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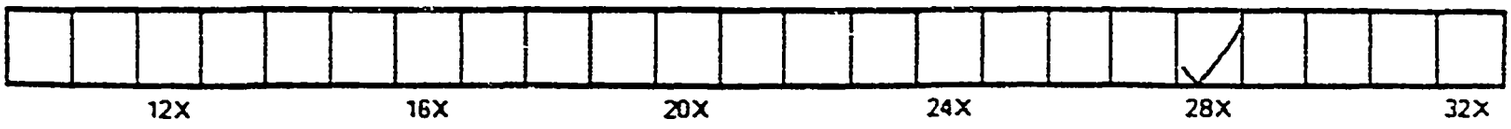

CANADIAN
ELECTRICAL NEWS
AND ENGINEERING JOURNAL

OLD SERIES, VOL. XV No.
NEW SERIES, VOL. X No. 10

OCTOBER, 1900

PRICE 10 CENTS
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SPARKS.

The Bellechasse Telephone Company recently started operations in Levis, Que.

The New Brunswick Telephone Company, of Fredericton, has increased its capital stock to $250,000.

The City Council of Kingston, Ont., is making arrangements to take over the electric light and gas plants.

It is stated that the contract is about to be awarded for the construction of the Canadian-Australian Pacific cable.

It is expected that telegraphic communication with Dawson City, in the Yukon district, will be established this month.

The Dominion Government has just taken tenders on the construction of a telegraph line from Golden to Windermere, B. C.

The new electric light plant for the village of Hespeler, Ont., is expected to be in operation early in November. The contract for engine and boiler was let to the Goldie & McCulloch Company, of Galt, and that for electrical apparatus to the Canadian General Electric Company, of Toronto.

The Renfrew Electric Company, of which Mr. A. A Wright is president, are building a new power house and developing all water power recently secured from Mr. Hough. The water wheel will be of the horizontal Crocker type, and the new dynamo of the most improved design. The new plant is expected to be in operation early in November.

The newly incorporated Western Telephone & Telegraph Company, of British Columbia, intends to build lines through the Nelson and Slocan districts and to connect the boundary country with the coast and Vancouver. The lines of the company will be operated in connection with those of the Columbia Telephone Company.

Sweden, of all the countries of Europe, is perhaps most blessed with natural power. From the mountain streams at the head of every fiord a quantity of energy is available, the total being enormous. To this fact the Swedes are rapidly waking up, and imports of electrical machinery for utilization of these water powers are growing with rapid increments.

Water powers have been developed as a result of the general introduction of electricity until there are now 500 of these electric plants in the United States, representing an investment of over $60,000,000 and a capacity of 200,000 horse power. Current thus generated is furnished for lighting 28,000 arc lights, 845,000 incandescent lights, and for operating about 60,000 horse power of motors. There are over 610 miles of electric street railways operated by water power electrically transmitted.

MOONLIGHT SCHEDULE FOR OCTOBER.

Day of Month.	Light.	Extinguish.	No. of Hours.
	H.M.	H.M.	H.M.
1....	P.M. 9.50	A.M. 5.00	7.10
2....	" 10.50	" 5.00	6.10
4....	" 0.00	" 5.00	5.00
5....	A.M. 1.10	" 5.00	3.50
6....	" 2.30	" 5.00	2.30
7....	No Light.	No Light.	....
8. ..	No Light.	No Light.	.....
9....	No Light.	No Light.	.....
10....	No Light.	No Light.	.....
11....	P.M. 5.50	P.M. 9.00	3.10
12....	" 5.50	" 10.00	4.10
13....	" 5.50	" 11.00	5.10
14....	" 5.50	" 0.00	6.10
15....	" 5.50	A.M. 1.00	7.10
16....	" 5.50	" 2.00	8.10
17 ...	" 5.50	" 3.00	9.10
18....	" 5.40	" 4.00	10.20
19....	" 5.40	" 5.00	11.20
20....	" 5.40	" 5.30	11.50
21....	" 5.40	" 5.30	11.50
22....	" 5.40	" 5.30	11.50
23....	" 5.40	" 5.30	11.50
24....	" 5.30	" 5.30	12.00
25....	" 5.30	" 5.30	12.00
26....	" 5.30	" 5.30	12.00
27....	" 5.30	" 5.30	12.00
28....	" 7.30	" 5.30	10.00
29....	" 8.30	" 5.30	9.00
30....	" 9.40	" 5.30	7.50
31....	" 10.40	" 5.30	6.50
		Total.....	218.30

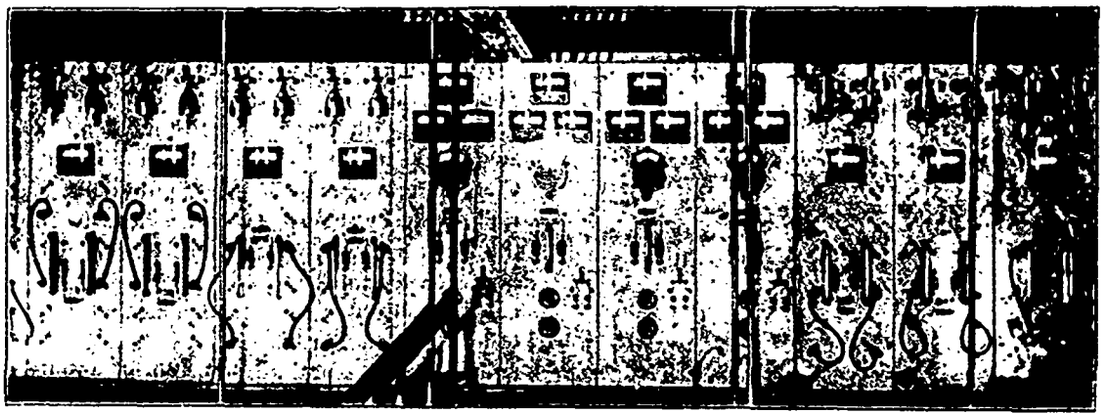
CANADIAN
ELECTRICAL NEWS
AND
ENGINEERING JOURNAL.

VOL. X. OCTOBER, 1900 No. 10.

A MODERN SWITCH-BOARD.

THERE has recently been installed in the station of the London Electric Company, at London, Ont., a sixteen panel switch-board for controlling the alternating output of their plant, which is a splendid example of modern switch-board construction, containing, as it does, the latest ideas obtaining in this class of work, and being adapted to control not only the present output of the station, but also that for some years to come.

The present alternating generating equipment of the station consists of two 300 k.w. revolving field and two 120 k.w. revolving armature, single phase, belt driven alternators, all manufactured in the Peterborough shops of the Canadian General Electric Company. The engines driving the first two generators are vertical, simple, non-condensing, designed for this plant by Messrs. E. Leonard & Sons, of London, the 120 k.w. generators being at present driven by the "Peerless" type, manufactured by the same firm.



SWITCH-BOARD IN LONDON ELECTRIC COMPANY'S POWER HOUSE, LONDON, ONT.

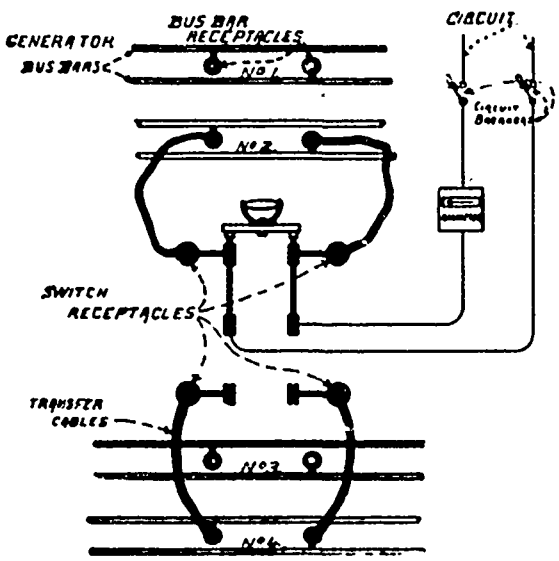
As it is intended that the generator equipment of the plant shall always be four units, the sizes being varied as the output increases, there are four generator panels provided, each capable of controlling a 300 k.w. generator and containing the usual equipment of main ammeter, voltmeter, exciter ammeter, generator switch, ground detector, field switch, and rheostats. Each panel is 80 inches high and 24 inches wide, a size very well adapted to give a pleasing and convenient distribution of the necessary apparatus, and being, for boards similar to this, much preferable to the usual arrangement of a shorter panel mounted on a sub-base. The material is polished blue Vermont marble, adopted on account of its high insulating resistance, and also because it makes a very effective background for the instruments, which are of the Wagner Company's make, finished in dull black and with scales calibrated to suit the particular load on each meter, the voltmeters reading from 90 to 130 volts, which arrangement obviously gives a clear open and easily read scale. The ground detectors are of the Canadian General Electric Company's usual static type, giving a continuous indication of the state of the insulation of all the lines throughout the city.

The generator switches are double pole, single throw and quick break, adapted to handle their rated current without destructive arcing. They are provided with marble barriers between the blades to prevent any chance of short-circuiting a generator when opening its switch, the handles being of the spade type. The field switches have a second set of jaws in addition to those usually provided, which put a resistance in parallel with the fields when the circuit is being opened, so as to take the inductive discharge. There are no fuses, the circuit breakers on the various feeders being relied on to take care of any line short-circuits.

The feeder panels, twelve in number, of which ten only are at present installed, the balance being added as occasion requires, are placed five on each side of the generator panels, and are of the same height as those for the generators, namely, eighty inches, three of them being twenty-four inches wide and the balance twenty inches. Each panel contains two single pole I. T. E. circuit breakers, mounted, as shown by the illustration, directly on the marble, one ammeter, and, as it was not deemed advisable, for a number of reasons, to parallel the generators, there is provided on each feeder panel one double pole, double throw, quick break switch, with barriers and transfer cables, for expeditiously changing the various circuits from one machine to another, the method of operation being as follows:

The centre studs of this switch are connected each to one of the outgoing feeder wires of a circuit, the two

bottom and two top studs being each connected to a flush mounted plug receptacle. On the back of the board, from end to end, are run eight generator bus-bars, a pair for each machine, each being tapped on each feeder panel to a receptacle similar to that on the switch blades. Now, if any pair of these receptacles be connected by means of cables with suitable plug terminals to either the upper or lower pair of switch receptacles, and the switch thrown onto that pair of jaws, it is evident that that feeder will be connected to that generator in whose bus-bar receptacles the cable plugs were placed, and that the other jaws of the switch will be entirely disconnected. This being so, they can, by means of a spare pair of cables, be connected to any other generator bus-bars desired, and if the switch be thrown the other way the circuit will then be transferred to that generator without interruption to the continuity of the service other than the two or three seconds occupied in throwing the switch. The receptacles connected to the switch jaws with their plugs, being larger than those for the bus-bars, it is obviously



London Electric Company's Switch-Board—Feeder Panel Connections, Showing a Circuit Operating from No. 2 Generator, with Spare Cables in Position to Throw onto No. 4 Generator.

impossible to short-circuit a machine by accidentally plugging cables across its terminals.

To reduce the floor space occupied, and also to give the attendant a clear view of all the machines under his control, the board is mounted on a platform, suspended from the roof timbers by the iron rods shown in the cut, about 12 feet above the floor, access being obtained by stairs, the landing of which is shown in the illustration. It has been in use sufficiently long to thoroughly show its suitability for the service desired, and is now in daily operation, handling the station in a highly satisfactory manner, and demonstrating the many advantages of a well-designed and modern switch-board over the numerous and various complications of old switches and wiring net-works too often found doing duty even at the present day, and which are not only fruitful sources of interruptions to the service, and often of fires, but are also a constant menace to the safety of those handling them.

The Belgo-Canadian Pulp & Paper Corporation, which purposes establishing pulp and paper mills at Shawinigan Falls, Que., have contracted with the Shawinigan Power Company for 15,000 h. p. of water. The works of the Pittsburg Reduction Company at the above place are nearing completion.

BY THE WAY.

A fat man who was holding on to a strap in a crowded Philadelphia street car was precipitated into the lap of a lady passenger by the car suddenly rounding a curve. The lady brought an action for damages against the company, for injuries sustained and the jury, after hearing the evidence of the medical witnesses, awarded her $2,300. Street railway companies cannot afford to let the fat men stand, however they may disregard the comfort of the thin ones.

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At the creation of the world two great lights were made, the greater light to rule the day, and the lesser light to rule the night. But there is no night for the lesser light to rule in the Yukon at present. A correspondent writing from Fort Selkirk on the 29th ultimo, writes: "It is now 11 p. m. and I can see to write without a candle. We have daylight twenty-three hours of the twenty-four." It is somewhat confusing to contemplate this nightless, night-capless, nightmareless existence in the golden north, and we find ourselves unable to determine whether its manifest advantages would counter-balance its disadvantages if such conditions of everlasting light prevailed in Montreal at this season of the year. It might lessen the work of the City Recorder, but it would certainly reduce the revenue of the gas and electric light companies.—Insurance Chronicle.

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A gentleman who recently returned from Sault Ste. Marie has told me something about the wonderful progress which that town is making, and which is in a large measure due to the ability and enterprise of Mr. Clergue, manager of the great pulp mills. This gentleman, who, by the way, is a bachelor, lives in a house of the block house type, and on the site where a block-house once stood. The first story of the building is constructed of local red sandstone, and the upper stories of logs or square timbers. Another peculiarity of this residence is that the heating, lighting and cooking are all done by electricity. The proprietor being also the owner of the electrical plant from which the streets and industries of the town are lighted, and of the immense water power by which the electricity is generated, is in a position to adopt this method of heating, the expense of which would be prohibitive in the case of persons less fortunately circumstanced. Speaking of power I am reminded that Mr. Clergue is now developing by means of canals on the Canadian side 80,000 horse power, and on the American side 100,000 horse power.

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The old saying that many a true word is spoken in jest finds an admirable illustration in a quotation from "Punch" of December 30th, 1848, which is published in the London Electrical Engineer. The quotation, which foreshadows the telephone in a remarkable manner, is as follows: "Our attention has been directed to an article made of gutta percha called the telakouphanon, or speaking trumpet, a contrivance by which it is stated that a clergyman having three livings might preach the same sermon in three different churches at the same time. Thus, also, it would be in the power of Mr. Lumley, during the approaching of the holiday time, to bring home the opera to every lady's drawing room in London. Let him cause to be constructed at the back of Her Majesty's theatre an apparatus on the principle of the ear of Dionysius, care having been taken to render it a good ear for music. Next, having obtained an

Act of Parliament for the purpose, let him lay down, after the manner of pipes, a number of telakouphanon, connected (the reader will excuse the apparent vulgarism) with this ear, and extended to the dwellings of all such as may be willing to pay for the accommodation. In this way our domestic establishments might be served with the liquid notes of Jenny Lind as easily as they are with soft water, and could be supplied with music as readily as they can with gas."

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I HAD a funny experience when I first went to Canada," said a well-known telephone engineer who is operating a large exchange in the Province of Quebec. "As you know, Quebec is the headquarters of the French-Canadian, and in the eastern part of the Province there are many people who speak no English ; in fact, there are whole towns full of them. One day I had to go on important business to a little town which we call Ste. Therese. When I found my man there I found also that he could neither speak nor understand English, nor did I at that time know a word of the peculiar lingo that the 'habitant' calls French. What to do I did not know, as no interpreter could be found, and finally, in desparation, I called up the Montreal office and asked for somebody who knew both languages. He came to the telephone, and I told him what I wanted to say to my French friend ; he repeated it to him over the telephone, received the reply and translated it for me into English. In this way we maintained a satisfactory conversation for about half an hour, the interpreter being a good many miles distant from the two men for whom he was rendering his services. I do not know when the telephone has ever been put to a test like this before to show what a polyglot instrument it is."

SPARKLESS MAGNET COILS.

By JAMES ASHER.

IT is the purpose of the writer to describe several simple methods of winding electro-magnets in order that sparking at the contact maker may be either entirely suppressed or greatly diminished. The first method and the fourth are my own ; the rest, are not generally known.

It is well-known that when the ordinary winding on an electro-magnet is used furious sparking occurs at the contact maker at each break of the circuit. Sparks are generated also at each close of the circuit, but these sparks are comparatively small. Sparking at the contact maker is due to the currents of self-induction, or extra currents in the wire which is wound round the core of the electro-magnet. At closing the circuits these currents oppose the current from the battery, but at breaking the circuit they flow in the same direction as the current from the battery. These extra currents are of considerable tension. The powerful sparking injures the contacts of the contact maker.

First Method.—Two insulated wires of the same kind and length are wound as one strand on the bobbin throughout their entire length. The two ends of one of these wires are firmly fastened together. The two ends of the other wire are connected with the contact maker and the battery in the usual manner. The extra currents in the winding which is connected with the battery are completely annihilated by the induced currents which are generated at their expense in the closed winding, which is similar and similarly situated to the winding which is connected with the battery. Hence we have no sparking at the contact maker.

Second Method.—This was invented by Carlier. It consists in winding the bobbin with bare copper wire, and separating each layer from the next by the thickness of paper. When currents of electricity having low voltage are employed, the lateral contacts of the coils of wire are sufficiently imperfect to prevent much loss of current from the battery by direct flow from coil to coil, while they easily allow the lateral passage of the extra currents, which are always of comparatively high tension. These become self-cancelled in passing through the coils of bare copper wire. Du Moncel states that this method is very effective, and he expresses his surprise that it has not been more frequently employed. Perhaps if the wire were dipped into very thin varnish before winding it upon the bobbin, we might use the magnet in connection with a battery capable of generating an electric current of high voltage.

Third Method.—The magnet has two separate windings of the same length and of the same kind of wire. These two wires should be wound together as one strand on the bobbin through out their whole length. The two ends of one wire are fastened to the terminals of the battery, consequently there is a closed circuit during the whole time of operating the electro-magnet. The two ends of the other wire are connected with a circuit closer and the battery in the ordinary manner. The connections of the two wires are made in such a manner that the current in the winding connected with the contact maker flows round the core in the opposite direction to that of the current in the other winding, which is unconnected with the contact maker. The two equal currents, passing round the core in opposite directions, fail to develop magnetism in the iron core of the electro-magnet. On opening the circuit of either of these wires the core instantly becomes magnetic. The effect on the core is directly opposite to that in the common method. We get absolutely no spark whatever at the contact maker, either at break or at close of circuit, according to Professor Silvanus P. Thompson.

Fourth Method.- Two insulated wires of the same kind and of the same length are wound together as one strand on the bobbin. The first two ends of the wire are fastened to a wire which extends to one binding screw of the battery. The last two ends of the wires are fastened to a wire which extends by way of the contact maker to the other binding screw of the same battery. The extra currents in the two windings at breaking circuit are neutralized by their mutual reactions.

Fifth Method.—This was invented by Billet, and described by Du Moncel in his book which is entitled "Electricity as a Motive Power." Each leg of the magnet has two bobbins of wire. The two ends of wire at the middle of each leg of the electro-magnet are joined to the two ends of wire at the middle of the other leg of the electro-magnet. The other two ends of wire on one core are connected with one terminal of the battery and the two corresponding ends of wire on the other core are connected with the other terminal of the same battery. A contact maker is interposed. The extra currents at breaking circuit are suppressed by their mutual inductive reactions. The extra currents at closing circuit, however, are not destroyed by this method. Consequently a small spark appears at closing circuit.

Sixth Method.—This was invented in England by W. Langdon-Davies. Each wire is wound as only one layer and the ends are allowed to slightly project. After all the layers have been wound the separate ends on one bobbin of the electro-magnet are joined to a wire which constitutes one terminal of a battery, while the separate ends of the wire on the other bobbin are joined to a wire which constitutes the other terminal of the same battery. On interrupting the current in either terminal the sparking is found to be weaker than usually is the case. The extra currents in the different layers of wire are not quite simultaneous, because the layers are at different distances from the core.

Seventh Method.—This was invented by an American named Paine. After winding each layer of wire round the bobbin a sheet of tinfoil is wrapped round the layer. At breaking and at closing circuit the extra currents in the wire induce currents in the sheets of tinfoil. In consequence, sparking at the contact maker at each break and at each close of circuit is greatly diminished.

Eighth Method.—A sheet of copper is wrapped round the bobbin before the wire if wound on. At breaking circuit induced currents are generated in the copper sheath. The sparking at breaking circuit is considerably weakened. Currents are generated also in the sheath at closing circuit. The sparking at closing circuit is weaker than usual. This method is believed to have been either invented or adopted by Mr. Charles F. Brush, of Cleveland, O.

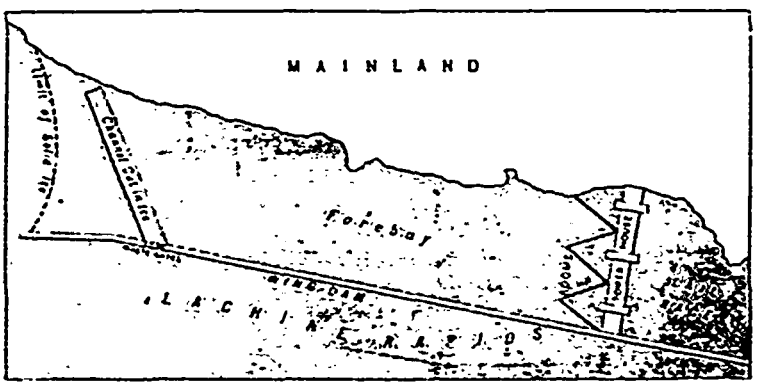
The Miner-Graves Syndicate have under consideration a project to transmit electric power from Grand Forks to Phoenix, B. C.

The city engineer of Toronto has submitted to the city council estimates of the cost of installing and operating a telephone system. For 6,000 subscribers he places the cost of installation at $675,000, and the annual cost of operating, including depreciation at five per cent. and interest at 3½ per cent., at $120,000. For a system for 10,000 subscribers the cost of installation is given as $1,120,000, and annual cost of operating $205,000. These estimates are based upon a common battery switch-board.

THE LACHINE RAPIDS ELECTRICAL TRANSMISSION PLANT.

In the ELECTRICAL NEWS of October, 1897, there appeared a general description of the electrical power plant of the Lachine Rapids Hydraulic & Land Company, of Montreal, then nearing completion. Since that time some improvements have been made, and we are now enabled to present to our readers a description in greater detail, which will doubtless be of interest.

HYDRAULIC DEVELOPMENT. The St. Lawrence river is divided by a long, narrow island at a point above the city of Montreal into two channels. The two streams taken together are known as the Lachine Rapids, and it is in the northern of the two streams that the power development has been made. Parallel with the shore there has been erected a wing dam 5,200 feet long, of cribwork composed of 12 in. x 12 in. timbers, faced with three inch plank and filled with rock. Between this dam and the shore the distance is 1,000 feet, and across the canal thus formed



SKETCH MAP, SHOWING LIMIT OF FREEZING IN THE LACHINE RAPIDS FOREBAY.

is built a solid masonry dam upon which is located the power house. The tail race is 1,400 feet wide, and the forebay or upper part of the channel about 4,000 feet long, 1,000 feet wide and 13 feet deep, the velocity of the water through it being two feet per second. There is a system of booms so arranged that all rubbish is carried away by the three waste gates in the main dam. The general situation may be understood by referring to the accompanying map. The total available fall varies up to about 16 feet.

FRAZIL ICE. The difficulties from frazil and anchor ice were in a large degree overcome by having a large enclosed area of still water, which would freeze over early in the winter, making it impossible for frazil or anchor ice to form under such cover. Frazil ice formed in the rapids above the enclosed area of still water. This obstacle was met by the fact that the natural current of the river, varying from 15 to 20 feet per second, would be deflected into the open river on meeting the frozen surface and would carry all frazil along with it. But during the winter of 1897-98 trouble was experienced from both frazil and backwater. The cause of the frazil ice was the previously unknown existence of a reef which projected past the wing dam and against which the frazil, in being swept onward with the current, adhered, producing anchor ice. This formed a natural dam, throwing the frazil into the head race instead of carrying it into the open channel beyond. During last year improvements were made which are said to have eliminated all further troubles from anchor ice. The wing dam was raised and extended a distance of 1,000 feet, thus enclosing a greater body of water. A pier was also erected some 7,000 feet above the power house, projecting 1,000 feet from the river bank, thereby diverting the original course of the river and causing it to flow towards the main channel and away from the head race. In addition, sluices have been left in the wing dam which, should occasion require it, may be used for ridding the head race of any anchor ice that may be forced into it when the river above is completely blocked with ice. To overcome the trouble from backwater the tail race was extended and deepened and an extension made to the wing dam.

THE POWER HOUSE. The power house is a steel building 1,000 feet long by 40 feet wide, and consists of three dynamo rooms 65 x 45 feet, and a similar number of turbine sheds. The floor is of concrete with 1½ inch slate, the whole being supported by steel beams. The building is heated electrically, each room being supplied with coil heaters.

TURBINES.—The hydraulic equipment consists of 72 54-inch Victor turbines, vertical, cylinder-gate type, capable of developing, under 14-foot head, about 300 h.p. Under the low head of 8 feet the wheels will develop 135 h.p. They are set in flumes, the wheels resting on wooden floors communicating with the tail race by means of short steel draft tubes. The wheels are set in sets of six in two rows, all six of each set driving by bevelled gearing a single shaft, which is direct coupled to the revolving field of one of the dynamos. A single governor controls the gates of all six wheels, the driving being accomplished by means of a wooden tooth gear on the wheel shafts meshing with cast iron pinions on the horizontal line shaft which runs to the dynamo. Two types of governors are used, the Giessler electro-mechanical governor, built by the Stillwell-Bierce & Smith-Vaile Company, of Dayton, Ohio, and the Lombard governor, manufactured by the Lombard Water Wheel Governor Company, of Boston, Mass. Iron head gates are placed at the entrance to cut off the water supply in case of necessity, and iron racks prevent debris and floating matter from being drawn into the wheels. An ingenious system of signals is used between the switchboard and the governor station in the wheel rooms, the invention of Mr. R. S. Kelsch, superintendent of the plant. When a machine is being brought into circuit signals are exchanged by means of colored lamps between the control table in front of the switchboard and the wheel station, these signals being wired in such a way that a signal must always be repeated back to the senders before it can be obeyed.

THE GENERATORS, ETC. Each battery of six wheels is direct coupled to a generator of the three-phase type, manufactured by the Canadian General Electric Company. There are 12 generators in all, with revolving fields, forty poles, giving 750 kilowatts at 175 r.p.m. They are wound to deliver 99 amperes with a frequency of 60 cycles per second at 4,400 volts directly to the transmission lines, no interposition of step-up transformers being needed. The winding is of the usual wire coiled type and is ranged in one slot per pole per phase. Each generator is direct connected to its jack-shaft. All of the field coils are connected together in series. The exciters consist of six Canadian General Electric machines, four polar, 75 k.w., 150 volt, direct current, compound wound, operated at 660 r.p.m. Each pair of exciters is driven by an independently governed water wheel. The wheel used for this purpose is one of the six 300 h.p. wheels for operating the generators, the last wheel of the series having been detached from the generator shaft and belted to one exciter. Each exciter is sufficient to operate the whole four machines in the dynamo room.

THE SWITCH-BOARDS.—The switch-board as at present installed contains seven panels, each 36x52 inches, with sub-panels, 28x36 inches, all mounted on slabs of blue Vermont marble two inches thick. The two outer panels, one at each end, are for light and power, there being two separate sets of bus-bars for

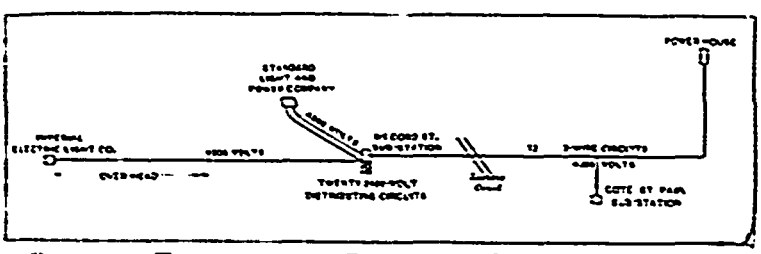


DIAGRAM OF TRANSMISSION AND DISTRIBUTION CIRCUITS FROM LACHINE RAPIDS POWER HOUSE AND IN MONTREAL.

this purpose insulated with heavy rubber and tested to 10,000 volts. These panels each contain three ammeters, a direct reading voltmeter, three single blade, double-throw, quick-break, high tension line switches, and two static ground protectors. The next two panels on each side are for the four generators, and each contains three synchronizing lamps, two ammeters and a field switch. The center panel controls the exciter and contains three Weston ammeters, a voltmeter, two alternating voltmeters, and two triple-pole, double-throw switches. All high tension fuses are situated on the back of the board and near the top, so that in case of a fuse blowing no damage is done either to the board and apparatus or to the attendant. The back of the board is interesting. The bus-bars are of copper cable covered with hard rubber tubing and caps. There are two sets of these bars, and

any machine may be thrown upon either at will, as may any of the transmission circuits to the city. In this way practically any combination of machine and circuit can be made. Situated in front of the switch-board is a marble table on which are placed the signalling apparatus by which the switch-board attendant can give or receive any signal necessary between the switch-board and the turbine shed. The regulating device consists of the four field rheostat handles, the exciter rheostats, the synchronizing switch and the four switches for operating the emergency switches of the oil type, worked by compressed air and placed one in each generator lead in the basement below the switch-board. The lightning arresters are of the Wirt 5,000 volt type, connected in delta between the three phases. It is understood that it is the intention of the company to replace the present switch-board with one of more elaborate construction and design.

THE POLE LINE.—From the power house a line 32,000 feet long is laid to the main distributing station at the corner of McCord and Basin streets, in the city of Montreal. It consists of 12 three-phase lines of No. o. B. & S. bare copper wire, mounted on triple petticoat porcelain insulators carried on 4x4 inch wooden cross-arms, on steel poles. These poles are of latticed iron, 35 feet long, imbedded six feet in concrete, foundation 2x3 feet, and spaced 100 feet apart. The line drop is 14 per cent. of full load. The twelve lines are all operated in parallel, though they can be subdivided in any way desired. When the corporation limits are reached the wires are placed undergound. They converge into a paper covered lead armored cable, one circuit in each, the insulation being 7-32 inch, and tested to withstand 15,00 volts. They cross ten feet below the bed of the Lachine canal, and 33 feet below the water level, in three inch cement lined iron pipes, of which there are 24, and thence to the sub-station not far distant. At an intermediate point a short line branches off to the Cote St. Paul sub-station.

THE SUB-STATIONS.—The main sub-station, corner McCord and Seminary streets, is a two-story brick structure. From the underground conduit running into the basement of this building, the transmission line passes to the high tension switch-board, and after passing through the aluminum line fuse it reaches the high tension switches, then the step-down transformers, of which there are three of 150 k. w., and four of 250 k. w., of the self-cooling oil type, one of the latter being in reserve. By these the voltage is reduced from 4,000 to 2,400. There are also three transformers of 30 k. w. each, of the self-cooling oil type, used as boosters. The transformers were built by the Wagner Electric Manufacturing Company, of St. Louis. In the Cote St. Paul station the equipment consists of Manning boilers, Westinghouse engines, two Walker and two General Electric synchronous motors, usually to operate three 125 arc light Wood machines, which are at present run from the jack shaft in the power house to light the streets of Westmount, one of the western suburbs of Montreal.

DISTRIBUTION.—The method of distribution will be understood by reference to the accompanying diagram. From the main sub-station the primary distribution is carried over the entire city in underground conduits containing from 8 to 63 ducts of 3-inch cement lined iron pipe, in which three phase wires varying from No. 3 to 0000 B. & S. are placed, each in a paper insulated lead armored cable manufactured by the National Conduit & Cable Company, of New York. The manholes in the street are each covered with a heavy iron cover. Ventilation is maintained by running pipes to the street pole. Cables are carried above ground from the conduits for the ordinary overhead distribution to feed areas of half a mile radius. The main sub-station supplies twenty 2,400 volt distributing circuits throughout the city, and also supplies one 4,000 volt circuit to the Imperial & Electric Power Company's station in the eastern end of the city, where the current is used to operate synchronous motors driving the electric light machinery, and two circuits to the station of the Standard Electric Light & Power Company, where one is transformed to operate two rotary converters feeding a 500 volt, three wire, direct current motor circuit in the business portion of the city, while the other operates a synchronous motor for driving arc lighting and other dynamos. These 4,000 volt lines are tested at the sub-station through two sets of 30 kilowatts transformers in parallel with one another, but in series with the line. On account of the extensive nature of the city, and the many trees it contains, the secondary net work is of unusual size. It is maintained at 110 volts, and small induction motors are fed at this pressure, the larger ones generally employing the 2,000 volts current of the intermediate distribution.

RESERVE.—To provide for accidents, the company have installed at the Cote St. Paul and Chenneville streets sub-stations a reserve steam plant which will be brought into use in case the water power plant is compelled from any cause to close down.

THE LOAD.—*The load on the company's system is about* 75,000 incandescent lamps, and between 2,500 and 3,000 horse power in motors, both synchronous and induction. The rate for lighting is ¼ of a cent per sixteen c. p. lamp-hour, with a discount of 20 per cent. for prompt payment. For large consumers under contract the rate is reduced to ½ cent per lamp hour, this corresponds to 9.4 and 7.8 cents per k. w. hour respectively, four watt lamps being used. The rate for power varies from $8s per horse power per year to $32 per horse power for large machines.

THE REASON WHY SOME BELTS DO NOT GIVE BETTER SATISFACTION.

BY E. H. NEWTON.

WE often hear this or that particular brand of belting condemned because it did not give satisfaction. Some men prefer leather for all purposes, while others are partial to some other kind. If we study the conditions under which one belt will work better and last longer than another, we will find that most belts are good if the proper judgment was exercised in their selection for the work they are inteaded to do. The fact that a leather belt will not last in a damp place or where it is exposed to wet *is no reason why the use of leather belting should be discouraged,* for under favorable conditions there is nothing better than a good leather belt. On the other hand, if a rubber belt has been run where oil got on it, destroying its good qualities, or the edge has been allowed to rub against something until it is worn through, allowing the belt to separate, or, as is too often the case, the belt is too light for the work and a gum or resinous substance is used to make it stick to the pulley—under such conditions good results will never follow, for I know of no better way to destroy *the life of a rubber belt than to use oil or gum on it. I have seen* the rubber peel clean off the inside of belts and stick to the pulleys by the use of resin and oil. In many mills incompetence does more to destroy the belt than the work if it was properly adjusted and cared for.

I once knew a man to use up five leather belts in succession in one season, where water was allowed to get on them. The next season a rubber belt was put on the same place and covered so that it was kept dry, and at the end of the season it was nearly as good as new. *Had this precaution been taken when the first* leather belt was put on, the result would have been equally satisfactory.

Much care should be exercised in selecting belts heavy enough to transmit sufficient power without being run too tight. If a wide belt cannot be used and a narrow one is not able to do the work, increase the diameter of the pulleys proportionately and you will overcome the difficulty. When a thick belt is run at high speed over a very small pulley with unfavorable results, if a wider and *thinner belt cannot be used, increase the pulleys also,* and note the improvement.

The lacing has quite a lot to do with the life of a belt, as when a belt is not properly laced the holes soon tear out, destroying the belt. I lace in three different ways for three different kinds of belt, namely, very thick, medium to thin, and cross belts. Thick belts, being usually run on large pulleys, work well with the straight lace. Thin belts on smaller pulleys work best with what I call the interwoven lace, as laced in this way the holes never tear out. *But for a cross belt, rubber or leather, I prefer* the lacing known as the "boot-leg," as the lace cannot wear when the belt rubs together, and laced in this way any cross belt will work well.

A company has been formed at New Denver, B. C., to light the villages of New Denver and Silverton by electricity.

According to the coroner's jury, an electric shock, due to a defective transformer, caused the death of Mr. H. B. Davidson, manager of the electric company at Selkirk, Man. The verdict concludes: "We are of the opinion that to avoid contact with the ground by any person or persons, that floors of the electric station should be insulated in the pump rooms and around the dynamos and switch boards, and that vulcanized sockets only be used in damp places, all machinery duly safeguarded by railings and other protection, and that for the protection of the public, a government inspector of electric light and power houses should be appointed, and all electric appliances tested."

EXHIBITS AT THE C. E. A. CONVENTION.

We publish in this number two views of the principal exhibit at the convention of the Canadian Electrical Association held recently in Kingston. This is the first year in which exhibits were made under the auspices of the Association. Unfortunately, when it was decided that an exhibit of electrical apparatus should form a feature of the convention, the time was very limited for manufacturers to prepare their exhibits, and a number who intended to exhibit, and no doubt will in the future do justice to their apparatus and supplies, were prevented on account of the season of the year from making an exhibit.

The Packard Electric Company, of St. Catharines, made a special effort, and in conjunction with their allied interests, consisting of Mr. R. E. T. Pringle, of Montreal, The C. P. Company, of St. Catharines, and the Hamilton Electric Supply & Construction Co., of Hamilton, had a handsome exhibit of the various apparatus and supplies made and sold by them. The exhibit, as shown in the illustrations, was arranged in a square 30 feet x 30 feet, with four entrances, the centre of each side. Uprights at the entrances and at each corner extended 18 feet above the floor. From the entrances to each corner there was a broad counter upon which various detailed supplies, coils of transformers, and meters, were exhibited. Within the exhibit were several summer couches, easy chairs, and various kinds of refreshments for the inner man. In the centre of the exhibit was a fountain eight feet in diameter at the base, the spray being ten feet above the floor. This was strictly an electric fountain of the rustic type, which, together with the plants and vines by which it was surrounded and covered, produced a very artistic effect, as underneath the water shone the radiance of 100 green lamps.

Probably the most interesting part of the exhibit was that of the new type "E" Scheeffer recording watt-meter for alternating current. This exhibit involved a number of instruments and was so arranged that an inductive and non-inductive load could be thrown instantly upon the meter which was being tested. Upon inductive loads, by means of a Stillwell regulator, the power factor could be varied from .30 to .90. Then the same load in watts upon incandescent lamps could be thrown upon the meter and readings taken. The meter was of small capacity, being the 10 ampere, and notwithstanding the small size involved, the results by actual test showed the meter to be correct within one-half of one per cent. upon the two loads with the varying power factor, as above stated. Several managers of prominent central stations in Canada took pleasure in making personal readings, and apparently the type "E" Scheeffer watt-meter solves the question of accuracy upon inductive and non-inductive loads, which has been carefully experimented with and sought for by several of the larger makers during the past two years. Doubtless other prominent makers have succeeded in accomplishing the same results, but this was the first actual test in Canada exhibited to the assembled fraternity.

Upon another counter was exhibited the flat, or pan-

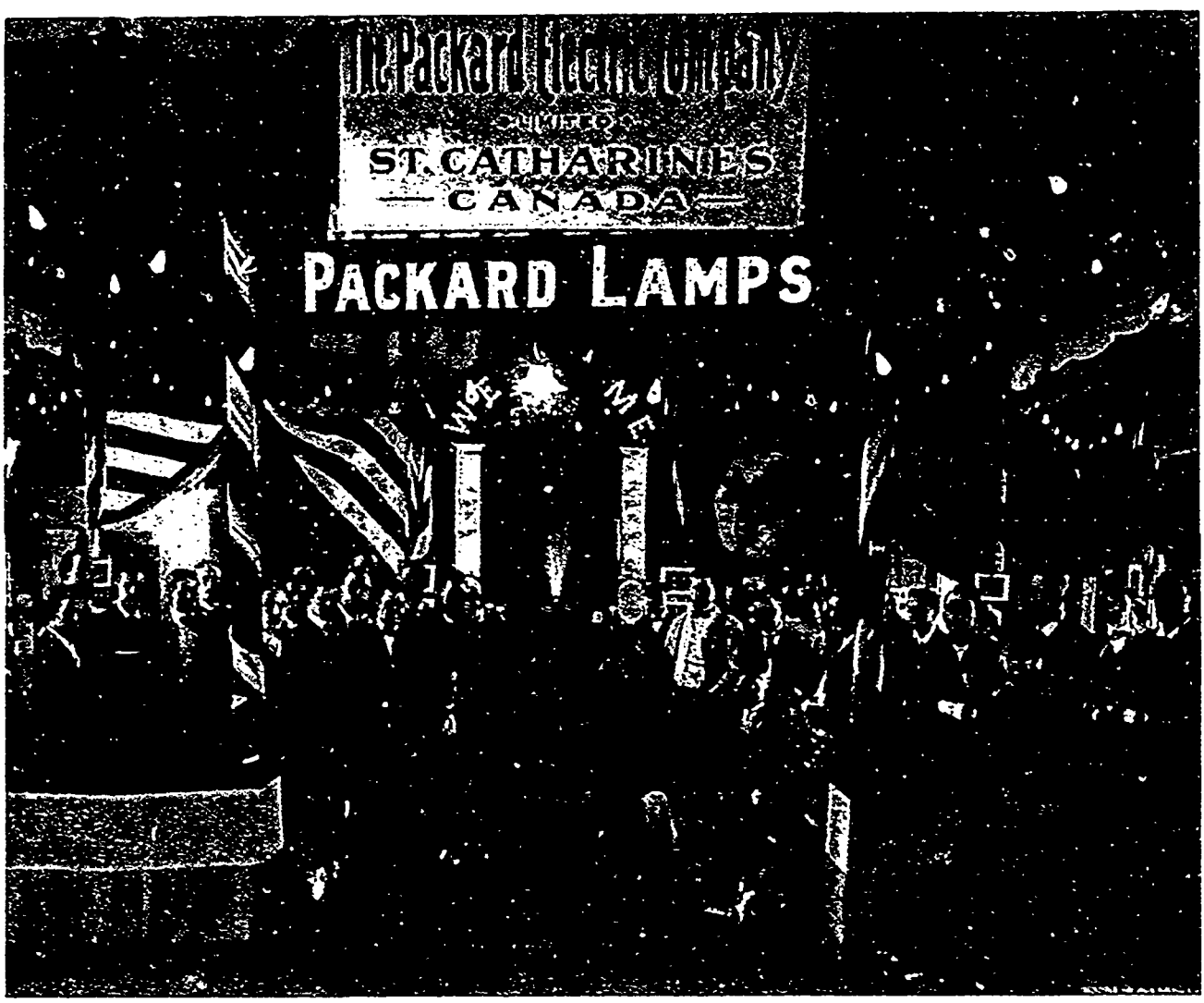


Exhibit of The Packard Electric Company at Canadian Electrical Association Convention, Kingston, 1900.

cake type of coil, which the Packard Company now use exclusively in all sizes of their transformers from 1.5 k.w. to 150 k.w.

The C. P. Company exhibited various supplies of a hundred and odd varieties which they are now manufacturing in the works of the Packard Company at St. Catharines.

Arc lamps, both series and for direct current, and multiple lamps for direct and alternating current, were exhibited also by the C. P. Company.

In addition to the exhibit of the above mentioned companies, Mr. Frank Martin, of the Hamilton Electric Light & Cataract Power Co., exhibited his register for central stations, which registers the current in amperes upon a chart, by which can be readily calculated the total energy of the output of a central station for 24 hours. These charts are very interesting; the register is very ingenious and doubtless will become in popular use.

A new enclosed magnetic type of lamp invented by Messrs. Martin & Stuart, of Hamilton, was exhibited, and one illuminated the interior of the exhibit, being placed directly above the fountain. Bunting and flags of Great Britain and the United States were plentifully used and lent an artistic appearance to the whole exhibit. Two large flags, one being the Union Jack and one Old Glory, were entertwined in the rear of the exhibit as one entered it through the main entrance of the City Hall, and between them was a banner with the motto "L'Union fait la force." Over 500 incandescent lamps illuminated the exhibit at all times.

NEW APPOINTMENTS AT THE KINGSTON SCHOOL OF MINING.

SEVERAL new appointments have recently been made in the Kingston School of Mining. Mr. L. W. Gill, B. A. Sc., has been appointed to the new chair of electrical and mechanical engineering. Professor Gill is a distinguished graduate of McGill University. After graduation he studied for two years as Exhibition Research Scholar, and had the distinguished honor of being offered the Scholarship for a third year. This scholarship is of the annual value of 150 pounds sterling, and is awarded by Her Majesty's Commissioners from funds remaining from the receipts of the Exhibition of 1851. Mr. Gill's work as research scholar was carried on partly at McGill and partly at Harvard University. Since the completion of this work he has been in the employ of the Westinghouse Company, Pittsburg.

Dr. John Waddell, B. A. Sc., Ph.D., has been appointed lecturer on Industrial Chemistry, and Mr. C. R. McInnes that in Applied Mathematics.

Mr. A. G. Burrows, M.A., has been appointed demonstrator in Mineralogy, and M. B. Baker, B. A., in Geology.

The Mining Laboratory has been rebuilt so as to give twice the space for machinery and a lecture room and testing laboratory. The Carruthers Science Hall has been improved by the addition of a ventilating system, controlled by fans, for removing the foul air and replacing it with pure warm air.

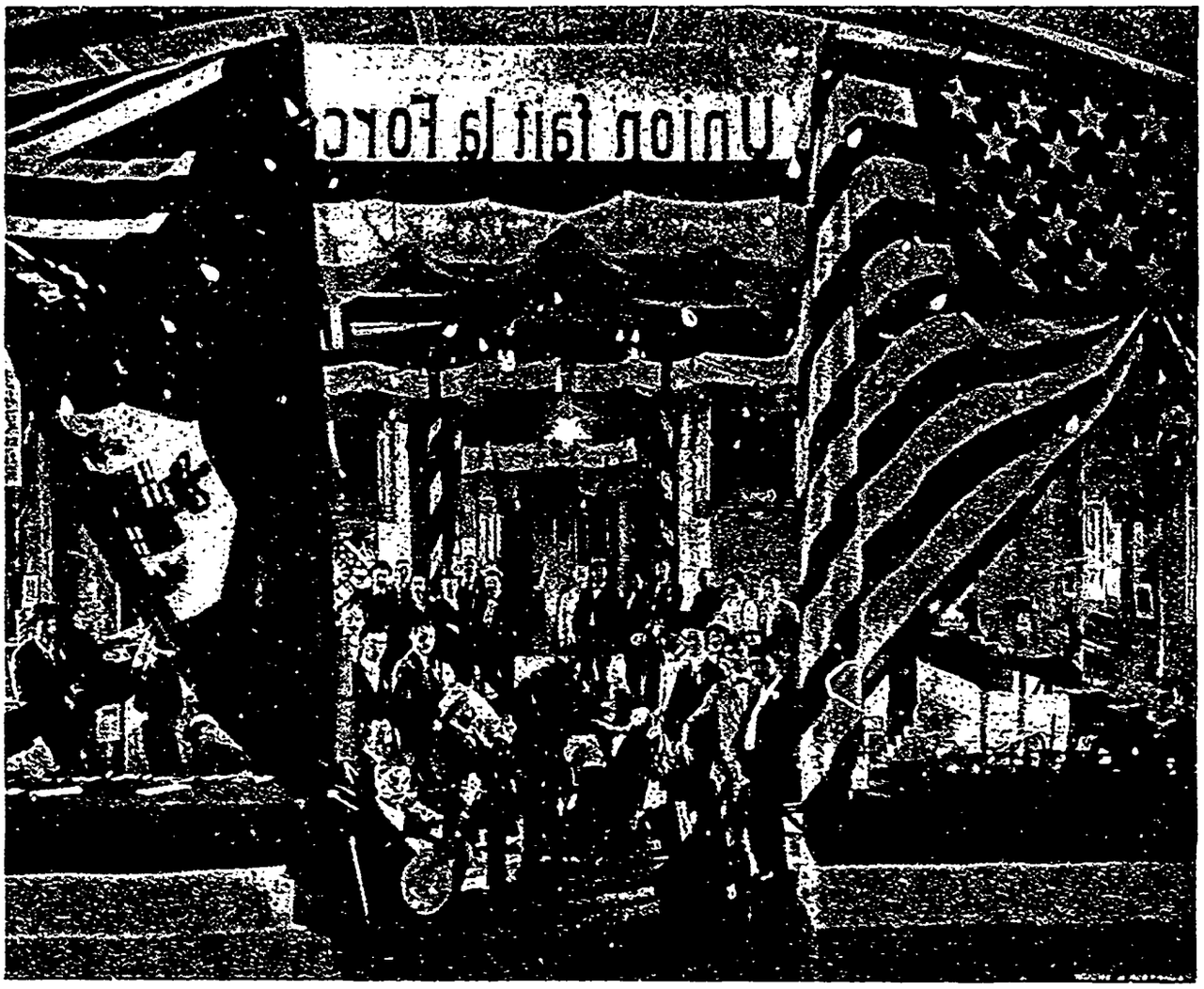


EXHIBIT OF THE PACKARD ELECTRIC COMPANY AT CANADIAN ELECTRICAL ASSOCIATION CONVENTION, KINGSTON, 1900.

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Governmental Management of Telegraphs.

SINCE 1870 the control and management of the British telegraph system has been vested in the government. The effectiveness of the service seems to leave little ground for complaint, but from a financial point of view the results are entirely unsatisfactory and calculated to make other countries think twice before adopting the system. While the system was being conducted as a private enterprise it paid dividends of 8 to 14 per cent. Since the government assumed control, however, there have been large deficits almost every year. The shortage last year on a total business of three and a quarter million pounds amounted to more than half a million pounds. The aggregate of these yearly deficits has now reached seven and three-quarter million pounds. The astonishing feature of the case is the fact that the volume of business and receipts has largely increased.

Electricity vs. Gas.

AN interesting paper on the above subject was recently presented by Mr. White, of Cincinnati, before the Ohio Electric Light Association. The figures which he gives prove conclusively the advantages of electricity over gas for street illumination. He showed that in about 60 per cent. of the cities of over 25,000 inhabitants in the United States gas had been entirely discarded in favor of electricity for street lighting purposes. In the other 40 per cent of the cities electricity is used to a greater or less extent and is steadily growing in favor. In only one city has electricity been replaced by gas, and it is said that the explanation of this bears a close relation to the politics of the city. The figures regarding the economy of the two kinds of illumination are particularly timely, and show that electric light is the cheaper. The cost in Chicago, from official figures, is $784.60 for gas lighting per mile and $567.45 for electricity, while the brightness of illumination of the latter is much superior to that of the former. Mr. White submitted the statement that one arc of 800 actual useful candle power will give as much light as 20 Welsbachs of 40 candle power.

Employment of Incompetent Attendants.

THE employment of persons incompetent to perform the duties expected of them is an evil which exists, perhaps, in a greater or less degree, in every branch of industry, and is therefore not altogether foreign to the electrical business. The claim has been made that the manufacturing companies are encouraging the employment of incompetent workmen as engine and dynamo tenders. The severe competition that is encountered and the desire to effect a sale is apt to induce salesmen to lead thier customers to underestimate the cost of attendance necessary for the successful and economical operation of apparatus. A certain firm in Toronto who are the owners of an isolated electric light plant are said to have engaged to operate the plant a cheap and inexperienced engineer. The mistake thus made was soon discovered and a competent engineer substituted. It has been stated that the builders of the engine were responsible for the employment of the first engineer, because they understated to the owner the amount of skill and attention that the plant would require. The necessity is apparent that manufacturers of electrical and steam apparatus should guard against having the reputation of their goods suffer as the result of inexperienced attendance. Cheap labor around an electrical

or steam plant invariably means that the saving effected in salaries will be more than offset by excessive operating expenses.

Effect of Snow on Telephone Wires.

EXPERIMENTS to determine the effect of snow on telephone wires have recently been made by Mr. E. Pierard, a telegraph engineer of Belgium, the results of which are interesting. He found that a bronze wire 2 mm. in diameter collected an ovoid of snow, whose two axes were respectively 28 mm. and 36 mm. The weight of the snow was, roughly, 1.78 times that of the wire. A smaller wire 1.4 mm. in diameter collected an envelope of snow 4.38 times its own weight. The result of this snow collecting on the wires running from the central office in Brussels imposed an extra weight of over 30 tons on the supports. In calculating the deflections produced by the heavy coats of snow the author found that in many cases the long spans were safer than short ones. This was because the long spans sagged sufficiently to enable the central portions to find additional supports on house ridges, etc. As an example of what these sags would be with the weights mentioned above, the author found that with a span of 100 yards there was a sag of four yards, with a span of 550 yards the sag was about 25 yards.

Electric Lighting Statistics.

AT the annual convention of the National Association of Officials of Bureaus of Labor Statistics of the United States, held in Albany in June, 1896, a committee was appointed to undertake an investigation of the private and municipal ownership of water, gas and electric light plants. This committee recently submitted the results of its investigations, which are published as the fourteenth annual report of the Commissioner of Labor. The general impression is that one of the main objects of the report was to prove the advantage of municipal as compared with private ownership. There seems no reason for dissatisfaction so far as the abundance of information in the report is concerned, it being perhaps quite as complete as could be expected, considering the many difficulties met with in gathering information of this character. It is equally true that the results neither prove nor disprove the claim that municipal ownership is more economical than private management. Neither is it difficult to discern that the compilers of the report were partial to municipal ownership, hence their statements should, in our opinion, be discounted. We will not attempt to make deductions from the numerous tables bearing upon the cost and operation of electric light plants, this being well nigh an impossibility, but some of the figures given in the introduction and analysis of the tables are of peculiar interest. It is shown that in the United States there are 965 gas plants, of which but 14 are under municipal control. The number of electric light plants is 3,032, of which 460 are municipal and 2,572 private. The report covers 320 municipal and 632 electric light plants, or about 35 per cent. of the total number in the United States. The capacity of the electric lighting plants has been given by taking the rate of horse power of the engines as the basis. It is noticeable that municipal ownership is most common in respect to small plants. Of those of 50 h. p. investigated by the committee, 9 were municipal and 6 private; of 100 to 125 h. p., 13 were municipal, and 10 private; 200 to 300 h. p., 14 municipal, 19 private; 500 to 750 h p., 7 municipal, 57 private; 1,000 to 1,500 h. p., 4 municipal, 34 private; while of 5,000 h.p. plants, none are owned by municipalities, and 15 by private interests. This is also shown by the invested capital, 320 municipal plants representing an investment of $10,908,925, and 632 private plants an investment of $113,917,815. The cost of producing electric light is gone into at some length. In this one of the largest items is, of course, the salaries and wages account. This is divided into two sections, that of salary including the remuneration to officers, superintendents, clerks, etc., and that of wages being the amount paid for engineers, firemen, dynamo tenders, linemen, and like help. In seven of the groups shown the average cost for wages exceeds that in the private plants, while in eight of the groups this item in the private plants is greater than in those municipally controlled. On the other hand, the average cost for salaries in municipal plants is smaller in every instance than in private plants, in some cases being less than one-half. This is, indeed, a strange anomaly, and somewhat contradictory. It is in calculations of this sort that the advocates of municipal ownership find ground on which to base their so-called arguments. Municipal electric light systems are frequently operated as an adjunct to other plants, making it possible for those so inclined to charge an unjust proportion to the cost of operation.

ANCHOR ICE AND ELECTRICITY.

A NOVEL use has been found for an electrical stove by the Water Board of Marquette, Mich. The stove has been put in the intake pipe which supplies the water to the city works from Lake Superior, and its purpose is to keep anchor or needle ice from forming on the sides of the pipe and finally stopping the flow. The stove is the invention of the superintendent of the local electrical plant. It is a resistance coil like those used for heating street cars, and is made in circular form to fit within the intake pipe, the water passing through it. Current is furnished to the stove at slightly above one hundred volts, and the plan is to keep it in constant operation when weather conditions are favorable for the formation of needle ice. It is not necessary that any great quantity of heat should be generated, a rise of two or three degrees being sufficient to melt the ice as fast as it forms. The cost of the apparatus is $25, and this expenditure will save at least $100,000 for a new and deeper intake.—N. Y. Evening Post.

THE NERNST LAMP IN GERMANY.

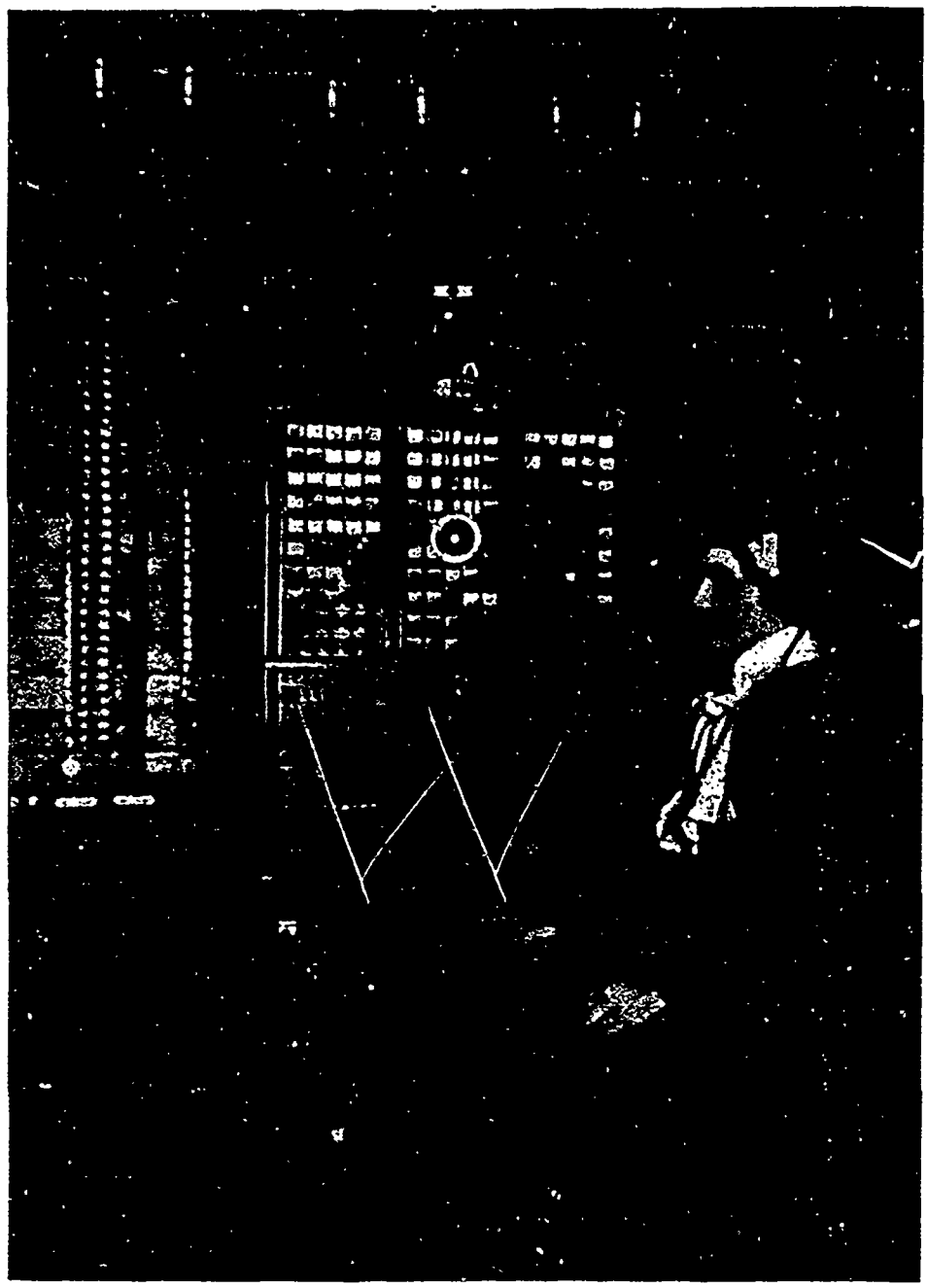
FROM a lecture given by Dr. Nernst in Berlin it appears that Nernst lamps are now being made by the Allgemeine Elektricitats Gesellschaft in 25, 50 and 100 c. p. sizes, with a life of about 300 hours and an efficiency of 1½ to 1¾ watts per candle power. Experiments are also being made with lamps of higher candle power. The wholesale manufacture of 110 and 220 volt lamps will be commenced as soon as the new works, which are being erected by the company for that purpose, are completed. The German patent office has dismissed all petitions against the validity of the Nernst lamp patents.

The town of Berlin has given a contract to the Berlin Gas & Electric Co., for electric and gas lighting for a period of five years from October 1 st, 1900.

A CIVIC TELEPHONE SYSTEM.

The question of municipal ownership of telephone systems is at present receiving much consideration. There seems to be a growing tendency, especially in rural districts and small towns, to form local telephone companies for the purpose of furnishing telephonic communication in the immediate vicinity as well as with adjacent villages and outlying districts. Many of these exchanges are now in successful operation, especially throughout the province of Quebec and the Maritime Provinces.

The town of Neepawa, Man., is one of the few corporations in western Canada which has shown its faith in municipal ownership of telephones. The authorities there have recently purchased from Messrs. Ness, McLaren & Bate, the well-known manufacturers of telephones and electrical supplies of Montreal, a complete outfit, consisting of a central exchange switch-board, with a capacity for 150 subscribers, and 150 long distance telephones, all supplied and installed by the above firm. An illustration of the switch-board in actual use is shown on this page. This type of board is recognized throughout Canada as the standard instrument. The drop used is very neat and occupies little room, the jack being placed immediately under the drop permits of making up the switchboard with a capacity for a large number of connections in a comparatively small space. The latest styles of exchange connections are used, such as cam levers and push buttons for generator, separate "ring off" drops, head receiver for operator when required, and also a special attachment for night alarm, the drop in falling making connection with a local battery and bell which continues ringing until the drop is reset. Connections with subscribers' lines are all made at the rear of the board in a convenient manner, each line being attached to a binding post on a numbered strip so as to be easily available for reference.



SWITCHBOARD IN TELEPHONE EXCHANGE AT NEEPAWA, MAN.
(Installed by Messrs. Ness, McLaren & Bate.)

Aerial lead encased cable is generally used for connecting the switchboard with the line wires of subscribers, the distributing cable box being placed on the nearest pole and connections made there when plant is installed. Each telephone may be grounded separately or a metallic return used by having a special switch-board suited for the purpose. The latter, however, costs double the amount of the former.

That the system installed at Neepawa has given eminent satisfaction is shown by a letter received recently from the authorities. Writing on their behalf, Mr. J. W. Pattison, secretary-treasurer of the municipality, says that "While at first you made up for us and installed only 100 of your Milde long distance telephones, we have since had to order from you several additional lots of instruments, the number of subscribers having increased until we have now our full complement. The system is giving perfect satisfaction."

The independent telephone idea appears to be growing. In Sweden the telephone system is under state control, and it is said that there are more telephones in use in that country than anywhere else in the world. Throughout the United States it has already assumed large proportions.

ELECTRIC RAILWAY DEPARTMENT.

PROPOSED ELECTRIC RADIAL RAILWAYS.

FOR some time a system of electric railways radiating from the city of Toronto, and passing through the somewhat thickly settled districts of Central Ontario, has been agitated. The City Council of Toronto instructed the Committee on Works to submit a report on such a system. This was done by Ald. Lamb, as Chairman of that Committee, in May last. A careful study of the question was made by Ald. Lamb, who outlined a scheme the execution of which, he believes, will result in a great expansion of the trade of Toronto and be of great benefit to the city and surrounding districts.

The proposed system consists of six main lines, with four branches, the route of which is shown by the accompanying map. The total mileage of the proposed system is 354 miles. The City Engineer of Toronto estimates that the cost of constructing the system would be approximately $5,000,000, made up of $2,850,000 for construction of tracks, grading, bridging, etc., and $2,150,000 for overhead work, power houses, machinery, car barns, equipment, etc. The cost of supplying power, the engineer states, will depend largely upon the amount of water power available along the different routes, and also as to the feasibility of transmitting power from the Niagara Peninsula.

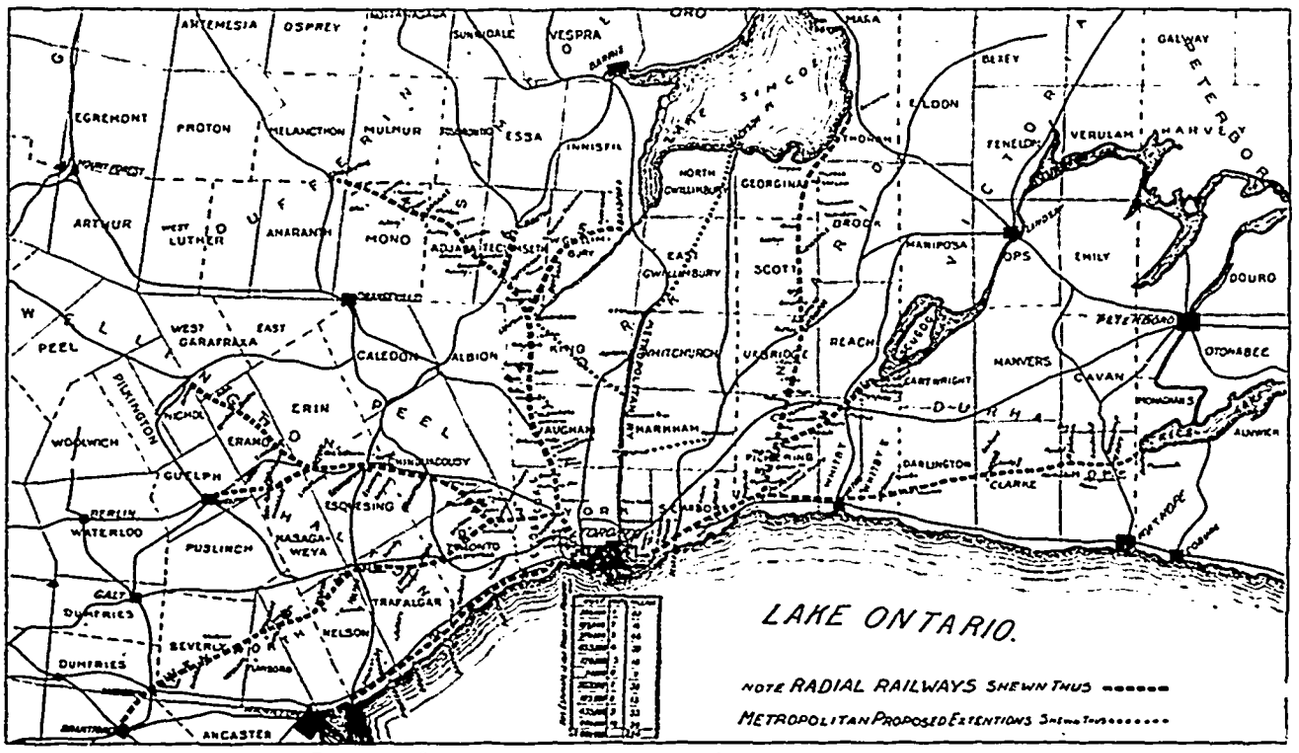
The assessed value of the city of Toronto is $125,736,000, and that of the townships through which it is proposed to extend the radial system $91,578,618, making a total assessed value of $217,314,618. The population of Toronto is 225,000, and of the townships 187,834.

The following propositions for building the system have been made by Ald. Lamb:

1. That the city of Toronto, together with the townships to be benefitted, could jointly build and equip the entire system at a cost of $5,000,000 by the issue of bonds bearing interest at 3 per cent., said bonds to be guaranteed by the respective municipalities in the proportion of their assessed values. The total value of bonds would be equal to a guaranteed assessment of 2½ per cent. upon the respective assessed value of each municipality. The interest of such guaranteed bonds would be the first charge upon the earned profits, so that in all probability there would be no expense incurred to the different municipalities except the liability of a guarantee.

2. The city and townships could contain control of the system as a public franchise by constructing the tracks, bridges, etc., at a cost of $2,850,000, under the same financial basis as above, and inviting tenders under certain terms and conditions for operating the road, the contractor supplying all overhead work, electric plant, cars, etc., and the guaranteed interest upon the municipal bonds to be the first charge.

3. The city of Toronto, the counties or townships to combine for the purpose of advertising for tenders for the exclusive privilege of constructing and operating the proposed railways.



PROPOSED SYSTEM OF ELECTRIC RADIAL RAILWAYS FROM TORONTO.

The routes as suggested on the map are not final, but may be changed to others more advantageous or to suit the financial support given by such townships as may wish to avail themselves of the system. An adjunct to the scheme is the extension of the Metropolitan electric railway from Thornhill east to Markham, from the main line just north of Richmond Hill west to Schomberg, and from Newmarket north to Jackson's Point.

The construction of such a system of electric railways could not but prove of great benefit to the country districts. It would increase the value of the farms in the several localities and provide the farmer with an easy means of getting his produce to market. In the United States similar systems are said to be operated with success and as a profitable investment to the promoters

A further step has just been taken by Ald. Lamb, who is having prepared an act to incorporate the Toronto and Central Ontario Electric Radial Railways, with a capital of $5,000,000, to construct and operate the system in conjunction with the different municipalities. He is said to have received positive assurance that such a company could be financed in New York city, but Canadian capitalists will be given the preference.

ENGINEERING and MECHANICS

BANQUET OF STATIONARY ENGINEERS.

The annual banquet of Toronto No. 1, Canadian Association of Stationary Engineers, will take place at the Walker House, Toronto, on Thanksgiving eve., October 17th. Such arrangements have been made as ensure an evening of pleasure. The local committee is composed of Messrs. G. C. Mooring, president; J. W. Marr, secretary; W. L. Outhwaite, treasurer; W. J. Webb, A. M. Wickens, H. E. Terry, S. Thompson, John Fox, A. Storer and Jas. Bannon. The tickets are one dollar, and may be obtained from any member of the committee.

CHIMNEY CONSTRUCTION.*

By E. J. Philip.

The construction of chimneys does not give us much thought, like many other things we have to deal with, until we have to construct one, and when you begin to look up facts it will surprise you how little real information there is to be had on the subject.

In the old country, where there are many large chimneys used for all purposes, there is on record much information both in reference to building, straightening and taking down. Most of the very high chimneys are used for other purposes than producing draft to burn coal, such as carrying off the poisonous gases from chemical works, etc. There is a book published called "Tall Chimney Construction," which gives the general details of many stacks built in the old country, and from these records you can make formula to guide you in designing a new stack.

Let us consider what is the proper method of designing a chimney for any given purpose. The first question is, "What is the chimney for, or what is it to do?" for this will govern some details of the shell. For instance, if it is to produce draft for ventilation, it will not require to be lined with fire-brick, nor will there be any benefit in putting in a loose lining.

We will suppose the chimney under our consideration is to induce draft to burn coal, as that is the most likely duty of any chimney that we will be connected with.

The size of the flue is the first dimension you will require, and it will depend on the quantity of coal to be burned and the velocity of the gases up the shaft. It is easily understood that as chimney powers increase the dimensions do not increase proportionately. To illustrate this I will take some figures from a table in a reliable work:

A chimney 70 ft. high, 30" diameter = 100 h.p.
" " 200 ft. " 66 in. " = 1000 h.p.

That is, the high chimney with five times the area equals ten times the power; and while I am not sure that this proportion is right, it seems to illustrate the way the formula works. The only correct way is to calculate the number of cubic feet of gas going up the chimney at the average velocity, and the area of this column is the area of the chimney. The rate of combustion depends on the draft, and the draft depends on the height of the chimney and the temperature of the gases. The height of the stack is nearly always determined by the surroundings, as the stack must of necessity be above any buildings or hills, and I might say that the average stack is higher than is necessary. However, when there are no buildings or hills, the following formula will establish the height. This is known as Gale's formula:

$$=H\frac{120}{T}\left(\frac{F}{g}\right)^2$$

After getting the height, the area may be obtained by Kent's formula, which is: $A=\frac{.06F.}{\sqrt{H}}$ In this rule the effective area is obtained and is two inches less all round than the actual area. This two inches is to make up the friction of shaft. We now have area of chimney and height of it. I might say that experience has shown that to burn hard screenings requires 175 feet stack, for buckwheat 150 feet, and for soft coal 80 to 100 feet. This is a pretty fair basis to start from. We will suppose our chimney is, say, 100 feet high and 40 square feet area. It looks a simple matter to construct a stack having this information, and so it is, only you must go about it in the right way. To continue your calculations after getting the size, you start at the top and work down. Authorities say that a chimney having a flue over five feet in diameter shall be 1½ brick thick at the top; from three to five feet in diameter, one brick; and under three feet, half a brick. A chimney five feet or over would have this size for the first 25 feet down and would increase ½ brick for each 25 feet. This, according to calculations, is almost too much. It can run 30 to 40 feet each stage, but will depend on kind of material, that is, whether hard or soft brick, and whether built in cement or lime; 30 to 40 feet will work with good material and workmanship. Having laid out the different thicknesses of wall, and knowing the batter, which varies with different builders and conditions from 1/16 to ¾ of 1 inch, having this you can get the weight of shaft or chimney proper. In large chimneys it is usually specified what they shall weigh per cubic foot. After getting weight you can decide how much bearing surface you will require for the kind of soil you have at the foundation. Various bearing powers of soil are given as follows: Hard rock, native bed, 100 tons sq. foot; clay, dry, 4 to 6; moderate dry, 2 to 4; soft, 1 to 2; gravel and coarse sand, 8 to 10; sand compact and well cemented, 4 to 6; clean dry sand, 2 to 4; quicksand and alluvial soils, to 1 ton per square foot.

When the ground is soft you would require piling or timbering, and to spread it out over a considerable surface. The weight in tons divided by bearing power of soil gives surface required. Wind pressure is also an important factor in getting the area of the base. I will not go into the rules affecting wind pressure, but experience has shown that at the base of shaft proper its diameter shall be 1/10th of height for square chimney, 1/11 for octagon, and 1/12 for round. In considering wind pressure it is usually figured at from 25 to 56 lbs., by different authorities. This must be resisted by foundation, as you can see that if the chimney rocks over with wind it will throw its entire weight on one side of foundation. In considering wind pressure it is necessary to take into account whether chimney is protected by buildings or standing in an open field. If the chimney is built into a building, windage may be almost disregarded except for piece above the roof.

There has been a great deal written and many discussions as to the merits of different shaped flues, but experience and tests have shown that a parallel flue is the best or as good as any shape. The arguments for taper flues are something like this, that the gases slow down due to cooling as they go up, and consequently they require more room, and the flue should get larger; others say that the gases cooling down contract in volume, and therefore the flue should get smaller so as to take the same shape as the column of gas. Experience has shown that both are correct. The gases contract and get smaller and consequently need less room, but they also slow down in velocity, due to their greater weight and therefore need more room. In this way they just balance up and require a parallel flue. Authorities say a round parallel flue is the best for all purposes, and the nearest approach is the next best.

The chimney should be finished with a cap of some material that will stand the weather. I like cast iron best, but a cap can be moulded of Portland cement, and if the stack is for smelting work, of fire clay. These materials stand well, and if there is a ladder on the chimney they can be kept in repair. A ladder should always be built on the shaft, as it makes a means of examining it at any time, and if repairs are needed they can be done easily.

Lightning conductors are also approved and disapproved; but if a chimney is the highest object in its vicinity it is likely to take the discharge from a storm over it, and a properly erected conductor will carry it off, although many stacks are standing without any.

*Paper read before the Canadian Association of Stationary Engineers.

The Cayuga Electric Light Company, of Cayuga, Ont., recently suffered the loss of their electric light plant by fire.

The electrical kitchen is a feature of the Paris Exposition, it being probably the most elaborate affair of its kind ever installed. Between three hundred and four hundred guests have been cared for daily. The mean consumption of electricity amounts to about six cents per guest per day. The main advantage with the electric kitchen is the rapidity with which food can be cooked and the absence of smoke and all possible danger of fire.

ENGINE ROOM NOTES.

W. H. WAKEMAN, in the Wood-Worker.

It is always a good plan to watch an engine carefully for loose pins, setscrews and nuts, for an ounce of prevention of accidents in this way is worth several pounds of cure, after an engine is wrecked by the failure of a governor to do its duty.

Grate bars should fit the furnace so as to prevent waste of fuel; but they should not be wedged in so tightly that when they are expanded by heat they will be ruined.

Friction clutches and cut-off couplings are a great convenience in a mill or factory; they enable the operatives to quickly stop a line of shafting in case an accident happens, without waiting to get word to the engineer. They also save power by making it convenient, or possible, to allow one or more lines of shafting to remain at rest, when not needed for use.

When selecting hangers, choose those which will admit of taking out the shafting without removing the bolts holding the hangers; in case of repairs it may save much time and expense.

When laying out holes in belts for lacing, do not locate them so near together that the strength of the belt will be seriously impaired; and after you have laced it, draw in extra pieces of lacing so that they will come between belt and pulley when in use, as they will save the lacing that holds the belt together.

It is poor policy to allow any kind of packing to remain in use too long, and especially so in the case of valve stems on Corliss engines, which are often made of a composition that is easily cut and grooved.

When an injector has worked well for some time, then declines further service, examine the feed pipe to boiler and see if it has become choked with scale and sediment.

It is a good plan to use a little oil on asbestos wicking, when packing valve stems, but if much is put on it makes an unsightly mess on the bonnets of nickle-plated radiator valves and in other similar places.

It is very annoying to an engineer who understands his business, to find that as soon as the flywheel begins to revolve in the morning, or when starting up after dinner, some workman in the shop has started a heavy machine into operation. As a rule these machines do not turn out good work when running at a slow speed; but whether they do or not, they should never be started until the engine has attained its full speed. Machinery in silk mills and similar places are exceptions to this rule, but wood-working machinery is not.

Metallic piston rod packing is a very good thing to have, but some kinds are made in the form of a wedge, and if an engineer screws the nuts on the studs up tightly, he may get himself into trouble; therefore he should go slowly until he fully understands the construction of the packing in his stuffing box.

If the indicator diagram from your engine shows an imperfection for which you cannot account, be sure that the indicator piston is well oiled before losing sleep to worry over it, for the oil may change the whole aspect of affairs.

Boiler compounds are necessary in many cases, but as soon as scale is removed from the shell and tubes, it should be taken out without delay, as it may cause the crown sheet to be burned.

Flange unions in the main steam pipe between the lubricator and the cylinder should be packed with asbestos millboard, copper gaskets, or some other substance that hot oil will not dissolve.

Where a jet condenser is in use, some of the exhaust steam will find its way back into the boiler, after being condensed and passing to the hot well; therefore measures should be taken to remove cylinder oil from it before it is condensed.

If the main belt on your engine has run steadily for years or months, and then begins to "flop" in an unreasonable manner, do not hasten to saw a piece out of the floor through which it runs, nor yet to cut a piece out of the belt, but apply an indicator and see if the valves do not need resetting.

Every pound of back pressure on the piston of an engine means another pound of forward pressure, which in turn means more fuel for the boiler, hence the back pressure should be reduced to the lowest point possible. This is what a condenser is used for.

At the time of going to press the tenders received for electric light and power plant for the corporation of Morrisburg, Ont., have not been made public.

SPARKS.

The Royal Electric Company are said to have decided to close down the electric plant at Aurora, Ont.

Mr. S. Glass, chief engineer of the Victoria Hospital, London, has recommended that a third boiler be put in.

The Cataract Power Company, of Hamilton, have put in a new 3,000 horse power turbine at their DeCew Falls power house.

Reeve Savage, of Richmond Hill, Ont., will submit to the council of that village a proposition for a system of municipal electric lighting.

Mr. Roderick J. Parke, E.E., of Toronto, has been advised by the town council of Perth, Ont., of his appointment as valuator for the town.

The Water Committee of the Montreal City Council has decided to call for tenders for the proposed electric motor plant for the high level reservoir.

The ratepayers of Almonte, Ont., will vote on a by-law on October 20th to raise $30,000 by the issue of debentures to establish an electric light plant.

There is a deadlock between Messrs. Eager & Sanderson and the village council of Winchester, Ont., over the price for electric lighting. If an agreement is not reached the lights may be discontinued.

The Berlin Furniture Co., Berlin, Ont., have placed an order with The Electrical Construction Company, of London, Limited, for a 150 light multipolar dynamo to be installed in their new factory.

Col. Tracey, of Vancouver, has estimated the value of the property of the Revelstoke Water, Power & Light Company, of Revelstoke, B.C., at $69,970. The company asks for the property $76,775.

The tender of the Goldie & McCulloch Company, of Galt, for an engine and boiler for the Newmarket electric light plant, has been accepted. Plans for an addition to the power house have been made.

Adelard Bolduc, of Hull, is issuing the Hull Electric Company for $10,000 for the death of his son, who was killed by an electric car. The plaintiff claims that the car was running at a high rate of speed and was not provided with a fender.

The Electrical Construction Company, of London, Limited, have secured the contract for the supply of a 600 light generator, and for the complete wiring of the new buildings of the McLaughlin Carriage Co., Oshawa, Ont.

The Standard Light & Power Company, of Montreal, have elected directors as follows: President, W. McLea Walbank; vice president, J. H. Burland; secretary, D. Craig; Peter Lyall, S. Finley, W. S. Evans, L. Henault and R. Wilson Smith.

Mr. E. B. Douglas, president of the Sault Ste. Marie Pulp & Paper Company, has placed before the councils of Fort William and Port Arthur, Ont., a proposition to supply these towns with electric light and power, developed from the Kakabeca Fa'

Negotiations are said to have been in progress for the purchase, by an American syndicate, of the plant of the Trenton Electric Company. The purpose of the syndicate is said to be to largely increase the present capacity of the plant. We have not learned that the purchase has yet been consummated.

The Brandon Electric Light Company, of Brandon, Man., are making good progress with the development of the power of the Little Saskatchewan river. The work of building the dam is nearing completion, and the power house has been commenced. It is probable that the town waterworks will be operated by electricity.

The Parry Sound Electric Light Co. are remodelling their power house and putting in two new boilers and one new engine, manufactured by the Waterous Engine Co., of Brantford, and one 75 k.w. monocyclic generator. The plant, when fully equipped, will consist of three water-wheels, two monocyclic generators of 75 k.w. each, and an auxiliary steam plant of 150 h.p.

The incandescent oil lamp invented by Mr. V. L. Emerson, of Ottawa, was recently given a test in that city. Six 16 candle power electric lights, we are told, illuminated the room in which the party of witnesses sat, and one student lamp, the globe of which was of about the size and appearance of the ordinary auer burner, was placed on the table. This light was constantly turned on and off to show the contrast between the six 16 candle-power electric lights and the new invention, and it is reported that the difference in brilliancy was remarkable.

DYNAMO PLANT FOR TELEGRAPH WORK.

THE C. P. R. Telegraph Company have installed a plant of motor generators in their Toronto office, to supply current to their circuits. The plant is located in the old battery room, which formerly was filled with battery stands supporting some two thousand cells, all of which have been done away with—the dynamo room now occupying about one-quarter of the space which had been taken up with battery jars. The machines consist of twelve Lundell motor generators, manufactured by the Sprague Electric Company, resting on two heavy wooden stringers raised 30 inches above the floor. Connection is made by means of twelve 5-conductor cables (one cable to each machine) with the switchboard, consisting of a slab of slate on which are mounted the necessary switches. The switchboard is bolted to a framework of angle iron secured to the floor and ceiling. On each side of the switchboard, mounted on wooden cross bars bolted to the iron frame, are the rheostats, one for each machine; above the switchboard are the ammeter and voltmeter, of Weston make. The voltmeter is provided with a flexible conducting cord and wedge, by means of which the voltage of any circuit can be taken. By means of a double throw two pole main switch connection can be had with either the overhead or underground circuits of the Toronto Electric Light Co. In the circuit between the main switch and the motor switches is placed a reversing switch, which is used on occasions when service current happens to be reversed. In the main circuit there is also a regulating rheostat and an underload switch. On the upper part of the switchboard are located the secondary switches, by which connection is made with the cable leading to the operating room, where the secondary currents are distributed to the wires through lamp resistances. The machines are wound for 225 volts primary, the secondary ratings being as follows: One of 100 volts, 2.5 amperes; two of 30 volts, 34 amperes; three of 130 volts, 3 amperes; three of 200 volts, 2.5 amperes; and three of 400 volts, 2.5 amperes. It being necessary to run only seven machines constantly, one machine of each voltage is allowed to remain idle in reserve. The secondary switches are so arranged that the machines can be transposed without interruption to continuity of current supplied to operating room.

PERSONAL.

Mr. Wm. Tarlin, late of Mitchell, Ont., has been appointed manager of the electric light plant at Palmerston, Ont.

Mr. Thos. Potter, who for eleven years past was superintendent of the Walkerton Light and Power Co., has recently resigned.

Mr. Walter Stillwell, head dynamo tender for the St. John Street Railway Company, has resigned, to accept a position in Sydney, C. B.

Mr. Andrew Ingram, of Seaforth, has removed to Kincardine, where he becomes superintendent of the electric light plant owned by the town.

It is announced that Mr. W. E. Gower, C. E., of Montreal, will in future reside in Great Britain as the representative there of the American Stoker Company.

THE ELECTRICAL NEWS recently had the pleasure of a call from Mr. Harvey Hubbell, an extensive manufacturer of brass machinery screws, of Bridgeport, Conn.

Mr. Geo. Patterson has resigned the management of the Amherst Electric Light Company, of Amherst, N. S., and purposes spending the winter at his home in Truro to recuperate his health.

Mr. G. F. MacDonald, city electrician of Ottawa, Ont., attended the recent convention of the Association of Municipal Electricians held in Pittsburg, Pa. Mr. MacDonald was honored by being re-elected vice-president of the association.

It is with pleasure that we notice that Mr. P. McCullough, late chief electrician for the Toronto Railway Company, who went to England a few months ago, has been appointed assistant manager of the municipal tramway system at Liverpool, England.

Mr. L. W. Gill, B. A. Sc., of Montreal, has been appointed lecturer in the newly appointed chair of electrical and mechanical engineering in the Kingston School of Mining. Mr. Gill is a gold medalist of McGill and will no doubt fill his appointment in an acceptable manner.

Mr. E. J Philip, who for a number of years has been chief engineer for the T. Eaton Company, Toronto, has tendered his resignation. Besides having the surpervision of the large electrical and steam plant, Mr. Philip acted as mechanica superintendent of the entire establishment.

Mr. Ralph D. Marchand, who for some years was expert for the Westinghouse Electric and Manufacturing Company in connection with the long distance transmission of electricity, is reported to have accepted a similar appointment with the Montreal Street Railway Company and the Chambly Manufacturing Company.

SPARKS.

The talk of an electric railway from Yarmouth to Digby, N.S., has been revived.

Mr. Edmund Conway, of the Quebec Railway, Light & Power Company, has been granted a patent on a street car fender.

Judge McDougall has been named as arbitrator in connection with the purchase of the electric light plant by the town of Woodstock, Ont.

The annual meeting of the Merchants Telephone Company, of Montreal, was held in that city a few days ago. The directors were re-elected.

A syndicate is negotiating for the purchase of Lake Park from Mr P. P. Salter, with a view to improving the park and building an electric railway to Carleton Place.

The Goderich Engine and Bicycle Company are now manufacturing the Whiting automatic pump, having acquired the exclusive right to manufacture this pump in Canada.

Mr. John Patterson, secretary of the Cataract Power Company, Hamilton, has made application to the township councils of Barton, Saltfleet and Grimsby for right of way for an electric railway. The line may be built next spring.

The Sarnia Street Railway Company are asking for tenders for ties, poles and overhead construction in connection with the conversion of the street railway at Sarnia, Ont., to an electric system.

The Cataract Power Company and other Hamilton capitalists have formed the Patterson Coal & Coke Company, of Pennsylvania. A large tract of coal lands in the Pennsylvania district has been acquired, and it is the intention to bring soft coal to Hamilton and establish large coke ovens adjoining the city.

The street railway of St. Thomas, Ont., has passed into the control of a new directorate, of which Mr. E. H. Coughall and Mr. J. W. Moyes, the latter of the Metropolitan Railway, of Toronto, are members. It is said that the road will be extended to Port Stanley. The company have already running privileges in Yarmouth and Southwold. Mr. E. H. Coughall will become manager.

The Niagara, St. Catharines & Toronto Railway Company have been granted, by the Stamford township council, an extension of time to May, 1901, to complete the Niagara Falls, Wesley Park & Clifton Electric Railway on Murray street. Mr. Edward Baxter and others have applied to the township councils for a franchise to build an electric railway from Chippewa to Falls View, Ont. Attorney O'Brien, of Buffalo, is looking after the charter.

The nineteenth annual convention of the American Street Railway Association will be held at Kansas City, commencing on October 6th. Papers on the following subjects will be read: "Double Truck Cars; How to Equip Them to Obtain Maximum Efficiency Under Varying Conditions."; "Comparisons of the Various Systems of Electrical Distribution for Street Railways"; "Consolidation of Street Railways and Its Effect Upon the Public"; "The Store Room and Store Room Accounts" "Painting, Repainting and Maintenance of Car Bodies."

The Sarnia Electric Light & Gas Company have just reconstructed their plant, which now consists of two boilers, two engines, one alternator and one arc machine. The smaller engine is a single cylinder of 100 h. p., and the large one a tandem compound of 250 h. p., both of the automatic cut-off Wheelock type, and belted to a new shaft, arranged with friction clutches in such a manner that either engine or machine can be used, or both. The main driving belt is 26 inches in width and 90 feet long. There is a duplex condenser, manufactured by the Northey Company, of Toronto. The alternator is a T. H. machine of 1000 lights capacity, and the arc machine is of the Wood system, capable of supplying 75 1,200 c. p. lamps. Both machines were supplied by the Canadian General Electric Company, of Toronto. The work of construction was carried out under the supervision of Mr. Wm. Williams, manager and secretary of the company. Mr. Geo. Shand is engineer in charge.

SPARKS.

A Detroit electrical firm has secured the contract for wiring for electric light the House of Refuge at Leamington, Ont.

The Elmvale Electric Light Co., Elmvale, Ont., have just installed a steam heater, supplied by H. W. Petrie, of Toronto, and a steam pump.

The tender of the Goldie & McCulloch Company, of Galt, has been accepted by the council of St. Mary's, Ont., for furnishing engines, boilers, etc., for the electric light plant. Elliott & Clyde will build the power house.

The Wolfville Electric Light & Heat Company, of Wolfville, N. S., have purchased water power privileges on the Gaspereau river from Mr. S. P. Benjamin. The extent of land involved is 30,000 acres and the consideration $30,000.

The town of Cayuga, Ont., is about to install an electric plant to supply private and street lighting, the plant there having been recently destroyed by fire. Mr. H. F. Strickland, E. E., of Toronto, is acting as consulting engineer for the corporation.

The by-law to borrow $10,000 to extend he electric light and water works plants owned by the corporation of Newmarket, Ont., has received the sanction of the Lieutenant Governor of Ontario. This will remove the necessity of submitting the by-law to the ratepayers.

Mr. L. J. Marien, superintendent of the Montreal waterworks system, has made a report to the city council on the question of increasing the water supply. He recommends that the sum of $30,000 be appropriated for the purpose of installing two electric pumps and the necessary motors at the high level reservoir. He reports that the superiority of electricity over steam, as a motive power, results from the inconvenience connected with the use of coal, also that the saving effected by the use of electric power would very soon reimburse the capital invested.

TRADE NOTES.

The Jackson Cochrane Co., Berlin, Ont., have purchased from the Electrical Construction Company, Limited, of London, one 75 light multipolar dynamo.

Messrs. Jack & Robertson, Montreal, Canadian agents for the Sprague Electric Company, have recently sent out to the trade Bulletin No. 200, descriptive of the Lundell motor equipments for printing establishments and book binderies, and Bulletin No. 400, relating to the Greenfield flexible steel armored conductors.

The Electrical Construction Company, of London, Limited, report the following sales during the past month: Ness, McLaren & Bate, Montreal, one 5 h.p. bipolar motor; Oram & Carter, Kingston, one 8 h.p. bipolar motor; L. Allcock, Sault Ste Marie, one 5 h.p. bipolar motor; The Rehder Plating & Mfg. Company, Thorold, Ont., one 12 h.p. motor; G. E. Matthews, Montreal, three machines of different sizes.

We are pleased to learn of the establishment of the Canadian Correspondence Schools of Toronto, the purpose of which is to carry on correspondence instruction by mail, after the manner of the correspondence schools in the United States. Among other subjects, the schools will have courses of instruction in electric lighting, electrical engineering, stationary steam engineering, and hydraulic engineering. Mr. A. J. Pell is manager and treasurer, and Mr. E. H. Richard superintendent of instruction.

In honor of the tenth or "tin" anniversary of the Canadian Electrical Association, Mr. E. E. Cary, one of the vice-presidents of the association and manager of the Packard Electric Company, of St. Catharines, is sending out a perpetual calendar, handsomely framed in aluminum, which is the nearest approach to permanent tin which could be found for the purpose. In addition to the calendar the frame bears on its face a thermometer, intended, we presume, as a reminder to business men to keep cool even at the expense of an electric fan.

The business of the Eugene F. Phillips Electrical Works, at Montreal, has so increased that the manufacturing capacity of the works has become altogether inadequate, and arrangements are being made to enlarge the factory. For many months past the works have been operated day and night. A number of improvements have been made in the plant, which have assisted the company in meeting the demands of customers. Among other large orders, the company have supplied bare copper wire to the value of about $40,000 for the Cataract Power Company's second transmission line between their generating station at DeCew Falls and Hamilton. The management of this rapidly growing industry is now in the hands of Mr. George H. Olney.

The Canadian Heine Boiler Company, of Toronto, are just installing two 410 h.p. Heine boilers in the T. Eaton Company's departmental store, in addition to five boilers of 150 h.p. each already installed. They are also installing two 410 h.p. boilers for the Toronto Electric Light Company, in addition to five of 250 h.p. each and two of 410 h.p. each previously used in operating that company's plant. This makes a total capacity of 3,960 h.p. in Heine boilers installed in these two establishments. The Canadian Heine Boiler Company are also putting in a 150 h.p. boiler for the Toronto Biscuit Company, and two 250 h.p. boilers for the Gutta Percha & Rubber Company, who already have one of similar capacity in use. They have just completed, and started in successful operation, two boilers of 250 h.p. in Lever Bros.' soap works.

SPARKS.

Mr. W. C. Caldwell has purchased a dynamo of 500 lights for lighting his mill at Lanark, Ont.

The council of Hespeler, Ont., want an engineer to take charge of the municipal electric plant.

The new pole line of the Cataract Power Company, from the power house at DeCew Falls to Hamilton, is about completed..

The Electrical Construction Company of London, Limited, have received orders from their Winnipeg agents for one 15 h.p. multipolar motor, one 16 h.p. multipolar motor, and one 8 h.p. bipolar motor.

The present contract for lighting the streets of the city of Montreal will expire on December 31, 1903. Ald. Ames moved in council that the Fire Committee be instructed to prepare specifications within ninety days in order to call for tenders for lighting the city after the above date. He pointed out that a new company would require two years in which to install the necessary plant. The motion carried.

CANADA FOR THE CANADIANS.

Editor Electrical News:

DEAR SIR,—I notice in your issue of last month, that you make mention, in an item p. 148, of the gratifying fact that the Canadian General Electric Company have the supply of a complete electrical plant to a Mr. Williams, of Dawson City, but when you add "Alaska" you invest the announcement with a sting quite uncomfortable to us westerners. Our cousins to the south, true to their instincts and methods, never fail to take advantage of opportunities to place Dawson City in Alaska. We expect this from friends over there, whose propensity for claiming everything and everybody with a record is proverbial. We do our best to set them right and to undeceive those whom they have misguided, but we don't expect to have wounds inflicted in the house of our friends. It is well-known that Dawson City has never been within a hundred miles of Alaska, and not likely ever will be unless the 141st meridian should chance to get entangled in the ice floe, where the bight drops into the sea to the north and south, and thus get shunted eastward. 'Till then kindly make it conspicuously apparent that Dawson City, and the far famed Klondike, are an asset of our greater Dominion, and doing business at the old stand in our N. W. Territories, and oblige.

Yours faithfully,

R. B. McMICKING.

CANADIAN CORRESPONDENCE SCHOOLS.

The Canadian Correspondence Schools of Toronto enter as a new factor into the educational development of Canada. Judging by the names of the gentlemen connected with this institution and the nature of the safeguards placed about the students' interests, the Canadian Schools deserve the hearty support of all. Their courses of instruction embrace tuition in steam engineering, electrical engineering, mechanical engineering, architecture, and book-keeping and busines forms. The headquarters of the schools is at 24 Adelaide street east, Toronto.

SPARKS.

The village council of Dutton, Ont., have given a contract for electric street lighting, for five years, to the Dutton Electric Light Company.

The council of Blenheim, Ont., have advertised for tenders for electric lighting the streets, the contract with Smith & Henderson having expired.

Mr. M. W. Crean, superintendent of the Yukon Government Telegraphs, and S. B. Charleson, supervisor of Yukon Public Works, are inspecting the telegraph line which is being built northward from Quesnelle to Atlin, B. C., which, when completed, will give the Klondike region direct communication with Vancouver, B.C. Mr. Charleson states that he will have the gap between Quesnelle and Atlin spanned by November.

The New York Electrical Review characterizes the paper presented before the Canadian Electrical Association by Prof. Herdt and Mr. Archibald, on "The Conditions Affecting the Wave Form of Alternators," as one of particular interest at this time, because so little attention has been given to this highly important subject. It has been held by some eminent members of the profession that the matter of wave form is one of small importance, but no one observing the curious double and triple-frequency effects exhibited in some of the diagrams, can fail to see that under some circumstances wave form may be of vast and vital importance. This is particularly true when the conditions of long-distance transmission are considered, where the high-frequency components of waves may, and frequently do, start resonant effects that may be highly detrimental or even dangerous. The subject is one that is well worthy of more careful attention than it has yet received, and it is to be hoped that the work outlined in the paper will be carried on further and more fully.

Messrs. Joseph Simpson & Sons, of Toronto, have recently installed a complete, up-to-date plant throughout their extensive factories. All the wiring and machinery was installed by Strickland & Company, Toronto. The generator is a 25 k. w. Canadian m. p., and is complete with marble switchboard, etc. The same firm have just completed all the electric wiring in the new Technical School, and two of the finest residential jobs of wiring in the province, being that of Mr. James Kerr Osborne and Mr. Sutherland Macklem, both of this city.

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