brantford	26	500	760
Huntsville Electric Light Company	1	550	560
Nicholas Egan, Tottenham		150	150
Mattawa Electric Light and Power Company		900	900
Town of Bracebridge		1,700	1,700
John Houke, Mattawa		703	703
Robert McGowan, Oakville	35	800	1,150
Lakefield and Whitby Electric Light Company	40		400
H. A. Train, Burk's Falls		200	200
Port Perry Illuminating Company	20	313	413
Tagama Water and Light Company	50	440	940
Gravenhurst Electric and Trading Company	11	500	610
Appleyard Electric Light Company, Grand Valley	7	75	145
Orangeville Electric Light and Power Company	26	850	1,110
Corporation of the Village of Markham	18	50	230
Robertson, Rowland & Company, Walkerton	30	800	1,100
Owen Sound Electric Illuminating and Man'g Company	55		550
Corporation of the Town of Collingwood	35	1,050	1,400
Town of Kincardine	19	575	715
Warton Electric Light Company	26	40	300
Ramage Bros. Electric Light Company, Chesley		400	400
Donald McIntyre Electric Light Company, Paisley	7	231	301
Wm Moore & Sons, Meaford	250	340	2,840
T. & J. R. Andrews, Thornbury	19	70	210
Southampton Electric Light Company	20	18	218
John Bearman, Chesley	22	210	430
Daniel Knechtel, Hanover	12	298	410
Durham Electric Light Company	22	250	470
La Corporation de la Ville de Joliette	33	1,202	1,592
Royal Electric Company	1,450	54,000	68,500

FROM WHOM COLLECTED.	NUMBER OF LAMPS.		
	Arc.	Incan- descent.	Totals.
Citizens' Light and Power Company	200	809	2,800
La Compagnie Electrique St. Jean Baptiste		3,447	3,447
La Ville de Maisonneuve	26	319	579
Corporation of the Town of Lachine	43	1,215	1,435
Temple Electric Company	20	1,750	1,950
I. B. Robert, Beauharnois		86	86
Valleyfield Electric Company		775	775
Electric Light Company of Terrebonne		332	332
Magloire Ouhinet, St. Jerome		497	497
Montmorency Electric Power Company	405	10,500	14,500
Sherbrooke Gas and Water Company	70	2,300	3,000
Richmond County Electric Company		877	877
Stanstead Electric Light Company	25	900	1,150
Coatirook Electric Light Company	28	650	910
Parker & Howe, Dixville		125	125
French Bros., Sawyerville		80	80
La Compagnie des Poutoirs Hydrauliques de St. Hyacinthe	2	3,000	3,020
La Compagnie pour l'Eclairage au Gaz de St. Hyacinthe	30	150	450
Granby Electric Light Company	35		350
Carleton Electric Light Company	31	375	675
St. John Railway Company	401	8,110	12,120
Frederick Gas Light Company	80	200	1,000
Woodstock Electric Light Company		1,800	1,800
Sackville Electric Light and Telephone Company		495	495
Small & Fisher Company, Woodstock		500	500
St. Stephen Electric Light Company	40	183	583
City of Moncton Light and Water Department	97	975	1,895
Prince Edward Island Electric Company	80	2,000	2,800
Full Electric Light Company, Charlottetown		490	490
Halifax Gas Light Company	75	2,200	2,950
Halifax Illuminating and Power Company	220	5,000	7,200
Dartmouth Gas, Electric Light, Heating and Power Co.		800	850
Windsor Electric Light and Power Company	12	1,350	1,470
"Chambers" Electric Light Company	65	2,900	3,550
Kentville Electric Light and Power Company		520	520
Acadia Edison Electric Company, Wolfville		500	500
Edison Electric Light and Power Company, Springhill		525	525
Lunenburg Gas Company		600	600
Bridgewater Electric Light and Water Power Company		475	475
Canada Electric Light Company, Amherst	26	1,500	1,760
North Sydney Electric Company		700	700
Sydney Gas and Electric Light Company		1,400	1,400
New Glasgow Electric Company	26	2,000	2,160
Digby Electric Light Plant		300	300
Bridgetown Electric Light Plant		200	200
Annapolis Electric Light Company		450	450
Citizens' Telephone and Electric Company, Rat Portage		3,500	3,500

SPARKS.

The town of Paris, Ont., is said to be considering the purchase of an electric plant.

An effort is being made to secure the installation of an electric lighting plant at Embro, Ont.

It is announced that another electric lighting company is likely to be started at St. John, N. B.

The electric light plant of the Hull Electric Company at Hull, Que., has been put in operation.

John Norwood, of Alvinston, Ont., has secured the contract for lighting that town by electricity.

It is rumored that an Ottawa firm propose putting in an opposition electric plant at Arnprior, Ont.

Mr. Tache is making arrangements to install an electric light plant for street lighting at Huntingdon, Que.

A dividend of 12 per cent. per annum has been declared by the Nelson Electric Light Company, of Nelson, B. C.

The conduits laid in the streets of Montreal by the Lachine Rapids Hydraulic & Land Company cover a distance of 80 miles.

A small addition is now being erected to the power house of the Hamilton Electric Light & Power Company at Hamilton, Ont.

The new electric light plant at St. Marys, Ont., will shortly be put in operation, the erection of the power house being nearly completed.

An electric light plant will be established at Shawville, Que., a company having been given twenty years' exemption from taxation.

In the city of Halifax, N. S., an agitation has been commenced towards having all electric light and telephone wires placed underground.

M. F. Beach & Company have been granted permission by the village council of Winchester, Ont., to erect poles for electric street lighting.

The Cocoa Matting Co., of Cobourg, Ont., have installed an isolated plant in their factory. The Canadian General Electric Co. secured the contract.

The new plant of the Sussex Electric Light Company was recently put in successful operation at Sussex, N. B. Over 400 lights have already been taken.

A despatch from New York states that the Commercial Cable Company have secured control of the Postal Telegraph Company,

and propose amalgamating it with their own system, issuing \$20,000,000 of debenture stocks.

Mr. Graham has made application to the village council of Norwich, Ont., for permission to erect poles and install a plant for incandescent and arc lighting.

The Toronto Electric Motor Company have requested that the present duty of 30 per cent. on magnet wire entering Canada from the United States be removed.

At the municipal elections in January a by-law will be voted on by the ratepayers of Bridgeburg, Ont., granting an electric light franchise for fifteen years to D. A. Coste.

The town council of Magog, Que., have in view the purchase of a dam on the property of the B. A. Land Company in order to secure power for electric lighting purposes.

The municipality of St. Louis du Mile End, Que., have awarded the contract to the Citizens' Light and Power Co., for lighting the streets for the next thirteen years, also for residential lighting.

Horseless carriages are to be manufactured in Montreal, a company with a capital of \$140,000 having been organized for that purpose. It will be known as the Moto-Cycle Company of Canada, Limited.

The Minden & Northwestern Railway Company, which proposes constructing a railway from Irondale Junction to a point on the Georgian Bay district, ask for authority to use either steam or electricity as the motive power.

The British Columbia Electric Company, with head office at Tacoma, Washington, and a capital stock of \$10,000, has been registered to do business in British Columbia. Its purpose is to equip fire and burglar alarm systems.

With a view to increasing the steam capacity of the locomotives, the Grand Trunk Railway are enlarging the boilers of some of their passenger locomotives by the addition of a square top over the boiler next to the cab engine.

A test of horseless vehicles was recently made at London, England, in which fifty-four vehicles were entered, including several German inventions, the two Duryea carriages from the United States, and a large number of English manufacture.

Bothwell & Irving, solicitors, of Victoria, B. C., are asking for an extension of time for the commencement of the works contemplated by the Kootenay Power Company's Construction Act. One of the objects of this company is the production of electricity.

At a meeting of the Standard Light & Power Company, Limited, held in Montreal on the 27th ultimo, Mr. W. McLea Walbank was elected president and Mr. Jeffrey H. Burland vice-president. A retiring director was replaced by the election of Mr. W. S. Evans.

The city council of Winnipeg have now under consideration the question of purchasing an electric light plant to be controlled by the city. The scheme has been sanctioned by the council, and the ratepayers will be requested to authorize the expenditure of \$75,000 for the purpose.

At a recent meeting of the shareholders of the Parry Sound Electric Light Company, of Parry Sound, Ont., the chief business was the adoption of the auditor's report and the disposition of the surplus earning over cost of operation. The statement presented was considered satisfactory.

A despatch from St. Paul, Minn., states that a small rotary engine of novel design has been invented by Grant Brambel, of Sleepy Eye, Minn., for the patent of which Mr. H. F. Allen, of London, is said to have offered \$1,600,000. The engine does away entirely with the crank motion of the steam engine, and uses its own plunger for a cut-off. It is steam tight and requires no ring packing.

Letters patent have been issued incorporating the St. Jerome Power and Electric Light Company, of St. Jerome, Que. The capital stock is \$30,000, and the objects are to purchase the electric light plant now in operation at that town and to develop electric and water power for commercial purposes. Among the incorporators are C. L. Higgins and J. J. Westgate, of Montreal, and James Pearson, barrister, of Toronto.

As the result of a disagreement between the town authorities and the electric light company of Welland, Ont., the lights were recently shut off. Some time ago the council passed a resolution compelling the electric light company to raise the street lights at their own expense, which the manager of the company refused to do, and it is probable that tenders for a franchise for electric street lighting will be asked for in consequence.

ELECTRIC RAILWAY DEPARTMENT.

GUELPH STREET RAILWAY.

On the 17th of May, 1895, the first spike was driven on the above railway, by the president's amiable wife, in front of their residence, and four months later five miles of the road were in operation. Early this year another mile was completed, forming a belt line on which is located the baseball grounds.

It is claimed—and justly too—that it is the smoothest road in Canada. The rails on the new part are 65 lbs., while on the other part they are 56 lbs. It is a single track, with suspended trolley wires in the crowded parts of the city, while the rigid bracket is used in the less crowded streets.

A twenty minute service is provided on all the lines, and connections are made to and from all trains. There are three lines and a belt line, each starting from

of the power house. This saves the cost and operation of pumps. A large C. G. E. generator generates the electric current for the operation of the cars. The power house is sufficiently large to operate a twelve mile road.

The car barn is the same size as the power house and is similarly built; it has accommodation for about twelve cars.

The company is composed of the Sleeman family. Mr. Geo. Sleeman, sr., is the president, and Mr. E. Sleeman secretary and superintendent. The other offices are held by other members of the family.

The company own a pretty park near Waterloo ave., which they are laying out for the benefit of their patrons. It is probable that in the near future the road may be extended south west to Hespeler, in which event



GUELPH STREET RAILWAY.

the C. P. R. depot. One runs to the dairy building beyond the Ontario Agricultural College, climbing a steep hill on the way, and another runs down Waterloo ave., to the city limits in the south west, terminating at the Silver Creek Brewery. Both these lines run through the market place. The other line goes up Wyndham street the main street—through St. George's Square, up Woolwich street to Elora Rd., and thence to the north west city limits. The belt line connects with the Waterloo ave. line at Edinburgh Rd., and with the Woolwich line at Suffolk street. On this line is the baseball grounds and the Collegiate Institute.

The rolling stock consists of five motor cars and a trailer, built by the Canadian General Electric Co. They are neatly furnished and upholstered.

The power house on Waterloo ave. is 100 x 40 feet in dimensions, with a ceiling 20 feet high, which is sheathed with Georgia pine. The two 100 h.p. Goldie & McCulloch boilers generate steam for a 150 h.p. cross compound Wheelock engine. There is space for another boiler and engine of the same power. In the basement is a large Northey condenser.

Water is supplied to the boiler by gravitation, there being a creek near by which is dammed 100 yards back

connection will be made with the large manufacturing town of Galt.

Application will be made to Parliament for the incorporation of a company to build an electric railway from Wabigoon, Ont., on the C. P. R., through the Manitou country to Rainy River, and touching nearly all the chief mining camps. Mr. E. A. C. Pew, of Toronto, is said to be one of the promoters.

Mr. Black, manager of the street railway at Niagara Falls, Ont., returned from New York a fortnight ago, where he interviewed the shareholders of the company with the object of converting the road to an electrical system. Nothing, however, can be done until next spring, and in the meantime present circumstances will have to alter considerably to secure the carrying out of the scheme, as the attitude of the council is said to be unfavorable thereto.

The Judicial Committee of the Privy Council has allowed an appeal, with costs, to the Edison Electric Company against the Westminster and Vancouver Tramway Companies, the Bank of British Columbia, and others. The Edison Company appealed against the decision of the Supreme Court of British Columbia granting a judgment in favor of the Bank of British Columbia against the tramway companies, to the prejudice of the Edison Company, who are the creditors of the tramways. The decision of the Judicial Committee of the Privy Council declares the judgment of the Supreme Court of British Columbia against the tramways to be null.

SPARKS.

The Canadian General Electric Co. are installing an isolated plant at Thetford Mines, P. Q.

The Canadian General Electric Co. have installed an isolated incandescent plant at Kearney, Ont.

There is talk of building an electric railway from Hurdman's Bridge to Morrisburg, Ont., via Metcalfe.

The Nova Scotia Steel Co., New Glasgow, have placed an order for an isolated incandescent plant with the Canadian General Electric Co.

The Metropolitan Street Railway Company, of Toronto, will increase their capital stock to \$500,000 by the issue of 5,000 new shares of \$100 each.

It is learned that the recently organized Peterborough Electric Power Co. have entered into a contract to supply 200 h. p. to the Canadian General Electric Company's works.

During the six months ending October 31 the Hamilton, Grimsby and Beamsville Railway carried 147,000 passengers, 545,000 pounds of fruit, and considerable other freight.

According to the report of the Canadian consul, concessionary powers have been granted to build 100 miles of electric tramway at Johannesburg, South Africa, with a capital of £2,000,000.

The Toronto Street Railway Company are building a passenger car for the Hamilton and Dundas Railway. It will be a handsome car of cherry wood, 60 feet in length, and superior in design and finish to anything the company have yet turned out.

D. Knechtel, of Hanover, has extended his monocyclic circuit to Neustadt, a distance of six miles, and to Caresruhe, a distance of 8½ miles from his generating station, and is now supplying a regular lighting service to both of these towns, as well as to Hanover.

It is probable that the construction of an electric railway from Brantford to Galt by way of Paris will be carried out at an early date. A charter for this road was granted about two years ago, some of the promoters being Mayor Elliott, H. McKay Wilson and Dr. Secord, of Brantford, and Henry Stroud, of Paris.

Wm. Shearer, of Blair, Ont., recently had a narrow escape from death. He was engaged oiling the machinery in the power house when the spout of the oil can came in contact with one of the bearings, directing the current to his left hand. Fortunately, his other hand being free, the circuit was broken, but his hand was badly burned.

An order-in-council has been issued incorporating the Hamilton, Chedoke and Ancaster Electric Railway Company, with a capital stock of \$100,000, divided into 10,000 shares of \$10 each. The names of incorporators are Edward Henderson, Ancaster; Harry Maxey, F. G. Beckett and Frederick Snider, of Hamilton, and

Henry Beckett, of the township of Barton. The promoters expect to commence operations in the early spring.

The Fraserville Company, Limited, of Fraserville, Que., which is seeking incorporation, will engage in the manufacture of pulp and the manufacture, sale and distribution of electrical machinery, electric power, etc. The capital stock is \$50,000, and among the promoters are Geo. White-Fraser, of Toronto, and David Cooke, of Fraserville.

The Montreal Street Railway Company have decided to grant bonuses to their employees who have been in the service of the company for five years and upwards, as follows: Men in the service five years, \$10 a year; ten years, \$20; fifteen years, \$30; twenty years and upwards, \$40. A fortnight ago the bonuses for this year were paid to the men.

The Hamilton Radial Electric Railway Co. have added to the winter equipment of their road a Ruggles rotary snow plow, which will be operated with four G. E. 1,200 motors supplied by the Canadian General Electric Co. This will be the first instance in Canada of the use of the electric rotary, and the powerful equipment provided should be an absolute guarantee against any interruption of the company's service even during the severest snow fall.

C. C. Udell, of Los Angeles, Ont., met death from an electric shock which he received while using a telephone. Udell was a conductor on the street railway, and was in the act of telephoning to the car house when he was thrown to the ground in an unconscious condition, 1,500 volts of electricity having passed through his body from an electric light wire which had become crossed with the private telephone line of the railroad company.

The O'Keefe Brewing Co. are installing a 500 light isolated generating plant, and the contract has been awarded to the Goldie & McCulloch Co. for an "Ideal" engine, and to the Canadian General Electric Co. for a 40 k.w. direct connected generator of their slow-speed multipolar type. The surplus capacity of the generator will be utilized to furnish current, from which will be operated motors installed at various points throughout the buildings, in place of the small steam engines at present in use.

FINDS IT INTERESTING.

MR. A. W. McMaugh, St. Catharines, in remitting his subscription for the ELECTRICAL NEWS, writes: "It is a very interesting monthly, and am pleased with some of the able articles appearing from time to time in its columns."

CAN'T DO WITHOUT IT.

MR. N. Smith, engineer, in charge of the Alexandria, Ont., water works, in remitting his subscription, writes: "I find your NEWS so interesting that I can't do without it."

The Ontario Electric & Engineering Co.

(LIMITED)

81 Adelaide St. West,
TORONTO

Telephone No. 479

ELECTRICAL REPAIRS

Manufacturers and Dealers in

ELECTRICAL
APPARATUS

for Isolated Plants

SECOND HAND MACHINERY BOUGHT AND SOLD

Mica Boiler Coverings

All Steam Users should see the NEW MICA BOILER AND PIPE COVERING. It is FLEXIBLE, DURABLE AND A MAGNIFICENT NON-CONDUCTOR OF HEAT.

Tested by Mechanical Experts of the Canadian Pacific Ry. Co., Grand Trunk Ry. Co., Michigan Central Ry. Co., Boiler Inspection and Insurance Co., and proved to be the BEST OF ALL NON-CONDUCTORS.

Full Particulars, Reports of Trials, Prices, Testimonials, &c., from

THE MICA BOILER COVERING CO., LIMITED
MONTREAL - WINNIPEG - 9 Jordan St., TORONTO, ONTARIO

Please mention the CANADIAN ELECTRICAL NEWS when corresponding with Advertisers

In the United States Circuit Court Judge Showalter issued an order recently of importance to the telephone industry, which practically puts an end to the alleged right of exclusive manufacture held by the Western Electric Company. The order made in the case is to the effect that the Western telephone switch patent expired July 30, 1895, by virtue of its having been taken out in Canada by the inventor June 30, 1890. The discovery that a Canadian patent had been issued on the invention was made only recently by the Western Telephone Construction Company, which concern was the principal defendant in the suit brought by the Bell and Western Electric combination. The court has had the case in which the Western Electric Company charged infringement under advisement since last summer, and, in the meantime, the Western Telephone Construction Company discovered this new evidence. Aside from ordering the admission of this testimony Judge Showalter could do nothing further until he renders his decision. Under the decision in the Bates refrigerator case,

the discovery of the Canadian patent shortens the time of the Watson concession five years, it having been ruled that a patent taken out in a foreign country acts against a later patent issued in other countries.

The Montmorency Electric Power Co., of Montmorency Falls, have placed an order with the Royal Electric Co., of Montreal, for two 600 k.w. "S. K. C." two phase alternating current generators and switchboards complete. One of these generators is to be placed at the Montmorency Falls, where it will be driven by a water power, and the current carried 9 miles into the city of Quebec to the sub-station of the Montmorency Electric and Power Co., where the second 600 k.w. alternating current generator will be located. The generator at the Falls will deliver 5,000 volts direct to the line, and the generator in the sub-station will be used as a synchronous motor and receive the current at 5,000 volts direct into the machine, so that no step-up or step-down transformers or any intermediate apparatus is required. The synchronous motor is to be direct-connected to a direct current railway generator, which is to furnish power to the new Quebec Street Railway, which will be built early the coming year.

ROBIN, SADLER & HAWORTH

Manufacturers of

OAK-TANNED LEATHER BELTING

MONTREAL AND TORONTO

Orders addressed either to our Toronto or Montreal Factory will have prompt care.
Goods will be forwarded same day as order is received.

FOR SALE

One 50-Light 4 Ampere (Ball) Arc Dynamo, with Station Apparatus and 48 Lamps; also one 25-Light 8 Ampere (Reliance) Dynamo, all in good order.

The above will be sold at a bargain.
For particulars apply to

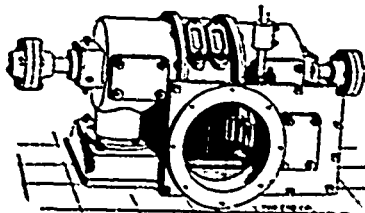
H. S. CANE,
Newmarket, Ont.

TENDERS WANTED

A Weekly Journal of advance information and public works.
The recognised medium for advertisements for "Tenders."

CANADIAN CONTRACT RECORD
TORONTO

"Little Giant" Electrical Turbine



SPECIALLY ADAPTED FOR ELECTRIC WORK.

Highest efficiency at partial gate opening.
Steadiness of motion. Easily operated.
Sensitive to the action of a governor.
No end thrust on wheel shaft.

Descriptive Circular Sent on Application

Estimates furnished for complete power plants:
Machine dressed gearing a specialty.

CORRESPONDENCE SOLICITED

J. C. WILSON & CO. - GLENORA, ONT.

253 Little Giants sold to the Canadian Government.

CANADIAN GENERAL ELECTRIC CO. (LIMITED)

Authorized Capital, \$2,000,000.00
Paid up Capital, \$1,200,000.00

HEAD OFFICE:
65 FRONT STREET WEST, - - TORONTO, ONT.

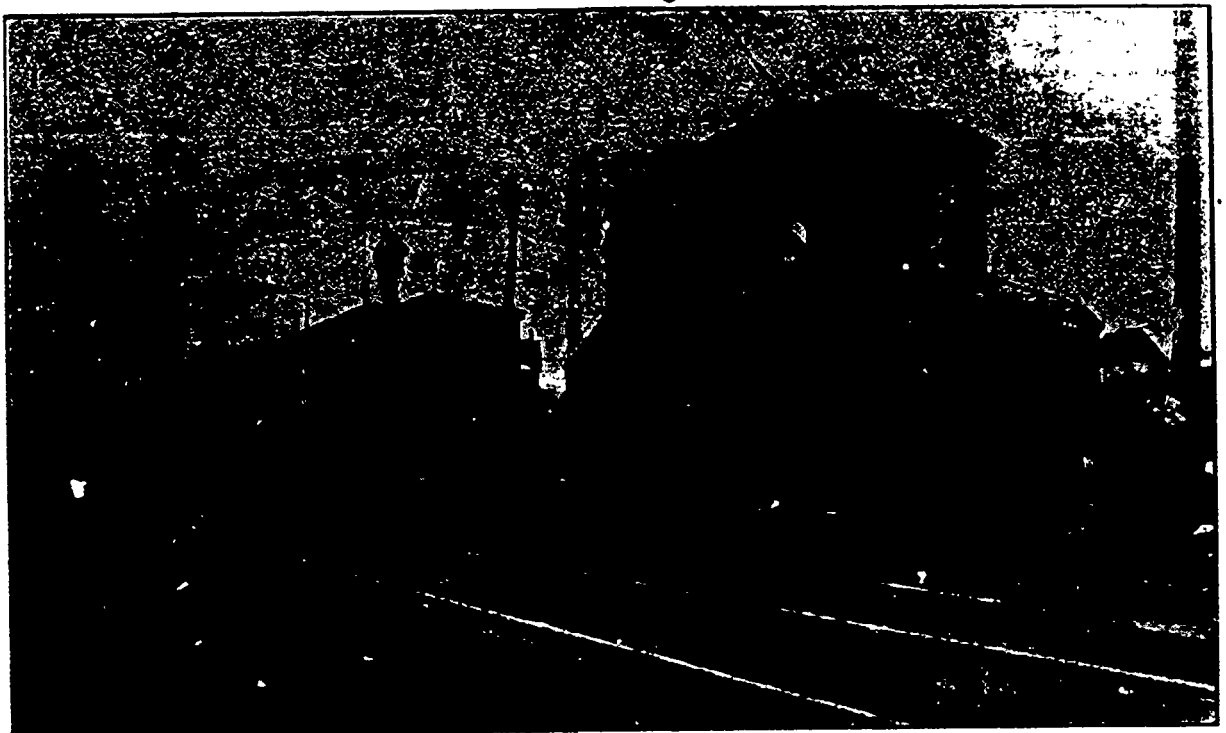
BRANCH OFFICES AND WARE-ROOMS:

1802 Notre Dame St.
138 Hollis Street

MONTREAL.
HALIFAX.

Main Street
Granville Street

WINNIPEG.
VANCOUVER.



ELECTRIC LOCOMOTIVE—AYLMER BRANCH CANADIAN PACIFIC RAILWAY.

Standard Electrical Apparatus

RAILWAY
LIGHTING

POWER
MINING

Electrical Supplies of All Descriptions Carried in Stock at our
Different Warerooms

SPARKS.

The Montreal Cotton Co. have placed an order for additional induction motors for their Valleyfield plant with the Canadian General Electric Co.

The Toronto Electric Light Co will shortly be ready to start up the new vertical engine driving the 450 k w Canadian General generator in their new power house.

The City Council of Chatham, Ont., will shortly consider the question of submitting a by-law to the ratepayers providing for the purchase of an electric lighting plant.

The Amherstburg Electric Light and Power Co. have increased their plant by adding a 1,000 light single phase alternator of the Canadian General Electric Co.'s standard type.

The corporation of the city of Guelph has given notice of its intention to submit a by-law to the ratepayers to authorize the purchase of an electric lighting plant to be operated by the city.

Canadian patents Nos. 53-456, 53-457, 53-458, 53-550, 53-551 and 53-552, covering improvements on telephone switchboards, signalling apparatus, etc., have been granted to the Bell Telephone Co. of Canada.

The Keewatin Power Company, of which Mr. John Mathers, of Ottawa, is manager, propose to utilize the water power obtained from its dam at Keewatin by transmitting electric energy of 5,000 horse power to Winnipeg. The distance between the two points is 120 miles.

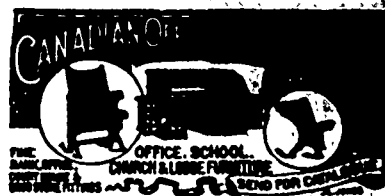
A Russian electrician is said to have perfected a telephone which practically disregards distance. At a recent test between Moscow and Rostoff, a distance of 890 miles, talking, singing and instrumental music at one end of the line were distinctly heard by listeners at the other. An experiment is to be made by land wires and Atlantic cable in talking between London and New York.

A plant for the manufacture of acetylene gas was recently put in operation at Niagara Falls, N. Y., by the Acetylene Heat, Light and Power Company. In the process of manufacture 75 lbs. of pure lime and 100 lbs. of pure coke are mixed together and put through a crusher, then through the rolling mill, the coke passing through what is termed a 50 mesh sieve. After being thoroughly crushed the mixture is dumped into a porcelain iron mixer with round pebbles in it, where the compound is shaken and mixed. It is then carried to the furnaces, where it is dumped into the crucibles on the furnace, of which there are four, each holding 800 pounds of the mixture. The crucibles are clamped by jaws, which are worked by wedges drawn in and out by endless screws. In each crucible is placed a few inches of ground coke, and then the carbon is let down on top of the mass, thus completing the connection; in short, circuiting the transformer. The carbon is afterwards gradually drawn up, all the while the mixture is being dumped in on each side. The chemical combination immediately begins to take place, and changes the coke and lime into calcium carbide. From two to two and one quarter tons of the mixture makes one ton of carbide.

ROBERT A. ROSS, E. E., (M. E. Grad. S. P. S.; B. E. Degree Toronto University; Member A. I. E. E.) Late Chief Electrical Engineer Royal Electric Co., Montreal, Works Engineer Canadian General Electric Co., and previously with Engine Companies.

ELECTRICAL AND MECHANICAL ENGINEER

Specifications, Plans, Supervision, Valuation and Advice on Steam and Electric Plants Special Machinery Designed Room 15, Hamilton Chambers, 17 St. John St., Montreal.



THE DAKE ENGINE

For Running Dynamos in
Small Isolated Plants

STEADY AND EVEN MOTION

ALSO FOR

ATTACHMENT DIRECT TO FANS, BLOWERS, CENTRIFUGAL
PUMPS, STOKERS, STEERING GEAR, ETC.

CORRESPONDENCE SOLICITED.

PHELPS MACHINE CO.

EASTMAN, P. Q.



JOHN L. BLAWIE Esq.
PRES.

E. W. RATHBUN Esq.
VICE PRES.

**THE BOILER INSPECTION
& INSURANCE CO.**

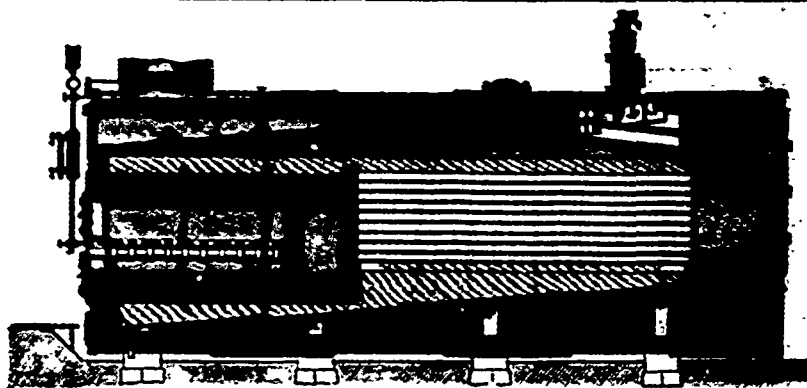
OF CANADA



CONSULTING ENGINEERS

G. C. ROBB CHIEF ENGINEER
A. FRASER SEC. TRES.

HEAD OFFICE TORONTO



THE MONARCH ECONOMIC BOILER

IS PORTABLE—Has an outer casing and requires no brickwork.
Leaves our shop mounted on skids ready for use.

SAVES FUEL—Some tests show a saving of 30 per cent. over a common
bracket boiler. We guarantee at least 10 per cent.

Robb Engineering Co., Ltd - Amherst, N. S.

WM. MCKAY, Seaforth, Ont., Travelling Agent.

FREE SAMPLE COPY OF HOME STUDY,

An Elementary Journal for Students

Of Mechanics, Electricity, Architecture, Mining, Plumbing, Heating and Ventilation, Steam Engineering and Mechanical and Architectural Drawing.

Address Box 1004.

HOME STUDY, SCRANTON PA.

PATENTS PROCURED ON ELECTRICAL INVENTIONS

BY **RIDOUT & MAYBEE,** 703 BAY ST., TORONTO Telephone 2582.
A pamphlet on patents sent free.
"RIDOUT ON PATENTS," price \$3.50; \$4.00.

W. HEATHCOTE

A. M. CAN. SOC. C. E.

Electrical Engineer and Contractor, Mechanical Draughtsman.

71 Yonge Street TORONTO, ONT. Telephone 479.

STEAM USERS

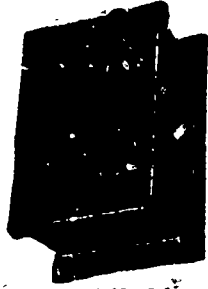
Desiring the services of **COMPETENT ENGINEERS** of any class, can obtain sober, intelligent and reliable men, by applying to

CANADIAN ASSOCIATION STATIONARY ENGINEERS.

J. J. YORK, President, Board of Trade Building, Montreal.

WESTON ELECTRICAL INSTRUMENT CO.

114-120 William Street, NEWARK, N.J., U.S.A.



WESTON STANDARD PORTABLE
Direct-Reading

VOLTMETERS, MILLIVOLTMETERS, VOLTAMMETERS, AMMETERS, MILLIAMMETERS, GROUND DETECTORS AND CIRCUIT TESTERS, OHMMETERS, PORTABLE GALVANOMETERS

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION AMMETERS and VOLTMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Our "Acme" Automatic . . . GURTAINS
Railway Coach and Street Car

For either open or closed cars—made to fit any Window,

ARE THE BEST IN THE WORLD.

We also manufacture a New Special Material for Excursion or Open Street Cars, which is perfectly waterproof, will not fade, natter in appearance, any width without a seam, stronger and cheaper than any shade now upon the market. Can be seen on new cars lately erected by the Toronto Railway Co. We also carry in stock every description of Railway Coach and Street Railway Shade Cloth, Goods, Fixtures, etc.

WRITE FOR PARTICULARS AND SAMPLES.

Menzie, Turner & Co. SHADE Toronto
MANUFACTURERS

Use Our

LAMPS

and our other

ELECTRICAL SUPPLIES

Munderloh & Co.

61 St. Sulpice St. MONTREAL

It pays to advertise in the CANADIAN ELECTRICAL NEWS.

THE GOLDIE & McCULLOCH Co. [LIMITED.]

MANUFACTURERS OF

Improved Steam Engines and Boilers

± FLOURING MILLS ±

And the Erection of same in the most Complete Style of Modern Improvement.

WOOL MACHINERY, WOOD-WORKING MACHINERY, SAWMILL, SHINGLE AND STAVE MACHINERY

Fire and Burglar Proof Safes and Vault Doors.

Special attention called to the "WHEELOCK" IMPROVED STEAM ENGINE as being unequalled for simplicity, efficiency and economy in working, and especially adapted for Electric Lighting, Street Railways, etc.

GALT, ONTARIO.

Please mention the CANADIAN ELECTRICAL NEWS when corresponding with Advertisers

TELEPHONES



TELEPHONE

SWITCH-BOARDS



G. W. HENDERSON

Contractor and Manufacturer
Electrical Supplies ...

ELECTRICAL CONSTRUCTION

Street Railway Car Fittings, &c.

44 Bleury St. - MONTREAL

THE OTTAWA PORCELAIN & CARBON CO., Ltd. OTTAWA, ONT. ...

MANUFACTURERS OF

Carbon Points

 for all kinds of Arc Lamps, including cored and solid carbon for incandescent circuits.

... ALSO ...

Motor Brushes and Specialties in Carbon for Telegraph, Telephone and Electric Light Supplies ...

Porcelain Insulators, Cleats, Door Knobs, and all kinds of Pressed Porcelain for Electrical and Hardware Lines ...

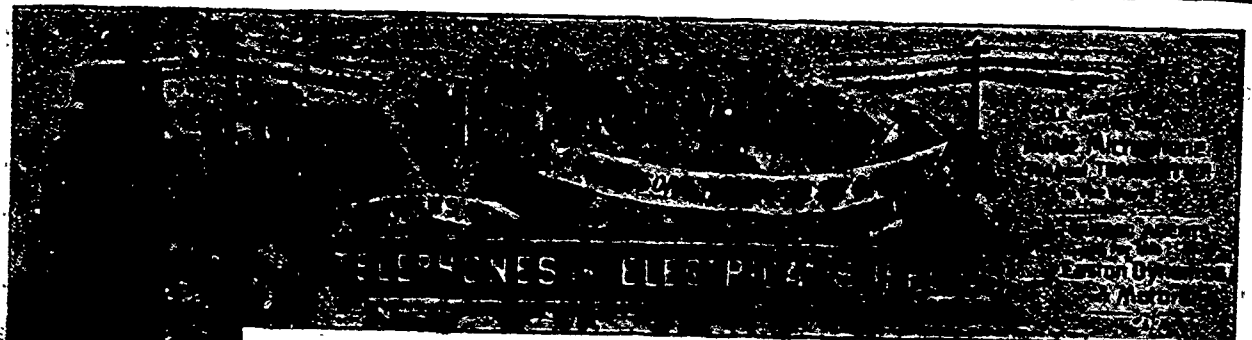
ALL GOODS GUARANTEED TO GIVE SATISFACTION

Carbon Cylinder Batteries

for use with Annunciators, Electric Bells, and all purposes requiring a Reliable Battery for Open Circuit Work.

Do you want a Dry Battery ? MESGO is the Best. Always in Stock. Special Prices to Trade

ROGERS ELECTRIC CO. : 425 Richmond Street, LONDON, ONT.
ELECTRICAL SUPPLY DEALERS AND CONTRACTORS FOR ELECTRIC CONSTRUCTION



Switch-Boards and Annunciators

FIRE ALARM APPARATUS and TELEGRAPH INSTRUMENTS

Cable Address : "Nessphones," Montreal.

749 Craig St., MONTREAL

Telephone No. 1100.

OAK TANNED BELTING

TORONTO
22 FRONT STREET EAST
Telephone 474

THE J. C. MCLAREN BELTING CO. MONTREAL