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THREE-PHASE POWER TRANSMISSION AT ST. HYACINTHE, QUEBEC.

By E. M. ARCHIBALD.

THE oldest transmission plant in Canada employing a three-phase system is that in St. Hyacinthe, in the Province of Quebec, Canada, a city of 13,000 inhabi-

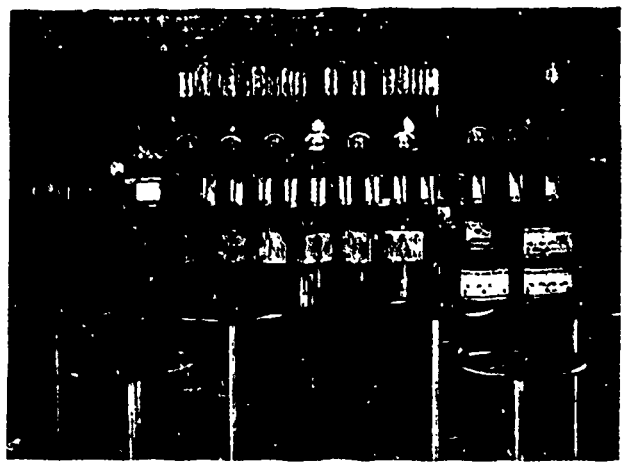

FIG. 1.—SWITCHBOARD.

tants, mostly French, distant about 40 miles from Montreal. In April, 1894, La Compagnie des Pouvoirs Hydraliques de St. Hyacinthe or the St. Hyacinthe Hydraulic Power Co. was formed, with the object of generating electrical power by utilizing the rapids on the Yamaska River and transmitting it into the city of St. Hyacinthe for illuminating and power purposes. By Christmas of the same year, the incandescent light had made its appearance there. This river Yamaska takes its source far back amongst the Green Mountains of Vermont, and its onward flow is fed by numerous small streams until it reaches the majestic St. Lawrence.

Situated five miles from the city of St. Hyacinthe, there was an old grist mill which had been operating for years by water power, a small head being obtained by damming up the river at Flat Rapid. This property the company secured and began improving the water power by raising the dam three feet, widening the head race from 15 to 40 feet, and by digging a tail race. The river at this point is 600 feet wide and one part of the dam has been built half way across, after which it turns slightly and runs obliquely towards the shore, thus making an entrance for the head race. This dam is of cribwork, in a triangular shape, filled in with cobblestones, 9 feet deep and 22 feet thick at the bottom. The up-stream side slopes upwards to the water surface and is 24 feet long, being the hypotenuse of a right angled triangle of the above dimensions. The timbers in its construction are all very large, those in front being 18 inches square. The side sloping upwards to the crest, 24 feet long, is lined with 3-inch planks 12 feet long, placed end to end, at the upper end of which iron plates ⅝-inch thick and 3 feet long are nailed in place across the whole length of the dam. These are used on account of the ice and rubbish which, passing over the crest, would otherwise injure it. This cribwork is also filled in with cobblestones.

In summer, when the water becomes scarce, planks 14 inches wide are placed edgewise on the crest of the dam to raise the head of the water by preventing any waste. The wing dam, extending from the beginning of the head race to the bottom of the tail race, a distance of 2000 feet, is also built of cribwork similar to the main dam, but is much higher and wider. The head race, originally 15 feet wide, is now increased to 40 and is 500 feet long, the sides being all boarded up. At the entrance a wooden boom 2 feet deep extends diagonally outwards, thus sweeping all ice and rubbish out towards the middle of the river and over the dam. A short distance further down four head gates, operated by a rack and pinion, control the supply of water entering the head race, while at the termination wooden racks prevent any rubbish which may have passed the boom from entering the wheel flumes. Four other wooden gates 6 inches thick are placed at the entrance of the wheel flumes, operated by gearing inside the power house. A waste gate at the termination of the head race allows of the disposal of all rubbish and dirt which may have entered.

The tail race, 40 feet wide and 1500 feet long, has been excavated from the solid rock by blasting. A head

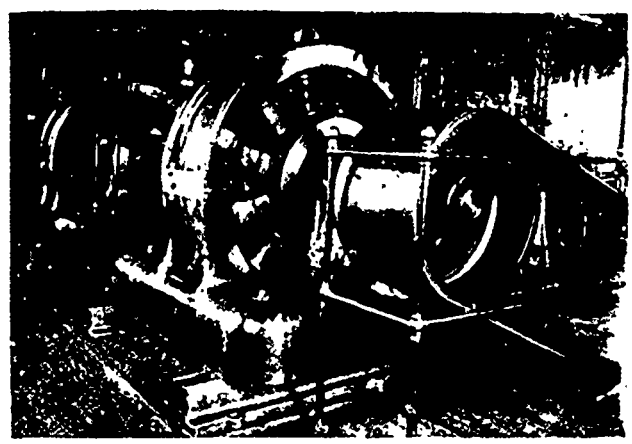

FIG. 2.—180 K.W. THREE-PHASE GENERATOR.

of 16 feet has been obtained by thus increasing the height of the dam and by excavating a tail race.

The plan adopted for uninterrupted power is that of having a steam auxiliary plant, which may be used should the water become too low or should there be any trouble experienced with frazil and anchor ice. When

in small quantities the frazil is swept over the dam by the greater current there, but it cannot thus be disposed of when in great quantities, or on account of the frazil then tending to diminish the current from its very density. Anchor or ground ice is also encountered, this being the ice that forms on the rocks at the bottom. When this occurs the steam plant is put in operation

FIG. 3. ENGINE ROOM

until the morning's sun raises the temperature Then the anchor ice rises immediately to the surface and is removed through the waste gate.

The power house is a wooden one-storey structure 150 feet long by 60 feet wide, extending from the outside of the head race on the wing dam to some distance on the shore. It is in three parts, the first situated on the head race being still a grist mill, not in operation, however, at present ; the second, the power house proper, containing the electrical apparatus, and lastly the steam plant The cobblestone foundations are laid on the bed rock, 12 feet below the ground surface.

The hydraulic equipment consists of four 50-inch Samson wheels of the vertical type, each capable of developing 225-h.p. under a head of 16 feet, and running at 95 revs per minute, manufactured and installed by James Leffel & Co , Springfield, Ohio. There are two water flumes, each containing two wheels. Power is transmitted from each wheel by means of a heavy bevel mortise gearing to a 5"-inch jack-shaft, running at 286 revs. per minute, under the floor of the power house and extending its total length. This jack-shaft is in four separate sections, so that any wheel may be closed down without interfering with the operation of the remainder. Each section is connected to its neighbor by a rigid coupling keyed to the shaft and yet movable to and fro on it by means of a lever.

When it becomes necessary to couple one section to that already running, water is gradually let into the wheel by opening its gates slowly, and as soon as the wheel attains the correct speed the coupling attached to its section of shaft is moved along by the lever until it engages with the opposite coupling and is then locked in position. The guide blades for each wheel controlling the quantity of water are connected together, all operating at the same time and controlled by means of a regulated wheel situated in front of the switchboard in the power house above.

Connected closely to the jack-shaft are three pulleys, each belt-connected to a generator on the floor above, which may be thrown into operation by means of three large Hill friction clutches, each controlled by a wheel placed in front of the switchboard, by which it may be engaged or disengaged. Another pulley is placed on the jack-shaft belt-connected to a pump used for fire purposes only. The jack-shaft, with all the gearing, pulleys and friction clutches, were installed by Miller Bros. & Toms, of Montreal.

The electrical equipment consists of three 180-k.w. three-phase Canadian General Electric generators, "star" connected, each machine having 12 poles, running at 600 revs. per minute, and delivering current to the line at a pressure of 2500 volts and at a frequency of 60 cycles per second ; two 6-k.w. standard bipolar Edison exciters, each belt-connected to a generator, and each capable of fully exciting the fields of the three generators ; and a 4-pole, 5-k.w. Crompton exciter of the upright type, belt-connected to one of the generators and running at 1220 revs. per minute. The 18-inch oak tanned belt connecting each generator to its pulley on the jack-shaft below is guarded by a substantial iron railing. All the electrical apparatus, including the switchboard, but with the exception of the last mentioned exciter, was manufactured and installed by the Canadian General Electric Co., of Peterboro, Ont.

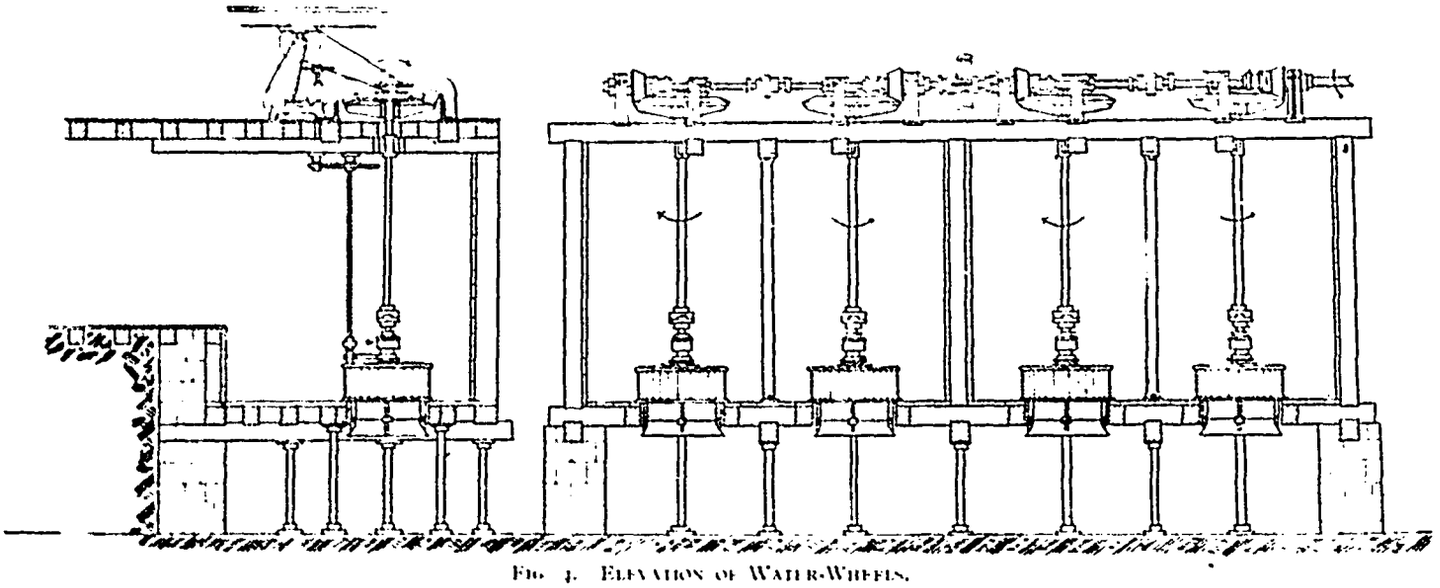

FIG. 4. ELEVATION OF WATER-WHEELS.

The switchboard, as may be seen from Fig. 1, is a four-panel skeleton hardwood board. The first panel is the exciter, the second and third are the generator panels, while the fourth and last is the line panel. The

exciter panel contains the synchronizing apparatus, consisting of three step-down station transformers and the phasing lamps, coupling being performed when the lamps are bright, all on front of the board, besides the regulating apparatus for the three exciters. This consists of two ammeters, one voltmeter connected to any exciter by a switch, and two rows of switches for connecting any exciter to any generator field. Of these two rows the top line is made up of three double-pole double-throw switches to connect any of three exciters, their terminals being connected to the middle pole, to either of two generator fields. The lower row contains three double-pole single throw switches for exciting the remaining generator field from either of the three exciters. At the extreme bottom of the board are situated the three exciter rheostats.

The two middle panels contain the apparatus for the three three-phase machines. Nine duplex fuses are placed on the top of the board in front, connected in each of the three machine leads in such a manner that should one fuse blow, the other may be thrown in immediately by closing a single-pole switch placed below. Between the fuse blows and the fuse switches are 9 ammeters, one for each machine lead; then a row of six switches, alternately the generator field and the main switches, the former being double-pole and the latter triple-pole for the three phases. At the bottom of the board are the three enamel field rheostats. The last or line panel contains three duplex fuse blocks with the three accompanying single-pole switches, serving the same purpose as those on the machine panels already explained; three ammeters, one for each line, and finally the ground detector, of the ordinary lamp type, and six lightning arresters, only three of which are in use, these being the Wurts non-arching type and having 0 gaps between each line and ground.

No choke coils are used whatever. From the last panel the wires pass directly to the line at a pressure of 2500 volts, no step-up transformers being used. Directly in front of the switchboard are two rows of regulating wheels, as may be seen in Fig. 1, the front row containing four, for purposes of regulating the quantity of water entering each wheel by suitably adjusting the guide blades. The back row consists of only three, each regulating the friction clutch on the jack-shaft for driving its generator.

It was found necessary to install a steam auxiliary plant to secure uninterrupted operation, on account of the scarcity of water in dry summers, and also on account of the frazil ice difficulty. This steam equipment consists of two 250 h.p. simple Corliss condensing engines, of the Jerome Wheelock type, running at 80 revs. per minute; two 250 h.p. water tube boilers, both engines and boilers being manufactured and installed by the Goldie & McCulloch Co., Ltd., of Galt, Ont.; one $5\frac{1}{4} \times 3\frac{1}{2} \times 6$ inches feed pump for the boilers, water being taken from the head race, built by the Northey Manufacturing Co., Ltd., of Toronto, Ont., and a T. J. C. injector, used as an auxiliary feed. The boilers are situated in a brick building adjoining the upper end of the power house; each engine is belt connected to a loose pulley on the jack-shaft, which, by means of a Hill friction clutch, transmits the power to the jack-shaft. All slack in the belt is taken up by a belt tightener situated on the power house floor at the point where the belt passes through to the jack-shaft below. Two 5-ton hand cranes are placed over the power house for handling and shifting machinery.

The three transmission wires coming from the power house pass to the pole line, which follows the highway into St. Hyacinthe, a distance of five miles. The voltage is 2500 direct from the generators, no transformers being used at either end except for the secondary distribution in the city. The wires are No. 00 medium drawn bare copper, securely fastened to the ordinary double petticoat glass insulators, and are placed on one cross arm, 18 inches apart. The poles are of white cedar, 40 feet long, 6 inches in diameter at the top, and are spaced 100 feet apart.

For protection against lightning a barbed wire is fastened with ordinary staples to the top of the poles and is grounded every fourth pole. In addition, lightning arresters of the Wurts outdoor type are placed at three points on the transmission line and also at two points in the city, each having an insulated wire running to ground on glass insulators. A telephone line connecting the power house and the company's office is placed on the same poles, but a distance of 7 feet below the transmission line. It is also frequently transposed to neutralize induction.

On the principal streets, four-wire secondary mains are run from banks of single phase transformers, reducing the primary voltage to 104. Power and light are both taken from the same circuits, but the drop due to the inductive load is not great, as the motors, although of the induction type, are neither large nor numerous. The largest is a 50 h.p. Oerlikon three-phase induction motor supplying power to a boot and shoe factory. The drop of voltage in the line, due to starting this motor, is too great to pass unheeded, so that a signal, by means of a magneto bell, is sent to the power house when the motor is to be started, and the machine voltage is regulated accordingly.

Current for light is sold by meter, the rate being 10 cents per k.w. hour. There are still a few flat rate customers, but they are gradually coming to use meters. Power is sold both by meter and by the flat rate, the charge in each case being according to the amount required.

The author desires to thank Mr. A. M. Morin, general manager of the St. Hyacinte Hydraulic Power Co., and Mr. Geo. Pominville, electrician, for assistance rendered in connection with the preparation of this article.
Electrical World.

We understand that the Cleveland Seed Co., of Picton, have placed their order with the Royal Electric Co. for a complete electric lighting plant for their warehouse. The dynamo is of 200 light capacity, and about 100 lights are wired up. The work is being done under the supervision of Mr. Crandall, of Picton.

A physician of Belleville, Ont., has received a letter from a participant in the Soudan campaign, which contains an account of a novel method adopted for the generation of electric current for use in Rontgen ray work in the field. "The pulley of a small dynamo," the writer states, "was connected by means of a leather strap with the back wheel of a specially constructed tandem bicycle. The required velocity for the dynamo was thus obtained and our procedure was as follows: Having carefully adjusted the circuit with the storage battery, and also with the voltmeter and ammeter, a warrant officer took his position on the seat of the bicycle and commenced pedaling. When 15 volts 13 amperes were registered, the switch, close to the handle of the bicycle, was opened and the charging of the battery commenced. As the resistance became greater, a sensation of riding uphill was experienced, and the services of an additional orderly were requisitioned for the front seat. The bicycle practice was generally carried out in a shade temperature of 110 deg. F., so that at the end of half an hour the orderlies were not sorry when the switch was turned off and the machine brought to standstill.

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Interesting Experiments.

DR. Leopold Kann, of the United States Arctic Geological Survey, is arranging for an expedition to Ellesmere Land, west of Greenland, for the purpose of studying atmospheric electricity. Absence in that latitude of moisture in the atmosphere and of trees and other impeding substances, renders the conditions most favorable for the prosecution of such experiments. Dr. Kann hopes by means of electrometers now under construction to be able to make a series of accurate measurements of the electric currents in that latitude, and thus to demonstrate, if possible, the connection between atmospheric electricity and the rotation of the earth on its axis.

Electricity at the Fair.

ELECTRICITY is much in evidence at the Industrial Exhibition in Toronto. The experiments with wireless telegraphy and telephony and X rays conducted by Mr. W. J. Clarke, of New York, and the exhibit of electric carriages are prominent features, and have attracted much attention. For lighting and decorative purposes there are required in connection with this Exhibition 500 arc and 1,000 incandescent lamps a plant requisite for the lighting of a medium size city. The majority of these lights must be newly installed each year to suit the constantly changing conditions. The larger proportion of these lamps are employed for signs and to light side-shows and refreshment booths, the location and requirements of which cannot be ascertained until the opening day, when there is an immediate demand from the lesees upon the Toronto Electric Light Co. for the installation of the necessary lamps. It will be seen that the task which is thus suddenly imposed upon the company is a most difficult one, and it is indeed surprising that work done under these disadvantages should have given such satisfactory results.

Horseless Vehicles.

THERE seems little room to doubt that in the near future horseless vehicles will be employed to a considerable extent commercially and for pleasure. It is estimated that in Europe there are at present in use 10,000 such vehicles. Over half this number are in France, where the development in this line has been the most active. In the United States the number is believed to be less than 500, but is increasing rapidly. In view of the possibilities in this new field, great interest attaches to the question—what motive power is best adapted for the propulsion of these vehicles? From statistics recently published, it appears that in France, where, as has been stated, the greatest amount of experimenting has been done, oil and gas motors are in greatest use. The experience of persons who have carefully studied the problem in Canada indicates that no class of motor which has yet been tried is best adapted to meet the requirements of all the varying kinds of service. The electrically propelled vehicle will probably best meet the requirements for pleasure in cities with well paved streets, but for country roads and the heavier class of delivery service the steam wagon appears to be the coming thing. Prof. Elihu Thomson has recently invented a steam boiler for this purpose which is said to be very satisfactory. A steam propelled vehicle, manufactured at Newton, Mass., has recently been purchased by Mr. Wilson Phillips, of Toronto, and will shortly make its appearance on the streets of that city. The claims made for

on its behalf are that it weighs less that 400 pounds, the boiler is tested up to 1,000 pounds per square inch, it can carry a supply of fuel sufficient to propel it one hundred miles, and can be operated at a speed varying from that of the slowest truck to 40 miles an hour, at a cost not exceeding three cents per passenger for a distance of twenty miles.

The Record of Acetylene.

In our July number was published as a part of the proceedings of the Convention of the Canadian Electrical Association, a tabulated statement, showing the number of acetylene gas plants installed and the degree of success which had attended their operation. In another column will be found a letter from a manufacturer of acetylene apparatus declaring the data given in the above mentioned statements to be entirely inaccurate. The Canadian Manufacturer also expresses doubt as to the accuracy of the published data, and calls upon the ELECTRICAL NEWS to explain why it should have published what it could not prove to be true. A little investigation would have shown the editor of The Manufacturer that the data was compiled, as stated in print, from reports submitted to the Canadian Electrical Association, and was, as already stated, presented to the members by the President at the recent annual convention. Its subsequent publication as part of the proceedings followed as a matter of course. Under these circumstances the ELECTRICAL NEWS is under no obligation to prove the correctness or otherwise of the figures. On the other hand, The Manufacturer has not published any evidence to support its contention that the data is unreliable.

Technical Education.

Not so many years ago Germany was little more than an agricultural country. That she should not always remain so, an expert was sent by the government to the United States to report in what way, if possible, her commercial position could be improved, and whether she compared favorably with other countries. This expert reported that in manufacturing Germany was being outclassed by other countries. The result was that immediate steps were taken to assist the manufacturing development of the country. This was done by means of the establishment of technical schools, in which a system of technical and commercial education was taught. In a very few years the benefit of such schools was to be seen in the increase and improvement of manufacturing industries, and in the extension of the foreign trade of the country, To-day Germany occupies an almost unparalleled position among the manufacturing countries of the world. For this her technical schools are largely responsible. The above facts give additional interest to a report prepared by a special committee of the Toronto Board of Trade on the subject of technical education. This committee, after reviewing the advantages of and necessity for technical training, makes the following remmendation: "That technical education, in order to be thoroughly successful, should be a part of the foundation of our general educational system, and elementary technology should be as speedily introduced into all forms of the public schools in the province as time and circumstances will permit. The technical subjects taught must vary according to the special locality, with due regard to the manufacturing industries to be benefitted." A list is also given of the subjects to be taught, which includes seventeen chief subjects in the technical department and thirteen in the commercial department, with a number of subordinate branches in each. Reference is made to the advantages of combining a commercial and technical or industrial education. In no other country in the world does greater necessity exist for the special training of the people than in Canada, with her abundance of natural resources awaiting development and the skilled hand of the artizan. Legislation now exists in Ontario empowering the introduction into our school system of a limited degree of technical training, but this does not seem to be sufficient, and we hope the time is near at hand when some more effective plan will be adopted. The Toronto Technical School was established mainly through the efforts of the Canadian Association of Stationary Engineers, who secured a government grant of $2,000 for the purpose. The attendance and the work accomplished at this school is evidence that there is a demand for such training as is there given. We believe many more persons would avail themselves of the advantages offered if they were better acquainted with the curriculum of the school.

Consolidation.

One of the most important events in the history of electrical development in Canada took place a week ago, when the control of the Hamilton Street Railway, the Hamilton and Dundas Railway and the Hamilton Radial Railway passed into the hands of the Cataract Power Company. It is understood that an attempt was made to include in this deal the Hamilton, Grimsby and Beamsville Electric Railway, but owing to the high price put upon the stock it was unsuccessful. The Cataract Power Company are seeking to provide a profitable market for the product of their electric generating station at DeCew Falls, which has a present capacity of 4,000 h.p. and an ultimate capacity of at least double that amount. With this object in view the company are understood to have under consideration the construction of radial electric railway lines to Guelph, Niagara Falls and other points. The city council recently gave them a ten years contract for public lighting, and they have also contracts for the supply of power to many of the leading industrial establishments in Hamilton. The capital of the Cataract Power Company has of late been very largely increased. It seems probable that in other localities where large water powers are available for the generation of current consolidation of electrical interests will take place, similar to that just consummated at Hamilton, but care should be taken that the capital stock is not placed too high.

The demand from Austria Hungary for electrical machinery is steadily increasing. The imports in this line from the United States last year were valued at $40,000.

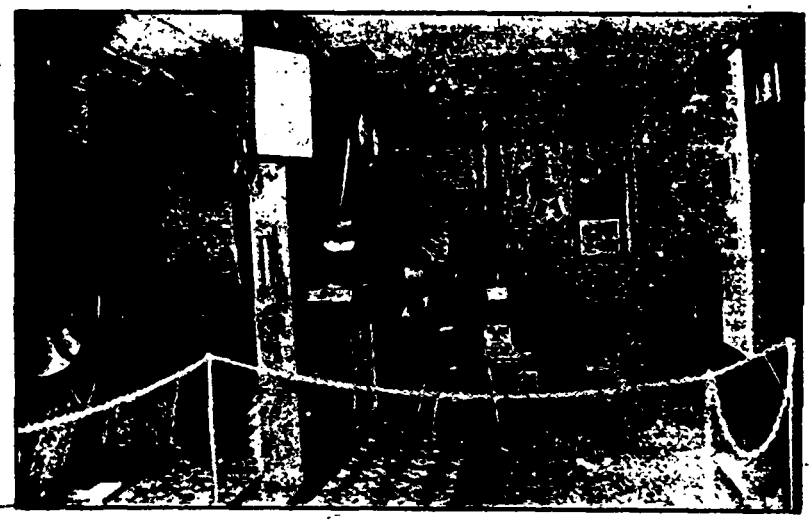
The originality and artistic taste of Mr. F. B. Utley, advertising manager for the Goldie & McCulloch Co., of Galt, is responsible for the production of some of the neatest and most attractive booklets which have yet reached our desk. That worthy of special mention is a miniature catalogue in bronze and blue black of the "Model" gas and gasoline engine manufactured by the above company. The art here introduced gives the booklet a greater interest than would otherwise be obtained. Accompanying each cut of the "Model" engine is an illustration, for the purpose of comparison, showing the pioneer methods employed, such as hand and horse power, wind mills, etc. The small catalogues of bankers' safes and "Wolf" gyrator are also well designed and replete with new ideas.

ELECTRIC TRANSMISSION PLANT IN NOVA SCOTIA.

Mr. E. L. Nash,
Manager Lunenburg Gas Co

The Lunenburg Gas Company, Limited, of Lunenburg, Nova Scotia, have recently installed a three-phase long distance transmission plant, to take the place of their direct current steam plant. The new power house is on the Mush-Mush river, one mile from the village of Mahone and eight miles from the town of Lunenburg. The Mush-Mush river is the best of its size in Nova Scotia for power purposes, it having at its head waters five lakes, with a united area of about twelve square miles, the outlets of which are controlled by the company. The dam, sixteen feet high, built of stone and timber, on a ledge of rocks that crosses the river at this point, is perfectly tight, and is one of the best constructed in the province.

The power house is 28 × 36 feet, two stories high, and is a substantial wooden building, with a metal roof. The water wheel is a "New Success" horizontal turbine, thirty-nine inches in diameter, of 105 h.p., built by the S. Morgan Smith Co., of York, Pa. It is so placed in a 12-foot penstock as to make it impossible for it to freeze up in winter. A twenty-four inch endless rubber belt conveys the power to a counter shaft; thence a two-ply endless leather belt transmits it to the generator.



Interior View of Power House—Lunenburg Gas Company.

The generator was built by the Canadian General Electric Co., and is one of their standard 100 k.w. three phase machines, running at 900 revolutions and delivering a 3,200 volt current. The switchboard carrying the necessary station instruments was built also by the Canadian General Electric Company, and is a beautiful piece of apparatus. The wiring of the station is very neatly done. From the station the three-wire pole line runs straight across fields to the main street of Mahone. One large transformer in the middle of the village reduces the current to 104 volts, and a heavy three wire system distributes it to customers.

From Mahone the pole line runs along an old road to Lunenburg. This, like many another old road, is remarkably straight and hilly, enabling the company to have a first-class line. In the town of Lunenburg the old three-wire distribution has been divided into three sections, A B C. B and C have two transformers each, while A has one, the transformer at Mahone making the balance on that phase. The distribution is much better than with the previous system, and as the high voltage current passes along only one back street of the town, the plan gives great satisfaction.

The company have their own telephone line, with Bell instruments at Lunenburg, Mahone, and in the power house.

The pole line was built under contract by Mr. L. C Gelling, of Bridgewater. The water power portion of the plant was planned and constructed by Mr. T. G. Nicol, of Mahone, and the electrical portion by Mr. E. L. Nash, the managing director.

The present directors of the Lunenburg Gas Company are: W. N. Zwicker, president; Chas. S. Marsh, vice-president; L. Joseph Rudolf, A. J. Wolffe, Jas. A. Nirtle, Lunenburg; T. G. Nicol, of Mahone; with Mr. E. L. Nash secretary-treasurer and manager. The company have over twelve hundred lamps running, and more are being added every week. The plant is already a financial success.

Power Station Lunenburg Gas Company.

A novel method of testing the efficiency of coverings for steam pipes electrically is in use. A section of the steam pipe is heated electrically by means of a coil of wire within the pipe. The amount of energy necessary to keep the pipe at a definite temperature is measured. Since the energy supplied is just enough to maintain a constant temperature, it must therefore equal the heat lost from the pipe. Hence, from the electrical energy supplied the heat lost from the outside can be calculated. The new method, which was recently described by Prof. Chas. L. Morton before one of the American learned societies, would seem to be worthy of attention.

ELECTRIC TRANSMISSION AND ELECTRIC DRILLS FOR MINES.*

By F. Hille, M.E., Port Arthur, Ont.

When we see that in the neighborhood of a number of our mines the fuel supply for motive power is, or is nearing to become, a question of grave concern, and that this is heightened through the burning off of valuable timber by careless and unwise men, or through accidental igniting of the dry bush by the sparks of the locomotives, or even through lightning in the course of thunder-storms, then we are very vividly reminded to look for another medium that can drive the machinery and apparatus in our mines. Now, what can impress itself more quickly on us than the numerous falls of our creeks and rivers, whose roaring and thundering has become to many of us, who roved around this country so often, a familiar music, and which has lulled us many a bright night into the arms of Morpheus. How often has that little dream-god shown us these wild rushing waters harnessed into useful occupations, and how long will it be ere these dreams materialize and we shall have every one of these at present useless spending powers utilized for the benefit of one or another of our industries? But before I proceed with this subject I take this opportunity of warning our people of this vandalic destruction of the forest by fire, or we shall experience the consequence, that in a few years most of the little creeks and rivers, and with them the lakes small and large, will dry up, and we will be deprived of the present very convenient way of travel, and the cheap medium for power. One who has known this country for years has seen, with regret, the diminishing and disappearing of many of our water courses. Even Lake Superior is lower by nearly twenty-four inches since I first knew it, and this is principally caused by the burning off of the forest.

I mentioned above that we have numerous falls in our country from which we could derive motive power, and I do not exaggerate when I say that I know of nearly a hundred in the districts of Rainy River and Thunder Bay, some of considerable size and beauty. Many of them are right in our gold mining region, others in close proximity, and others again further off, but many so conveniently situated that they would not cause a great outlay of capital in transmitting the electricity profitably to the mines. We all know that distance is nowadays no great obstacle since improved machines and a better insulation are at our disposal. Even as early as 1891, at the time of the Frankfurt electric exhibition, the first long-distance power transmission of 110 miles in length proved a success, for the loss was only 26 per cent., although different pressures from 65 to 28,000 volts were tried; and now we talk of distances of 500 miles and losses of only 10 to 15 per cent. Distance has to be considered only, then, when the consumption of power in a mine is small and it is within easy reach of cheap communication. The question will arise, then, if it would not be more economical and convenient to use a different motive power, produced either with gasoline, or better yet, refined or crude petroleum, for instance with a Diesel motor.

The advantages of long-distance transmissions are specially noticeable when high voltages are transmitted for large industrial centres, or for the distribution of power among a greater number of mines, situated in close proximity, or for a mine far off from the sources of fuel. But, as I said above, it is very questionable if it will be always advantageous for a single mine to go to the great expense of establishing water power and transmitting it from afar to the workings. This has to be determined in every instance by closely figuring all the different conditions. We have, therefore, to consider transmission for greater distances, and such for electricity generated at the time.

Now let us suppose, for instance, that we needed a large amount of h.p. for different machines, and wish to sell our surplus power to others, and know we can get this power from a rather distant waterfall. We take also for granted that utilization of this fall and the establishing of the primary motor here the turbine or any other water wheel causes no difficulty whatever; therefore, the next thing to be taken into account would be the dynamo, that is, has it to be a direct current or an alternating current machine? Now we know we need a greater number of h.p., the distance is not inconsiderable, and we wish the current to do different work. In this case the only acceptable machine for us would be the alternating dynamo, because the direct current machine has a limited transmission of only about 2,000 volts, and this current cannot be divided in the manner we wish. This is different with the polyphase current, which can easily be transformed into direct current of any strength which we might desire, or charged into as many motors as its pressure will permit. I come now to the second question: the production of electricity by some other medium than water and directly at the mine. The building of dams, the paying of pipes, and the erecting of a power-house with all its machinery and other installations near a waterfall for the transmission of electricity over a long costly wire, is rather an expensive thing, and not every owner is in the fortunate position to indulge in such expensive enterprises. We conclude, therefore, to buy a Diesel petroleum motor, which offers the most convenient and economic way to solve that problem. Also in this case the dynamo is a polyphase current machine, is coupled directly to the primary motor, and the generated electricity transmitted to the transformer and thence to the electric motors driving the various machines.

This mode of generating electricity will prove in many instances more advantageous and economic than the first system, for what we spend more in petroleum to run the motor we save again in wages for attending to the different machines and line of wire, and also on interest of capital expended, and not less so on loss of time in repairing, in telephoning from the mine to the power house at the falls, and I have a right to mention it, a saving of power in the shorter transmission. These are considerations of much importance, which will, I have no doubt, decide in many instances the choice between the two systems of primary power, especially in places where railroad or water communications are near at hand and the freights reasonable.

A mine which is in the fortunate position of having electricity as motive power should make use of its advantage and drive with electric motors everyone of its machines or works. The great convenience which accrues out of such an installation is obvious when we consider the difficulty which we experience often in transmitting the power of the steam boilers and engines, be it steam, air, or rope transmission, to our various mine workings. I might mention, however, that machines which need more than 50 horse-power would be better driven by a generator of their own, because the switching in and out of large motors would cause inconvenient

* Paper read before the Canadian Mining Institute

differences of pressure in the main line, and would affect the other motors to some extent. What advantage it is, but especially in large works, to disconnect or switch out any machine or apparatus at any moment without being obliged to shift belts over loose or friction pulleys, nor being able to stop the humming and buzzing noise of the overhead shafting with its tangle of belts, which are a constant menace to everyone's dear existence, not to speak of the great convenience to convey the power with ease from place to place and from any machine above or below ground to another!

Now, I wish to direct your attention to one of these machines which has, strange to say, found in this country very little or no attention, although it deserves it very fully. It is this, an electric drill of a very ingenious but simple construction and of great efficiency. The reason that we have heard and read but little of it in this country, and even in the States, is that we are too indifferent in acquainting ourselves with what other nations do in the various industries, and this is especially the case in the mining industry. We patronise in many cases the home industry too much to the disadvantage of our miners and mines. To some extent it might also be attributed to the prejudice which seems to exist against electric drills on account of the poor success which the so-called Solenoid machines of Van Depoele and Marvin had. These machines were constructed after Werner Von Siemen's so-called electric hammer principle, but soon abandoned by the latter. The principal fault of these machines were their inefficiency and weak return pull of the bit, although the consumption of energy was large, too large compared with the newer drills of Siemens & Halske. But even that earlier machine is surpassed in waste of power by the air drills so much in vogue at the present time. These earlier machines had the Solenoids the motor - in the drill itself, which was a great disadvantage, considering the shocks which they received with every stroke of the piston; besides, it became soon hot, and lost on account of this a large amount of energy, that is, efficiency. Different is it with the newer percussion drill of Siemens & Halske. The motor is here separated from the drill, and is connected with it by a flexible shaft of about 8 ft. long. This arrangement enabled the inventors to construct a more compact solid machine, but at the same time a more simple mechanism. The axis of the piston could be placed near the one with which it is fastened to the upright or tripod, therefore a more rigid position was secured, and a shaking when in operation was avoided. But to give the drill a still more steady working a fly-wheel was fastened on the crank shaft of the machine, whose inertia would hinder the power-transmitting mechanism, especially the teeth of the cog-wheels, from clattering upon each other. Another good arrangement is connected with the machine the piston rod for the drill steel is hollow throughout, therefore it is not necessary to change the position of the machine when a new bit has to be inserted. It can be done from the hind end by releasing the key with which it is fastened in its place. Further, the feed of the steel is on these machines either by hand or automatic, but always self-regulating according to the hardness of the material to be drilled. A jamming of the bit in the hole, which is with most percussion drills a very common occurrence, happens very rarely, for the return pull of the piston is so strong that on account of this and the powerful concussion the columns or stretcher bars had to be constructed especially strong, and instead of the common tripod, a quatripod, if you will permit me to give the four-legged stand that name, had to be provided for this percussion drill.

In regard to the consumption of power, this machine excels in economy every other percussion drill so far invented or in the market. A drill working with full capacity will use from 0.8 to 1.3 kilowatt, or six drills in operation will need ten horse power of a steam or water engine, if the length of the transmission of power is not too great, and 12 horse-power if it is great. It will drill a hole in the hardest rock from 1¼ to 1½ inch wide, and from 2 ins. to 12 ins. deep in one minute; for instance, in very hard granite 3 ins. to 4 ins. deep per minute. There is not one percussion drill, steam or air driven, which could show such results combined with such economy. To make a comparison, only the largest size of air drill might be able to drill a hole of the same depth and in the same time above mentioned, but would need six to eight times the power of one of the smaller electric drills. The vertical depth drilled with this machine is 6½ feet, and the depth bored without changing bits is 16 ins., with about 420 strokes per minute. The weight of the machine is about 240 pounds, and to raise and lower it on the stretcher bars with ease a small block and tackle is used.

Besides the percussion drill the firm of Siemens & Halske manufacture also a "rotary drill." This machine, which is used for boring in rocks and fossils of a softer nature, is of simpler construction and lighter weight than the former. No fly-wheel is necessary for this drill, because the drill barrel has only to follow the rotation of the flexible shaft and the forward feed of the inner mechanism, which is automatic and self-regulating according to the hardness of the material to be drilled. The consumption of energy is with this machine as with the former, about 806 watt = to one h.p., and will bore in rock salt a hole 1 6-10 in. wide by 12 to 16 in. deep, or in salt, clay, gypsum, or oolitic iron ore, etc., 8 to 10 in. per minute. With two bit changes the machine can bore a hole of over 6 ft. Its weight is not more than 70 lbs., and breakage or parts showing wear and tear can be easily and quickly replaced by new ones. The construction of the stretcher bar or column can be said to be a very handy apparatus.

I have to say now a few words about the flexible shaft which connects the drill with the motor. This shaft consists of two parts; the outer protecting flexible tube is made of a steel wire spiral and surrounded with leather, while the inner, the real power transmitting part, is a very pliable apparatus made of a number of right and left wound conaxial steel wire spirals, provided on both ends with massive steel pins and couplings, with which they rest smoothly against the outer protecting tube, and connect firmly with the motor and machine. The whole shaft is very solidly made, so that a rough handling in the workings will not injure it very easily.

Now, when we consider with what ease all the different parts connected with these drills can be carried from place to place, and compare it with the work that is necessary and the difficulty which exists in carrying the air or steam along in a mine, we understand readily the saving of time, and also the saving of expenses especially when we compare the much greater efficiency of these electric drills with those of steam or air.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

ANNUAL CONVENTION AT BERLIN.

THE tenth annual convention of the Canadian Association of Stationary Engineers has passed into history. It was held on August 15th, 16th and 17th, in the C.O.F. hall at Berlin, one of the most progressive manufacturing towns in Ontario, where there is an active association of engineers with a good quota of members.

MEMBERS OF THE BERLIN AND WATERLOO ASSOCIATIONS.

When the convention opened at 11.30 a.m. on Wednesday, President W. G. Chapman, of Brockville, presided, being supported by the following executive officers: R. C. Pettigrew, Hamilton, vice-president; G. C. Mooring, Toronto, acting secretary and treasurer; W. Bear, Dresden, conductor; J. Wendell, Waterloo, door-keeper. The other delegates and members present during the convention were as follows:

Toronto No. 1—A. E. Edkins, A. M. Wickens, J. J. Bain, J. W. Marr, Chas. Moseley and W. G. Webb.

Hamilton No. 2—Joseph Ironsides.

Guelph No. 6—R. W. Greene.

Dresden No. 8—W. F. Jamieson.

Berlin No. 9—G. Steinmetz, W. Oelschlager, A. McKersie, J. Heyd, W. Tiedt, J. Koehler, B. Englert, A. Arndt, L. Bowman, C. Fries, K. Gildner, R. Cossey, F. Hisse, J. Schneider and W. Wilschonke.

Brockville No. 15—F. W. Turkington.

Waterloo No. 17—Nathan Uttley, F. A. Pflug, J. R. Uttley, N. Beam, F. Alward, W. C. Mielke, G. Beam, A. Stockfish, J. Nihill and M. Cadwell.

Toronto No. 18—J. M. Dixon.

There was also present Mr. T. J. Halsey, representing the Fairbanks Company, engineers' supplies, Montreal.

Mr. W. Oelschlager, chairman of the local committee, read an address, in which he extended to the delegates a hearty welcome to Berlin. President Chapman replied as follows:

PRESIDENT'S ADDRESS.

BRETHREN,—I have the honor to welcome you to this our tenth annual convention. I am aware that in selecting you as delegates our various branches have sent their best men. Consequently, I am confident that your deliberations will result in the advancement of our organization, and that in dealing with the various subjects brought before you, the one and only aim sought shall be the greater good of the C.A.S.E. I am sure that naught but good will shall prevail; indeed, such is one of the cardinal principles of our order. I need not ask for your hearty support, as this has always been given to the occupant of the chair. We have not increased the membership during the past year, only one new association was organized, and very few new members added to replace those who have withdrawn and those taken by death. But, brethren, I have the pleasure of saying that we have received into the C.A.S.E., out in Calgary, a lot of energetic members that in the near future will have their subordinate lodge second to none in our fair Dominion. I have also in my possession a letter from Bro. Wm. Cross, also one from a Mr. Cook, chairman of a committee appointed by the engineers out at Rossland, asking information as to the starting of an association in that place. So you see if we have lost in the east we have gained in the west, where everything grows in abundance and to an enormous size.

You will be asked to look over a bill drafted by a committee appointed by the Ontario Association, also to give your opinion and co-operation, that a greater effort may be put forth to have the bill become law at the next meeting of the local House. In this connection I should say that in this movement not only are the two associations a unit in favor of such a law, but, I might add, almost all the qualified engineers of this country are with us, as well as most of the steam users. It may be necessary at the present convention to again take up the matter of biennial conventions, with a view to the curtailment of the expense necessary for an annual meeting. Steps should also be taken to arouse the engineers of the Dominion to the loss they sustain in not being of our membership. I regret very much the steps taken by our secretary, also by Montreal No. 1. I presume most of you have seen the item in the Canadian Engineer that Montreal had moved to withdraw from the executive. For what reason? Because they did not get from the executive the results desired in accordance to what they pay in; also that the cost of attending the convention was too great. Now, brethren, do you think that is the object? They have had for the past two years the executive secretary, a man possessed of good ability, and I consider it the most important office in the executive. So if they have not obtained what they want in the way of information it is their own fault. I think it would be wise to appoint some good past president to the secretaryship and keep him for a term of years, and have him devise some scheme whereby the subordinate associations will be drawn in closer touch with the executive head. For instance, he might send out problems to the different lodges, for them to work out and return, and any errors they might make could be rectified by him, thereby keeping up a correspondence and making the executive head a medium of instruction. These are a few points I have brought up for your consideration, and I feel satisfied that your best judgment will be used in dealing with them. The finances will be dealt with by the executive treasurer; therefore I will not touch on them. In conclusion, I desire to express to you my deep sense of gratitude for the great honor you conferred on me one year ago, when you elected me to the high and honorable position of president of this association, and for the loyal manner you have stood by me. In closing I will only add that it is my heartfelt wish that your deliberations at this convention will result in the advancement of the association.

On motion of Mr. Wickens, seconded by Mr Pettigrew, it was decided to refer the communication to the Committee on the Good of the Order for a report.

The minutes of last meeting were read by the secretary and adopted, after which the following committees were appointed:

Credential Committee—A. E. Edkins, J. W. Marr and F. W. Turkington.

Finance Committee—G. W. Webb, A. M. Wickens and R. C. Pettigrew.

Mileage Committee—J. J. Bain, J. Ironsides and W. F. Jameson.

MR. R. C. PETTIGREW, President.

Good of the Order—Jas. Dixon, A. M. Wickens, Chas. Moseley and W. Oelschlager.

The convention then adjourned for lunch.

AFTERNOON SESSION.

At 3 p.m. Mr. Oelschlager introduced Mayor Egan, who, after welcoming the delegates spoke as follows:

The Stationary Engineers fill a most important position in connection with the welfare of the country. In the first place they hold the key to our manufacturing industries, whereby the trade

and commerce of the land is very much increased. They also control to a great extent the labor employed in cities and towns, and without this employment, the cities and towns of our country would be very much reduced in prosperity and population. This must show to the engineers the necessity of each of you being intelligent and ingenious. A man to-day to be of any use in any profession must be more than a machine. You are showing your wisdom in forming yourselves into an association and meeting regularly to discuss new requirements in your particular lines. No doubt many of you are clever individually, but all can learn

MR. G. C. MOORING, Vice-President.

from one another. It should be your object to try and benefit your employer by giving him as much power as possible with the least expense. Now, as Mayor of this town, I extend to you all a hearty welcome to our town of Berlin—a town which we boast of as being the best in this fair Dominion—a town which employs to-day more stationary engineers than any other town of its size in Canada. I understand that only some of our engineers have as yet joined the association, but I trust your meeting here will act as a stimulus and result in having all our engineers identify themselves with the organization. Our town is known as a most hospitable one, and I can assure you the freedom of the city wherever you go. No doubt you will be most interested in our manufacturing establishments, and I can assure you from what I know of our manufacturers, it will be a pleasure for them to show you through their factories. I trust you will enjoy your visit here in such a way that you will see fit to meet here again in the near future, at which time we will have all our streets fixed up in keeping with the rest of the town. I again extend to you, friends, the freedom of our town.

The president acknowledged the hearty reception extended by the Mayor. He said he believed that the Dominion was destined to become one of the greatest countries in the world, and appreciating this truth, it became them as engineers to sow the seed

MR. A. M. WICKENS, Secretary.

of theory and practice combined, which were the fundamental principles of the Canadian Association of Stationary Engineers. The object of the association was to help one another socially and educationally, thus benefitting employers as well as themselves.

On motion of Messrs. Mooring and Edkins, the minutes of the last annual meeting were adopted.

Notices of motion were given as follows: That two days session be the limited time apportioned to conventions; that conventions in future be held every alternate year; that the per capita tax be reduced from 70 cents to 50 cents.

The reports of the treasurer and secretary were presented and adopted. The secretary's report embodied a letter from the Montreal association announcing the decision of Montreal No. 1 to withdraw from the Canadian association. A special committee was appointed to report as to the action to be taken in this matter.

The report of the Credential Committee was then read and referred to the Mileage Committee. Mr. Dixon presented a report from the Parliamentary Committee, and the convention adjourned at 4 p.m. to meet the following morning. In the evening many of the delegates visited Waterloo, where they were entertained by the local association and dined at the Progress House.

SECOND DAY.

Upon reassembling on Thursday morning, Mr. Wickens presented the report of the Finance Committee, and Mr. Dixon that of the Committee on Good of the Order. It was decided to take up the latter clause by clause. The clause referring to the limitation of the session of conventions to two days was struck out, the point being covered by the constitution. The report as adopted is as follows:

REPORT ON THE GOOD OF THE ORDER.

1. The President's address contains much that is essential to our vitality as an organization. His reference to our development

MR. CHAS. MOSELEY, Treasurer.

has a regretful aspect, but certainly the cause lay in the hands of those who it was possible to control, much less to coerce into activity.

2. The outlook for our extension in the near future is hopeful, inasmuch as enquiries have reached us from the Pacific coast regarding organization under our charter. We suggest that these enquiries be closely attended to by our present or incoming executive.

3. Relative to bill for the protection of stationary engineers, your committee appointed at convention found it impossible to act. The Ontario Association took the matter up with great enthusiasm and interviewed Hon. Mr. Dryden, M.P.P., who advised them to amend the bill and present it at the next session. Your committee desires to impress upon the individual membership the necessity of supporting this association in its praiseworthy efforts in our interests; further, we are of the opinion that a special committee appointed from this convention to act in conjunction with the Ontario Association would be a wise measure to adopt, and that the funds to assist in forwarding this object should be realized by special appeal of the executive to the primary lodges.

4. The president's suggestion that a past president be elected to the office of executive secretary we consider is a wise one, and we would recommend that the office be held for a term of not less than two years, and that the secretary, at pleasure of convention, be eligible for re-election.

5. We would recommend that the executive issue a circular to primary lodges inviting a plebiscite vote on the question of holding conventions annually or biennially, returns of said votes to decide.

6. We would recommend that the per capita tax be reduced from 70 cents to 50 cents. This would certainly be a boon to primary lodges, and if the biennially sessions are adopted, would still increase the general fund of the executive, as by paying 50 cents annually with expenses arising every two years, there would be 25 cents extra accumulate over and above the ordinary fragments.

7. We beg to remind our executive that a motion stands on the book that they issue instruction and question papers. No course that we are cognizant of would be so effective in keeping our membership in close touch with each other, and we beg to emphasize this action on the executive as being of paramount importance.

After some lively discussion on the recommendations embodied in the above report, it was, on motion of Messrs. Edkins and Ironsides, adopted. The president read a telegram from the Goldie & McCulloch Co., of Galt, inviting the delegates to visit their works in the afternoon. It was decided to accept the invi-

MR. W. OELSCHLAGER, Conductor.

tation and wire the company to that effect. Mr. Oelschalger announced that the train would leave Berlin at 3 o'clock.

VISIT TO THE GOLDIE & MCCULLOCH WORKS.

In response to the invitation from the Goldie & McCulloch Co., of Galt, all the delegates visited the works of the above firm. The entire party expressed the greatest surprise at the immensity of this well-known establishment. Solidity seemed to be stamped on everything, their substantial stone buildings and offices covering more than one entire block. Mr. A. R. Goldie met the delegates and personally conducted them through the various departments. A visit to the moulding shop proved of very great interest, for here was found one of the finest foundries in the Dominion. It has an immense floor space of 90 feet by 160 feet. At one end is situated three large core ovens, and at the same end are also three very large cupolas. The ponderous ladles of molten metal are conveyed from these to their respective destinations by one large Whiting travelling crane of 40,000 lbs. capacity—this immense crane being operated entirely by compressed air. Supplementing this are six smaller hydro-pneumatic swinging cranes, three on each side of the floor. With these and other late equipments, it is not the difficult task it otherwise would be to handle the ponderous castings. The moulding shop is well lighted and ventilated.

The delegates next visited the machine shop, where was seen the very latest improved machinery in lathes, planers, etc. System and good management were apparent in every detail here, as in all the other departments of the works.

Perhaps no department proved more interesting to the engineers than the erecting room, for it is always interesting to engineers to see the assembling of the different parts of an engine. On this floor were to be seen engines in all stages of construction. Here were massive cylinders and immense frames carried here and there by powerful cranes to be united, fitted and finished, some of them to soon go out and develop 400 to 500 horse power for the work they have been purchased to perform. This was the department which most interested the engineers, and they saw why this firm have been so successful in engine building, thoroughness, system and great care being exercised in every minute particular.

The visitors were shown through the other parts of the works, such as the wood-working machinery department, flour mill machinery, safe, boiler and other shops.

Before leaving, the president, Mr. Chapman, in fitting words, tendered a very hearty vote of thanks to Mr. Goldie for his kindness in showing the delegates through the establishment and also to the firm, and three rousing cheers were given for the Goldie & McCulloch Company. Mr Goldie, in response, expressed his pleasure at being privileged to meet and entertain such an intelligent body of men. The delegates returned to Berlin about 8 p.m.

THIRD DAY.

The proceedings opened on Thursday morning with the presentation of the report of the Mileage Committee. On motion of Mr. Edkins, the name of Mr. Wickens was added to the list of persons to be given mileage expenses. Mr. Dixon moved, seconded by Mr. Moseley, that the report with addition be adopted. Carried.

Mr. Dixon presented the report to the Special Committee to deal with the letter from the Montreal association. While expressing regret that the association had withdrawn from the Dominion organization, the hope was expressed that ere long Montreal No. 1 would apply for representation again. The report stated that the committee had extended its power, and submitted a resolution that the Montreal association be presented with a charter of the association as a memento. This was carried unanimously by a standing vote, and, on motion by Mr. Edkins, seconded by Mr. Moseley, the report in full was adopted and ordered to be transmitted to the secretary of the Montreal association.

The question of making some changes in the bill for the licensing of engineers was left in the hands of the proper committee.

Mr. Mooring moved that a new Legislative Committee be appointed to work in conjunction with the Ontario association, and that the members thereof should reside in one city or near by each other. This was seconded by Mr. Pettigrew and carried. The president appointed as the Legislative Committee Messrs. Dixon, Edkins, Webb, Mooring and Moseley, Mr. Dixon to be chairman.

Upon motion of Mr. Moseley, this committee was given power to draw upon the funds of the executive for $50 for preliminary legislative work, in case this amount should be required.

Upon motion of Mr. Wickens, seconded by Mr. Dixon, the incoming secretary was instructed to procure copies of the constitution and by-laws for the use of subordinate associations.

Mr. Jamieson reported that there were a great many engineers in the town of Petrolia, and he was of the opinion that an association could be organized there. He was requested to furnish the names of some of the engineers to the executive secretary.

Mr. Mooring announced that the committee had placed the value of property owned by the association at $109.50.

ELECTION OF OFFICERS.

The next business was the election of officers, for which purpose Messrs. Steinmetz and Walker were appointed scrutineers. The result was as follows: President, R. C. Pettigrew, Hamilton;

MR. W. BEAR, Door-Keeper.

vice-president, G. C. Mooring, Toronto; secretary, A. M. Wickens, Toronto; treasurer, Chas. Moseley, Toronto; conductor, W. Oelschlager, Berlin; doorkeeper, W. Bear, Dresden. The newly elected officers were then presented by Mr. Webb and duly installed. The thanks of the association were tendered to the scrutineers.

The next place of meeting was then taken up. Mr. Oelschlager moved that the next convention be held in Toronto, which met with the unanimous approval of the convention.

The retiring president, Mr. Chapman, was presented with the usual past-president's jewel.

The acting secretary was granted $15 for his services, and

votes of thanks were tendered to the authorities of Berlin; to Mr. Wm. Oelschlager and the local committee; to the ladies of Berlin, and to the mechanical press. Brief speeches were made by the newly elected officers, which closed the business session.

In the afternoon the delegates drove to Waterloo, where they visited the Sleeman stables, the large button factory, and other industries.

THE BANQUET.

The programme announced a banquet at the Walper House in the evening. About seventy-five persons gathered around the tables in the spacious dining hall. Seated at the head table were Mr. Oelschlager, who acted as chairman; president Pettigrew; past-presidents Wickens, Phillips, Pettigrew and Chapman; vice-president Mooring; treasurer Moseley; conductor Baer; and Mr. Chas. Rogers, of the Queen City Oil Co., Toronto. There were also present Mr. G. B. Towers, of the Vacuum Oil Co., Toronto; Mr. J. H. Clappison, of the Clappison Pipe and Boiler Covering Co., Hamilton; Mr. T. J. Halsey, representing Fairbanks Company, Montreal; several of the town councillors and many prominent citizens of Berlin and Waterloo.

After the menu had received attention, the chairman made a brief address, and read letters of regret from Mayor Eden, Mr. J. J. York, Montreal, Mr. Wm. Sutton, Toronto, and the Goldie & McCulloch Co., Galt. Then the toast of "Our Queen" was royally honored, followed by the toast of "Canada Our Home," to which Mr. L. J. Breithaupt, M.P.P., was asked to respond. Mr. Briethaupt said he was pleased, as an employer of labor, to be present, and that he was in sympathy with such an association. The employer soon recognized the fact that an intelligent workman was saving him money. Employers could not get along without employees and vice-versa, therefore their interests were mutual. Referring more particularly to Canada, Mr. Breithaupt pointed out that there never was a time when the future of Canada was so appreciated and recognized as it is to-day. The exports to Great Britain were proportionately more in the last few years than ever before. Engineers, he thought, would be certain to derive some benefit from this prosperity. In conclusion Mr. Breithaupt referred to the activity in manufacturing in the town of Berlin, which he said was an example of the conditions prevailing all over the Dominion. Upon resuming his seat Mr. Briethaupt was heartily cheered.

The "Mayor and Council" followed, in which Dr. Bowlby, deputy reeve, councillors Rumpel and Hagen, and Mayor Deibel, of Waterloo, responded.

The chairman then called upon Mr. James Dixon for a song, he rendering in a most acceptable manner "And She Was Tired of Him," which, needless to remark, received a hearty encore.

Coupled with the toast of "The Executive Head" were the names of Messrs. Pettigrew, Mooring, Moseley, Wickens and Dixon. Mr. Pettigrew said that the association, with education for its corner stone and progress for its motto, had been the means of establishing technical schools throughout the country. It was organized only twelve years ago, but now extended from salt water to salt water. Speaking on legislation he said he failed to see why engineers were not as much entitled to protection as professional men. Mr. Mooring said that when he accepted office in the association it was with the intention of reaching the top, and this he hoped to do next year. Messrs. Moseley and Wickens spoke briefly, after which Mr. Dixon indulged in some humorous stories, one being of the small boy who, when asked by the professor what steam was, replied: "Steam is water in a terrific state of perspiration."

MR. ROGER'S SPEECH.

Then came the toast of "Our Manufacturing Interests," to which Mr. Samuel Rogers, president of the Queen City Oil Co., was the first respondent. Mr. Rogers said that as a result of his meeting with the engineers he would in future take a deeper interest in the prosperity of stationary engineers. Knowledge properly applied was what made the wheels of the world go round, and he was pleased that the stationary engineers association was for educational purposes. An employer greatly appreciated an honest, faithful employee, and the prosperity of engineers depended in a large measure upon the prosperity of employers. For the last ten years, he said, his firm had been shipping oil to Australia and New Zealand, and each succeeding year the quantity had doubled. Mr. Rogers then spoke at some length upon the manufacture of oil, giving a most interesting and instructive talk. He said in part:

"Crude oil is placed in the still, which ordinarily is charged with from 350 to 500 barrels. The still has a dome on the top, from which large pipes lead to the condenser, which is built in the shape of a flume. The flume is kept filled with cool water. Condenser pipes are joined with vapor pipes, which come direct from the still. As these condenser pipes are under water, the vapor from the still is condensed while passing through them, and comes out at the worm end in liquid form, but varying very much in quality in proportion to the length of time which the still has been running. The first vapors which come from the still are very light, and when condensed make a liquid of 90 gravity, which is called gasoline, being nearly ten degrees heavier than vapor. Formerly this product was all lost for want of knowledge and lack of capital to build up-to-date refineries. At present closed worm ends are used, so that even the gases which are uncondensable are secured and drawn back to feed the fire under the still. As the fire is continued the vapors grow heavier. Next to ninety gravity gasoline comes eighty-eight, then eighty-six gravity. All the above are used for making gas for lighting churches, mills, etc., by simply mixing air with the gasoline. After this comes stove naptha, ranging from seventy to seventy-four gravity, used for motor carriages, for summer cooking stoves and for plumbers' use. Then we get 62 to 64 gravity, used for benzine and naptha, from which varnish and other paints are made.

"After this we get down to the series from which refined burning oils are made. At this point it may be better to explain that crude oil is composed of molecules or little balls, which vary in size according to the gravity, and it is very important that a proper separation be made of all these different qualities. This is done by the stillman watching the worm end continually, and taking samples of the distillate at least every fifteen minutes, and as change takes place in the quality of the distillate, the stillman takes off the product of the still and runs it into different tanks, thereby making the first separation. After the refined series is passed, we get down to the heavier molecules from which gas oil, high fire test burning oil, high grade spindle and other oils are made. When the above point is reached, we get down to the heavier paraffine series, from which high grade engine and other machine oils are made, also wax candles and petroleum specialties.

"After all the above products have come from the still, in the form of vapor, passing through the condenser, and the different liquids separated at the worm end, there only remains in the still petroleum coke, which is used to make carbons for electric light plants, or for other heating purposes. The products thus far produced are all in a crude state, and require close and careful handling, having to be chemically treated. Many more separations are also made before the finished articles are ready for the market—there is not time to follow all these in detail. One million dollars has recently been spent in building a new refinery at Sarnia. Owing to this expenditure all grades of petroleum are now made in Canada equal in quality to anything produced in the United States. During the last three years wonderful advances have been made in manufacturing petroleum. Take for example one by-product, gas oil, which is a by-product from crude oil, a large quantity of which is used by gas companies for making gas (one company alone using 40,000 barrels per year). Roughly speaking, their method of using this oil is to build a high retort; this is filled in openly with fire brick, leaving an arch at the bottom in which a coal fire is kept burning, heating the fire brick red hot. A small stream of oil is then fed in the retort from the top. Live steam is also introduced into the retort, and all the oil is therefore converted into gas and smoke. As this is conveyed in vapor from the retort to the gas holder, it passes through a scrubber in which there is water. The water condenses the smoke into thick, heavy tar, mixed with water. The tar is afterwards taken to the varnish factory and put again into a still with a condenser attached. As the still is heated the vapor which comes from the tar is again condensed, and, strange to say, after the water has been all removed in vapor from the tar, there comes again a thin oil. This oil, which has once been made from crude oil and then made into gas oil and smoke, is again made into oil, which is used for making tar-paper by mixing with tar, or it can be burned as fuel for firing the still. The residue of the condensed smoke remaining in the still is made into pitch, electrical compound, Japan and many other articles. All of these products have been redeemed from the fire, while in the past many of them were lost, absolutely thrown away. The bringing into this country of new capital, coupled with the expenditure of millions of money in experiments and plant, has made Canadian oil equal to the best American, and if Canadians were only as loyal to their country as Americans are to theirs, no American oil would be bought so long as the Canadian supply held out. The Queen City Oil Company have from one hundred and seventy-five to two hundred employees engaged in the sale of this oil in Ontario. Every one of them are Canadians. The oil is equal to or better than the best imported, and the money received instead of going to the States is sent to Sarnia to buy Canadian crude oil, furnishing home work for thousands of Canadians and helping to build up a Canadian empire which is truly loyal to the British Crown, proud to live beneath the glorious flag of our beloved Queen."

Mr. J. S. Anthes, furniture manufacturer of Berlin, also spoke in response to the last-named toast.

Mr. Hugo Kranz spoke in response to the toast "Educational Interests." He declared himself in favor of technical education. Some years ago, he said, Germany was a purely agricultural country. The government decided to send an expert to the United States to report as to the products of industries and if Germany was equal with other countries. This expert reported in the negative, and as a result technical schools were started. To-day Germany occupies a foremost position among the manufacturing countries of the world, largely due to her system of technical schools.

The toast of "Sister Associations" came next. Mr. E. J. Philip, in responding, said that the Canadian Association of Stationary Engineers was the only association that gave a man a practical benefit that remained with him. Mr. Wickens followed, explaining the difference between the Canadian association and the Ontario association, and pointing out the necessity of having boilers in charge of competent men. An ordinary boiler, he said, had an explosive force equal to two kegs of gun-powder.

The toast of "The Press" was acknowledged by Mr. W. A. Smith, of the Canadian Engineer, T. S. Young, of the ELECTRICAL NEWS AND ENGINEERING JOURNAL, and by representatives of the Berlin press. Mr. Dixon then favored the audience with another song. Then followed the toast of "The Ladies," responded to by Mr. Dover and Mr. Geo. O. Philip; "Berlin and Waterloo Association," proposed by Mr. E. J. Philip and responded to by Messrs. W. Oelschlager, Geo. Steinmetz and J. Wendell; "Host and Hostess," by Mr. Philip, on behalf of Mr. A. Walper. The banquet was brought to a close by the singing of "God Save the Queen," and by giving three cheers and a tiger for Berlin.

CONVENTION FLASHES.

The Alpha Chemical Co., of Berlin, distributed among the engineers sample boxes of Moody's metal polishing paste.

Mr. Joseph H. Walker, chief engineer of the Kincardine electric light plant, although not a delegate, was a visitor to the convention.

Mr. G. O. Philip, a brother of Mr. E. J. Philip, is an engineer in heart, if not in practice. Someone suggested that he be made a life member of the association.

The thanks of the association are due Mr. Samuel Rogers, of the Queen City Oil Co., for a substantial contribution towards the expenses of the convention.

Mr. Geo. Steinmetz, vice-president of the Berlin association, is chief engineer at the power house of the Berlin Gas & Electric Light Co. He was at one time a traveller for engineers' supplies.

Even the oratorical powers of Mr. James Dixon, chief engineer at the Toronto city hall, were not sufficient to fittingly express the appreciation of the hospitality extended by the authorities of Berlin.

The Babcock & Wilcox Co., of Montreal and Toronto, displayed in the convention hall their "Beats All" improved pump governor, reducing valve, steam trap and Crosby steam gauge, which attracted much attention.

The local association were assisted in the entertainment of the delegates by Messrs. R. Wegener and H. D. McConachie, resident representatives respectively of the Queen City Oil Company and McColl Bros., Toronto.

Mr. Nathan Uttley, of Waterloo, may be said to be the father of engineers. Although 67 years of age, he is now firing under five boilers of 70 h.p. each in the Waterloo Woollen Mills, which position he has occupied for 18 years. His son, Mr. J. Uttley, is chief engineer of the plant.

That the engineers might remember the brands of oil manufactured by the Queen City Oil Co., Mr. R. Wegener, the local representative, placed in the hands of each person at the banquet a package of matches, each match bearing the name of some brand of oil made by his company.

Too much credit cannot be given to the energetic local committee for their faithful labors to make the convention a success. While every member was true to his duty, special thanks are due the chairman, Mr. W. Oelschlager. From the arrival of the first train until every delegate had departed from the town, he was ever on the alert to add to the comfort and pleasure of the visitors. Mr. Oelschlager is a member of the firm of Oelschlager Bros., engineers and machinists, of Berlin, who manufacture high speed engines, steam pumps, power and hand hoists, etc.

Mr. T. J. Halsey, of the Fairbanks Company, of Montreal, lost no opportunity to make known to the engineers the merits of the goods of his company. He had a choice exhibit of the Fairbanks renewable asbestos disc valves, asbestos pack cocks for boiler blow-offs, and lines of vulcabeston packing. A special feature of their Globe disc valves is the very simple manner of renewing the disc. They are held in a central position by guides cast on the valve body, and have no nuts, screws or pins to become detached in use. The discs can be put in place by simply removing the bonnet of the valve, slipping a new disc on the end of spindle, and replacing the bonnet again.

MOTOR CARRIAGE TRIP ON COUNTRY ROADS.

ON August 15th Mr. E. J. Philip, chief electrician for the T. Eaton Company, ran his motor carriage from Toronto to Berlin, to attend the convention of the Canadian Association of Stationary Engineers, of which society he is a past-president. Mr. Philip was accompanied by his mother, who is seventy-four years of age. The following account of the trip has been furnished to the ELECTRICAL NEWS:

"Leaving Toronto at 11.15 a.m., we arrived in Berlin about 8.30 p.m. About two hours was lost at noon and forty-five minutes at tea, making the running time about 6½ hours, or a speed of 12 miles an hour. This, of course, included stoppages to inquire as to the best route. The trip was made practically without a hitch, and the total load moved was about one ton, there being, besides the weight of the carriage, that of the passengers, an extra two gallon can of gasoline, and a valise. About four gallons of 74° stored gasoline and 11 pails of water were used on the trip. At 12.30, when on the road between Brampton and Cooksville, a key fell out of a bronze pinion. It was found to be too long, and after cutting it off with the tools at hand, we were invited to partake of dinner by a farmer. When a start was again made it was 2.30, having lost two hours. The water tank was filled before starting,

MR. E. J. PHILIP AND HIS AUTOMOBILE.

and the run from this point to Georgetown was made without a stop except to inquire the way. At Georgetown the water tank was filled, some gasoline put in the tank, and the engine oiled up. From Georgetown to Guelph being all up hill, we used nearly as much gasoline and water on this run as from Toronto to Georgetown. Guelph was reached about 6.30 p.m., when we had supper, filled the water tank and oiled up. Leaving again at 7.20, we arrived in Berlin about 8.30.

"The return journey was made without incident. We left Berlin about 7 p.m., and ran down to Galt, stopped over night, left Galt at 7:15 a.m. for Hamilton, arriving at 9:30. The water tank was filled at Sheffield and Dundas; it was leaking badly all the way home, and lost more water than was evaporated by the heat. At Hamilton we took the boat for Toronto. The carriage caused much sensation along the road, and seemed to be regarded as a wonderful curiosity by men, women and children.

"The carriage was built by the Winton Motor Carriage Co., of Cleveland, Ohio, and weighs 1,600 pounds, with gasoline and water tank filled. The motive power is supplied by a 7½ h.p. horizontal gasoline engine; the cylinder and frame is cast in two pieces, and is made of bronze. It has a thin sheet brass jacket through which the cooling water circulates. The water tank is also made of this sheet brass, with plenty of ribs to give a sufficient radiating surface.

"The firing of the mixture is done by eight cells of Nungesser battery. The spark takes place between the platinum points, operated by a cam, and there is an explosion every second revolution. The distinctive feature of this carriage is the method of regulation. This is obtained by making the suction or admission valve stem very long, so that it extends through a head into a small cylinder. A piston is put on the stem in this cylinder, and between the little piston and head air is pumped by a small

air pump worked from the engine. On the pipe between the pump and controlling cylinder are placed two valves, one a set valve and the other being controlled by the foot at will. In starting up there is no air pressure in the small cylinder, and the valve can open wide, but as the engine speeds up, air is pumped into the chamber, the valve is kept closed, and the engine will slacken down and run slower, just keeping the air supplied that is escaping at the set valve. The engine will operate in this way when the carriage is standing still. The clutches not being in, in order to start the carriage, the operator, by pressing down the other valve with his foot, lets the pressure escape from the chamber, the valve will open wide, and the engine will speed up; the low or hill climbing clutch is now pulled in and the carriage starts off slow, the engine running fast; as it speeds up, the low clutch is thrown out and the high one put in; this direct connects the engine with the chain, and the carriage will now make about 18 miles an hour on a first-class road. The speed can be regulated by raising or lowering the foot. Within the range of speed of the engine to go slower, the low clutch is used; this low clutch lever when pulled in toward the operator drives the carriage ahead slowly, and when pushed away from the operator the carriage will back up. The high speed lever runs the carriage fast when pulled in, and by pushing it in the opposite direction it puts on a band brake that stops the carriage almost instantly. In case the brake should fail, the back-up gear can be used. These levers are operated by the right hand, the left doing the steering, which is as easy as steering a bicycle. The right foot controls the engine air valve, the left foot is at the bell, and the operation of the carriage becomes as unconsciously automatic as walking. The body of the carriage is hung on easy springs, the front wheels being 32-inch, the back ones 36-inch, and the tires Hartford 3-inch single tube.

"Some of the roads over which we passed were very hard on the tires, but as the horseless carriage comes into more general use, good roads must certainly follow. The distance to Berlin by the route we took was about 80 miles, and the return to Hamilton 37 miles. In and around Berlin the carriage must have covered about 100 miles, as six gallons of gasoline were consumed in the town, while only four gallons were consumed in going from Toronto to Berlin."

STEAM BOILER INSPECTION IN BRITISH COLUMBIA.

FOLLOWING are the rules for inspection of steam boilers and engines in British Columbia under the authority of the act passed at the last session of the Provincial Legislature.

MODE OF INSPECTION.

The inspector may, whenever he deems it necessary, and he shall at least once each year, subject every boiler in his district to a test by hydrostatic pressure, in the ratio of 150 pounds to 100 pounds per square inch allowable as a working pressure, using the water in such test at a temperature not exceeding 60 degrees Fahrenheit. For the purpose of such test, however, the owner or his agent shall provide the necessary pipe and fittings to connect the inspector's pump with the boiler, and shall also provide men to work the pump and assist the inspector in his examination of such boiler.

Before a boiler is subjected to a test by hydrostatic pressure, it shall be opened up for inspection, the man-hole and mud-plate doors removed, the outside and the inside of the boiler cleaned, the furnace grates removed and all flues and tubes swept clean. The owners or their agents shall see that the foregoing requirements are complied with before applying for inspection.

In any case in which a test is not satisfactory, the defects shall be made good and the boiler re-tested before a certificate is granted.

The inspector shall fix the working pressure of boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material of which they are composed.

In order to satisfy himself as to the strength and internal condition of a boiler the inspector may, should he deem it necessary, order holes to be cut in it, and may so demand that such information, by drawings and specifications of the several parts, be furnished him of the construction as will enable him to determine, by calculation and examination, their strength.

In the event of satisfactory information not being obtainable, the inspector shall use the factor of safety provided above, with such additions as his judgment may dictate.

When the outside of a boiler cannot be otherwise perfectly inspected on account of brickwork or other covering, such covering shall be removed once at least in every four years.

In subjecting boilers made of iron plates to the hydrostatic test aforesaid, the inspector shall assume 100 pounds to the square inch as the maximum pressure allowable as a working pressure for a new boiler 42 inches in diameter, made of the best refined iron, at least one quarter of an inch thick, in the best manner and of the quality herein required, and shall rate the working pressure of all iron boilers, whether of greater or less diameter, according to their strength compared with this standard.

In subjecting boilers made of steel to the hydrostatic test aforesaid, the inspector shall assume 125 pounds as the maximum pressure allowable as a working pressure for a new boiler 42 inches in diameter, made in the best manner of the best quality of steel plate, at least one quarter of an inch thick, with all the rivet holes drilled in place, the plates being taken apart and the burrs removed, the longitudinal seams in the shell being fitted with double butt steel straps cut from the plate, and each at least five-eighths or over the thickness of the plates they cover, and all seams being at least double-riveted, and having 70 per cent. of the strength of the solid plate, and all flat surfaces stayed in the best manner and all the seams double-riveted; and he shall rate the working pressure of all steel boilers so made, whether of greater or less diameter, according to their strength compared with this standard.

If the inspector is of the opinion that any boiler, whether made of iron or steel plates, by reason of its construction or material, will not safely allow so high a working pressure as that hereinbefore specified for each such description of boiler respectively, he may, for reasons to be stated specifically in his certificate, fix the working pressure of such boiler at less than two-thirds of the test pressure.

When it is known or comes to the knowledge of the inspector that any steam boiler is or has been carrying an excess of steam beyond that which is allowed by the certificate of inspection, he shall, in addition to reporting the fact to the Attorney-General for prosecution under Sub-Section (3), Section (8), of the "Boilers Inspection Act, 1899," require the owner, or owners, of such boiler to place thereon a lock-up safety valve that will prevent their carrying an excess of steam.

On commencement of the construction of every boiler built in British Columbia under the provision of this Act, the maker of such boiler shall notify the inspector that it is open for his inspection.

The fees or dues to be paid yearly by the owners of steam boilers shall be 20 cents per horse-power, with a minimum of $5 for each boiler under 25 horse-power. The amount of such fees or dues shall in each case be paid to and received by the Inspector of Steam Boilers, who shall, at such time and in such manner as the Chief Commissioner of Lands and Works shall from time to time direct, account for and pay over the same to the Minister of Finance, to form part of the Consolidated Revenue Fund of the Province.

The inspector shall not make or deliver a certificate respecting any steam boiler under this act unless the fees or dues have been paid, as hereinbefore set forth.

DUTIES AND LIABILITIES OF ENGINEERS.

Engineers are required in all cases, upon stopping the engine, to open the safety valve, so as to keep the steam in the boiler below the limit allowed by the inspector's certificate; to close the dampers, and when by accident the water in the boiler has fallen below the point of safety, to put out the fires at once.

Engineers are required to report to the owner, and also to the inspector, any defects of or injury to the boilers or machinery, by which the safety of the same may be endangered.

They shall also report to the inspector any accident happening to the boilers or machinery; and in case of omission to make such report, the license of the engineer so omitting shall be revoked.

The chief engineer of a steam plant will be held accountable to the Department for the proper care and management of the boilers and machinery under his charge.

Engineers, on first taking charge of steam plants and at least once a year, shall satisfy themselves, by examination, that all braces, and stays, and bolts of the boiler are in good order, and that the safety valves are in thorough working order.

MANAGEMENT OF BOILERS.

Getting up steam.—Warm the boiler gradually. By getting up steam too quickly the boiler will soon be destroyed.

Firing.—Fire regularly. Use the slice bar gently and as seldom as possible.

Feed Water.—Let the feed be regular and constant.

Glass gauge and try cocks.—Keep the glass clean and free, and try the gauge cocks often.

Safety valves.—Lift each safety valve at least once each day, and always before getting up steam.

Low water.—Put out the fires by drawing them or throwing ashes on them. Never use water.

Blowing off the boiler.—Do not blow off by steam pressure; let the water run off if possible. See that the fires are all out and hot ashes removed.

Boiler purgers.—Never use any composition to keep down incrustation without the approval of the inspector.

TELEGRAPH and TELEPHONE

THE APPLICATION OF WIRELESS TELEGRAPHY TO THE PROPOSED SYSTEM OF BUOYS.

By F. A. Hamilton, M.I.E.E., M. Can. Soc. C.E.

My idea with regard to the possibility of using the Marconi system in conjunction with the electric gong buoys is based on the following considerations:

It is a generally recognized fact that some means of improving the approaches to Halifax harbor and other points on this coast must be provided. The subject has been discussed at intervals for years, but recent shipping disasters and more especially the increase of insurance rates have had the effect of so arousing public opinion that active measures are being taken with a view to carrying out some means of securing the desired result.

My proposal is to run a submarine cable from some suitable place near one of the headlands to a distance of about 12 miles off Sambro. Connected with the cable I propose mooring three buoys, placed in convenient positions, as described in the Canadian Electrical News of October, 1898, page 206, and in the Halifax public press in 1891-92, each buoy being fitted with an electric motor and other apparatus, such as bell, hammer and switch. The current would be generated at the station on shore, and each buoy would sound its own signal or number. Such a system of buoys could be maintained at a considerable less cost than would be incurred in the case of a lightship, and with more satisfactory results, for the former could be placed well out in the offing in water that would be beyond the depth in which a lightship could be moored. One of these buoys could be fitted, in addition to its ordinary apparatus, with a Marconi transmitter of sufficient efficiency to admit of signals being projected for a distance of a few miles, say four or five miles from the outer buoy.

By means of this combination provision would be made whereby vessels bound in would not be running into danger when searching for the buoys, and the latter would be so placed that the course of the ship standing to and fro would be parallel with the land. On passing to leeward of one of the buoys its number would be ascertained and a safe course to the harbor assured.

Ships having the Marconi receiver would be doubly served, and other vessels, such as the smaller sailing craft, would not be ignored. Such is briefly the scheme in outline.

With regard to the mooring of these buoys, I may say that a long experience in connection with submarine cable repairs justifies my conclusions with regard to the possibility of maintaining the proposed service at a cost which would not be prohibitory, and at an initial expense considerably less than would be required to provide and equip an efficient lightship, allowing for argument's sake that such a vessel could efficiently serve the purpose intended under circumstances when visual signals would be absolutely useless, seeing that thick weather is almost invariably the accompaniment during a southerly wind, and that vessels approaching the land are then standing down the wind and consequently towards a lee shore, frequently in dense fog which no light could penetrate. It may appear a vain repetition to recite the oft quoted experience of each and all of those who have studied the question of marine signals, that it is no unfrequent occurrence during intermittent fog for the passing mariner to see the jet of steam from a fog whistle, but without the faintest sound therefrom reaching him; and so with the automatic buoy, whose doleful moan can be heard for miles to leeward, but is inaudible a hundred yards to windward. Taking these facts into consideration, it would seem reasonable that the suggestions here submitted would commend themselves as proper subjects for investigation.

Halifax, August 8th, 1899.

POLICE AND FIRE ALARM SYSTEMS IN CANADA.*

By Geo F. Macdonald, City Electrician, Ottawa.

You have asked me to prepare a paper on the progress and development of the fire alarm and police telegraph in the Dominion of Canada. Gentlemen, I appreciate the honor, I assure you. In my early occupation in commercial telegraphy we charged so much per word, therefore force of early training compels me to be as brief as possible.

The first alarm and police telegraph in Canada was established in Montreal in 1863, just 36 years ago. The "A.B.C." or dial instruments were used for police purposes. Montreal started with 53 boxes; to-day that city has 255. Montreal introduced the modern police alarm on street corners in 1884.

Toronto, the next largest city, installed the alarm in 1871 with 40 boxes; to-day it has 183, with 10 circuits and one of the most complete telegraph and underground systems to be found anywhere.

Quebec, the third largest city, built the alarm in 1867 with fifty boxes; to-day it has 100 boxes.

St. John, N.B., introduced the system the same year as Quebec, commencing with 25 boxes; to-day it has 61.

Ottawa, the capital of the vast Dominion, the "Washington of the North," commenced in 1874 with 30 boxes; to-day we have 100, and I am trying to get 50 more of the up-to-date pattern.

Halifax, N.S., Hamilton, London, and many other cities all have the fire alarm system.

Montreal and Toronto are the only Canadian cities having a perfect police patrol alarm. Montreal commenced to use the gravity battery in 1867.

The cities I have mentioned are using the keyless, non-interfering boxes, more or less. The day is fast approaching when we will have nothing but underground wires, non-interfering boxes and the storage battery system. I cannot close without acknowledging the great benefits derived by the introduction of the Gamewell repeater and the telephone in connection with our signal service.

* Paper read at the annual convention of the National Association of Municipal Engineers, September 4, 1899.

SHORT-CIRCUITS.

The town of Revelstoke, B.C., will install an electric fire alarm system.

The Bell Telephone Co. purpose renewing their line between Almonte and Pembroke, Ont.

The Bell Telephone Co. is said to be running a copper wire circuit from Montreal to Buffalo.

The bill providing for the payment by Canada of a proportionate share of the cost of the construction of the proposed Pacific cable was passed in the Dominion parliament on August 2nd.

The Georgian Bay Cement Company, Limited, of Owen Sound, Ont., have placed an order with the Canadian General Electric Company for the complete installation of an electric plant for 150 lights in their new works.

Mr. James Wilson, superintendent of C.P.R. telegraphs in British Columbia, returned a fortnight ago to New Westminster, after a three months' trip to Southern California. We are pleased to learn that Mr. Wilson's health is improving.

The annual meeting of the shareholders of the New Brunswick Telephone Co. was held recently at Rothesay, N.B., when directors were elected as follows: L. J. Almon, president; D. C. Dawson, secretary; Col. Tucker, A. O. Earle and James Kennedy.

A meeting of members of the town council and board of trade was held in Lindsay, Ont., recently, to decide whether a five years' exclusive franchise should be given to the Bell Telephone Company, or whether the newly organized Victoria County Telephone Company should be encouraged. The concensus of opinion seemed to be in favor of the Bell Company.

Messrs. A. E. Porter and W.A. Anderson, of Bennett, B. C., have made application to the Legislature of British Columbia for an Act to incorporate a company with the power to construct and operate a system of wireless telegraphy from some point at or near Bennett, in the district of Cassiar, to some point on the Canadian Pacific Railway between the eastern boundary of the province and the sea.

The demonstrations of Marconi's system of wireless telegraphy at the Toronto Industrial Exhibition are being conducted by Mr. W. J. Clarke, of the United States Electrical Supply Co., of New York. Mr. Clarke is a native of Trenton, Ont., and was for some years manager of the Hamilton Electric Light Co. The process of wireless telegraphy is shown operating with the receiver and transmitter about 15 feet apart.

Mr. Frederick Eli, of Newark, N.J., has patented a fire alarm box, intended to prevent the turning in of false alarms, as well as to give the fire department immediate notice of a fire. The invention consists of a cage, in which the fire alarm is located. When the door of the cage has been opened the door of the alarm box remains locked, and the door of the latter becomes unlocked as soon as the cage door is entirely closed. In this way the person ringing the alarm is compelled to remain in the cage until the firemen arrive to open the door by a key.

THE LATE JOSEPH H. KILLEY.

A PROMINENT citizen of Hamilton and a well known engineer passed away on August 10th, in the person of Mr. Joseph H. Killey.

Deceased was born in Castletown, Isle of Man, on April 24th, 1827. From his earliest years he had a great love of machinery. His parents purchased for him the work "Lardner on the Steam Engine," and this he mastered before he was twelve years old. At the age of fourteen he constructed a crude model engine and boiler. He went to Liverpool to learn the foundry business, and after five years entered the Vulcan Iron Works, owned by a cousin of the late W. E. Gladstone. Mr. Killey afterwards became foreman of a large foundry, and later mechanical manager and partner in the Windsor Machine Works, near Liverpool. In 1864 he came to Canada, obtaining employment with F. G. Beckett & Co., of Hamilton, and later became foreman of the St. Lawrence Foundry Co., Toronto. Then he was appointed engineer of the steamer Rothesay Castle, afterwards becoming engineer of the gunboat Prince Albert. After serving for three years on this boat, he built an oscillating and marine engine and boiler for the composite steamer Adelaide Horton.

Mr. Killey then established a business in a small way in the city of Hamilton, but it gradually increased to an important engine building concern. In 1870 the business was conducted under the name of J. H. Killey & Co., and in 1884 it became the Osborne-Killey Co. For some years after the winding up of this company he was associated with the late F. G. Beckett as the Killey-Beckett Co., manufacturing engines on a somewhat large scale. Among the machinery constructed by Mr. Killey were the pumping engines at Hamilton beach and the engine at the Asylum. For the past five years he has not been engaged in active business.

ELECTRICAL APPARATUS FOR WINDSOR CASTLE.

FOR the purpose of showing how cheap notoriety may be obtained, Fire and Water gives the true inwardness of the case out of which arose the statement recently published broadcast in the press that the order for electrical apparatus to be installed in Windsor Castle had been given to an American firm. The real facts of the case are these: A London firm received a contract for putting in a regular domicile electric fire alarm system in that royal residence. The boxes, wire, and special appliances for such work can be obtained at any electrical suppy house in almost any large city in this country or in European countries. From the fact, however, that through American ingenuity and machinery, goods of this kind can be made here and imported at a lower price than they can be purchased in England, the London firm in question decided to order from us. A Connecticut firm, which makes a cheap line of electrical goods, received an order for small bells and boxes, while the Gamewell Fire Alarm Company, of New York, was asked to furnish its special instruments, and another New York firm was patronized to a small extent to complete the order. There was no competition for the work on this side of the Atlantic, whatever there may have been in London, so the orders were distributed by the contractors as stated above. Of course, the fact that Her Majesty's principal home was to be equipped with American goods led the Connecticut firm to derive as much newspaper notoriety and free advertising as possible; and that it succeeded is very much to its credit as a clever stroke of business. The amusing part of the story is that those who had orders for the expensive patented instruments to be used in the installation were not referred to at all in the newepaper paragraph, and the amount of the order was not stated as being in the aggregate not more than $2,000.

THE LARGEST INCANDESCENT LAMP EVER MADE.

IT would seem at first sight ridiculous to construct incandescent lamps of a candle power comparable with that of arc lights, owing to the superior economy of the latter, but for one particular purpose the incandescent lamp is far preferable. That purpose is light-house illumination, in which the superiority of the incandescent is its greater fog penetration, the yellower rays of the glowing filament being dampened out and absorbed to a much less extent than the rays of an arc light. The Bryan-Marsh Company has on this account been experimenting on large lamps, the largest of which

A 5090 C. P. INCANDESCENT LAMP.

is one nominally of 5000 candle power, which was exhibited at the Electrical Show, and the magnitude of which can be judged from the accompanying reproduction of a photograph which is reprinted from the "Imperial Lamp Gazette." The lamp is of the standard double-filament type like the smaller Imperial lamps, the two filaments being in parallel with each other and each taking the full 236 volts. The economy was about 3 watts per candle, the total consumption of power being, therefore, some 15 kilowatts, requiring a current strength of over 60 amperes. The lamp was exhibited but three nights when it burnt out, owing probably to the intense heat to which the glass of the neck of the bulb was subjected. Owing to the fear that the filament would droop, the lamp hung in a position the reverse of that shown in the illustration, and the heat was very intense at the base, probably softening the glass, which then collapsed due to atmospheric pressure. A larger bulb in an upright position would eliminate this difficulty. The cost of construction and erection of this single lamp was over $1000.

THE MARITIME ELECTRICAL ASSOCIATION.

At a meeting of the Executive Committee of the Maritime Electrical Association held on August 31st, the resignation of Mr. R. T. McKeen having become imperative in consequence of his leaving the province, Mr. F. A. Hamilton accepted the vacant position of secretary-treasurer of the association for the remainder of the term, it being the unanimous wish of the other members of the Executive present at the meeting that he should undertake the duties. The services of Mr. McKean were cordially recognized by the Executive, all of whom wish him every success in his new sphere in Montreal, whither he is about to proceed for the purpose of studying at McGill College.

PERSONAL.

The ELECTRICAL NEWS learns with deep regret of the sudden death of Mrs. Milne, wife of Mr. James Milne, manager of the General Engineering Co., of Toronto. Deceased was summering at Jackson's Point.

Mr. J. M. Campbell, who has spent the last two years in British Columbia, has returned with his family to Gananoque, Ont., where he will reside. Mr. Campbell is president of the Gananoque Electric Light and Water Supply Co.

The many friends of Dean Bovey, of the faculty of applied science of McGill University, Montreal, will be pleased to learn that he has recently been elected a member of the Council of the Institute of Civil Engineers of Great Britain. The honor is well bestowed.

Mr. E. W. Kelk, Hamilton agent of the Hamilton and Dundas Electric Railway, has removed to St. John's, Nfld., having accepted a position in connection with the Reid system of railways on that island. Mr. Kelk will also have charge of the telegraph system, some 660 miles in length.

Mr. Samuel S. Glass has been appointed chief engineer of the Victoria Jubilee Hospital at London, Ont. This hospital has recently been completed, at a cost of $100,000, and is equipped with a complete electric and steam plant. Mr. Glass is to be congratulated upon his appointment as chief engineer of this important institution. He was employed for over twenty years on the Grand Trunk railway as engineer, and has given much study to subjects pertaining to electrical and steam engineering. He is looked upon by his associates as up-to-date in all matters of mechanical detail, and is well qualified for his new position.

SPARKS.

An agitation is on foot at Wroxeter, Ont., to establish an electric light plant.

The village of Gatineau Point, Ont., will likely take over the electric plant now supplying light for the streets.

The council of Winchester, Ont., are considering an offer from Eager & Sanderson to light the streets of the village.

The Canadian General Electric Company are installing a lighting plant for the Expanded Metal & Fireproofing Co., Toronto.

On September 23rd the ratepayers of Weston, Ont., will vote on a by-law to raise $8,000 for putting in a municipal electric light plant.

The village of Shelburne, Ont., is preparing to enter into a contract for a ten years' franchise for lighting the streets. Tenders are invited by D. C. Dunbar, clerk, up to September 21st.

The Dominion Electrical Company has commenced business at Waverley, N.S. Mr. T. R. Gue, of Halifax, is one of the principal shareholders, and Mr. A. E. Porter, of Waverley, manager.

The Windsor Calcium Carbide Company are about to establish extensive works at Windsor, N.S. The promoters have secured an option on a water power capable of developing 2,500 h.p. the year round.

Messrs. McCurdy & Co. have disposed of their electric light plant at Sydney, C.B., to Mr. G. D. Whidden, late of Halifax. There are already 800 lights installed, and the system is constantly being extended.

The municipality of DeLorimier have accepted the offer of the Royal Electric Co. to supply arc lights at 33 cents per night, incandescent of 32 c.p. at 5½ cents per night, and incandescent of 65 c.p. at 11 cents per night.

Bennett Bros., who own and operate a flour mill at the corner of Parke and Market streets, Hamilton, Ont., are installing in their premises a 40 h.p. S.K.C. motor to drive their mill, power being supplied by the Cataract Power Co.

The Owen Sound Electric Illuminating & Manufacturing Company have been given a contract to install in the factory of the North American Bent Chair Company a 500-light incandescent plant and motors for driving the machinery in the building.

The Sarnia Street Railway Co. have re-elected directors as follows: President, J. S. Symington; vice-president, S. A. McVicar; secretary and manager, H. W. Mills; directors, Chas. Mackenzie, John Cowan, J. H. Jones, Jas. Flintoft and Frank Smith.

Messrs. A. Campbell and John McGregor, representing eastern capitalists, have secured an option on the Boundary Falls water power and the franchise for the electric lighting of the town of Greenwood, B.C. It is said to be their intention to install a plant.

The town council of Almonte, Ont., have been unable to come to an agreement with the Almonte Electric Light Co. regarding the price to be charged for street lighting, and have decided to submit a by-law to the ratepayers on September 25th to raise the sum of $30,000 for the purpose of establishing a municipal plant.

A new smelter is under construction at Columbia, B.C., in connection with which an electric plant will be put in. The contract is said to have been given to the Westinghouse Electric & Manufacturing Co., of Pittsburg, Pa., for two alternating current generators of 180 k.w. each. These will be direct connected to a 250 h p. turbine.

The Hamilton Screw Works, of the city of Hamilton, are another of the converts of electric power, having shut down their steam plant. They are being supplied with power from the wires of the Cataract Power Co. The Royal Electric Co., of Montreal, are installing one of their 40 h.p. S. K. C. two phase motors. This adds another smokeless chimney to the many now in Hamilton.

The Alberta Railway & Coal Co., Lethbridge, N. W. T., has ordered two 150 horse power Mumford improved boilers from the Robb Engineering Co. They have had three of them in use for about half a year, and this order speaks well for the satisfaction they have given. The makers of these boilers claim they are more efficient than any other type in use, while they cost less than a water tube boiler.

A feature of the National Export Exposition at Philadelphia will be an exhibit by the International Correspondence Schools, Scranton, Pa., illustrating their method of teaching by mail. The bound volumes of their instruction and question papers, as well as work done by students, including numerous drawing plates, may be inspected by visitors, and a representative will be in charge to give full particulars.

The ELECTRICAL NEWS acknowledges receipt of an invitation from the Eugene Phillips Electrical Works, Montreal, to attend the twenty-first annual Rhode Island Clam Dinner tendered to the electrical fraternity by Mr. Eugene F. Phillips, general manager of the American Electrical Works, of Providence, R.I. This popular event will take place at the Pomham Club in Providence on Saturday, September 9th.

A compound friction car brake has been invented by J. H. K. McCollum, of Toronto, and is now being used on some of the cars of the Toronto Street Railway Company. The brake can be applied to the axle of any car, and obtaining its power from the momentum of the car, costs nothing to operate. Patents have been secured in Canada and the United States, and a company is being formed to exploit the invention.

The council of the town of Rat Portage, Ont., are calling for tenders up to September 7th for an electric light and fire alarm service. Propositions are to be submitted as follows: 1, for a complete incandescent system of 41 lights; 2, for a complete arc system of 30 lights; 3, for a complete system of part arc and part incandescent, of 15 arc lights and 25 incandescent lights; 4, for use of four telephones as may be placed and directed by council; 5, a fire alarm system; 6, cost per additional light if required.

The Ragged Rapids-Orillia electric power transmission scheme is now fully under way. The Electrical Maintenance & Construction Co., of Toronto, are the contractors in charge of the work. The entire electrical machinery, consisting of two 300 k.w. S.K. C. two-phase generators, with 600 k.w. in step-up and 600 k.w. in step-down transformers, as well as the necessary switchboards and station apparatus, and one 50 h.p. induction motor to drive the waterworks pumps and one 50 h.p. induction motor to operate the arc machine, is being furnished by the Royal Electric Co. Rapid progress is being made, and it is expected that light and power from Ragged Rapids will be in Orillia between November 15th and December 1st.

ELECTRIC RAILWAY DEPARTMENT.

ISLE OF MAN TRAMWAYS.

The Isle of Man is the gem of the Irish Sea. It is only 33 miles long and 12 miles wide, but every acre of its green, gorse-grown hills and rugged coast line is beautiful, and the quaint Manx language and customs which still survive make it doubly interesting to the visitor. It is situated almost in the centre between England, Ireland and Scotland, and being within easy reach, by swift steamers, of Manchester, Liverpool and Glasgow, has become a favored summer resort.

Douglas, the principal town, situate on a beautiful bay, has a fixed population of about 30,000, which in summer rises to about 50,000. Every steamer from Liverpool and other ports, of which there are several daily, bring hundreds who spend a few hours, days or weeks in this lovely spot. One of the chief attractions is the beautiful glens which indent the coast line, running up into the interior of the island between the hills.

The Isle of Man Tramways Co., which operates an extensive system of cable and electric tramways in Douglas, has recently extended its electric line from Douglas to Ramsey, the next largest town in the island. The tramway runs around the precipitous cliffs overlooking the sea, skirting the beautiful Groudle, Laxey and Ballaglass glens. This drive, about 14 miles in length, winding in and out in full view of the sea, in an open electric car on a bright summer day, is superlatively beautiful and most invigorating.

Interior of Power Station, Ballaglass, I. O. M.

The recently completed extension of the I. O. M. tramways is a fine example of modern railway building and electrical construction. It is double tracked throughout, the road bed is rock ballasted, and the bridges and culverts are of solid masonry. The overhead trolley is used, all the details of electric work being of the latest and best design and construction. Two large accumulator stations are used to equalize the load and assist the cars over the steep grades.

The motive power of the tramway is supplied from five power stations placed at various convenient points throughout the extensive system. The illustration represents the interior of the largest and most complete power station at Ballaglass; it contains two 150 k.w. electric generators manufactured by the Electric Construction Co., of Wolverhampton, England, directly connected to two 250 h.p. tandem compound condensing Robb-Armstrong engines, manufactured by the Robb Engineering Co., of Amherst, N. S., Canada, for Messrs. Dick, Kerr & Co., of London, who were contractors for the equipment. The station is also provided with two standard Galloway boilers and Ledwards electrically driven ejector condensers. Adjoining the power station is a large accumulator power house—the whole making one of the most complete railway power houses in Great Britain.

All the work of the Ramsey extension, including road bed, electric lines and power stations, was engineered by the company's most efficient staff of engineers. Mr. Alexander Bruce, manager of Dumbell's Bank, is chairman of the company, and with his usual energy and persistence has done much to advance its interests. Dr. Farrell, one of the original owners of the tram car lines in Douglas, is also an active director.

SPARKS.

The Winnipeg Street Railway Company will likely build new car barns next year.

The Rock Lake Mining Co., of Thessalon, Ont., will likely construct an electric railway from Bruce Mines to their mine.

Promoters will apply at next session of parliament for incorporation of a company to construct a railway between Ottawa and Brockville, to be operated by either steam or electricity.

The first passenger car of the Metropolitan Electric Railway Company ran into Newmarket on Saturday, September 5th. Cars are now running regularly, covering the distance of 30 miles in one and one-half hours. The new power house is located at Bond Lake, about 18 miles from Toronto, and it is the intention to close up the old station at North Toronto.

The Nelson Street Railway Co., of Nelson, B.C., have elected the following officers: F. W. Peters, president; T. J. Duncan, vice-president; T. C. Duncan, secretary; C. S. Drummond, Emile Gareke, W. A. Macdonald and J. Laing, stock directors. A contract for the electric equipment of the road has been given to the Canadian General Electric Co., of Peterboro', Ont. The power house will be built at the eastern boundary of the city.

Dr. N. H. Edgerton, of Philadelphia, the inventor of the high tenson storage battery, is building a factory at Hamilton for their manufacture in Canada. Work on the building is progressing. A temporary building, however, has been obtained, in which the immediate requirements in that line will be manufactured as soon as they can put the machinery in place. This means another electrical industry for Hamilton, which will employ about 50 men. The equipment of electrical instruments and switchboards was given to the Royal Electric Co., who are to have the same in operation within two weeks. Storage batteries for street railway purposes are to be the speciality of this concern, and with the advent of the electric carriages an immense field will be opened or this class of apparatus.

SPARKS.

The Canadian General Electric Company are installing a plant for Mr. A. MacLaren, of Wakefield, P.Q.

The Hamilton Electric Power Co. have installed an electric light plant at the Palmerston Pork Packing Co.'s works.

It is reported that the management of the Niagara Falls Metal Works at Niagara Falls, Ont., is considering the construction of automobiles.

A by-law to raise $20,000 to purchase the existing electric light plant or install a new one at St. Johns, Que., was defeated by the ratepayers last month.

The Kootenay Electrical Supply & Construction Co., of Nelson, B.C., have decided to open a branch at Grand Forks, with Mr. W. P. Dickson in charge.

The contract for electric lighting for the new Dominion Steel Co.'s works at Sydney, C.B., is said to have been awarded to the Maritime Electrical Co., of Halifax.

The Canadian General Electric Co. are installing one of their 30 k.w. generators, direct-connected to a Goldie & McCulloch Ideal engine, for the William Davies Company, Limited, Toronto.

Mr. Chas. W. B. Lawrence, proprietor of the Oakville electric plant, has just installed a new 60 k.w. single-phase alternator purchased from the Canadian General Electric Company.

The Berlin Gas & Electric Light Co. are reported to be considering the building of an electric railway to Preston. Should this be decided upon a new power house will likely be erected.

The ratepayers of Kamloops, B. C., recently approved of a by-law to raise $10,000 to extend the electric light plant. Mr. Willis Chipman, C.E., of Toronto, will have charge of the work.

The Canadian General Electric Company have just received an order from the West Kootenay Power & Light Company, Rossland, B.C., for another of their standard 30 h.p. three-phase induction motors.

The name of the Cataract Power Co., of Hamilton, has been changed to the Hamilton Electric Light & Cataract Power Co., and permission is given to increase the capital stock from $250,000 to $3,750,000.

The Montreal Cotton Company are continually increasing their electric development, and have placed an order with the Canadian General Electric Company for two additional 75 h.p. and one 5 h.p. three-phase induction motors.

George C. Hinton & Co., of Vancouver, B. C., have placed an order with the Royal Electric Co. for one of their 10 k.w. multipolar generators and the necessary wiring of lamps for one of their mining camps on Vancouver Island.

Toronto and Ottawa capitalists have formed a joint stock company for the purpose of taking over the business of five of the largest bicycle firms in Ontario. It is said that this company will also engage in the manufacture of automobiles.

The Wm. Kennedy & Sons Co., Ltd., of Owen Sound, Ont., are installing a new electric plant at their works, and have purchased for the purpose, from the Canadian General Electric Co., one of their standard 25 k.w. multipolar generators.

Mr. F. A. Huntress, manager of the Halifax Tramway Company, has recently returned from a trip to the West Indies, having visited Barbadoes, Port Au Prince and Georgetown, all of which have favorable openings for electric street railways. It is expected that important franchises will shortly be secured by Canadian capitalists, and that Halifax parties will be interested.

The Engineering Contract Company, of 603 Temple Building, Toronto, (Henry F. Duck, manager), has been awarded the contract for the construction of a concrete dam, sluice-ways, bulkhead, flume pipe supporters, power house foundations and tail race at Chaudiere Falls, near Point Levis, for the Canadian Electric Light Company of Quebec. The company will shortly award contracts for the power house, hydraulic and electric machinery, and the transmission line. The engineers of this work are Messrs. T. Pringle & Son, of Montreal.

MOONLIGHT SCHEDULE FOR SEPTEMBER.

Day of Month.	Light.	Extinguish.	No of Hours
	H.M.	H.M.	H.M.
1....	P.M. 7.00	A.M. 3.10	8.10
2....	" 7.00	" 1.10	9.10
3....	" 7.00	" 4.30	9.30
4....	" 7.00	" 4.30	9.30
5....	" 7.00	" 4.30	9.30
6....	" 7.00	" 4.30	9.30
7....	" 7.00	" 4.30	9.30
8....	" 7.00	" 4.30	9.30
9....	" 7.10	" 4.30	9.20
10....	" 7.50	" 4.40	8.50
11....	" 8.30	" 4.40	8.00
12....	" 9.30	" 4.40	7.10
13....	" 10.40	" 4.40	6.00
14....	" 11.00	" 4.40	5.40
15....	" 11.50	" 4.40	4.50
16....	.....	" 4.40	3.40
17....	A.M. 1.00	.....	
18....	No Light.	No Light.	.....
19....	No Light.	No Light.	.....
20....	No Light.	No Light.	.....
21....	No Light.	No Light.	.....
22....	P.M. 6.20	P.M. 8.40	2.20
23....	" 6.20	" 9.20	3.00
24....	" 6.20	" 10.10	3.50
25....	" 6.20	" 11.00	4.40
26....	" 6.20	A.M. 12.10	5.50
27....	" 6.20	" 1.00	6.40
28....	" 6.20	" 1.00	6.40
29....	" 6.20	" 2.00	7.40
30....	" 6.20	" 3.00	8.40
	Total.....		177.10

TRADE NOTES.

The Rossland Sentienel have installed in their printing establishment one of the Royal Electric Co.'s S.K.C. two phase motors to drive their presses

The Dominion Cotton Mills Co., of Montreal, are installing in their mill a 300 k.w. S. K. C. synchronous motor. This is in addition to a number already placed.

The British Columbia Southern Mine, Limited, operating the Gertrude Mine in Rossland Camp, B. C., have placed their order for a complete lighting plant with the Royal Electric Co., Montreal.

The Aptus Veneer Company, of Albert, New Brunswick, have placed their order with the Royal Electric Co. for a complete electric lighting plant for their works, the plant to be in operation within four weeks.

Work has begun on the development of the Shawenegan Water & Power Co.'s plant at Shawenegan Falls, Quebec, and is being pushed night and day. The Royal Electric Co. have installed for the contractors one of their T. H. arc machines and lamps, lighting the entire work.

The corporation of Goderich, Ont., after receiving report of committee appointed to visit and investigate a number of plants installed by different manufacturers of alternating current apparatus, have awarded a contract to the United Electric Co., of Toronto, for one of their 60 k.w. inductor alternators.

The Iron Mask Gold Mining Co., of Rossland, B. C., are enlarging their electric hoist and air compressor, and have placed their order with the Royal Electric Co. for one of their 120 k.w. S.K.C. synchronous motors. The first order received by the above company from the Iron Mask Company was for a 75 k.w. S.K.C. motor. This was found not large enough for their requirments.

The Wm. Sutton Compound Co. of Toronto, Limited, have now added to their very extensive stock of engineers' supplies, which includes oils, grease, lubricators, belting, lace leather, flue cleaners, rubber packings, etc., a very large, complete and select stock of asbestos in its many forms, being of the finest Canadian and German manufacture, including millboard of all thickness, sectional pipe, elbows, tees, valve covering of every size, cement paper, building felt, rope and wick packing of every size. They wish to inform their many patrons that they can sell this class of goods at most reasonable prices and with prompt delivery. Any enquiry to the company's office, 185 Queen street east, in regard to any particular branch of their extensive business, will receive every courtesy and prompt attention.

Henry Morgan & Co., of Montreal, recently asked for tenders for two 75 k.w. and one 50 k.w. direct connected generators and engines for lighting and power for their departmental stores. Tenders were received for apparatus manufactured by the United Electric Co., Ltd., Toronto; Canadian General Co., Peterboro'; Royal Electric Co., Montreal, and the following American firms; Ridgeway Dynamo & Engine Co., Crocker-Wheeler Co., and Eddy Electric Co. The contract has been awarded to the United Electric Co., of Toronto, for the entire apparatus.

The well known electrical firm of Julius Sax & Co., of 119 Coldharbor Lane, London, S.E., has been taken over by a new combination, of which Mr. H. Salmony is the managing director. The firm of J. Sax & Co. has been established for 50 years, and at the world's exhibitions of 1862, 1882, 1883, 1884 and 1886 in London, 1879 in Sydney, 1881 in Melbourne, and 1881 in Paris, secured gold medals for their exhibitions. As artistic metal-workers, manufacturers of telephones, fire alarm appliances, bells, railway signal material, and all bell-work appliances, they have the reputation of standing alone in the British electrical world as makers of high class work. The special sphere of the business is the carrying out of government contracts. The new managing director, Mr. H. M. Salmony, has a very large trade connection with the electric lighting and tramway world of Great Britain; but as the present works of J. Sax & Co. will be fully occupied with the manufacture of the above mentioned goods, it is impossible for the firm to manufacture the material required for lighting and tramway systems. Consequently, Messrs. J. Sax & Co. are ready to take up agencies for motors, arc lamps, railway supplies or any similar articles required in the trade. The present members of the firm have made prolonged visits to America, and are ardent admirers of American motors, enclosed arc lamps and switches. The firm occupy an extremely strong financial position, and have arranged for all transactions to be on the basis of cash payments. Apart from this they are prepared to give highest references, which will strongly recommend them as agents for American houses.

CANADIAN GENERAL ELECTRIC CO'Y

LIMITED

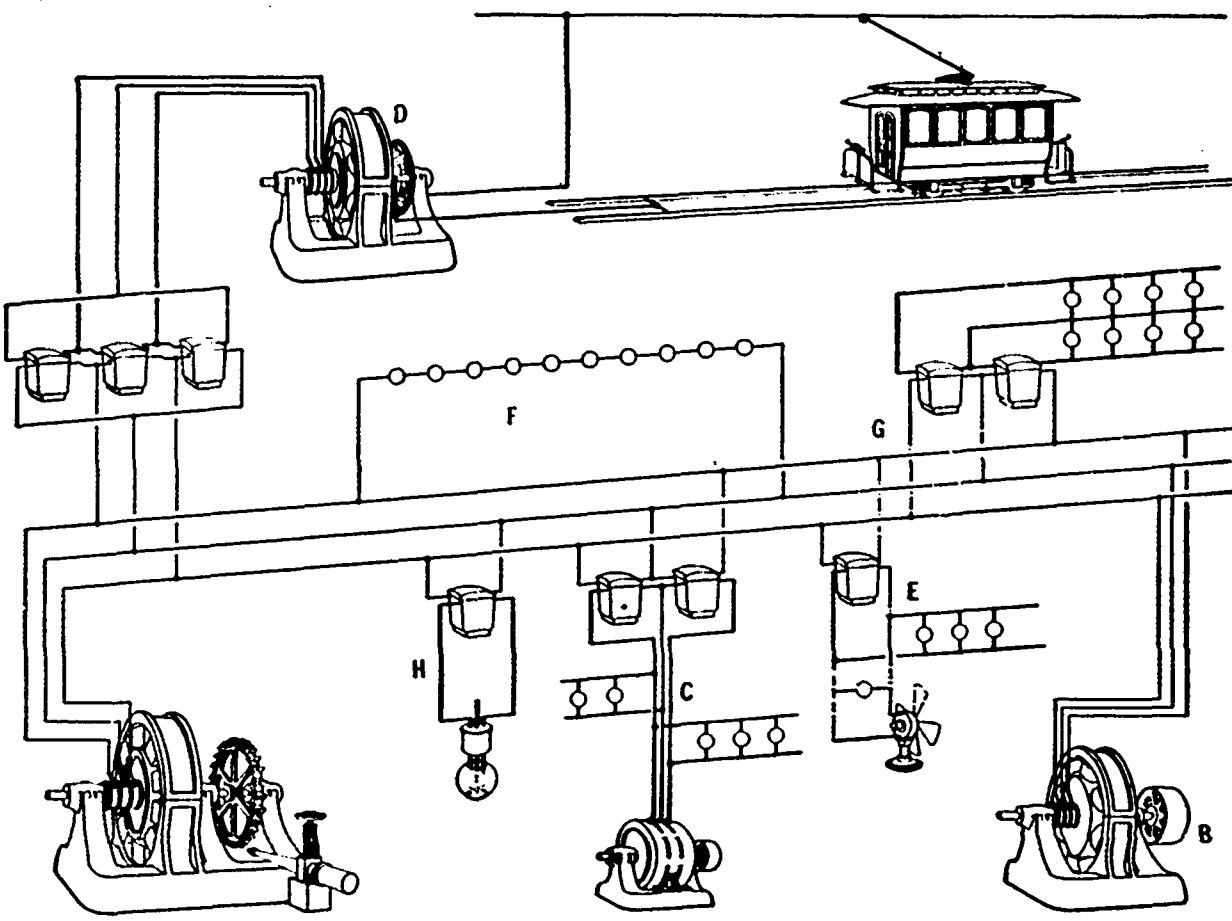
The Largest Manufacturers of Electrical Apparatus under the British Flag.

HEAD OFFICE:
TORONTO. ONT.

FACTORIES:
PETERBORO', ONT.

BRANCH OFFICES:
HALIFAX MONTREAL WINNIPEG ROSSLAND VANCOUVER

LONG DISTANCE POWER TRANSMISSION



This Company was the first to introduce Long Distance Power Transmission in Canada, and as evidence of the superiority and success of the apparatus installed, we append a partial list of Power Transmission Plants in operation and under construction, contracted for during the past few years, viz:

Lachine Rapids Hydraulic & Land Company	Montreal, Que.	12,000	H.P.,	6 mile Transmission.
Montreal Cotton Co.	Valleyfield, Que.	4,000	"	Short "
St. Hyacinthe Electric Light Co.	St. Hyacinthe, Que.	500	"	4½ mile "
Department of Railways and Canals	Soulanges Canal	700	"	14 " "
Trenton Electric Co.	Trenton, Ont.	400	"	12 " "
Lunenburg Gas Co.	Lunenburg, N.S.	150	"	9 " "
J. R. Scott & Co.	Napanee, Ont.	150	"	8 " "
J. R. Booth, Esq.	Ottawa, Ont.	500	"	4 " "
Auburn Power Co.	Peterboro', Ont.	400	"	2½ " "
Hanover Electric Light and Power Co.	Hanover, Ont.	100	"	8 " "
Durham Electric Co.	Durham, Ont.	100	"	4 " "
Light, Heat and Power Co.	Lindsay, Ont.	600	"	14 " "
B. C. Electric Railways Co.	Vancouver, B.C.	1,000	"	12½ " "
West Kootenay Power Co.	Rossland, B.C.	4,000	"	30 " "

FOR INFORMATION ADDRESS NEAREST DISTRICT OFFICE

Mr. Robert Anderson, of Ottawa, who has been awarded the contract for supplying arc lighting to the town of Arnprior, Ont., for the next five years, expects to have his plant in operation within three months. He expects to supply incandescent light also.

The corporation of the town of Liverpool, N.S., are installing a complete electric plant to furnish arc and incandescent lights for the streets and incandescent lights for indoor use. The by-law was voted on some time ago, and last week an order was given to the Royal Electric Co. for a complete electrical equipment, consisting of a 75 k.w. S.K.C. two-phase alternating current generator, with exciter and switchboard complete, also a complete switchboard and regulating apparatus for twenty-five 2000 c. p. enclosed alternating arc lamps for the streets, as well as the necessary transformers and materials for installing 2000 incandescent lamps, the whole plant to be in operation within six weeks.

SHUTTING OFF STEAM.

"Shall we stop our advertising for a while now?"

This is a question that some business men are apt to ask themselves, particularly in the summer, or during what they regard as their "dull season."

Suppose your engineer asked you:

"Shall I stop putting coal on my fires, sir?"

What would you reply?

"Why no unless you want the engines to stop."

The advertiser who thinks of discontinuing may argue, "We have been advertising so long and so steadily that our name and specialities are well known, and we intend to advertise again when business is better in our line than it appears to be now; in the meantime our business won't stop."

No: neither will the engine stop the minute the men suspend shovelling in the coal. The point is, however, that when the engine is to be started again, ten times as much will have been lost in power as has been saved in fuel or feed.

Using up reserve force never pays.

It is a loss, however it may be looked at. The buying public is prone to forget. It is, moreover, much more difficult and much more expensive to regain a lost customer than to prevent his straying away. Money Maker Magazine, Chicago.