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.

- [x] 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
- [x] Bound with other material/ Relié avec d'autres documents
- [x] 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.

- [ ] Coloured pages/ Pages de couleur
- [ ] Pages damaged/ Pages endommagées
- [ ] Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- [x] Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- [ ] Pages detached/ Pages détachées
- [x] Showthrough/ Transparence
- [x] Quality of print varies/ Qualité inégale de l'impression
- [x] 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

- [x] Additional comments:/ Commentaires supplémentaires: Various pagings.

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

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
									✓		

CANADIAN
ELECTRICAL NEWS
AND ENGINEERING JOURNAL

OLD SERIES, VOL. XV.—No 8
NEW SERIES, VOL. X.—No. 6.

JUNE, 1900

PRICE 10 CENTS
$1.00 PER YEAR.

CANADIAN
ELECTRICAL NEWS
AND
ENGINEERING JOURNAL.

VOL. X. JUNE, 1900 No. 5.

THE LINDSAY LIGHT, HEAT AND POWER COMPANY.

Opening of Their Electrical Transmission Plant.

A representative of the ELECTRICAL NEWS journeyed to Lindsay on Thursday, May 31st, to witness the formal opening of the new power plant of the Lindsay, Light, Heat and Power Company. Almost every Canadian was enjoying a holiday, in recognition of the news of the surrender of Pretoria, and at two o'clock in the afternoon upwards of one hundred and fifty persons got on board the steamer Crandella, provided by the company, which carried them from Lindsay to Fenelon Falls, where the power plant is located. The sail up the picturesque Scugog river was most enjoyable. Music was furnished by an orchestra.

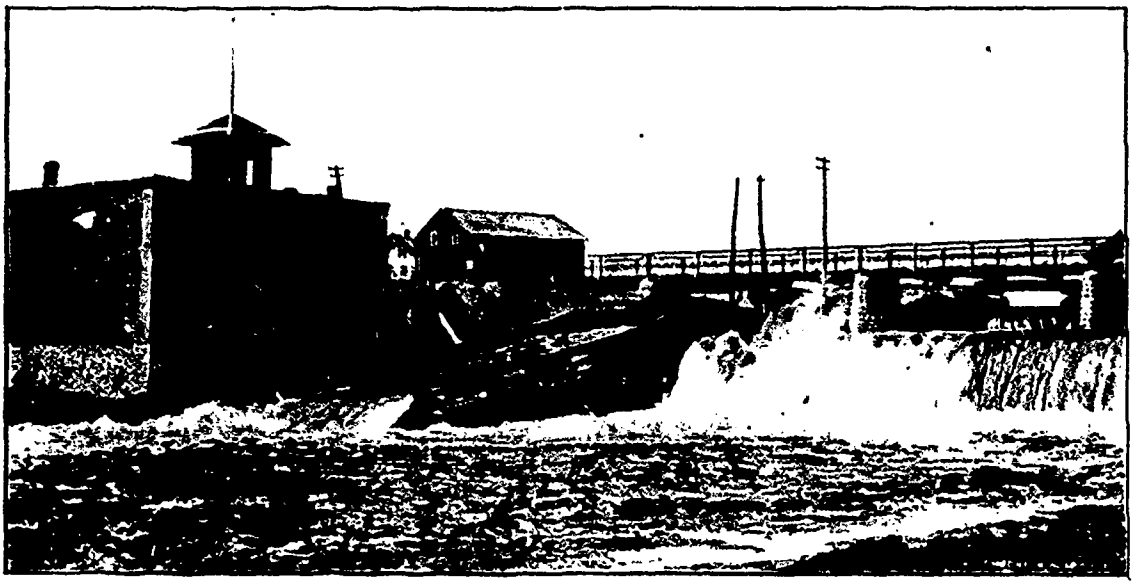


FIG. 1.--GENERAL VIEW OF FALLS AND POWER HOUSE.

At Fenelon Falls about an hour was spent in inspecting the falls and power house. In the absence of the president, Mr. Wm. Needler, the machinery was set in motion by the vice-president, Mr. Thos. Sadler, and its operation explained by Mr. C. H. Mitchell, engineer in charge of the hydraulic work. On the return trip the party reached Lindsay about 8 p. m.

ORIGIN OF THE COMPANY.

Some years ago Mr. B. F. Reesor, then one of the members of the Newmarket Electric Light Company, recognizing that electricity was but in its infancy, decided to install an electric light plant in the town of Lindsay. This being accomplished, he was given the contract for street lighting. His success induced competition, and another company was formed and continued to exist for some years. Mr. Reesor was joined by Messrs. Wm. Needler and Thos. Sadler, two prominent business men of the town, and the outcome of this amalgamation of capital was the incorporation of the Light, Heat and Power Company, of Lindsay, Limited, with a capital of $125,000, and the purchase of the competing electric and gas plants. Mr. Wm. Needler is president of the company, Mr. Thos. Sadler vice-president, and Mr. B. F. Reesor managing-director and secretary. For some time the company had been giving some consideration to the question of transmitting power from Fenelon Falls, and a demand for increased power, together, perhaps, with rumors of competition from a new company, resulted in the decision of the directors to undertake the development of the water power at that place.

Early in the spring of 1899, the company purchased the water power from the Smith estate, or, more correctly speaking, secured a franchise to utilize 1,100 horse power. As the townships of Ops and Fenelon had granted a pole-line franchise to another party, the Lindsay, Light, Heat and Power Company applied to and secured from the Grand Trunk Railway permission to use their right of way between Lindsay and Fenelon Falls. The work of development was commenced in July of last year.

HYDRAULIC DEVELOPMENT.

The hydraulic division of the power plant is quite simple and compact. The falls at Fenelon, situated on the Gull river, are about fifteen feet in height, and a

short distance above the Government maintains a wooden dam for the purposes of the Trent Valley canal system, two locks of which are at this point, thus forming a beautiful sheet of water called Balsam Lake. This dam and the falls provide a total nominal head of 24 feet. The water is drawn off the upper level through a head race on the west side of the dam, and is led to the power house, which is situated immediately below the falls. The head race is substantially built in rock, the river side being formed by a heavy concrete retaining wall, the short side cut in rock, and the whole being about 150 feet in length. The head gates consist of a set of heavy stop logs with convenient raising devices, and the minimum section of race is 10 by 26 feet. Racks and seats for lower stop logs are provided at the piers and head wall in the north side of the power house, the steel flumes leading directly from the race at this point.

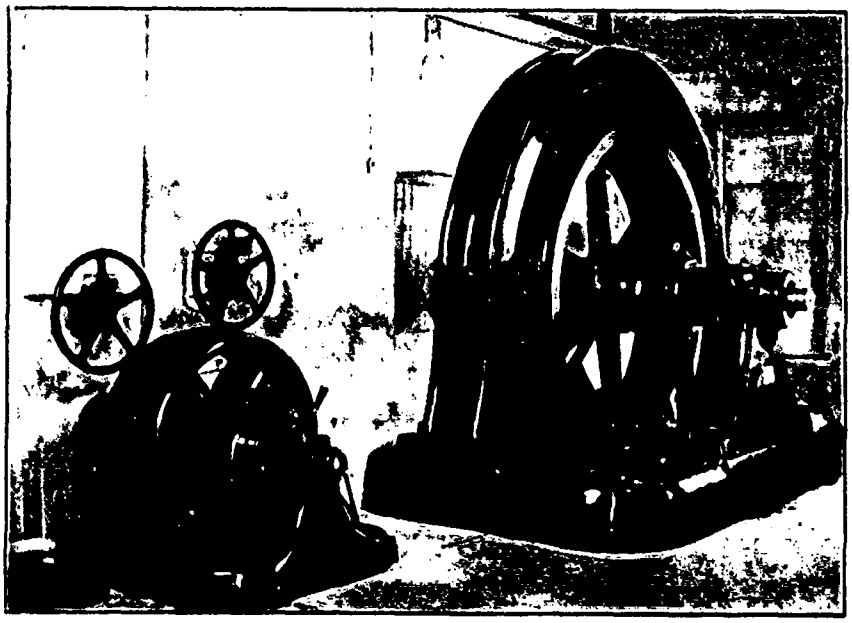


FIG. 2.—GENERATOR AND EXCITER.

THE POWER HOUSE.

The power house occupies the site of the old Smith saw mill, in fact, it was built up inside of the mill, the latter being torn down afterwards. The building is 37 x 52 feet inside, and all available space is occupied, as the location is cramped owing to the rocky bank of the river. A splendid view of the power house and falls is shown on the previous page. The power house is of plain but substantial construction, built of brick with stone foundation, and consists of two floors, the lower one containing the hydraulic machinery and generators, the upper having the lighter equipment, such as high potential switchboard, transformers, blower, stores, offices, etc., access to which is had directly from the bank level above the falls.

The head wall of the forebay, with its piers, forms the upper foundation wall of the building, and through this the three flumes lead the water to the wheels. Two of these are 11 feet in diameter and the third is 4 feet in diameter. The large flume next the river and the small one are already in use, the other large flume not being yet completed, but it will be used when future extension is made.

The hydraulic plant already in operation consists of a pair of 40-inch Samson turbines, of the Leffel type, for the generator, and a 20-inch turbine of the same make for the exciter. The turbines were manufactured by the William Hamilton Manufacturing Company, of Peterboro, Ont. The pair of power turbines are connected with the generator by a 7-inch horizontal shaft, and will generate together upwards of 650 horse power under a head of 24 feet, using about 300 cubic feet of water per second, and running at 200 r. p. m. The small wheel to run the exciter will develop about 60 h. p., only about half of which will be used by the exciter. The company are, therefore, using less than one-half of the water to which they are entitled by their franchise. At present the water wheel governor is not installed, but it is the intention to put in a high-class governor at an early date. The discharge of the water from the wheels is into a tail race cut into the rock below the falls, by which it enters the swift waters of the river, thus flowing rapidly away, a feature which is very important. Another promising feature of this plant is the absence of the formation of anchor ice, as the conditions for such cannot arise in the head race or in Balsam Lake above.

The intention of the company is to duplicate the present power plant as soon as the demand for power makes it advisable to do so. There is ample provision made for this in the power house and general works, and the water privileges of the company and consequent power obtainable are quite sufficient for a total output of some 1,000 h. p.

ELECTRICAL EQUIPMENT.

The generator building, as it stands at present, contains but one of the two direct connected generators

FIG. 3. GENERATOR SWITCHBOARD.

which it is proposed shall form the ultimate equipment of the plant. This machine is a 400 kilowatt, 550 volt, three-phase revolving armature generator of the Canadian General Electric Company's standard design, driven at 200 revolutions per minute by the wheels described above, to the shaft of which it is directly coupled without any insulating device. The field frame is cast

round laminated internally projecting fields, 36 in number, thus giving a frequency of 60 p. p. s.

The exciter consists of one 20 k. w., 125 volt, form "H" generator, running at 385 revolutions per minute, being directly connected to its wheel shaft similarly to the alternator. This method of connecting the exciter to a separate wheel is a comparatively new feature in engineering practice, possessing many valuable features

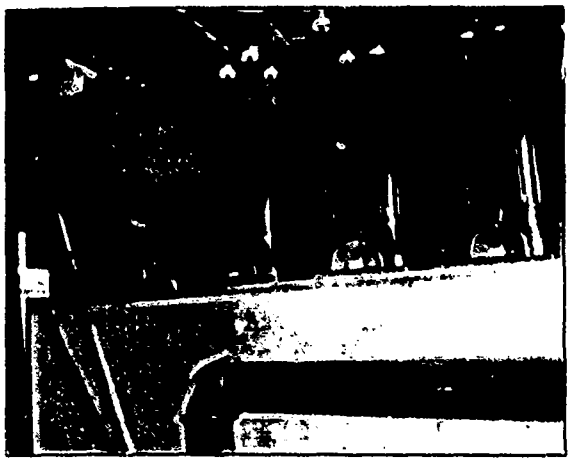


FIG. 4.—STEP-UP TRANSFORMERS IN POWER HOUSE.

over the usual method of belting from the generator shaft, and one the success of which will be watched with some interest. The exciter has capacity for exciting four machines similar to the one now in use, so that when the present equipment is doubled there will still be a large reserve of exciting power. A view of the generator and exciter is shown in Fig. 2.

The low tension switch-board, as shown in Fig. 3, is placed directly in front of the generators, so that the attendant has everything in plain view and within easy reach without having to move from the board. The board is of polished blue Vermont marble. Each panel, of which there are three at present installed, is in one piece, 80 inches high and 30 inches wide, this size enabling a very pleasing and symmetrical distribution of the apparatus contained. There is mounted on the boards the usual equipment of instruments and switches, the former of the Inclined Coil type, finished in black oxide, the latter being single-pole and quick-break for the heavier currents and of the ordinary double pole type for the smaller circuits. The three panels as installed control the generator, the exciter and the low tension side of the step-up transformers. When the capacity of the plant is increased three more panels will be added, one each with the additional machine and exciter, and one for the synchronizing instruments and paralleling switches which will then be necessary. The low tension transformer switches are arranged so that any one of the three transformers can be instantly cut out of service without in the least affecting the operation of the system; thus even should they be supplying a 24-hour service they can be regularly inspected and cleaned without danger to the attendant. Provision is also made on the board so that when the plant is increased either machine can be run separately on either set of transformers or all can be run in parallel.

All the low tension wiring is carried under-ground in conduits placed in the cement floor and covered by iron checker plate, this keeping all leads out of the way and free from liability to damage, at the same time giving facilities for inspection not excelled by overhead open work.

The three step-up transformers (Fig. 4) are rated at 135 k. w. each and give a pressure of 11,000 volts to the line. They are of the Canadian General Electric Company's standard air blast type, the primary and secondary windings being so arranged with ventilating blocks between that a very large radiating service is presented to the air blast provided by the blower, and thus the weight and floor space are both kept within very moderate limits; they run very cool under even heavy overloads, and the efficiency is high.

The blower is of the Buffalo Forge Co.'s standard low pressure type, 50 inches in diameter, and, like the exciter, is capable of delivering about four times its present output. It is driven by a two horse-power 500 volt induction motor, placed on the floor level. The blower stands on top of the air chamber similarly to the transformers, the discharge being down into the air chamber, which is of ample dimensions to allow the transformers being inspected and cleaned without difficulty.

The high tension panels, two in number, are placed close to the transformers, in order to keep down the amount of high tension wiring necessary. One contains six s. p. snap break switches, separated by marble barriers and controlling the transformer primaries, being connected so that any transformer can be cut off the line instantly if necessary. The other panel contains ground detectors of the astatic type, which are permanently connected to the line, and thus give a continuous indication of the state of its insulation. The high potential board is shown in Fig. 5.

The lines from the high tension panel ascend vertically to a wire cupola placed in the centre of the roof, going through its walls in heavy porcelain tubes to a cross arm bolted to the wall, and from there directly to the first pole. The eaves of the cupola are extended so as to

FIG. 5. HIGH POTENTIAL SWITCHBOARD IN POWER HOUSE.

thoroughly protect the lines from any wet or dirt and the point where they pass through its walls. This cupola also contains the lightning arresters, of the Wirt type, one for each line, each consisting of a number of 2,000 volt arresters connected in series.

THE POLE LINE.

The transmission line, fourteen miles in length, runs from the power house for about three-quarters of a mile

over private right of way until it strikes the Grand Trunk track running from Haliburton to Lindsay, which it then follows to within half a mile of the Lindsay town limits, there leaving the track and running directly south on Main street to the sub-station. It consists of three No. 4 B. & S. copper wires, bare, except for the small part inside the corporation limits, which latter is weatherproof. The wire was supplied by

FIG. 6.—STEP-DOWN TRANSFORMERS IN SUB-STATION.

the Dominion Wire Company, of Montreal. The line is supported throughout by No. 1 Imperial porcelain insulators, triple-petticoated and tested to 20,000 volts. The pins are locust, the cross-arms being of 4x5 tamarack and double braced. The three wires are at present supported on one arm, though when the second line is strung they will be arranged so as to provide against any chance of voltage disturbance from mutual inductance of the two circuits; it was not considered necessary to transpose the three wires now in use.

Below the transmission line is a telephone line, run on a standard two-pin arm, with the usual glass insulators placed three feet below the main line and transposed every fifth pole. The wire is No. 12 I.W.G. galvanized iron. No difficulty whatever has been experienced from induction troubles, the service being perfect, independent of the load on the main line.

The poles are of cedar, set 56 to the mile, varying from 35 to 50 feet in height, so as to make the line as level as possible. For the greater part of the distance no difficulty was experienced in setting them, as the ground is clean, though a little blasting was necessary on account of rock found near the Falls, and when crossing swamp the poles are for some 4000 feet supported by piles, to which they are bolted, some special device of this character being rendered necessary by the water which at this point covers the ground for the greater part of the year.

In addition to the lightning protection provided in both stations, a barb wire line runs over the full length of the transmission, fastened securely to the top of each pole and grounded at every third. This, it is expected, will take the majority of the discharges occurring near the line.

THE SUB-STATION.

The Lindsay Light, Heat and Power Company, before the installation of the new plant, ran two steam driven stations, and one of these has been changed to accommodate the new apparatus and is used as a sub-station. It contains a high tension panel similar to that of the power house controlling the primaries of the three oil-cooled 135 k. w. step-down transformers, giving a secondary voltage, which is varied, according to the load, from 1,050 to 1,150 volts, at which pressure the current is distributed to the lights and motors throughout the town.

Like the power house, all the sub-station low tension wiring is run in conduits under the floor, which is cement. The low tension switchboard consists of four polished marble panels, one similar to that in the power house, controlling the 1,040 volt side of the transformers, one containing the ammeters, voltmeters and ground detectors, and the remaining two containing switches controlling the various circuits throughout the town, these being arranged so that three phase or single phase distribution can be made as desired.

Power is now being supplied for lighting and power purposes in the town of Lindsay, and it is said that the current is steadier and more satisfactory than when the steam plant was in use. The company at present have the contract for lighting the streets of the town. They are also supplying a number of commercial lights and a quantity of power for grain elevators, refrigerating machines, printing presses, and other service. Their present lighting business consists of 7,000 incandescent lights of 16 c. p. and 60 arc lights of 60 c. p. It is said that in proportion to its population, the town of Lindsay uses more electric current than any other town in Canada.

All the electrical apparatus was furnished and installed by the Canadian General Electric Company, the expert work being done by Mr. Davies, of Toronto, and Mr. Smallpiece, of Peterborough. Mr. C. H. Mitchell, C.E., of Niagara Falls, Ont., had entire charge of the power development, which reflects great credit upon him. The power house and pole line construction was carried out by the Lindsay, Light, Heat and Power Company, under the superintendence of Mr. B. F. Reesor, assisted by his son, Mr. Walter Reesor. The suc-

FIG. 7.—SWITCHBOARD IN SUB-STATION.

cessful operation of the plant must be a source of gratification to all concerned.

THE BANQUET.

In the evening a banquet was served by the Lindsay Company in a large hall in the town, which was prettily decorated for the occasion with flags and bunting. Probably 200 persons were present. The menu card was enclosed in a neat khaki cover and contained a list of

good things sufficient to satisfy the most exacting appetite.

The chair was occupied by Mr. J. D. Flavelle, president of the Lindsay Board of Trade, and the vice-chair by Mr. B. F. Reesor. Letters and telegrams of regret at their inability to attend were read from a number of distinguished personages, including Mr. Frederick Nichols, general manager of the Canadian General Electric Company, who was represented by his assistant, Mr. Geo. Watts. The toast list included: "The Queen"; "Our Manufacturing and Commercial Interests"; "Our Municipal Institutions"; "Electrical Enterprise"; "The Bench and the Professions," and "The Press," all of which were fittingly responded to. A noticeable feature of the speeches was the unanimity in commending the directors of the Lindsay Light, Heat and Power Company for their energy and business acumen in carrying to completion the enterprise which was responsible for the occasion. In responding to the toast of "Electrical Enterprise," Mr. C. H. Mitchell pointed out that the first stone of the undertaking had been turned within the last eight months, while at the

MR. B. F. REESOR.

great Niagara Falls the people had been waiting for the development of the power there for as many years. He said that all present might not be aware that the electric lights and fans in the hall were being supplied by current generated at Fenelon Falls. He believed that the development of water powers for the generation of electricity would result in the greater development of the mines near the town. He was certain that in the near future mining by electricity would be proven to be a practical success, as well as a laboratory success which it now is. After the disposal of the above toasts the company were asked to drink the health of the Lindsay Light, Heat and Power Company. This brought responses from Messrs. Sadler, Reesor and Stewart, and the evening closed with the singing of the National Anthem.

MR. B. F. REESOR.

Mr. B. F. Reesor, managing director of the Lindsay Light, Heat and Power Company, a portrait of whom is here shown, first launched into the electrical business in the year 1886, when he installed an arc lighting plant in the town of Newmarket, Ont. At that time very few towns in Canada could boast of having their streets and places of business lighted by electricity. But Mr. Reesor was confident that electricity was the coming light. After successfully operating the Newmarket plant for a few years, he cast about for a larger field of operation, and finally decided to locate in the enterprising and promising town of Lindsay, where a favorable opening seemed to present itself. Notwithstanding that a gas plant of considerable dimensions was already in operation there, the reception given to the electric light was such that in a very short time his most sanguine expectations promised to be realized. The capacity of his electrical plant was speedily taxed to the utmost, necessitating the installation of a duplicate plant. In less than two years after this increase his business expanded to such an extent that he was once more compelled to enlarge. About this time an opposition electric plant was installed in the town, and the two concerns were operated with considerable vigor and varying profits until July, 1895, when, as stated elsewhere, a joint stock company was formed and the opposition electric and gas plants absorbed by Mr. Reesor's company.

The completion of the long distance plant of the Lindsay Light, Heat and Power Company, one of the finest in Ontario, is but another indication of the progressive policy characteristic of Mr. Reesor. In him the company have a manager whose business ability, coupled with his extended experience in electrical matters, are sufficient to ensure the commercial success of the new plant.

THE USE OF ACCUMULATORS.

MONTREAL, May 26, 1900.

Editor ELECTRICAL NEWS:

DEAR SIR,—In your April issue you make an editorial plea for accumulators. It is my purpose to point out a few reasons why they are not in more general use in Canada:

1st. Price cost, the accumulator plant generally equalling in expense the engine, dynamo and wiring, after adding duty and freight. Considering the materials used in the construction of accumulators, there does not appear to be any valid reason why this should be, except we place it to patents acquired, litigation, and high running expenses of some of the manufacturing companies.

2nd. The number of alternating plants in use in Canada, accumulators furnishing as they do direct current, could not be used with transformers.

3rd. Accumulators, unless they receive (not ordinary but) skilled attention, are the most unmitigated nuisance known to the electrical fraternity, and unfortunately seven times out of ten they do not get that attention.

One other objection, which it is unnecessary to classify, may prove of interest. A certain large and wealthy public institution in Canada, any one of whose directorate could buy up, "lock, stock and barrel," a fair-sized electrical manufacturing business without emptying his pocket to any extent, received the following terms and a quotation on accumulators, which they were desirous of trying: "50% with order, 25% on shipment, balance three days after receipt of goods!" This was from the United States; needless to say it was refused. Moral—Buy in Canada.

Yours truly,

"ANTI-ACCUMULATOR."

The Chambly Water & Power Company will, it is said, materially increase their power plant at Chambly, and also develop another power of some 30,000 horse power. When the proposed improvements are completed, the company expect to have 30,000 horse power fully developed.

The United Electric Company, Limited, of Toronto, are working their factory day and night. One large contract which they have to complete in the near future is for Messrs. Lever Bros., Limited, for their Sunlight soap works now being constructed in Toronto. This contract comprises a 200 h. p. generator and some 15 specially designed cast steel iron-clad dust proof motors, to meet the requirements of the manufacture of their products.

CANADIAN ELECTRICAL NEWS AND ENGINEERING JOURNAL

PUBLISHED ON THE TENTH OF EVERY MONTH BY

THE C. H. MORTIMER PUBLISHING CO'Y
of Toronto, Limited,

HEAD OFFICE: CONFEDERATION LIFE BUILDING,
Corner Yonge and Richmond Streets,
TORONTO, — — CANADA.
Telephone 2362.
BRANCH OFFICE: IMPERIAL BUILDING, MONTREAL.
Bell Telephone 2299.

ADVERTISEMENTS.

Advertising rates sent promptly on application. Orders for advertising should reach the office of publication not later than the 28th 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 26th 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 25 cents is added for cost of discount. Money sent in unregistered letters will be at senders' 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 Publishers 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:
A. A. DION, General Superintendent Ottawa Electric Co, Ottawa.

1ST VICE-PRESIDENT:
E. E. CARY, Manager Packard Electric Co., St. Catharines, Ont.

2ND VICE-PRESIDENT:
P. G. GOSSLER, Royal Electric Company, Montreal.

SECRETARY-TREASURER:
C. H. MORTIMER, ELECTRICAL NEWS, Toronto.

EXECUTIVE COMMITTEE:
J. J. WRIGHT, Manager Toronto Electric Light Company, Toronto.
JOHN CARROLL, Eugene F. Phillips Electrical Works, Montreal.
ORMOND HIGMAN, Chief of Electrical Inspection Department, Ottawa.
A. B. SMITH, Superintendent G. N. W. Telegraph Co., Toronto.
GEORGE BLACK, G.N.W. Telegraph Co., *Hamilton, Ont.*
D. R. STREET, Ottawa Electric Co., Ottawa, Ont.
A. SANGSTER, Sherbrooke Gas and Electric Light Co., Sherbrooke, Que.
J. F. H. WYSE, Brantford Electric & Operating Co., Brantford, Ont.
B. F. REESOR, Manager Electric Light Co, Lindsay, Ont.
W. H. BROWNE, Manager Royal Electric Company, Montreal.

MARITIME ELECTRICAL ASSOCIATION.

President, F. A. HUNTRESS, Man Halifax Elec. Tramway Co. - Halifax, N. S
Vice-President, P. R. COLPITT, City Electrician, - - "
Secretary-Treasurer, F. A. HAMILTON, E.E., - - "

ONTARIO ASSOCIATION OF STATIONARY ENGINEERS.

BOARD OF EXAMINERS.

President, O. P. ST. JOHN, - -	Toronto.
Vice-President, THOS. ELLIOTT,	Hamilton
Registrar, J. G. BAIN, - - -	113 Yorkville Ave., Toronto.
Treasurer, A. M. WICKINS,	Toronto.
Solicitor, H. CARSCALLEN, - -	Hamilton.

TORONTO—O. P. St. John, A. M. Wickens, A. E. Edkins, J. G. Bain, F. Donaldson.
HAMILTON—Robt. Mackie, Thos. Elliott.
BRANTFORD—A. Ames, care Patterson & Sons.
LONDON—F. G. Mitchell.
OTTAWA—Thomas Wesley.

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

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

EXECUTIVE COMMITTEE.

President, R. C. PETTIGREW, -	Hamilton, Ont.
Vice-President, G. C. MOORING, - -	Toronto, Ont
Secretary, A. M. WICKENS, -	Toronto, Ont.
Treasurer, CHAS. MOSELEY, - -	Toronto, Ont.
Conductor, W. OELSCHLAGER,	Berlin, Ont.
Door Keeper, WILLIAM BEAR, - -	Dresden, Ont

Canadian Electrical Association.

IN consequence of the recent disastrous fire at Ottawa, where it had been arranged to hold the annual convention of the Canadian Electrical Association, it has been deemed advisable to postpone the meeting until September. A notification to this effect has been sent to the members. The place and exact date for the Convention have not as yet been fixed, but will be decided upon at an early date, when announcement of the same will be made.

The Responsibilities of Telephone Companies.

A PECULIAR action has been brought by George C. Stone and wife, of Onio, in the United States Court at Savanah against the Southern Bell Telephone Co. The plaintiffs owned a winter residence at Thomasville. At about two o'clock one morning they discovered that their home was on fire and undertook to call the fire department through the telephone, but could not get a response from the central office. Thinking it possible that their own telephone might be out of order, they went to their neighbors, but with the same result. Time was wasted in this way, and the fire obtained such headway that, when the fire department was finally communicated with through a messenger, it was impossible to put out the flames, whereas, had it arrived promptly, it is claimed the fire could have easily been extinguished before any material damage had been done. The plaintiffs state that they were subscribers to the telephone company, as was also the Thomasville fire department, and that it was the business of the company to furnish to each of its subscribers means of communication with all the others by means of the telephone at all hours of the day and night. Hence they claim damages from the company in the sum of $26,000, the value of their property. If claims of this nature are allowed by the courts the telephone companies will find it necessary to revise the terms of their agreements or go out of business.

The National Electric Light Association.

THE twenty-third annual convention of the above association held at Chicago on May 26th, 27th, and 28th, brought out a large attendance. Judging by the published reports, the proceedings were characterized by an earnest purpose to solve some of the more difficult problems which confront those connected with the management of electric lighting companies. Without neglecting the social features, which are a necessary part of the programme of such conventions, the more practical side of the meeting received perhaps closer attention than on some former occasions. It has come to be recognised that there are important objects to be attained by an association of this kind, and that its continued existence will depend upon the degree of earnest attention bestowed upon them. On the recommendation of the committee on standardization of electrical apparatus, the association endorsed the classification and rating of the various kinds of electrical apparatus, as defined by the American Institute of Electrical Engineers, whose recommendations are said to be already commonly recognized and followed by the manufacturers. Following the reading and discussion of a paper by James B. Cahoon, of Syracuse, N.Y., on "Uniform Accounting," a resolution was passed requesting the executive to appoint a committee to formulate a system of uniform accounting and report at the next annual meeting. Mr. Insull, a former president of the association, declared

himself to be strongly in favor of uniform and public accounts, that the people may see exactly what the profits of the electric-lighting business are in the case of each company. If municipal ownership must come, he said, let the business of the central-station company be bought out by the city at a fair valuation, determined by an equitable system of accounting. A committee was appointed to determine the best method of analyzing fuel gas. A recommendation to Congress to pass the bill now before that body to establish a national standardization bureau was adopted. Pending the establishment of such a bureau, the association is arranging to have standard 16 c.p. lamps of 110 and 220 volts prepared at Columbia University for the use of members. A committee is also preparing for publication a specification and drawings for a standard photometer room and its equipment, and has under consideration a standard form of simple photometer. The committee appointed to consider the subject of grounded circuits gave it as their opinion that while the permanent "grounding" of one side of the secondary circuit is not an absolute preventative of accidents to person and property, yet it is a step in the right direction, and, if adopted, will add greatly to the safety of the public, and reduce the hazards attending the transmission of electrical energy by what is known as the alternating or transformer system. Mr. James B. Cahoon, of Syracuse, N. Y., was elected president for the ensuing year, and we are pleased to note the election of Mr. Charles B. Hunt, of London, Ont., as a member of the Executive Committee. It is rumored that the next convention may be held in Buffalo in connection with the Pan American Exposition.

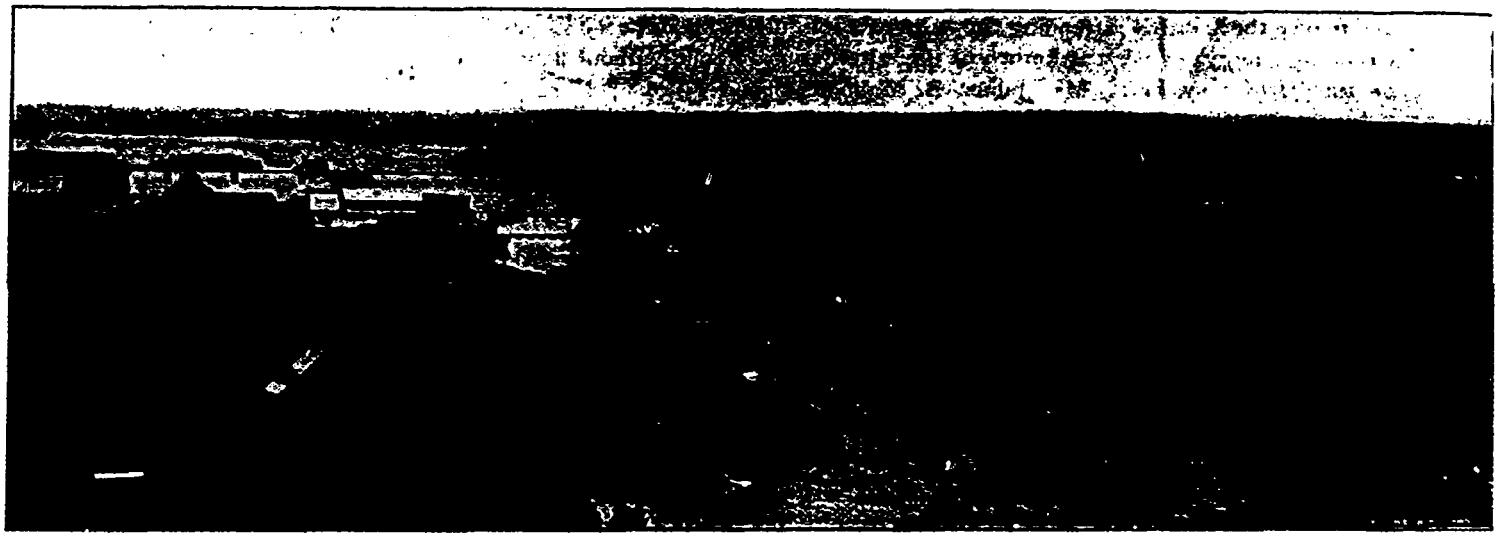
Trade Opportunities in the Oriental Market.

UNTIL very recently the eyes of Canada were turned almost exclusively towards the east, and her thoughts occupied with commercial matters in Europe. During the last few years it has occurred to many that the Pacific ocean, instead of being the back road from the country, might become a highway fully as important as the Atlantic, and this idea is certain not to be disappointed by results. Trade with Australia, China, Japan, Malaya and Polynesia is no mean prize to strive for, and the splendid Pacific highway at our doors places us in a position to compete favorably with any country. The rapid advances made by the United States and Japan in their Oriental trade shows that business methods adjusted to the established ideas of the east will bring a quick return, and that the lack of flexibility inherent in British trade methods is resulting in the loss of the previous overwhelming commercial supremacy. If Canada is to take that part in the Oriental market which should be expected owing to her favorable geographical position, it will have to be brought about by a careful study of the existing and prospective conditions and demands and by enterprise in pushing sales. Many discussions have taken place regarding the trade possibilities of China, and as many diverse opinions have been expressed, varying from the optimistic idea that the millions of China represent a market for our exports equivalent to a similar population in Europe, to the pessimistic opinion that these Chinese millions will eventually swamp our markets by their cheap productions. Both of these extreme opinions are based on the supposition that the country has been opened up to trade and that foreign investments have been rendered secure. The truth, as is generally the case, appears to lie between these extremes, for on the one hand no one who knows in any degree the conditions existing in the East will allow that its ability to absorb Western products is at all commensurate with its population, and that any deductions made from results in European countries are very misleading. On the other hand, Japan has progressed far enough to act as an object lesson in the increased cost of labor which results from an increase of production, and, speaking generally, it will be conceded that when a nation has arrived at some state of stability in her manufactures, the labor cost of the output will not be found to vary from the standard all over the world. For instance, labor in Europe is cheaper than in America when reckoned by the cost per hour, but it is found that in spite of this fact the labor cost of turning out manufactured articles is not very different owing to the greater rate of production per hour of the American artisan. This equalizing effect will be found to act as a corrective, and it does not appear at all probable that our western commerce is in danger of extinction at the hands of Oriental competition. The Oriental will be a keen competitor, but judging from his character he will not originate, but will be a very successful copyist. The initiative will be found without doubt in Europe and America.

Apart from China and the French colonies in the East, trade there is less restricted than in Europe. In China the unwillingness of the ruling classes to admit the foreigner, the insecurity of capital, the fluctuating currency, and greater than all, the poverty of the millions, are the great obstacles in the way of the western trader. These are obstacles that cannot be appreciated at their full value without a knowledge of the Chinese character, of its inertness, its placid content with things as they are, its sense of superiority over the Barbarian. Under these existing conditions no opening of the trade door will take place from within, but the country will have to be burglarized by the Occidental nations, and this will probably not be long deferred. What form the forcible entry will take is not apparent, but it appears that as it requires an Asiatic to deal with an Asiatic, Japan and Russia are best fitted to obtain the advantage, and to hold it when obtained. If the open door policy prevail there will be large openings for railway enterprise. Many lines are already projected, but the question as to whether they would pay in many cases is exceedingly problematical, as China has a tremendous canal system, with cheap native labor as the motive power. However, many will be built, and this will require the services of many engineers and great quantities of materials. In the mining field the prospects are exceedingly good, the country having coal in many provinces and minerals in abundance. This, with cheap labor, will stand in the way of great importations of raw materials, and whatever staples are required will be manufactured in the country, so that given the open door policy, the first effect would be the importation of engineering materials and machinery, but it seems improbable that any great increase in staple imports could take place. This lesson may be learned from the history of Japan, where imports are decreasing and exports increasing—although the process in China will be very much slower.

With the exception of the larger electrical machinery, Japan can and does manufacture for herself. China at

the present does not know that she requires any, and the other Eastern countries, while dimly conscious of the advantages of electric light and transportation, are apparently too inert to take the question up for themselves. It does appear, however, that live concerns going into the business as a specialty and covering the whole electrical field would be able to show good results, even at the present time, especially in small lines such as fans, bells, telephones, etc., the installation of ship plants, etc., with an occasional local plant, and perhaps an electric railway or two. The methods of selling electrical apparatus as at present carried on is very crude, large business houses handling the apparatus as they would hardware, without pushing sales, and being without the special knowledge which is required for this work, there are continual troubles with apparatus, and, generally speaking, there is no life in the trade. In many other lines the same methods prevail, and there is no effort made to thrust manufactures under the eyes of the customer and make trade. The Canadian Pacific Railway Company, in establishing the splendid steamship service to the East, has done much for Canada and Canadian trade, and it is owing to this fact that most of the Europeans and many of the Orientals have crossed Canada, and its products are known and could be largely extended in this field where enterprising management is seldom met with.



General View of the Chaudiere District, Showing Seat of the Recent Fire.

THE HULL-OTTAWA FIRE.

Presented herewith are some views bearing upon the disastrous fire which occurred in Ottawa and Hull on April 26th last by which the electrical interests of that city suffered severely. The first illustration will give the reader a general idea of the magnitude of the fire and of the extent of the fire-swept district. Figure 2 is a view from Parliament hill of the fire while in progress, while the third illustration shows the ruins of the burned power house of the Ottawa Street Railway. The Street Railway Company had two power houses, the one recently built being a fire-proof construction and containing a 1,200 kilowatt generator direct connected to Stillwell-Bierce horizontal turbines. The roof of this building was not built on an absolutely fire-proof plan, being of corrugated iron laid over wooden rafters. The intense heat caused the roof to melt, the blazing mass falling upon the generator, but, it is said, without injury to it or any portion of the electrical plant. The old power house which was destroyed was operated by steam, and was to have been used as an auxiliary to the new power plant.

The Ottawa Electric Company suffered the loss of their four sub-stations, including the arc light station. They estimate their loss at $100,000. The work of rebuilding their plant is progressing rapidly, under the superintendence of Mr. A. A. Dion. Considering the great destruction, the customers of the company have suffered very little inconvenience, as new machines arrived the next day and were set up in a fire-proof building, owned by Mr. J. R. Booth, and once used as a saw mill. These machines are now being temporarily operated by two water wheels loaned for the purpose by Mr. Booth.

The destruction of a large portion of the plant of the Ottawa Electric Company has revived the agitation on behalf of certain members of the city council for the purchase and control of the plant by the municipality. Some months ago a special committee was appointed to report on the advisability of purchasing a municipal plant. The price at which the Ottawa company offered to dispose of their property to the city did not meet with the approval of this committee, who contend that in some respects the plant was not up-to-date. Now that the company are installing new and modern machines, it is thought that the present is an opportune time to renew the negotiations.

Another possible result of the fire is said to be the establishment of a large central power house at the Chaudiere. A scheme is announced to be on the tapis, the object of which is to secure the amalgamation of the manufacturing interests for the purpose of erecting a large power house to supply electric energy to the various industries in Ottawa and Hull adjacent to the Chaudiere. It is pointed out that the carbide establishments will require considerable power, and it is thought that it would be possible to induce a number of new industries to locate there.

It has been announced that the Slave Lake Power Company, which purposes developing the water power at Slave Lake falls and transmitting electric power to Vancouver, B. C., have accepted the offer of the London Gold Fields Company to provide the necessary funds for the project. From this it appears that the proposition is likely to be carried to completion.

BELTS AND PULLEYS.

THE following questions are asked by a correspondent of Modern Machinery:

(1). How shall I determine the exact amount to cut out of a belt where a small pulley has been substituted for a larger one? (2) Is their gain or loss of power where two large pulleys are removed from shafts that run at the same speed, and a smaller one substituted, keeping the speed constant? (3) Which side of the belt should be put next to the pulley, and why?

The answers are as follows: (1) We advise you to use a tape line or a cord that will not stretch, and draw it over the pulleys, thus finding the exact length needed. If the new pulley is not much smaller than the old one, their respective circumferences may be calculated, and one-half of the difference taken, but if the diameter is very much less than before, the change in the angle of the two sides of the belt will affect the result. Therefore, the tape line method is the safest. (2) If you mean to ask whether more or less power can be transmitted, we should say less, for the belt speed is reduced and less surface is in contact with the pulleys, both of which are factors in the calculation. If you mean to ask which will require the most power to drive, there will be a slight difference in favor of using the smaller pulleys. (3) When a double belt is made, the hair or smooth sides are always put outward, so that it makes no difference which way the belt is put on, except on account of the rivets, and this shows plainly what the belt manufacturer thinks about it. If a single belt is examined it will be found that the rivet heads, which should run next to the pulley, are on the hair side, thus showing that the maker intended this side for the pulleys. The matter is in much dispute among machinists and mill men, and it probably always will be.

VIEW FROM PARLIAMENT HILL OF THE HULL-OTTAWA FIRE WHILE IN PROGRESS.

THE HULL-OTTAWA FIRE—RUINS OF THE STREET RAILWAY POWER HOUSE.

The Sydney Record states that the Sydney Gas & Electric Company have just put in a new 200 light dynamo and a 100 k.w. S.K.C. two-phase generator, a 250 h.p. tandem side-crank engine, and a 250 h.p. improved Mumford boiler.

The Electrical Construction Co., of London, Limited, have recently received orders for nine motors of various sizes from their agents in Montreal.

A by-law was carried on May 28th authorizing the council of Morrisburg, Ont., to acquire water privileges from the Dominion government and to construct electric light and power works. The vote stood 141 for and 16 against.

MONTREAL

Branch Office of the CANADIAN ELECTRICAL NEWS,
Imperial Building,

MONTREAL, June 2nd, 1900.

THAT something is "in the wind" between the Royal Electric Company, Chambly Electric and Manufacturing Company, and the Montreal Street Railway Company, can be fairly taken for granted if there is any truth whatever in the many rumors around town. Some of these rumors have been denied in part, but only to crop up again in some other form and somehow refuse to be completely drowned. Names of prominent shareholders connected in the past with one concern are suddenly brought forward as acquiring stock now in one of the others. Some of the reports no doubt originate in the brains of our St. Francois Xavier street stock-brokers, who seem to delight in playing a sort of battledore and shuttle-cock game over Royal Electric and Montreal Street Railway stock, but if the latest report given on excellent authority be true, that the Chambly Company intend building a dam further up the river from their present one, then the statements of ocal members of the electrical fraternity bear the stamp of possibility, viz: It is stated that the Montreal Street Railway directors have been watching closely the development of both the Lachine and Chambly water powers with a view to utilizing at least a portion of one or the other company's output. They saw that the Lachine Company had considerable ice troubles their first winter, and also that the Chambly Company, who had this experience to profit by, did not entirely succeed in freeing themselves from ice troubles when they ran through their first winter. The Montreal Street Railway have also no doubt seen that the Lachine Company have run through their second winter without a hitch from ice trouble, and can see the precautions being taken by the Chambly Company to prevent any trouble whatever arising from this source again, as well as the projected works for increased power. Under the circumstances it is highly possible that they should wish to make use of this cheaper method of producing power, and have now sufficient confidence in the scheme to warrant their allying themselves, naturally to the company with whom they are most intimately connected, i.e., Chambly Electric and Manufacturing Company and Royal Electric Company. As to these two companies themselves, as one cannot live without the other, it would surprise no one if they amalgamated, in fact, it is almost a foregone conclusion. That the Montreal Street Railway, however, intend closing down their present steam power house in the near future is, as Kipling says, "another story."

ELECTRICAL SUPPLY HOUSES.

It is not so many years ago that the well-known firm of Munderloh & Company went into the electrical supply business. Formerly the firm handled glassware and a choice line of dry goods specialties. They also acted as agents for the Hansa line of steamships, and their late senior partner was the respected consul of the German Empire. This firm, however, noting the strides electricity was commencing to make, a few years ago decided to try and take a hand in the game—and with astonishing success. First, their action was a wise one, namely, to secure some person capable of handling this new branch of their business who fully understood it, and their happy choice fell on Mr. John A. Burns, who is a Montreal boy and a McGill graduate, having passed with honors and a degree of B.A. Sc. One of their first and best agencies is probably that of the General Electric Company, of Berlin ("Allgemeine Elektricitats Gesellschaft"), whose products, notably the A. E. G. well known incandescent lamp, they still continue to handle. Mr. Burns soon perceived that if he wished to avoid the formerly slurring expression "made in Germany," that he must educate his German manufacturers to produce the shape, style, etc., best suited to this market. It is a well known fact that the German workman can imitate almost anything, if given the opportunity and the price to do so. In this case the opportunity was given and the directions furnished to make a first-class high-priced (i.e., for Germany) article. The success of the scheme is evident, for although formerly the A. E. G. Company sold an enormous quantity of lamps in Europe, the shape, base, style, etc., did not take here, but after the "coaching" they received the result is that their American pattern lamp has a large sale, not only in Canada but in the neighboring republic. Mr. Burns has also succeeded in importing a two-wire porcelain cleat made according to specification, which surpasses in appearance any cleat produced in this market or in the United States. Messrs. Munderloh & Company also carry a full line of annunciators, electric light shades, cut-outs, batteries, switches, etc., from prominent United States centres, and have just lately started a manufacturing department for fixtures, brackets, and the like. The designs are mostly the work of Mr. Burns, who is a "worker," and spares neither trouble nor time to push forward his department. To use the words of one who knows a fixture—"their excellent finish and perfection in lacquering, combined with solid mechanical work, would put to shame some large Canadian houses who have been longer in the business and who make more pretence at fixture-making." It is understood a catalogue is in course of compilation. As Messss. Munderloh & Company stick to their own legitimate business and do no contract work, they have on their books a large number of contractors' names in Montreal and throughout Canada.

Many years ago, when incandescent lamps were more of a novelty than they are to-day, and when their "novel" price was kept up by those "in the ring," a gentleman of electrical aspirations, who will be nameless (as it will suffice to say that he never became friendly with any of the electrical fraternity, was more famed for his "avoirdupois" than for celerity, and has somehow been lost track of in the grand race for prominence in matters electrical,) got hold of an Austrian or Hungarian lamp agency. Seeing, evidently, that he could not "work" it alone, he sought for some one of more ability, and luckily happened to hit on John Forman, now of electrical supply fame in Montreal. Mr. Forman, with his natural shrewdness, it is said, declined the assistance (?), but offered good money for it to run alone, which history says was accepted. We here lose track of the electrical aspirant (sic) and turn to John Forman. So far as we are aware this was Mr. Forman's first venture in the electrical field. He was then, if memory serves aright, occupying chambers in the Chesterfield building on St. Alexis street. Seeing the possibilities before him, Mr. Forman took up other agencies, such as the Ediswan Company, and Crompton & Company, of London, Eng. He then opened with a well selected stock on Craig street, about number 650, moving some months later to the old stand of T. W. Ness at 644 Craig street. Here Mr. Forman, seeing the delays unavoidable with English agencies, turned his eyes to the United States also, and added many valuable lines to his already growing list. Just a few months ago Mr. Forman moved his business into the elegant building further west on Craig street, vis a vis to Alexander street, where he has a general electrical supply stock that would be hard to beat. Motors, push-buttons, switches, batteries, wire, bells, etc., are to be seen on the premises. When the Canadian Bryant Company wound up their business in Montreal, their stock, assembled and unassembled, was purchased by Mr. Forman, who continues to supply their well known types of cut-outs, sockets, rosettes, etc. Among Mr. Forman's latest acquisitions in the way of agencies may be mentioned those of the Gordon (formerly Gordon-Burnham) batteries, and the Lawrence Gas Fixture Company's electroliers, brackets, ceiling pieces, etc. For this latter agency he has, at considerable expense, fitted up a special show-room, handsomely and tastefully decorated. The colors of the decorations have been well chosen so as to make a telling effect on the fixtures, which in themselves are certainly choice and of late design. It is said that the total equipment of fixtures and brackets for the residential flats built by Mr. M. S. Foley on Dominion Square, have been furnished by Mr. Forman. From the foregoing it will be seen that any buyer will be well rewarded by paying Mr. Forman's establishment a call, and he will have to ask for something rather out of the ordinary if it cannot be shown him there.

Mr. R. E. T. Pringle, son of the well known hydraulic engineer, Mr. Thos. Pringle, and now possessor of one of the largest electrical supply houses in the Dominion, is well versed in electrical industries, having at one time occupied the post of superintendent in the factory of the Royal Electric Company. His establishment, which lately comprised two stores, one on St. James street and one on Craig street, has been now gathered together into the Craig street premises, which were much the larger of the two. This consolidation is appreciated by customers and gave Mr. Pringle an opportunity to put in, as he has done, a well selected and exceedingly varied stock—English goods, such as decorated push buttons, counterweights, etc., and American goods such as Patrick, Carter & Co.'s annunciators, Western Electric Co.'s lines, etc. In the Canadian goods, Mr. Pringle handles all the Packard specialties, such as transformers, lamps, and meters, and last but not least, the C. P. specialties. The trade mark

"C. P." is quoted by some as meaning "Canadian Produce," and by others as Cary & Pringle (Mr. Cary being the well known manager of the Packard Company.) Be this as it may, the trade in general owe them a debt of gratitude, for at the time this line of C. P. rosettes, sockets, cut-outs, switches, etc., were put on the market, we were just about in shape to be dictated to by a large United States combine, but C. P. spoiled the little game entirely. Mr. Pringle handles enormous quantities of wire, the weatherproof lines from a noted Canadian factory, and the rubber covered from a prominent United States concern. The popular sales manager for Mr. Pringle is Mr. Geo. Rough, who is well acquainted with the business, having taken a hand at it himself in the past when in St. Jo, Miss. *Mr. Rough is a Montreal boy and eminently successful in* making sales. Buyers calling at Mr. Pringle's will have to be hard to please if they cannot find what they are looking for, or if they have anything to cavil at in their treatment. We hear a good deal from supply houses across the line when they make a big sale; they are apt to print fac similes of cheques they receive for their goods, etc. It is a fact, however, that such items are of every-day occurrence with R. E. T. Pringle, and no fuss made over it either; in fact, were it not for this quiet manner in which their business is done, this item could be greatly extended, but their policy is not to blow trumpets.

NOTES.

We hear that Mr. George Hill, formerly employed by John Forman, electrical supply dealer, is now no longer with that firm.

Mr. John Shaw, of the Montreal Electric Company, who has been more or less of an invalid for six months past, is now able to put in a daily appearance at the office.

Mr. N. L. Piper, of Messrs. Noah L. Piper & Sons, Toronto, manufacturers of reflector shades, etc., is doing a good business with the electrical supply dealers in Montreal, and no representative is more esteemed. Mr. Piper is a man of few words; he sells his goods on their merits, and stands behind them.

The setting in of warmer weather seems to be having its effect in developing the usual spring crop of mushroom electrical contractors. There are many around already soliciting contracts who do not appear to know the difference between a cut-out and a socket. It is rather a pity that the winter is so severe in Montreal, so many "promising" saplings wither away before they have time to make a good sized tree.

Mr. Wm. Allan, the veteran engineer and dynamo tender at the Canadian Pacific Railway plant, Bisson street, has, we hear, resigned his position, to take a similar one with Messrs. Tooke Bros., St. Henri, whose electrical equipment has already been described in these columns. Mr. Allan has the good wishes of his electrical friends in his new sphere.

The promoters of the Shawinigan Falls plant speak of transmitting power to Montreal. As the distance is 80 miles, some electricians doubt if it will be a commercial or rather financial success, taking into consideration the high voltage required and our climate. Another phase may soon appear, and that is, that the supply of such power will exceed the demand. However, the enterprise deserves good wishes, and any electrical difficulties that may crop up will only be an incentive to their electricians to overcome, and the data on such will be sure to interest the electrical fraternity generally.

A couple of steam automobiles are in town, one belonging to Mr. Dandurand, of Queen's Park "bicycle track" fame, the other to the Cycle & Automobile Company, whose office is in Windsor Hotel block. As yet no manufacturer has tried conclusions with our hills with a storage battery electro-mobile, but it is rumored that an electro-mobile is under construction in the city.

There have been of late several accidents in this city, due to the electric current. A man named Zori Daw received an electric shock while working among wires at the corner of Notre Dame and Fulford streets, and was taken to the Notre Dame Hospital. R. F. Girdwood, employed by the Royal Electric Company, had a narrow escape from death. He was engaged in making a test of some apparatus when another workman, not knowing his position, turned on a current of 6000 volts. Besides receiving a severe shock, he was badly burned, and was removed to the hospital, where he is improving. It would seem that when any such testing is being done with the apparatus at a distance from the switch, it would be desirable to have a third party mid-way between, who would act as a check or safe-guard, in case of a misunderstanding of orders called from one employee to the other. The widow of George Peace is suing the city for $10,000 damages consequent upon the death of her husband, who was killed by an electric shock at the incinerator on St. Patrick street on November 10th last. Negligence on the part of the city is alleged.

DOMES ON STEAM BOILERS.

By W. H. Wakeman.

A few days ago I fired up a boiler that had not been used for six months. After the air was forced out of it by the steam, through an open safety valve, the valve was closed and pressure allowed to accumulate. It was not tight, so I raised the lever and let steam blow freely through it. At first this steam was dry, but after about 30 seconds the discharge pipe was nearly half full of water that was coming out with the steam. As this boiler has no dome on it my attention was called by the incident to the difference between boilers that have domes and those that have none. In the above mentioned case the boiler was not flooded with water, as there was only two gauges, or no more than would be carried in practice.

The philosophy of the water coming out with the steam is as follows: When the safety valve was lifted enough to give the full capacity of pipe, there was a very great rush of steam through it, which lowered the pressure on the surface of the water immediately under the steam pipe. I do not mean to say that it was lowered very much, for it probably was not, but a difference of one pound is enough to cause trouble; for, as the pressure is maintained on the remainder of the water surface, it forces the water directly below the steam pipe out with the steam. Domes are put on boilers to obviate the evil, for they afford a very much larger opening for the escape of steam, consequently the velocity is less, and the water below the opening is not forced up with the steam. It is not assumed that the shell is cut away for the full size of the dome, as that would weaken the shell more than is necessary, but an opening that is twice the diameter of the steam pipe should be provided. Where there is a manhole in the dome, the shell is cut away enough to make an opening as large as the manhole. Those people who object to domes point out the fact that an opening of this size greatly reduces the strength of the boiler, but there is no good reason for this remaining so.

A boiler without a dome is usually fitted with a manhole in the shell, and this is reinforced with a frame that is supposed to be as strong as the metal in the shell was before it was removed. Suppose it was decided to put a dome on his boiler, and to locate it over the top manhole. Could any boiler maker consider it necesary to remove the frame as useless? I think not, for he would say that it supported the shell and made the whole structure stronger than it otherwise would be. This being true, why is it not good policy to put on a supporting frame inside of the dome when a boiler is built? If this was done the claim that a dome weakens the shell of a boiler would no longer be tenable; and this is the principal objection to having one included in the specifications. The claim that it acts as a reservoir for steam, to be used when wanted, as presented by those who favor it, is not worthy of serious consideration on account of its small capacity; neither is the objection offered to it by the opposition, who say that it acts as a condenser, as the surface exposed is not large, and it should be protected by some good covering. The conclusion of the whole matter is, therefore, that a dome furnishes dry steam to the engine as above described, and it does not weaken the shell when properly constructed, any more than it does to put a manhole in shell at some other point.—The Wood-Worker.

ENGINEERING and MECHANICS

EXAMINATION OF ENGINEERS.

By W. H. Wakeman.

The examination of steam engineers for licenses on land or sea, or for admission into the various societies that are supported for the purpose of benefitting the craft, is always an interesting subject, and to prospective candidates for these honors it is peculiarly fascinating. As a rule an examining board does not adopt a list of questions for those to answer who apply for examination, although it may have such a list from which to make selections for use at various times. This makes it practically impossible to inform the candidate in advance of what he will be required to answer. He must therefore gain a general knowledge of the business, and having become well grounded in its fundamental principles, apply them to the solution of problems presented, use good judgment in formulating replies and never get nervous or excited.

All men are not qualified to pass these examinations, neither is every man who finds himself a member of an examining board qualified to discharge the duties of that important position.

Sometime ago it was the writer's privilege to attend an important meeting of engineers, a feature of which was an ideal examination of a candidate for admission to their ranks, and as much interest in the questions asked has been manifested, an article in which these questions are fully answered will prove benificial to many others interested.

There were twenty-five questions propounded, and while the replies given here are more elaborate than can be allowed for an ordinary examination, they are none too explicit to convey a full and correct knowledge of the subjects treated. The questions, answers, and explanations follow:

1. How would you proceed to inspect a boiler?

A. Every part of the shell, tubes and heads that can be reached should be examined and a thorough search made for places affected by internal or external corrosion, pitting, cracks, blisters, and bagging caused by lack of water.

Internal corrosion may be caused by steam and water leaking into a not in use, or by certain impurities in the feed water while it is under pressure every day. External corrosion is caused by water dripping on the outside of it from leaky steam pipe, valve stem, or on account of holes in the boiler house roof.

Pitting is caused by impure feed water, and sometimes by allowing a boiler to stand many days with warm water in it, although said water may be pure. In some cases small blisters are raised on the metal, and when these are broken, pits, or hollow places are found under them.

Cracks are caused by unequal contraction and expansion, by injudicious use of the drift pin, and by expanding tubes into the heads. Very close examination will disclose their presence, and sheets and heads that are imperfect in this respect may be detected by means of a light steel hammer in the hands of an experienced engineer, as when they are struck the sound differs from that given out by sound iron or steel.

Blisters are caused by imperfections in iron plates, for where several pieces are rolled together to make a boiler plate the weld may not be perfect throughout the whole piece, and when put into hard service the different layers become separated and a blister is formed. If the defect does not not extend deep into the plate it may be trimmed, its extent carefully noted, and if the remaining portion is as strong as the riveted joint, no further precautions are necessary, except to make sure that it does not spread. If the blister is large and deep it will be necessary to cut it out and put on a patch.

The bagging of a sheet is caused by lack of water in direct contact with it. This does not necessarily mean that the water line has been allowed to fall so low that the part has been uncovered, for grease may have collected upon the sheet and thus effectually prevented the water from retaining it, the result of which is that it has been overheated and the pressure has bulged it out, or caused a "bag" to appear.

All of the rivets should be tested in order to detect loose ones, and every brace examined, for if one is loose or broken it will cause unnecessary stress to come upon others, which may strain or break them. While the engineer or inspector is inside the boiler, he should see that all the pipes connecting try cocks, water and steam gauges are free from rust and sediment, and if an excessive amount of scale is on the tubes and shell it should be removed. The safety valve should be examined and tested in order that it may be known to be in good working order, and all superfluous weights removed from its lever.

2. A boiler is sixty-six inches in diameter, the plates are three-eighths-inch thick, and have a tensile strength of 60,000 pounds per square inch of sectional area. The strength of the seams is 75 per cent. of the solid plate and the factor of safety is 5. What is the safe working pressure?

A One hundred and two pounds. It is calculated as follows (for every applicant for a license should be able to explain the examples given him): The plates possess a tensile strength of 60,000 pounds per square inch of sectional area, but they are only three-eighths inch thick, therefore the ultimate strength of a strip one inch wide is $60{,}000 \times .375 = 22{,}500$ pounds. ($\frac{3}{8} = .375$.

A boiler plate cannot be considered stronger than its weakest part, and in this case the seam has 75 per cent. of the strength of solid plate, therefore $22{,}500 \times .75 = 16{,}875$ pounds, which is the actual strength of the plate put into this boiler, calculated from the weakest part, which is the seam. This is to be divided by one-half of the diameter, and $16{,}875 \div (66 \div 2) = 511$ pounds, which is the bursting pressure of this boiler. The factor of safety is 5, which means the bursting pressure is to be divided by 5 to obtain the safe working pressure. $511 \div 5 = 102$ pounds.

3. The area of a safety valve is ten square inches the steam pressure ninety pounds, and the distance from valve to fulcrum is three inches, and the ball weighs one hundred pounds. What should be length of the lever in order that the weight shall balance the steam pressure, neglecting the weight of valve and lever?

A. Twenty-seven inches. As the area of valve is ten square inches, the pressure ninety pounds, and the distance from valve to fulcrum three inches, these factors must be multiplied together and the product divided by weight of ball. $10 \times 90 \times 3 \div 100 = 27$.

4. Give the principal cause or causes for boiler explosions?

A. There is nothing mysterious about boiler explosions, as they are all caused by putting more pressure on than the boilers are able to carry, hence the failures. There is, however, a variety of reasons for this, as a boiler may have become weakened by abuse and unavoidable wear, until it is no longer strong enough to carry the ordinary working pressure. In many cases where boilers are not insured, the pressure to be carried is determined by what is needed to drive the engine, without regard to the strength of boiler. Some of the defects which weaken a boiler are so covered that it is impossible to detect them, and several explosions have occurred from this cause. Incorrect steam gauges and safety valves that require the use of a sledge hammer to lift them from their seats have caused explosions from over-pressure.

5. The crank of an engine is fifteen inches long and makes ninety revolutions per minute. How many feet does the piston travel in a minute?

A. Four hundred and fifty feet. As the crank is fifteen inches long, the stroke is 30 inches, so that the piston travels sixty inches per revolution, and $60 \times 90 \div 12 = 450$ feet. Some confusion seems to exist among men in charge of steam plants who are not well informed, concerning the proper way to measure the stroke of an engine, and some amusing results have been secured in efforts to calculate the piston speed under these conditions, but the above way is correct for making the calculation, and the way to determine the length of the crank is to measure from the centre of crank shaft to the centre of crank pin.

6. The initial pressure on a piston is seventy pounds and the compression is thirty-five pounds, both gauge pressures. Is the clearance half filled?

A. This is one of the questions intended to "catch" the candidate, or, in other words, to offer a test for quick action in arriving at conclusions, as the reply involves the consideration of several things. When the writer first heard that question it appeared as if the intention was to ask if the compression pressure equalled one-half of the initial pressure, when both are measured from a perfect vacuum, as this is the true basis from which to start. If we take the atmospheric pressure at fifteen pounds the total initial pressure is eighty-five pounds, and the compression fifty pounds, so that the latter is more than one-half the former. Such a reply might be understood as an attempt to put an incorrect construction upon sentences that are very plainly worded, and a candidate

is always justified in taking questions as they are given him. Viewing it in this light the reply would be, No.

The explanation of this is as follows: Under ordinary conditions we say that when a space is filled with steam, even if the pressure is only one pound above a vacuum, it is full, because nothing is there but steam, and yet when we bring the whole matter down to what is technically correct, a space is never full so long as it is possible to get anything more into it, therefore when steam is forced in until the pressure is thirty-five pounds by the gauge, it is not one-half full, neither is it full when the pressure rises to seventy pounds, for more can be forced into it, and it is difficult to locate the limit.

7. How do you find the ratio of expansion for a compound engine?

A. There are two ways of doing this, one of which is to determine the volume of the high pressure up to the point of cut off, also the total volume of the low pressure cylinder. Divide the latter by the former and the quotient is the ratio of expansion for the engine. The other is to multiply the ratio of expansion in the high pressure cylinder by the ratio in the low pressure, and the product will be the total ratio. There are many engineers in charge of fine plants that do not understand this, for it appears as if the ratios of the two cylinders should be added together instead of multiplied.

Take the case of an engine with a high pressure cylinder twenty inches and a low pressure forty inches in diameter, making the areas 1 to 4, and assuming that the cut off takes place at one-quarter stroke. This makes the ratio 4 for the high pressure cylinder, because at the end of the stroke the space filled by the steam is four times as large as at the point of cut off. When the exhaust valve opens and allows the steam to go to the low pressure cylinder, it fills it at an equal pressure up to one-quarter stroke, at which point the ratio is still 4, but when the low pressure piston has advanced to one-third stroke it is 8, at three-quarters stroke it is 12, and at the end of the stroke it is 16. As it is 4 for each cylinder, it is $4 \times 4 = 16$ for the combined or total ratio. In this case the effects of clearance are neglected, in order to make the illustration simple and comprehensive.

8. The areas of the pistons of a three cylinder triple expansion engine are 100, 300 and 900 square inches respectively. The ratio of expansion in the high pressure cylinder is 3. What is the ratio in the intermediate cylinder? What is it for the low pressure cylinder? What is the combined ratio?

A. As the ratio in the first cylinder is 3 and the second or intermediate cylinder is three times as large, the cut off would take place at one-third stroke, making the ratio 3. The low pressure cylinder is three times as large as the intermediate, therefore the ratio is three for this also, and the combined ratio is $3 \times 3 \times 3 = 27$.

Another way to explain this is to assume that the stroke of all pistons is thirty-six inches, thus locating the cut-off in the high pressure cylinder at $36 \div 3 = 12$ inches. The contents of it up to this point is $100 \times 12 = 1,200$ cubic inches. The contents of the low pressure cylinder is $900 \times 36 = 32,400$, and dividing one by the other shows that $32,400 \div 1,200 = 27$.

9. What is latent heat?

A. Heat that is not indicated by a thermometer. Heat is a form of motion, so that when water is heated to the boiling point the molecules of which it is composed are set in active motion. This is indicated by a thermometer, but when more heat is applied in order to increase the motion of the molecules and throw them further apart so as to form steam, it is not shown by a column of mercury, therefore it is said to be latent or hidden.

10. What is sensible heat?

A. Heat that is indicated by a thermometer, or that is sensible to the touch.

11. What is meant by the absolute zero of temperature?

A. It means a temperature so low that it is impossible for it to go lower. In other words, it means when the molecules are brought to a state of perfect rest. This has never been secured in practice, and is therefore a theoretical calculation only, but it is necessary for use in many engineering calculations. By the Fahrenheit scale it is 461, by Reaumer 229, and Centigrade 274 degrees below zero.

For the Fahrenheit scale, which is the one most commonly used in the United States, it is calculated as follows: It has been determined that a quantity of mercury will shrink about $\frac{1}{491}$ of its bulk for each degree that its temperature is lowered. Starting at the freezing point, which is 32 degrees, in order to reduce its bulk to nothing it must fall about 493 degrees, or to $493 - 32 = 461$ degrees below zero.

12. What is the total weight of a column of water whose cross-section is nine square inches, the height being one hundred feet and the temperature 62 degrees Fahrenheit?

A. 389.375 pounds. As the cross section of this column contains nine square inches and it is $100 \times 12 = 1,200$ inches high, it contains $9 \times 1,200 = 10,800$ cubic inches, or $10,800 \div 1,728 = 6.25$ cubic feet. At a temperature of 62 degrees, one cubic foot weighs 62 3 pounds, and the whole will weigh $6.25 \times 62.3 = 389.375$ pounds.

13. What is the difference between a continuous and an alternating current of electricity?

A. A continuous or constant current flows in one direction only, but an alternating current (as its name indicates) changes its direction, or alternates many times per second, the number depending upon the design of the generator that supplies the current.

14. When the reading of the voltmeter and the ammeter are given, how do you determine the electrical horse-power?

A. Multiply one by the other and divide by 746.

15. What is a volt?

A. It is the unit of pressure in electrical work, the same as the pound is for steam pressure. When the conductor cuts 100,000,000 lines of force per second, a pressure or potential of one volt is generated.

16. What is a kilowatt?

A. One thousand watts, and as 746 watts make one horse-power, a kilowatt is practically one and one-third horse power.

17. Explain briefly the theory of mechanical refrigeration.

A. Some liquid or gas, usually ammonia, is compressed by a mechanical device called a compressor, or by expansion caused by the application of heat, until a high pressure is secured, and the heat concentrated, after which it is removed by cold water in a condenser. Passing on through pipes until an expansion valve is reached it is allowed to expand into a much larger volume in pipes of greater diameter. As it does not contain heat enough to supply the increased volume, it attracts it from the surrounding air, in the direct expansion system, from the brine in the indirect system, thus producing a low temperature.

18. Why is ammonia used in this process?

A. Because it is readily obtained at a moderate price, it is quickly changed from a gas to a liquid, and its expansive properties are very great.

19. What is the latent heat of ice?

A. It is 142 heat units. It is so called because when ice is at a temperature of 32 degrees it requires the application of 142 heat units to melt one pound of it into water at 32 degrees, and when in the form of water as above stated, it is necessary to abstract 142 heat units in order to freeze it.

20. Why is salt water used in circulating pipes instead of fresh water?

A. Because it can be reduced to a lower temperature without freezing.

21. What is a gas engine?

A. It is an engine in which either natural or manufactured gas is burned in the cylinder in order to move the piston.

22. What is a gasolene engine?

A. An engine in which the gas formed from gasolene is burned in the cylinder.

23. How do you determine the mean effective pressure of a gas engine?

A. A diagram is taken and its mean effective pressure computed the same as for a steam engine, but the time during which this pressure is acting on the piston must be taken into account. If there is one explosion for four strokes, the pressure shown by the diagram must be divided by four to decide the mean effective pressure for the full piston speed, or the actual mean effective pressure for one stroke may be taken, and one-fourth of the piston speed taken when calculating the power developed by the engine.

24. What is meant by a two cycle engine.

A. It means an engine in which there is one explosion of gas for each two strokes made. The term "two stroke cycle" is much more comprehensive.

25. Why are heavier fly wheels used on gas engines than for steam engines of the same power?

A. It is necessary to do this in order to maintain steady speed. In some engines there is one explosion for two revolutions of the machine, thus making the impulses far apart, so that in the absence of heavy fly wheels or balance wheels, to absorb and give out the power developed, the speed would be very unsatisfactory. The same is true, in a less degree, of two cycle engines. The Tradesman.

ONTARIO ASSOCIATION OF STATIONARY ENGINEERS.

The Ontario Association of Stationary Engineers held their annual convention in London on May 28th, at which there was present a good representation of the certificate holders. The report of the registrar as to the membership showed 917 as the total number upon the books, of which 13 have died, 8 are blank numbers, and 154 have been cancelled, leaving 742 members on the books.

The financial statement of the treasurer showed an income, including the balance from last year, of $653.99, and an expenditure of $517.89, leaving a balance on hand of $136.10.

A full discussion of the license law and the prospect of having it passed, brought out the fact that many steam users who were at one time opposed to the measure, were now favourable to it, and a committee was appointed to further enlighten the steam users generally as to the working of the proposed act.

The election to fill the place of the retiring members of the board, resulted in the selection of Messrs. O. P. St. John, of Toronto, A. E. Eakins, of Toronto, A. M. Wickens, of Toronto, and Alex. Findlay, of London. The board then elected its officers by selecting O. P. St. John as president; Thos. Elliott, of Hamilton, as vice-president; J. G. Bain, 113 Yorkville avenue, Toronto, registrar, and A. M. Wickens, of Toronto, treasurer.

A lively election occurred for the next place of meeting, St. Thomas, Paris, Brantford and Berlin all being named, with the result that the ballot was in favor of Berlin. The usual complimentary votes to the officers were then passed, and the meeting closed in time for most of the delegates to catch the evening trains for their respective homes.

ELECTRICALLY OPERATED CONDENSER.

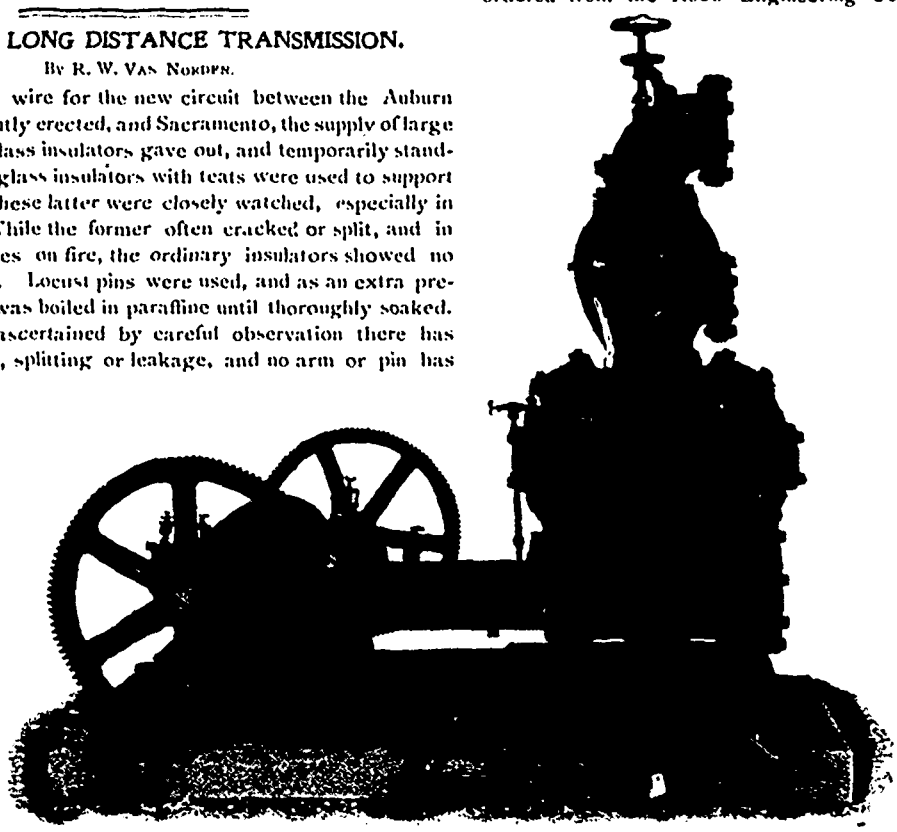
There was lately installed at the United States Government yard, Bremerton, Washington, an electric plant, one of the units of the plant being a special Smith-Vaile direct connected electrically operated jet condenser, as illustrated by half-tone engraving herewith. A sub-base is provided extending under the air cylinder, as well as condensing chamber, and also extended to receive a G. E. motor. The power end is provided with double reduction of gears; the motor is provided with raw-hide pinion, and there is also a raw-hide pinion on pinion shaft of condenser. The gears are machine cut; air cylinders removable and brass lined; air piston is of bronze, fibrous packed and provided with expansion ring; special priming valve is also furnished; and the condensing chamber is provided with special distributing valve.

The condenser was manufactured and installed by the Stillwell-Bierce & Smith-Vaile Co., of Dayton, Ohio.

HINTS ON LONG DISTANCE TRANSMISSION.

By R. W. Van Norden.

In stringing the wire for the new circuit between the Auburn power house, recently erected, and Sacramento, the supply of large tripple-petticoat glass insulators gave out, and temporarily standard two-petticoat glass insulators with teats were used to support a mile of wire. These latter were closely watched, especially in wind and rain. While the former often cracked or split, and in some cases set poles on fire, the ordinary insulators showed no signs of weakness. Locust pins were used, and as an extra precaution every pin was boiled in paraffine until thoroughly soaked. So far as can be ascertained by careful observation there has been no cracking, splitting or leakage, and no arm or pin has been burned or charred. The line has been cut out and thrown in suddenly every day for nine months; but while the water in a storm hangs from the teats and drips near the wire or upon the arms, no results detrimental to the proper working of the line have been observed. Several large glass insulators have passed through severe storms without accident, though badly cracked. It is therefore a natural conclusion that boiling the pins in paraffine is of extreme importance.



Smith-Vaile Direct Connected Jet Condenser.

The possibility of synchronizing the machine at Auburn with the Newcastle generators, the distance between the stations being some five and one-half miles, and the line of No. 4 copper wire, was seriously questioned by some authorities, who claimed that as the capacity of the line was small, the effect would be to cause a current lag or a change in the form of the electromotive force curve and make the machines pump or altogether fall out of synchronism. Not the slightest difficulty of this nature was experienced. In fact, when Station No. 2 comes in, the operator at Station No. 1 hardly knows the moment, there being only a slight movement of the ammeters.

At present all regulation (the system is hand regulated) is done at Station No. 1. Station No. 2 starts up with a specified load, and as the general load increases, at a telephone signal Station No. 2 augments its own load 100 horse power at a time, every hour or half hour, until the maximum is reached. The operation is then reversed until Station No. 2 is cut out entirely.

By this method no water is wasted at Station No. 1, where it is valuable for irrigation, etc., while at Station No. 2 the water must flow constantly, this station being on the same canal but farther up the country.

If for any reason the generator in Station No. 2 be underexcited, the difficulty can be remedied by over-exciting the lower generators. This causes a slight flattening of the electromotive force curve, however, so that a wattless current flows between the stations, which tends to make the voltmeters fluctuate very slowly but regularly about one volt, and the ammeters become unsteady.

The distance seems to have a cushioning effect, and it is not by any means so necessary to have the generators so near in synchronism when thrown together as when side by side.

It is therefore evident that stations may be distributed over considerable distance and yet run as one, all aiding to swell the total of current to be delivered.

*Paper read at the annual convention of the Pacific Coast Electric Transmission Association, San Francisco.

A COMPLIMENT TO CANADIAN ENGINEERING.

The Municipal Technical School, Manchester, England, has ordered from the Robb Engineering Co., of Amherst, Nova Scotia, a 150 h. p. tandem compound engine, to be directly coupled to dynamo from Dick, Kerr & Co., of London, for electric lighting. The order was given on the recommendation of Dr. J. T. Nicholson, Professor of Engineering, who was formerly at the Institute of Science, McGill University, and the purchasers state that this engine is to be placed with other engines of the leading British makers as an example of the best English and foreign practice in engineering.

The council of St. Mary's, Ont., have passed a by-law to provide $15,000 for the purpose of acquiring the electric light plant now owned by Mr. Reesor. The ratepayers will vote on the question on July 21st.

Mr. W. T. Steward, electrical engineer, Toronto, has removed from Temple Building to Room 38, Yonge Street Arcade. Mr. Steward has just given a valuation of the electric light plant at Galt, Ont., for the corporation.

In the report in last issue of the annual banquet of Hamilton No. 2, Canadian Association Stationary Engineers, it was stated that the response to the toast of "Education" was made by Mr. Geddes, of the Scranton School of Correspondence. This was an error, as Mr. Geddes represents the American School of Correspondence, of Boston.

HANDY WIRING TABLES.

BY "W. R."

In many shops and mills where the readers of this journal pass twelve out of the twenty-four hours of each day, six days in the week, says the Stationary Engineer, they have to attend a dynamo for three or more hours per day at this season of the year. Should another lamp be wanted in some closet or over some bench, the engineer, of course, is the one to put it in. Oftentimes he may be in doubt as to the size of wire to run by which he would be insured of getting the full candle power. The tables accompanying this will show the current required by lamps of different candle power and voltages and the size of wire for a given distance in feet for any number of lamps of the two principal voltages now in use, viz: 50 volt alternating and 110 volt direct. The tables are correct and conform to the rules of the board of fire underwriters, and are the same as are used by one of the largest construction companies in Massachusetts. The tables are of such convenience in running wire that the task of selecting the proper size becomes an easy matter, and engineers having electric light work to do should preserve them for future reference. Table No. 1 shows the current in amperes required by lamps of different candle power and designed for different voltages. Table No. 2 shows the size of wire required for any number of 16 c.p. 110 volt lamps with the average loss of 2% at any distance from 50 to 200 feet. Table 3 gives similar information regarding 16 c. p. 50 volt lamps.

TABLE I.

Amperes per Lamp at Different Voltages.

Voltage.	50	60	70	75	100	110	120
C. P.	Amperes.						
10	.80	.56	.50	.48	.46	.44	.43
16	1.0	.86	.76	.74	.60	.58	.56
20	1.5	1.15	1.11	1.10	.78	.76	.74
24	1.6	1.22	1.18	1.15	.80	.78	.76
32	2.40	1.70	1.50	1.45	1.20	1.18	1.16
50	3.50	2.30	2.25	2.20	1.72	1.68	1.60
75	4.20	3.50	3.45	3.40	2.42	2.36	2.30
100	6.80	4.60	4.40	4.35	3.25	3.20	3.15

Watts per lamp = E.M.F. × current.
Ex.:—50 volts × 1 ampere = 50 watts.

TABLE II.

16 c. p. 110 volt lamps.
Current per 16 c.p. lamp, 110 volt = .56 ampere. No. 16 wire is the smallest allowed to be used by the underwriters.

No. of lamps.	Distance in Feet.										
	50	60	70	80	90	100	120	140	160	180	200
	Size of Wire, B & S Gauge, 2% loss.										
1	16	16	16	16	16	16	16	16	16	16	16
2	16	16	16	16	16	16	16	16	16	16	16
3	16	16	16	16	16	16	16	16	16	16	16
4	16	16	16	16	16	16	16	16	15	15	15
5	16	16	16	16	16	16	16	13	13	13	12
6	16	16	16	15	15	15	14	13	13	12	12
7	16	16	16	14	14	14	13	13	12	11	11
8	16	16	15	14	14	13	13	12	11	11	10
9	16	15	14	14	13	13	12	11	11	10	10
10	15	14	14	13	13	12	12	11	10	10	9
12	15	14	13	13	12	12	11	10	10	9	9
14	14	13	13	12	11	11	10	10	9	8	8
16	13	13	12	11	11	10	10	9	8	8	7
18	13	12	11	11	10	10	9	8	8	7	7
20	12	12	11	10	10	9	9	8	7	7	6
25	11	11	10	9	9	8	8	7	6	6	5
30	11	10	9	9	8	8	7	6	6	5	5
35	10	9	9	8	7	7	6	6	5	4	4
40	9	9	8	7	7	6	6	5	4	4	3
45	9	8	7	7	6	6	5	4	4	3	3
50	9	8	7	6	6	5	5	4	3	3	2
60	8	7	6	6	5	5	4	3	3	2	2
70	7	6	6	5	4	4	3	3	2	1	1
80	6	6	5	4	4	3	3	2	1	1	0
90	6	5	4	4	3	3	2	2	1	0	0
100	5	5	4	3	3	2	2	1	0	0	0

TABLE III.

Sixteen c. p. 50 volt lamps. Loss 2% both sides of circuit.
Current per 16 c.p. 50 volt lamp = 1 ampere. No. 16 wire is the smallest allowed to be used by the underwriters.

No. of lamps.	Distance in Feet.												
	25	35	50	60	70	80	90	100	120	140	160	180	200
	Size of Wire, B and S Gauge.												
1	16	16	16	16	16	16	16	16	16	15	15	14	14
2	16	16	16	16	15	15	14	14	13	12	12	11	11
3	16	16	15	14	13	13	12	12	11	10	10	9	9
4	16	15	14	13	12	12	11	11	10	9	9	8	8
5	16	14	13	12	11	11	10	10	9	8	8	7	7
6	15	13	12	11	10	10	9	9	8	7	7	6	6
7	14	13	11	10	10	9	9	8	8	7	6	6	5
8	14	12	11	10	9	9	8	8	7	6	6	5	5
9	13	12	10	9	9	8	8	7	6	6	5	5	4
10	13	11	10	9	8	8	7	7	6	5	5	4	4
12	12	10	9	8	7	7	6	6	5	4	4	3	3
14	11	10	8	7	7	6	6	5	4	4	3	3	2
16	11	9	8	7	6	6	5	5	4	3	3	2	2
18	10	9	7	6	6	5	5	4	3	3	2	2	1
20	10	8	7	6	5	5	4	4	3	2	2	1	1
25	9	7	6	5	4	4	3	3	2	1	1	1	0
30	8	6	5	4	3	3	2	3	1	0	0	00	00
35	7	6	4	3	3	2	2	2	0	0	00	00	000
40	7	5	4	3	2	2	1	1	0	00	00	000	000
45	6	5	3	2	2	1	1	0	00	00	000	000	000
50	6	4	3	2	1	1	0	0	00	000	000	0000	0000
60	5	3	2	1	0	0	00	00	000	0000	0000	0000	
70	4	3	1	0	0	00	00	000	0000	0000	0000		
80	4	2	1	0	00	00	000	000	0000	0000			
90	3	2	0	00	00	000	000	0000	0000				
100	3	1	0	00	000	000	0000	0000					

BY THE WAY.

By the courtesy of Mr. E. B. Merrill, I have been privileged to glance over a letter received by him from a friend, who is a Lieutenant with the volunteer detachment of Electrical Engineers (R.E.) in South Africa. This detachment, consisting of fifty men and four officers, was organized early in the year, and their offered services were eagerly accepted by the War Office, who granted £5,000 for equipment and apparatus. This consists of two search light trains, each comprising a steam traction engine, and two 24-inch projections, the latter mounted on gun carriages. Each train consists of twenty-three men commanded by a Captain. Each dynamo is mounted on a bracket in front of the engine and arranged for link belt drive. While the apparatus was being manufactured, the detachment were given a "send off" dinner at the Princes' restaurant in London, at which Lord Kelvin presided, and were also entertained by the Mayor and Corporation of Chelmsford. On March 16th they sailed for Cape Town. I quote from the letter the following further particulars: "Our plant is of our own design and something completely new in the field. The navy had already improvised lights by taking theirs off their decks and screwing them onto railway trucks, but their use was only for signalling, and they are tied to the railway line, whereas ours are perfectly as movable as field guns, and we are to take them right into the firing line, one idea being to cover the advance of men at night with a screen of light, and of course we would also be used in connection with heavy artillery for siege purposes. We have also got some very neat field telephone gear, and we have arranged bikes to carry reels of 22 bare copper wire, which can be paid out on the veldt at the rate of ten miles an hour if necessary. It is astonishing how little insulation is required. At some experimental runs we buried the two experimental wires in mud 10 feet apart at a road crossing, and the talking was quite distinct. We have also got a very complete equipment of tools, so that it would be a queer job that we could not tackle. We can work the lights up to a distance of one mile from the generator, the cables being arranged on drums mounted on gun wheels. As one instance of our usefulness, we could have enabled the artillery to reduce Cronje's defence in a couple of days, because he could not have had a chance to entrench at night time."

BURLEIGH FALLS POWER DEVELOPMENT.

On Monday, June 4th, upon the invitation of Mr. J. A. Culverwell, managing director of the Central Ontario Power Company, a party of gentlemen from Lindsay and Peterborough made a visit of inspection to Burleigh Falls, where the plant of the company is to be located. On arriving at Burleigh Falls, per steamer from Lakefield, they crossed over to the mouth of Perry's Creek. The channel forms the overflow from the waters held back by the large dam above, and down its course an immense volume of water was racing. Fifty yards from where the creek empties into the lake the sides of the gorge come together within a few feet, and at this point the power dam will be placed. The solid granite sides of the gorge slope up from the narrow bottom in the form of a V, affording facilities for the strongest possible construction. It is proposed to build the dam of rock and concrete. The head of water is estimated at from 27 to 30 feet. The visitors were much impressed with the immense source of power, and the purposes of the company were explained to them, after which dinner was partaken of at the Burleigh Falls hotel, and some brief addresses given by Mr. Culverwell, Mr. McLaughlin, solicitor for the company, and others.

PERSONAL.

Mr. J. W. Marr, chief engineer for the Metropolitan Railway Co., has resigned his position.

Ald. Robt. C. Pettigrew, president of the Canadian Association Stationery Engineers, was elected one of the board of managers of the Hamilton Art School at the annual meeting on May 28th.

Mr. Geo. McDonald, late electrician for the city of Moncton, N. B., has been engaged to superintend the installation of the electric power plant of the Truro Knitting Mills Co. at Truro, N. S.

Mr. Albert Mitchell, who succeeded Mr. Somerset as superintendent of the Winnipeg Street Railway, has resigned this position and has gone to Perth, West Australia, to engage in railway work.

Mr. J. Alex. Culverwell, electric and hydraulic broker, has removed from Toronto to Peterborough, having accepted the position of managing director of the Central Ontario Power Company, proprietors of the Burleigh Falls water power.

Mr. Frederick A. Hamilton, E. E., of Halifax, N. S., has been engaged by Clarke, Forde & Taylor, engineers to the Commercial Cable Company, to accompany the expedition which is to lay a cable from Canso, N. S., to New York. Mr. Hamilton expected to remain at New York to take the usual thirty days' tests.

Mr. S. Potter, superintendent of the London Street Railway, recently tendered his resignation, and we understand has been appointed chief engineer at the power house of the Toronto Railway Company. Before leaving London, Mr. Potter was made the recipient of a diamond ring and complimentary address from the employees of the mechanical department of the London Street Railway Company. Mr Potter has been succeeded by Mr. Harry Welburn.

We regret to record the death of Mr. F. E. P. Pepler, barrister, of Barrie. The late Mr. Pepler was among the enterprising citizens who in the early days assisted to introduce the electric light, having been one of the largest stockholders in the local company. Deceased manifested distinguished abilities, not only in his chosen profession, but also as a business man and in political and municipal affairs. He was twice elected mayor of the town and filled many other responsible positions.

The following gentlemen from Canada attended the recent annual convention of the National Electric Light Association at Chicago: Mr. Fred. Nichols, manager Canadian General Electric Co., Toronto, who is an ex-president of the N.E.L.A.; Mr. W. McLea Walbank, manager of the Lachine Rapids Hydraulic & Land Co., Montreal; Mr. C. B. Hunt, manager London Electric Co., London, Ont.; Mr. A. A. Dion, superintendent Ottawa Electric Co. and president of the Canadian Electrical Association; Mr. E. D. McCormack, Canadian General Electric Co., Toronto; Mr. R. S. Kelsch, superintendent Lachine Rapids Hydraulic & Land Co., Montreal.

The Electrical Construction Co., of London, Limited, have recently received orders for four motors of different sizes from their Toronto agent.

The Noxon Company, of Ingersoll, have purchased from the Electrical Construction Co., of London, Limited, one 15 h. p. multipolar motor, and report being well pleased with the machine.

The Electrical Construction Co., of London, Limited, have completed a contract with the Chatham Navigation Co. for the wiring and complete installation of a 100 light electrical equipment for their boat at Chatham.

Mr. James F. Webb, of Ypsilanti, Mich., representing a syndicate of capitalists, is promoting an electric railway from Windsor to Ruthven and from Kingsville to Leamington, Ont. The capitalists are those who own the electric railway running from Ypsilanti to Orchard Lake, Mich.

SPARKS.

A telephone line is being built from St. Martin's to St. John, N.B., the Bonny River Lumber Company being interested.

The Pontiac Telephone Co., of Pontiac, Que., was sold by the sheriff recently to Mr. William McCochon, for the sum of $1,700.

The St. Martins Telephone Company, at annual meeting held at St. Martins, N.B., last month, elected John McLeod, M.P.P., president, W. H. Allan vice president, and A. W. McMackin secretary.

Mr. E. H. Boss has resigned his position as local manager of the Bell Telephone Co. at St. Catharines, Ont., and has entered the employ of the Niagara, St. Catharines and Toronto Railway Company.

The Kinnear's Mills Telephone Co., of Kinnear's Mills, Que., are about to construct a telephone line from Thedford Mines to Kinnear's Mills, a distance of 12 miles, and have invited tenders for the work.

A recent report from Springhill, N.S., stated that owing to a disagreement between the town authorities and the electric light company as to the number of hours per night the light should burn, the contract had been cancelled and the town was in darkness.

The town of Dartmouth, N. S., made a proposition to the Dartmouth Electric Light Company to purchase their plant, at the price of $20,000. This the company refused to accept, and suggested $27,000 as the figure at which they would sell. It is probable that arbitration will be resorted to.

The electrical equipment of the D. S. Perrin Co., biscuit manufacturers of London, Ont., has gone through a great many radical changes since the company decided to operate their own plant. Originally a 125-light dynamo was thought to be sufficient for their requirements. This they found too small, but they retained it as a power generator to operate a 12 h.p. motor for running a box factory, and installed a 250 light dynamo to operate the lights throughout their factory. In the fall of 1899 they realized that they should have a larger lighting dynamo, but after receiving figures and making sundry tests they decided to retain the 250 light machine for another season, which they operated to over 250 lights regularly. They have now placed an order with the Electrical Construction Co., of London, Limited, for a 50 k.w. generator (67 h.p.), retaining the 250 light dynamo for operating their recently enlarged box factory. This makes four machines this enterprising firm of biscuit manufacturers have purchased from the Electrical Construction Co., of London, Limited, and they express themselves as well pleased with their operation.

The inauguration of the new electric street railway system at St. Johns, Newfoundland, took place on May 1st last. The road was built by Mr. R. G. Reid, of Montreal. The power house is situated at Petty Harbor, nine miles south of St. Johns. At this point a small river discharges its waters into the sea. The stream is fed from a chain of four lakes beyond the head of the valley, which run into each other. At the outlet of the last of these lakes Mr. Reid constructed a large dam, and from this a flume winds along a steep hillside for 3,300 feet, passing through a tunnel 350 feet in length, cut through the solid rock and terminating in a large sluice box of timber, at the bottom of which is a steel tube six feet in diameter, through which the water has a descent of 185 feet, to the bottom of the valley. The water wheel is 20 feet in diameter. The power house is 130 feet × 24 feet and is built of stone. The capacity of the plant is 3,200 h.p., although the present needs do not call for more than 2,350 horse power. The cars were built in Montreal. Mr. G. H. Massey, of Montreal, was superintending engineer, and Mr. W. Mackay electrical superintendent.

SPARKS.

The Central Electric Company, of Portage la Prairie, Man., will enlarge their plant this year.

The council of Parry Sound, Ont., are considering the question of taking over the electric light plant.

The town of Palmerston, Ont., will probably purchase the electric light plant now owned by Mr. C. Anderson.

G. C. Hinton & Company have secured the contract for electrical supplies for the corporation of Victoria, B.C.

Conroy Bros. have commenced the erection of a new power house at Deschenes, Que., to replace the one recently burned.

It is announced that by the early fall the Metropolitan Electric Company, of Ottawa, will have completed their power plant at Britannia.

A scheme is said to be on foot to erect a large power house at the Chaudiere, Ottawa, for the purpose of supplying electric power for industrial purposes.

Grand Forks, B. C., ratepayers are to vote on a by-law to raise $50,000 to complete and extend the water and electric light system and to make other improvements.

A committee has reported to the Montreal city council recommending that tenders be invited for operating an incline railway service to the mountain, to be operated by steam or electricity.

The owners of the Dufferin Mine, on Salmon iver, in Nova Scotia, have recently installed an underground ectric lighting plant, said to be the first of the kind employed in that province. The engine is 250 h.p. Corliss.

The Jacques Cartier Water Company, of Quebec, have purchased property on the corner of St. John and d'Anteuil streets, in that city, and are having plans prepared for a brick and stone building to be built thereon, to be used as office and distributing station.

Among the companies incorporated at the recent session of the Nova Scotia Legislature were the following: The Liverpool & Milton Tramway Co., of Liverpool; the Liverpool Marine Railway Company, and the Cape Breton Electric Tramway & Power Company.

The Toronto Railway Company will ask the York county council for the right to extend the Mimico and Lake Shore road to the Lorne Park rifle butts. The company purposes asking Peel county for the right to extend to Oakville.

Mr. Willis Chipman, C.E., of Toronto, has reported for the corporation of Brockville, Ont., on the valuation of the gas and electric light plants in that city. He places the value of the gas works at $56,000, and that of the electric light plant at $38,000. The value of the arc system was placed at $8,000. The corporation will probably take over the plants.

Chicago capitalists, including Messrs. D. S. Wegg, J. P. Wiborg, G. K. Clutton, W. H. Dayton and G. H. Pope, have been incorporated as the Anglo-American Power Company, with a capital of $5,000,000. The company is to acquire the Jenison water powers on the Kaministiquia river near Port Arthur, which it is the intention to develop for power purposes.

MOONLIGHT SCHEDULE FOR JUNE.

Day of Month.	Light.	Extinguish.	No. of Hours.
	H.M.	H.M.	H.M.
1....	P.M. 9.30	A.M. 3.30	6.00
2....	" 10.00	" 3.30	5.30
3....	" 10.30	" 3.30	5.00
4....	" 11.00	" 3.30	4.30
5....	" 11.30	" 3.30	4.00
6....	A.M. 0.00	" 3.30	3.30
8....	" 0.20	" 3.30	3.10
9....	" 0.50	" 3.30	2.40
10....	" 1.20	" 3.30	2.10
11....	No Light.	No Light.	....
12....	No Light.	No Light.	....
13....	No Light.	No Light.	....
14....	No Light.	No Light.	....
15.	P.M. 8.10	P.M. 10.40	2.30
16..	" 8.10	" 11.10	3.00
17....	" 8.10	" 11.50	3.40
18....	" 8.10	A.M. 0.20	4.10
19....	" 8.10	" 0.50	4.40
20....	" 8.10	" 1.20	5.10
21....	" 8.10	" 2.00	5.50
22....	" 8.10	" 2.40	6.30
23....	" 8.10	" 3.30	7.20
24....	" 8.10	" 3.30	7.20
25....	" 8.10	" 3.30	7.20
26....	" 8.10	" 3.30	7.20
27....	" 8.10	" 3.30	7.20
28....	" 8.10	" 3.30	7.20
29....	" 8.10	" 3.30	7.20
30....	" 8.30	" 3.30	7.00
		Total.....	130.20

TRADE NOTES.

Messrs. Darling Bros., of Montreal, have placed an order with the Electrical Construction Co., of London, Limited, for two 5 h.p. bi-polar motors.

The Times Printing Co., of St. Thomas, Ont., have purchased from the Electrical Construction Co., of London, Limited, one 8 h.p. multipolar motor for operating printing presses.

The T. Eaton Co., Toronto, are making extensive changes in their electric plant, and have ordered two 350 horse power engines for direct connection to dynamos from the Robb Engineering Co.

The Electrical Construction Co., of London, Limited, recently received the following order from their agent in Winnipeg: One 1 h.p., two 2 h.p., one 5 h.p., and two 8 h.p. bi-polar motors, and two 15 h.p. multipolar motors.

The Electrical Construction Co., of London, Limited, report the following recent sales: Geo. May & Sons, Ottawa, one 5 h.p. motor; C. D. Burdick & Co., London, one 10 h.p. motor; The London Pant & Overall Co., one 6 h.p. motor; E. Parnell, London, one 8 h.p. motor; J. P. Archibald, Ingersoll, one 15 h.p. motor; Timbell & Co., London, one 3 h.p. motor; C. Kennedy, London, one 3 h.p. motor; H. W. Petrie, Toronto, one 12 h.p. motor; F Raney, Kingston, one 8 h.p. motor; W. Carson, Kingston, one 3 h.p. motor; N. H. Good, Berlin, one 3 h.p. motor.

The United Electric Company, of Toronto, announce the following recent sales of apparatus: R. Anderson, Ottawa, one 30 h.p. motor, three 5 h.p. motors, two 12 h.p. motors, and one 2 h.p. motor; Chas. Morton, Montreal, three 2 h.p. motors; R. E. T. Pringle, Montreal, one 3 h.p. motor and one 8 h.p. motor; Miller Bros. & Toms, Montreal, four 5 h.p. motors, one 10 h.p. motor, and one direct connected elevator motor; John Turner & Son, Toronto, one 10 h.p. motor; Dominion Bridge Co., Montreal, one 60 k.w. generator; Maritime Electric Co., Halifax, N.S., one 10 k.w. direct connected generator; McBurney & Sons, Callander, Ont., one 20 light arc dynamo and lamps; Fred Thompson & Co., Montreal, one 5 h.p. motor and one 3 h.p. motor; S. F. McKinnon Co., Toronto, one 15 h.p. motor; Wm. McGill & Co., Toronto, one 10 h.p. motor; Canada Electric Co., Montreal, one 9 k.w. generator; West Lorne Electric Light Co., West Lorne, Ont., complete plant, both arc and incandescent, for lighting the town; Truth Publishing Co., Toronto, one 300 light dynamo; Darling Bros., Montreal, 5 elevator motors; Scott Bros., Ingersoll, Ont., one 10 h.p. motor; R. Elliott, Ingersoll, Ont., one 4 h.p. motor; P. Stewart & Co., Ingersoll, Ont., one 4 h.p. motor, C. S. Crabtree, Toronto, one 5 h.p. motor; A. Trudeau, Ottawa, one 5 h.p. motor; Paris Wincey Mills, Paris, Ont., one 500 light dynamo; C. N. Vroom, St. Stephen's, N.B., one 6 h.p. 500 volt motor; White Packing Co., Stratford, one 400 light dynamo and one 15 h.p. motor; A. Bauer & Co., Waterloo, Ont., one 35 light dynamo; P. W. Ellis & Co., Toronto, one 3 h.p. motor; C. W. Huffman, Winnipeg, one 6 h.p. motor; Perth Flax & Cordage Co., Stratford, one 100 light dynamo; Hodd Culleh Manufacturing Co., Stratford, one 50 light dynamo; Kootenay Railway & Navigation Co., Kaslo, B.C., one 10 k.w. direct connected generator; Rideau Lake & Navigation Co., Kingston, one 250 light generator; Lippert & Co., Berlin, Ont., one 100 light incandescent dynamo; John McGowan & Co., Alma, Ont., one 60 light dynamo; James Fenwick, Preston, Ont., one 70 light arc dynamo; Hamilton Steamboat Co., Hamilton, one 150 light dynamo.

SPARKS.

Tenders closed on May 30th for lighting the streets of Berlin, Ont., with 80 arc lights.

The village council of East Toronto have decided to again ask for tenders for a system of electric lighting.

The Paris Electric Light Company, Limited, of Paris, Ont., has been incorporated, with a capital of $20,000.

Mr. J. Carew, of Lindsay, Ont., has recently installed an electric light plant for lighting his saw mill and yards.

The Whitby Park and Electric Railway Company has been incorporated, to develop a summer resort scheme near Whitby, Ont.

Permission has been granted to the Sun Oil Refining Company, of Hamilton, to increase their capital stock from $15,000 to $50,000.

The promoters of the electric railway between Woodstock and Ingersoll, Ont., expect to commence the construction of the road in about a fortnight.

Mr. Jobin, an employee of the Quebec Lighting and Railway Co., was seriously burned at the Montmorency power house by coming in contact with a live wire.

The Citizens' Electric Light Company, of Smith's Falls, Ont., are increasing their plant. They will build a stone addition to the power house and put in another engine.

The city of St. John, N.B., has invited tenders for lighting the streets of the city by electricity. Tenders close June 29th. Mr. Robert Wisely is the director of the Department of Public Safety.

The Montreal Cotton Company have applied to the corporation of Valleyfield, Que., for a bonus of $50,000 and exemption from taxation for twenty years, in return for which they agree to considerably enlarge their works and to supply the town with light and power.

SPARKS.

It is understood that negotiations are in progress with a view to installing an electric light plant at Port Maitland, Ont.

The by-law authorizing a bonus of $21,000 to the Port Dover, Brantford and Berlin Electric Railway Co. was carried in Berlin, Ont. a few days ago.

The time for receiving tenders for lighting the streets of Toronto by electricity and gas and for the supply of electric energy has been extended to June 15th.

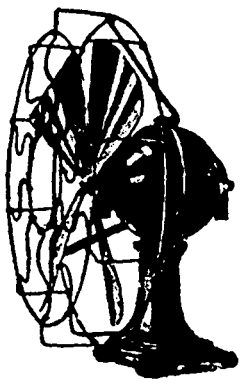
The town of Toronto Junction, Ont., will issue debentures to cover the cost of installing an electric light plant. An expert has estimated the probable cost of a plant at $13,000

The Manhattan General Construction Company, of Newark, N. J., had the most extensive of the many arc light exhibits at the recent N. E. L. A. convention at Chicago. In the basement of the hotel this company had placed a 50 k.w. two-phase 1000 volt 60 cycle alternator, which was driven by a direct current motor. This alternator supplied two circuits of series alternating lamps, one of 12 lamps in a parlor occupied by the company's exhibit,and another of 10 lamps on the hotel's regular arc light standards in the street. The former circuit also contained incandescent lamps and instruments to show the constancy of the current obtained by the regulator when the arcs were cut in or short circuited. To connect up these circuits required 2,000 feet of [illegible] covered wire. In addition to the two regulators in use on these two lines, the company showed a number of its standard sizes of the latest type, ranging in capacity from 12 to 100 lamps. The lamps shown in operation were of the latest type, with shunt regulating coils and no series coils whatever. The shunt coil is concentric with the carbon holder, and a dash pot, also concentric, is provided to prevent the shunt coil from striking the arc too suddenly, the dash pot cylinder being cut away so that over the normal range of operation, once the arc is formed, there is no retardation or friction. The cut-out is electro mechanical, the regulating magnet, in case it drops the clutch to its lowest limit, closing a by-pass around the arc, but through a magnet which holds the contact closed. With the shunt form of regulator used in this lamp, the power factor is improved over that of the series lamp, and, if desirable, the candle power of the lamps may be changed by simply varying the current, the arcs in this case remaining of constant voltage and not shutting up as they do in the differential form.

Canadian General Electric Company's

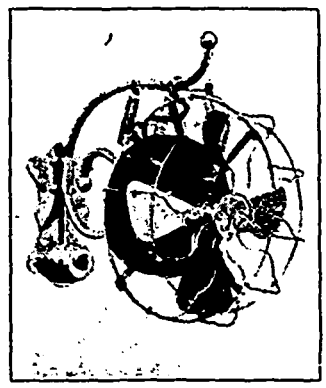
FAN MOTORS

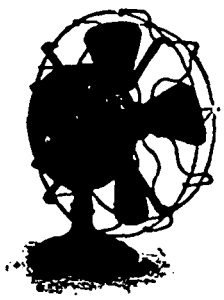
1900



Desk Fans Wall Fans Ceiling Fans

For Direct or Alternating Current Circuits





The "C.G.E." Fan Motors have stood the test of many seasons, and results have proven that they are mechanically and electrically as nearly perfect as possible. The same general standard of excellence will be found in them this season, and we feel confident that they will continue to maintain their supremacy for durability and efficiency.

Our price list will be ready for issue in a few days. Please write us for discounts.

CANADIAN GENERAL ELECTRIC CO'Y

LIMITED

HEAD OFFICE:
14 and 16 King Street East
TORONTO, ONT.

FACTORIES:
PETERBORO', ONT.

BRANCH OFFICES:
MONTREAL · HALIFAX WINNIPEG VANCOUVER ROSSLAND

Scientific American, Oct. 14, 1899.

THE AUTOMOBILE MAGAZINE has at last come to hand and is the most thoroughly satisfactory periodical which we have seen in any language on the subject. It is of regular magazine size and has 111 pages. The quality of the articles is very high and the illustrations are of the best. Everyone who is at all interested in the automobile will find something in the new magazine which will interest him. Even the social side is far from being neglected, as there is an article on the recent floral parade at Newport and on the Automobile Club of France. The Automobile Index, which occupies some nine pages, is exactly what has been needed. On the whole the magazine is a most satisfactory one.

N. Y. Evening Post, Oct. 9. 1899.

The new illustrated AUTOMOBILE MAGAZINE (New York: U. S. Industrial Publishing Co.) has a very attractive appearance, and is so varied in contents, without undue padding, that one wonders how the editor can fill his pages hereafter. Still, the list on page 101 shows that there is a considerable "foreign automobile press;" and what foreigners can do in the way of furnishing "copy" to the printer, Americans can. The society feature of the new vehicle is brought to the front with news from the *Newport festival*—the driver, by the way, not always sitting on the left. There are competent-seeming book reviews, and some concessions are made to the general reader in comicalities of pencil and verse. The magazine seems free from bias.