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CANADIAN

ELECTRICAL NEWS

ENGINEERING JOURNAL

OLD SERIES, VOL. XV—No. 8.
NEW SERIES, VOL. IX.—No. 11.

NOVEMBER, 1899

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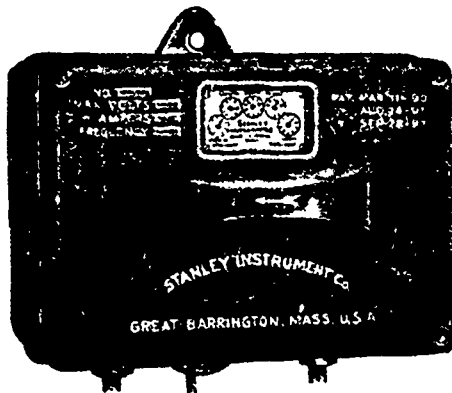
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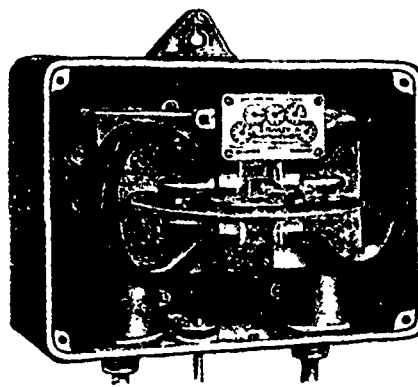
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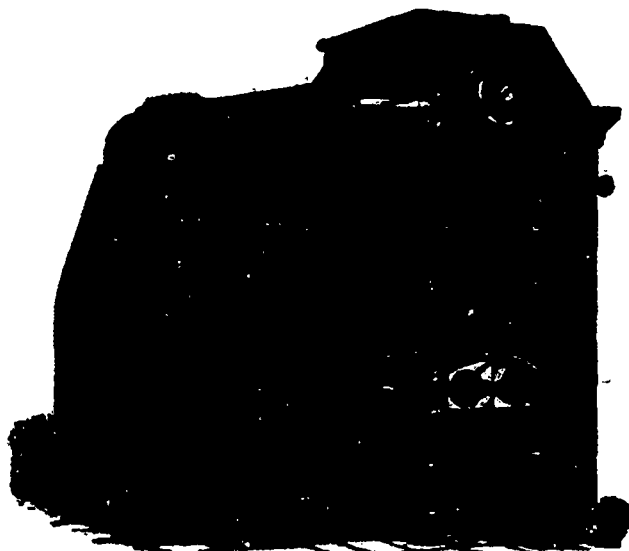
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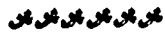
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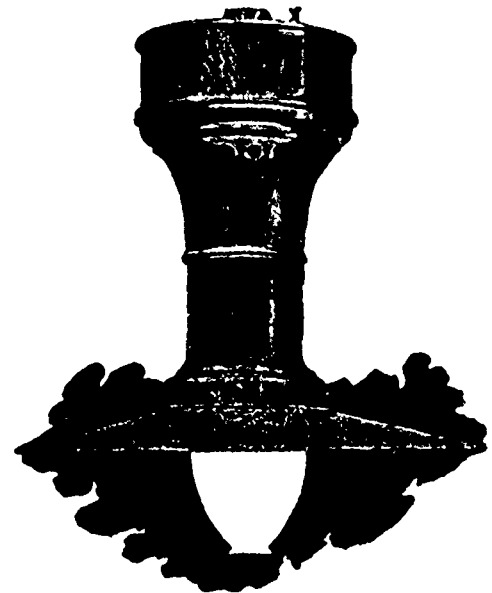
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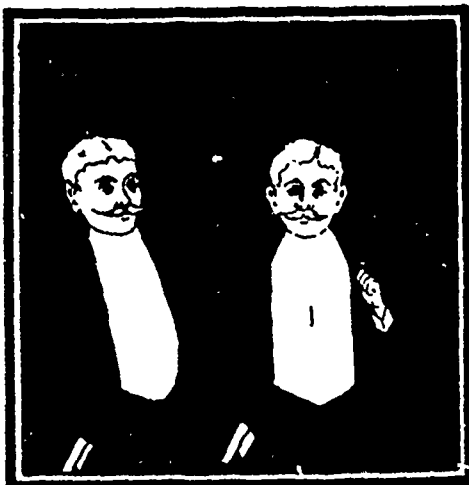
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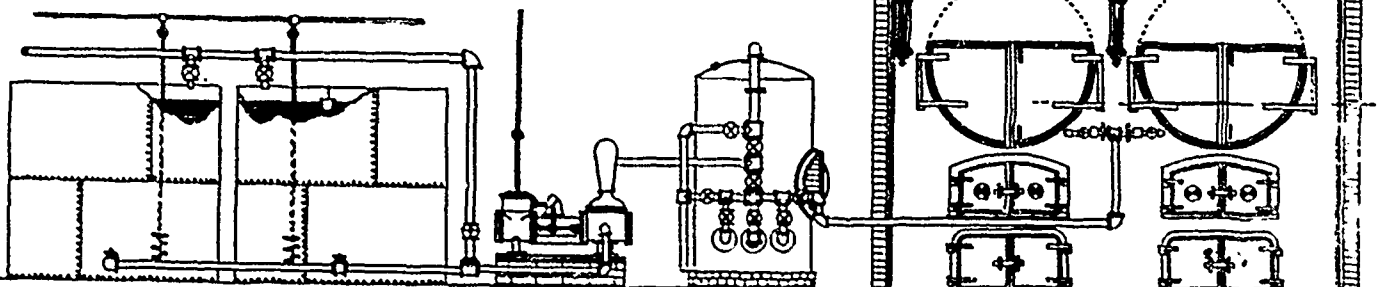
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Vol. IX.

NOVEMBER, 1899

No. 11.

**TWO-PHASE WATER POWER DEVELOPMENT
AT SHERBROOKE, QUEBEC.**

THE Magog river, its source in Lake Memphremagog, some thirty miles in length and situated high up in the Green Mountains of Vermont, flows in a northeasterly direction, crossing the border between the United States and Canada, finally joining the St. Francis river, one of the numerous tributaries of the St. Lawrence. At the junction of the two rivers Sherbrooke, a city of 12,000

standpoint to investigate the method employed by the various mills to develop the water power, we must content ourselves with a brief description of the electric light and power plant, its power development, its equipment and distribution.

This electric light plant, as it is still called, was installed in 1889 by the Sherbrooke Gas & Water Company, which at that time operated both the gas and water works, as its name implies, but which has since

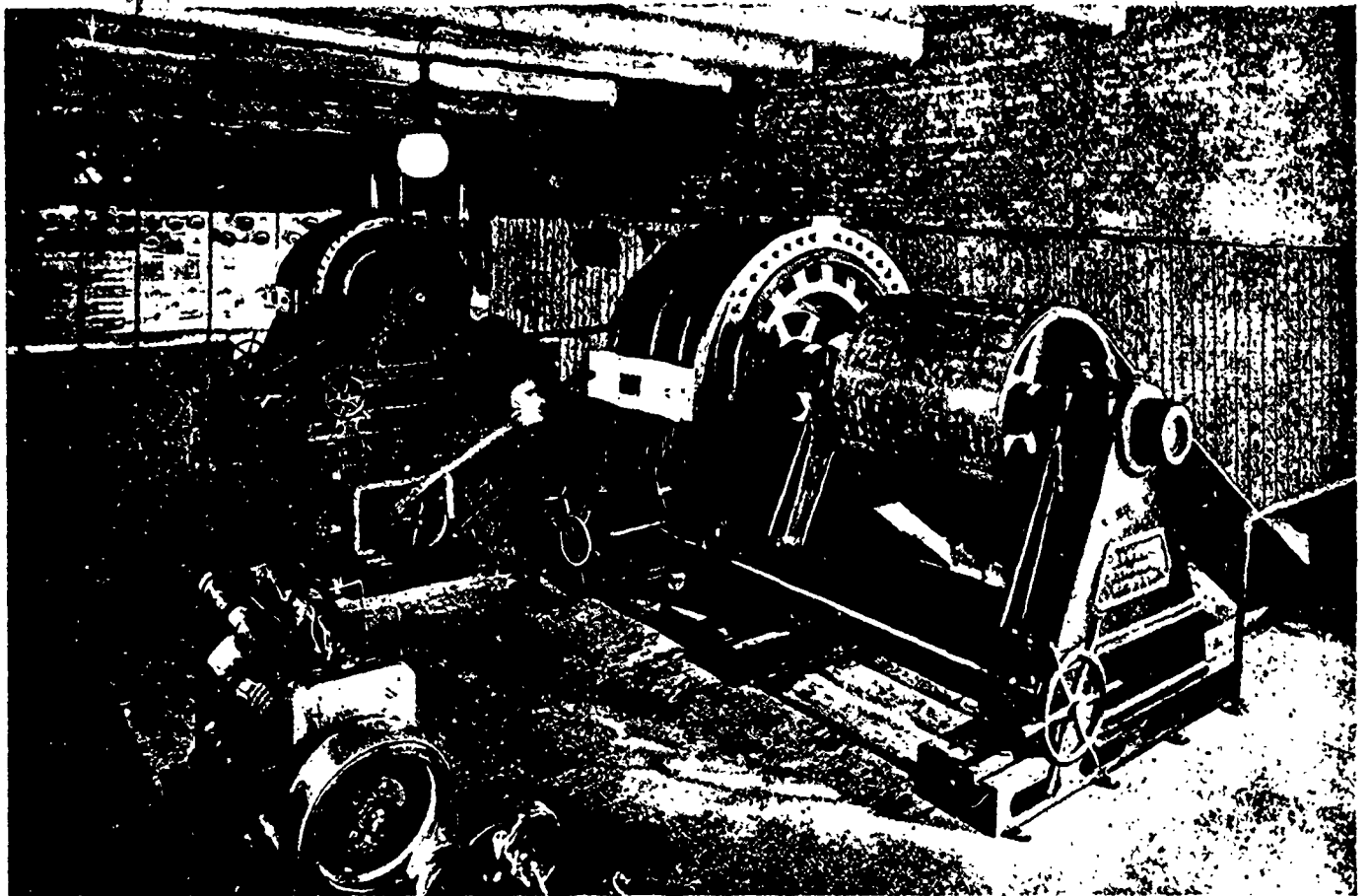


FIG. 1.—INTERIOR OF POWER HOUSE.

inhabitants, is prettily situated, lying on the banks of both the Magog and St. Francis rivers.

Within half a mile of this junction there is a gradual fall of 110 feet in the Magog, and as there is a plentiful supply of water throughout the entire year, this convenient and economical power is utilized to a great extent in supplying many industries, of which the principal are woolen, grist and saw mills, iron works, a carpet factory, the water works and the street railway and electric light plants. Though the head obtainable for each mill varies to a large extent, yet the average is about 24 feet.

Though it might be profitable from an hydraulic

disposed of the latter to the city, still retaining the gas works, together with the electric plant. Here we find one of those rare cases where the gas and electrical interests do not conflict. In all the latest buildings being constructed the electric light is installed to the exclusion of gas, which is now, however, much used for heating purposes, taking to a great extent the place formerly occupied by the coal stove.

Since its inception the electric plant has undergone many changes. It first started with but a few lights run on the single-phase alternating current system. After increasing in common with all other similar plants, machine after machine being added when neces-

sary, a radical change was made in 1897 by the adoption of the two-phase system using S.K.C. machines, which have been in operation ever since for both light and power with excellent results.

WATER POWER DEVELOPMENT.

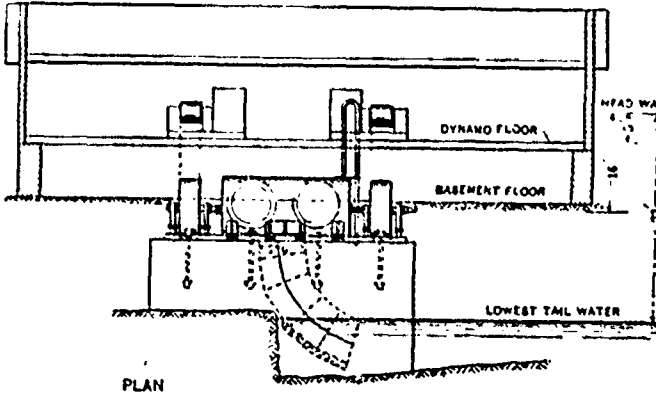
One of the numerous small falls on the Magog has been utilized as a head for the power required. By reason of a natural dam extending across the river at

feet at the extreme end of the head race, while the base varies correspondingly.

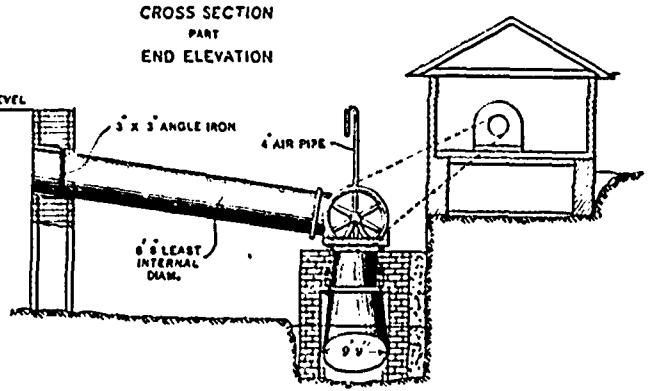
The head race is 300 feet long and varies in width from 50 feet at the bulkheads to 150 feet at the entrance, the breadth of the river; in depth it is 5 feet at the entrance, increasing somewhat as the bulkheads at the far end are reached.

The velocity of water in the head race is 4 feet per

SIDE ELEVATION



CROSS SECTION PART END ELEVATION



this point between the two rocky cliffs composing the river banks, but a comparatively small outlay was necessary to control, store and utilize the otherwise wasted potential energy of the water.

The river flows through a narrow rocky gorge some 200 feet wide, the sides rising very abruptly, almost precipitously, from the river bed, which is nothing but solid rock. The natural rock dam extended almost entirely across the river at the point selected for the head race entrance, and all that was required was to erect a wing dam and thus direct the flow of the water and also to store it.

The inner side of the head race is the abrupt bank of

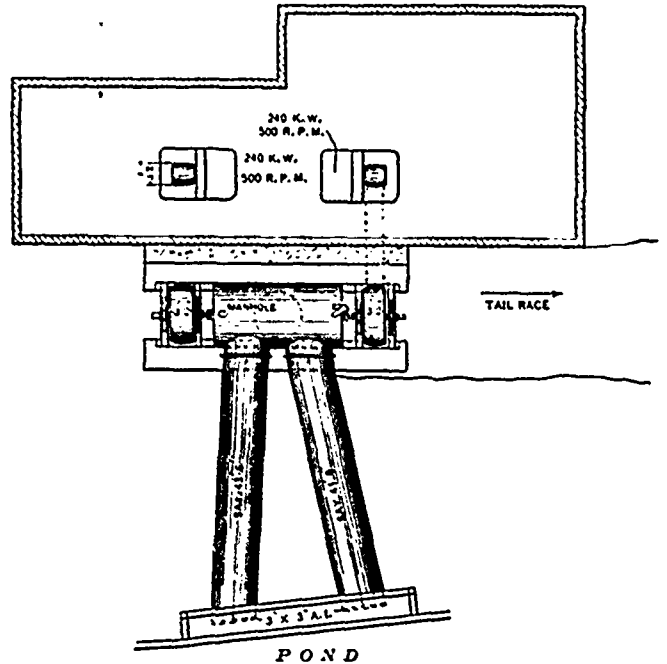


FIG. 3.—PLAN, ELEVATION AND SECTION OF POWER HOUSE.



FIG. 2.—POWER HOUSE.

he stream, some blasting being necessary for the removal of the projections and the large boulders to make it conform to the required conditions for service. The outer side is constructed entirely of timber, the main supports being 10 inch by 10 inch spruce faced with 3 inch plank on the inner side, which slopes diagonally into the head race such that the weight of the water itself provides the required stability. The form of this retaining wall is thus a right-angle triangle, the vertical side varying in height from 8 feet at the entrance 3

second, and it is consequently never frozen over even during the most severe weather in winter. Strange to relate, no great difficulty has been experienced with either frazil or anchor ice, never yet necessitating the shutting down of the plant for a moment. There is, of course, a certain amount of frazil at times, as in all running water exposed to intense cold, but not enough to do any damage, and during severe weather men are always stationed at the two racks to prevent the accumulation of ice, slush or rubbish, which they remove with rakes through small waste gates in the side of the head race or over the sloping sides. There are two racks placed 100 feet apart in the head race to prevent ice of any description, logs or floating debris passing through to the wheels.

Situated at the lower end of the head race are two gate houses serving as intakes or entrances to the three pipes or flumes carrying the water to their respective turbines in the power house. In each gate house there are wooden gates which may be

closed when necessary to stop the flow of water in the flumes.

The first flume is a $\frac{1}{4}$ inch steel pipe 6 feet 6 inches in diameter, composed of 6 foot lengths securely riveted together; the whole flume from gate house, where there is a one-eighth turn elbow located, to the wheel case, to which it is riveted, is 50 feet long. The remaining two flumes are also $\frac{1}{4}$ inch steel, 6 feet 8 inches in diameter, 50 feet long, running side by side in a straight line to the wheel case situated in the power house. A view of this when under construction is shown in Fig. 4. The weight of these massive pipes is supported by two large masonry piers in which they are imbedded to about one-quarter of their diameter. Expansion or contraction is neglected, as it is inconsiderable in such a short length of pipe, besides which the water inside is flowing continually and the heating or cooling effect of the atmosphere on the pipe is thus reduced to a minimum.

TAIL RACE.

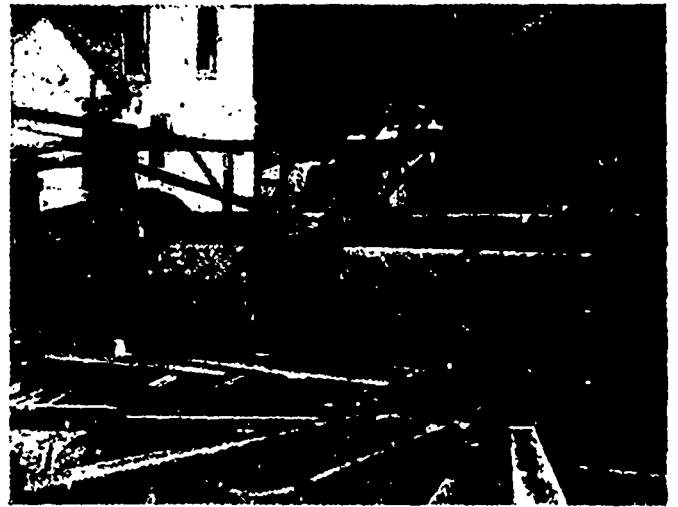
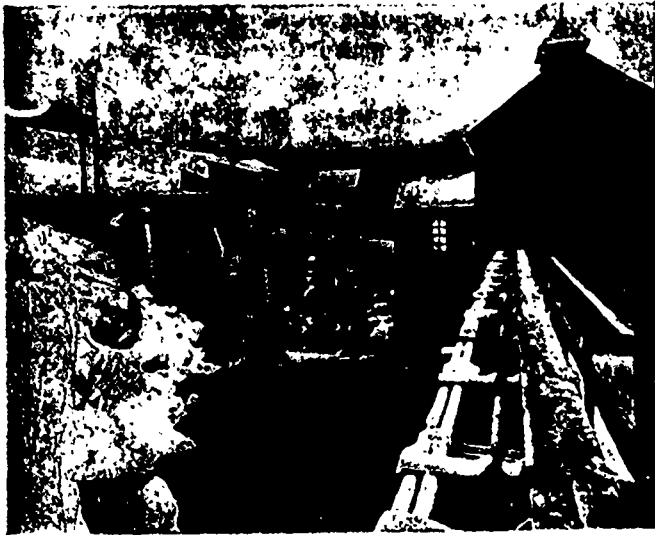
The tail race, a great portion of which has been blasted out of the solid rock, is directly beneath the bulkhead, and lying between it and the power house. A winter

80 feet long by 26 feet wide (Fig. 2). The foundations are of solid masonry resting on the bedrock.

The framework is of wood, the timbers being very massive; the floors are of very thick hardwood planking supported by wooden beams; the roof is also of planking, but is covered with iron sheathing.

The hydraulic equipment consists of three turbines, having a total capacity of 1,730 h.p. The first is a 54-inch "New American" vertical turbine capable of developing 535 h.p. at 124 r.p.m. under the normal head of 30 feet obtained at this point; this head may be increased at any time by carrying the tail race excavations further up, and so obtaining almost the whole 34 feet, which is used at the other wheels only some 20 feet away. This wheel was manufactured and supplied by Wm. Kennedy & Sons, Owen Sound, Ont., the Canadian agents and manufacturers for the Dayton Globe Iron Works Company, of Dayton, Ohio. From a horizontal pulley connected to the vertical turbine shaft by means of a mortise bevel gearing, a generator in the dynamo room is belted.

The remaining two are each 40-inch "Crocker"



[FIGS. 4 AND 5—VIEW OF TAIL RACE AND FLUMES.]

view of this and also the bulkhead and pipe line is shown in Fig. 5. It is 140 feet long and 40 feet wide, the discharge flowing away into the river, where it undergoes a similar process farther down, being utilized again and again for power purposes.

A wing dam constructed of rock and of the shale removed during the process of blasting separates the tail race from the river, and 5 feet higher than the level of the tail race, thus preventing it being submerged by the river even at high water.

The draft tube, 7 feet in diameter at the top, extends down vertically a few feet from the large wheel case, then gradually making a quarter turn, discharges into the tail race in the direction of flow, its diameter here being increased to 10 feet. A deep hole was excavated in the tail race to accommodate this huge pipe, keeping it continually submerged, so that no air could possibly enter to destroy the head produced by the vacuum due to the rapidly descending discharge water. The greatest available head is 34 feet, which is one very desirable for facility and economy of operation.

POWER HOUSE.

Nestling in the chasm between the precipitous banks of the river is a small rocky island, and here is the location of the power house, a one-storey brick building

wheels of the horizontal type, both placed in one case, a huge steel cylinder, 10 feet in diameter and 22 feet long, fed by the two steel flumes (Fig. 1). Being inward flow turbines, the water enters at each end of the case, and rushing inwards towards the centre, strikes the wheel vanes, the thrust of each wheel being equalized by the other. Being then deprived of its energy, the water falls inert into the draft tube, and, descending vertically, discharges into the tail race. This draft tube has a vertical height of 17 feet above the tail race, and the head over the wheels is also 17 feet, thus producing an available head of 34 feet, at which each wheel is capable of developing 596 h.p. at 180 r.p.m. Two overhung pulleys, one at each end of the wheel case, supply power to two generators in the dynamo room by means of two immense leather belts; an adjustable belt tightener is used to take up all slack. A plan and elevation of the power house (Fig. 3) will show the above arrangement. The two "Crocker" wheels, with wheel case, steel flumes and draft tubes, were manufactured and installed by the Jenckes Machine Company, of Sherbrooke, Que.

The gates on all three wheels are of the "register" type, which, on opening or closing by some regulating device, control and adjust the quantity of water striking

the vanes of each wheel. The regulating device, by means of which the gates are opened or closed according to the variation in the speed of the generator, is a "Replogle" electro-mechanical governor, manufactured at the Replogle Governor Works, Akron, O. There are two of these governors, one for each water wheel unit—one for the "New American" and the other for the two "Crocker" wheels, the gates of both wheels being operated to the same degree at the same instant, as both are in the same wheel case.

The electrical equipment consists of two 240 k.w. two-phase S.K.C. generators belted to the "Crocker" unit, one 180 k.w. two-phase S.K.C. generator and three 35-light "Ball" arc machines, all belted to the "New American" wheel.

The two largest machines (Fig. 1) are placed on concrete foundations 20 feet high resting on the bed rock beneath, and operate at 500 r.p.m., delivering current at a pressure of 2,400 volts direct to the line with a frequency of 133 cycles per second. The 180 k.w. two-phase generator has the same voltage and frequency, but is run slightly faster—at 660 r.p.m.

Belted to the shaft of each of the three generators is

chines in operation in proportion to their respective capacities.

The first three panels, which are the three generator panels, are similar to each other, except that the third contains an S.K.C. static ground detector and switch for connecting any line to ground, hence a description of one applies to all. Each machine panel contains the following apparatus in the order named, starting from the top of the board: A voltmeter, which, by means of a small switch placed underneath, reads the pressure on either phase; two ammeters, one in each phase; two double-pole high potential S.K.C. slide switches, one in each generator phase; two regulator heads, one in each phase; a double-pole, double-throw switch such that either of two exciters may be used to excite the field of any generator; and lastly, a generator and an exciter field rheostat. The regular heads in each phase act to vary the machine voltage by causing some small armature coils in the machine to act either in conjunction with or in opposition to the main armature coils, thus raising or lowering the voltage. For this purpose it is, of course, necessary to run the terminals of each coil to the regulator head on the switchboard, though in a small machine the regulator heads are placed on a terminal board on the machine itself. The maximum variation in the primary voltage obtained by means of this regulator head is 200 volts on each phase.

Each of the five feeder panels is but a repetition of the other, so that a description of one will suffice. The first two panels are for the incandescent lighting circuits only, while the remaining three panels are for combined light and power from the three-wire two-phase distribution used. Each of these panels, then, contains the following apparatus, viz.: Two ammeters, one in each phase or circuit; two S.K.C. circuit breakers, also one in each phase, and four double-pole double-throw switches such that any circuit on the lighting panels may be placed in either phase of either generator.

The indicating instruments are mostly of the Royal Electric Company's round type, though some few of the Whitney make are used.

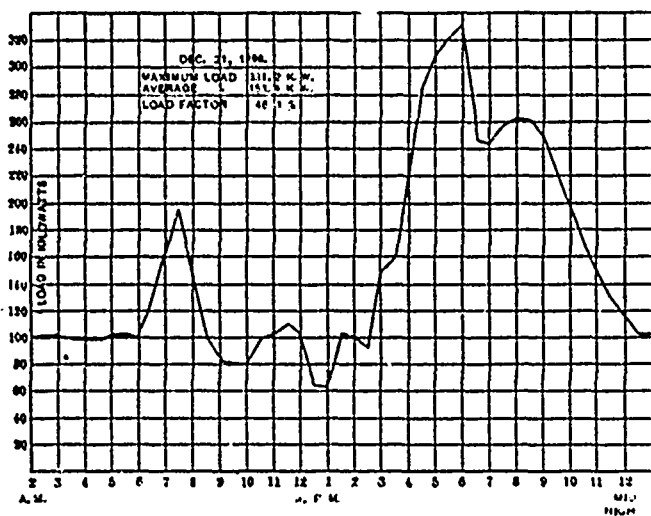


FIG. 6.—LOAD CURVE, DEC. 21, 1898.

an 8 k.w. 4-pole exciter, each of which is capable of fully exciting the entire plant.

All the S.K.C. apparatus, generators, switchboard and instruments were manufactured and installed by the Royal Electric Company, of Montreal.

There are three 35-light arc machines, made by the Ball Electric Company, of Toronto, in use at present, but these will shortly be shut down and the present system of direct current series arc lighting changed to the enclosed alternating current arc lamp system run from constant current series transformers, so that power, incandescent and street lighting will all be operated from one machine, thus making an ideal arrangement.

SWITCHBOARD.

The switchboard, a view of which may be seen in Fig. 2, consists of eight white marble panels mounted on a solid white oak frame, presenting a handsome appearance. It is situated at the end of the dynamo room.

The first three panels to the right are solely for the machines, while the remaining five are the distributing panels for the various feeders; each panel is one huge slab of Vermont white marble.

The machines are not operated in parallel, but are run separately, the load being divided between the ma-

DISTRIBUTION.

From the switchboard the various feeders pass through two cupolas in the roof to the poles, where current is then distributed in the city on the three-wire two-phase primary system, and transformed down to 104 volts for light and power service by means of transformers banked in as large units as may be economically used to supply all the customers in that immediate vicinity. The ordinary four-wire two-phase secondary distribution is used exclusively.

Though no lightning arresters nor choke coils are placed in the power house, there are no less than twenty sets of two S.K.C. non-arcing lightning arresters located at various points on the line, to which taps from the service wires are taken, the ground wire being No. 4 B. & S. As an extra precaution, a barbed wire is run along the top of the poles and grounded at every fifth pole in one section of the city.

There is a short transmission line to Lennoxville, a town of some 2,000 inhabitants, situated four miles away, where both light and power are supplied.

The poles for this line are similar to those used in the city, perhaps somewhat shorter, and are of white cedar, 35 feet long, 7 inches in diameter at the top, embedded 5 feet in the ground, and are spaced 100 feet apart.

The three-wire two-phase line consists of two No. 2

B. & S. and one No. 1 B. & S. weather proof insulated copper wires placed on double petticoat glass insulators, thirteen inches between wires. A transformer is used as a booster to raise the potential on this line a slight amount, such that the voltage at Lennoxville will be the same as in the city; that is, the amount boosted will represent the line drop, which is in this case a very small amount.

This plant is in operation continually, suffering no interruptions. A load curve is shown in Fig. 6. There are some 6,500 16 c.p. incandescent lamps and about 150 h.p. in induction motors in various sizes installed, and, as previously stated, by the time this goes to print there will be a system of 100 enclosed alternating current arc lamps of the General Electric type for street lighting, supplied from the regular circuits by means of constant current transformers.

Current is sold both by meter and by the flat rate, some 300 meters being already installed. For incandescent lighting the rate is one-half cent per ampere hour, after deducting the usual discount allowed for prompt payment, a $3\frac{1}{2}$ -watt lamp being used. The flat rate is \$6 per 16 c.p. lamp per year, with a sliding scale of prices for large consumers. For power the rate varies from \$70 per h.p. year in small units to \$30 per h.p. year for larger sizes, such as 30 h.p. and greater.

The officers of the Sherbrooke Gas & Water Company are: Mr. R. W. Heneker, president; Mr. E. F. Waterhouse, secretary, and Mr. A. Sangster, electrical engineer and general superintendent. E. M. Archibald, in *Electrical World*.

BY THE WAY.

WHAT is claimed to be the largest electric sign in Canada attracts the attention of passengers on the Grand Trunk west bound trains as they approach the little village of Acton, Ont. This sign stands on the coping of the factory and reads: "W. H. Storey & Son, Glove Manufacturers." It is over 50 feet from the ground and 100 feet in length. Each letter is three feet in height and of corresponding width, and 340 incandescent lamps, designed to give the most brilliant effect, are required to properly light it. The current is supplied by a dynamo on the premises, and the work of wiring and installing the lamps was done by Mr. Kitchen, electrician in charge of the municipal plant. The brilliancy of the sign is a splendid example of the usefulness of electricity for advertising purposes.

x x x

SOME time ago trouble developed on the arc light circuit at the Union Station, Toronto. The electric light company's officials went carefully over the circuit and examined with the closest scrutiny every joint, without finding any defect which would account for the failure of the lamps to operate. While walking about the building with eyes alert to discover any clue which might assist to solve the mystery, the official's attention was attracted to the peculiar conduct of a man in the barber shop, who was gazing intently at the lamp overhead. In answer to a question as to the object of his interest, he replied that he had invented and was testing a new kind of arc light carbon, "and," he added enthusiastically, "I'm satisfied it will be a success." Here then was the solution of the mystery. The ingredients in the new style carbon were not of a kind to permit the passing of the current to the lamps beyond. In the absence of a stenographer there is no actual re-

cord of the language employed by the electric light official towards the enterprising inventor, but it is said to have been delivered at a very high voltage and not intended for publication.

ALUMINUM WIRES.

IN a recent comment on the proposed use of aluminum wires in connection with the electric transmission line from Ragged Rapids to Orillia, Ont., the fact was mentioned that in like manner in only one other instance was aluminum being similarly employed, viz., in the new transmission plant at Snoqualmie Falls, 31 miles distant from Seattle and 45 miles from Tacoma. From a description of this plant appearing in the *Electrical World and Engineer*, the following particulars are extracted regarding the transmission lines, for which aluminum wire is exclusively employed:

The transmission circuits are led from the transformer house over a rough but not mountainous country to a sub-station at Issaquah, 10 miles distant, the lines paralleling each other at a distance of 40 feet. These parallel lines continue to Ranton, a further 9 miles, where current is used locally, and from that point branch to the north-west and south-west to Seattle and Tacoma.

Aluminum wires have been used on these long distance transmission circuits of No. 1 and 2, B. & S. gauge. Line conductors are spliced with the McIntyre joint, consisting of a flattened aluminum tube 9 inches long, with walls 1-16 inch thick, large enough to enclose two wires. The latter is given three complete twists by special clamping tools to complete the joint (Fig. 1). The Seattle line contains about 67,000 pounds of aluminum, and the Tacoma line 72,000 pounds, each

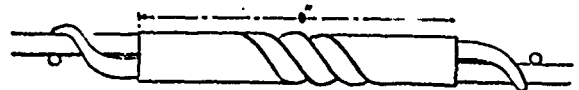


FIG. 1.—ALUMINUM WIRE JOINT.

line consisting of two three-phase circuits. The conductors are carried on triple-petticoat "Imperial" glazed porcelain insulators, $4\frac{1}{2}$ inches high, $6\frac{1}{2}$ inches in diameter, weighing 4 pounds each. Paraffined locust pins are used to support the lower part of the insulator 4 inches above the cross arms. The tie wires are of No. 3 aluminum.

Two circuits are run on each pole line, one on each side, with triangular space of 30 inches between wires (Fig. 2). Four wires on the lower cross arms are

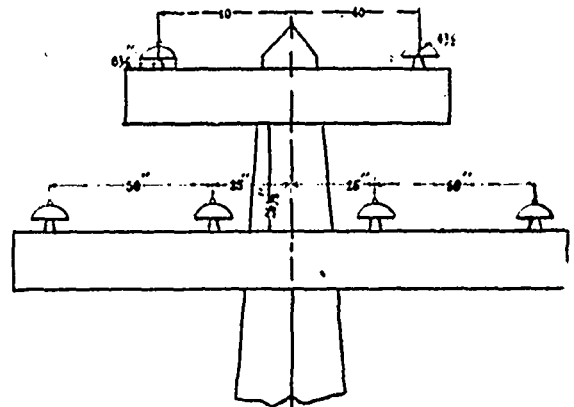
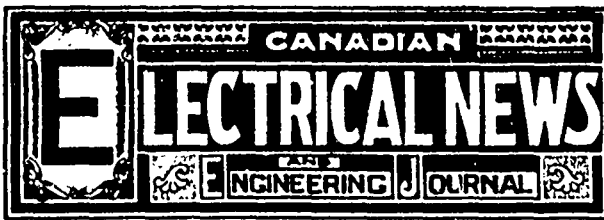


FIG. 2.—LOCATION OF CIRCUITS ON POLES.

spaced on either side 25 inches and 75 inches from the centre of the pole; $25\frac{1}{2}$ inches above on another cross arm are two wires, 50 inches on either side of the pole. The length of span on the Seattle lines varies from 90 to 150 feet, with an average of 110 feet. On the Tacoma line the average span is 150 feet.

The behavior of the new conducting material when this plant goes into operation will be watched with particular interest.



PUBLISHED ON THE TENTH OF EVERY MONTH BY

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

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

TORONTO, Telephone 3767. CANADA.

NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 7977.

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The *ELECTRICAL NEWS* will be mailed to subscribers in the Dominion, or the United States, post free, for \$1.00 per annum, 50 cents for six months. The price of subscription should be remitted by currency, registered letter, or postal order payable to C. H. Mortimer. Please do not send cheques on local banks unless 25 cents is added for cost of discount. Money sent in unregistered letters will be at sender's risk. Subscriptions from foreign countries embraced in the General Postal Union \$1.50 per annum. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for if so stipulated by the subscriber, but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears paid.

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

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

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The courts will shortly be called to a Nice Point in Law. decide a fine point of law in connection with the appeal which has been filed by the Montreal Street Railway Company against the assessment which the city seeks to impose on the company's poles, wires and rails. The valuation for assessment purposes put upon this portion of the company's plant is \$280,000. The assessment is made under article 361 of the City Charter. The company in their appeal have pointed out that, while authority is given, under the above mentioned article of the City Charter, to tax poles, wires and rails of the company, this article is a violation of article 567 of the charter which provides that the city shall not be allowed to violate any of its obligations undertaken by contract. The contract between the city and the company stipulates that a percentage of the earnings of the railway shall be paid to the city in lieu of taxes, except taxes on real estate. The company state that, in accordance with this provision, the city have accepted a percentage on the earnings of the company in lieu of all taxes and assessments, with the exception of the tax on immovable property which was immovable at the time of the making of the contract. The company express their willingness to pay taxes on their lands, buildings and machinery. The courts will be asked to decide the question.

The American Street
Railway Association.

The eighteenth annual convention of the American Street Railway Association, which opened in the city of Chicago on October 17th, was in some respects one of the most successful yet held. The attendance was unusually large, and while but four papers were presented, their reading and discussion brought out many interesting and suggestive points. A noticeable feature of the convention was the consideration given to the labor question and the method of manipulating employees. Mr. Vreeland characterized the question as one requiring a great deal of energy and ability, but which if satisfactorily handled was one of the greatest elements of strength in street railway management. An argument was advanced in favor of employing young married men. A question affecting street railway practice was brought up by Mr. Heft, who made the statement that in looking up the matter of weights he had found that for every passenger hauled with a modern street railway equipment 721 pounds of dead weight were also hauled, which is only 137 pounds less than the standard steam railroad equipment. It was pointed out that street railway managers might with advantage turn their attention to effecting a reduction in the weight of equipment. The respective merits of single versus double motor equipments formed an interesting discussion, the consensus of opinion being in favor of cars equipped with two or more motors. The objection to single motors was the greater cost for repairs and insufficient tractive power. "The Construction and Maintenance of Street Railway Tracks" was treated in a paper by Mr. Edward Butts. He advocated that the rail should be not less than six inches in depth, the rail trench 20 feet wide at the top and 6 inches wide at the bottom, and that cast-welded joints be used. This latter recommendation created considerable discussion, inasmuch as it is a comparatively new practice in street railway construction. Mr. Heidelberg, of Chicago, said that the Chicago

City Railway Company was the second company to use the cast-welded joints, and that they had given excellent satisfaction. It might be mentioned that the Montreal Street Railway Company have lately adopted this class of joints on a portion of their road, and that the directors have recommended that it be applied to the entire system. There was present at the convention the following representatives of Canadian street railways: J. B. Griffith, manager, and C. K. Green, director, Hamilton Street Railway Company; E. H. Keating, manager, Ewan Mackenzie, assistant superintendent, and P. McCullough, electrician, Toronto Street Railway Company; Duncan McDonald, superintendent, H. A. Brown, electrician, and W. A. Ross, comptroller, Montreal Street Railway Company.

THE employment of Mr. Marconi by *Wireless Telegraphy*, the New York Herald and the Chicago Times Herald, to report, by means of wireless telegraphy, the recent International yacht race, has given a further demonstration of the practicability and value of this important discovery. By means of the Marconi system messages were transmitted from the vessel on the race course to the city of New York within periods of one-half to two minutes, to Chicago within seven minutes, and to London within fifteen minutes. In other words, the system effected a saving in time, as compared with dispatch boats, of fully an hour. On another page will be found a very clear and concise description of this system prepared for the New York Herald by Mr. Marconi's assistant, Mr. Broadfield. We are pleased to observe that the British Government are said to have arranged to make use of the Marconi system in connection with the war which is at present in progress in the Transvaal. It would appear that the system might there be employed to great advantage in view of probable interference on the part of the Boers with the telegraph system. Notice has recently been given in the press of an action which has been entered against Mr. Marconi by Professor A. E. Dolbear, of Tufts' College who claims to be the original discoverer of space telegraphy, and who is said to be in possession of broad patents covering the transmission of messages without wires. Professor Dolbear is not likely to receive much sympathy in connection with the step which he is said to have taken. If, as far back as 1885, he demonstrated the practicability of telegraphing without wires, has allowed the important discovery to remain unutilized until the present, and has left to another the task of proving its commercial value, he is deserving of none of the rewards.

Private vs. Municipal Control.

THE city of Austin, Texas, furnishes what may be termed a horrible example of municipal control of electric lighting. In 1890, the city decided to discontinue the arrangement under which the public lighting had been done by a private company at a cost of \$18,000 per year, and adopted the project of constructing a gigantic dam across the Colorado river, three miles west of the city of Austin, by which it was expected that some 14,000 horse power could be developed and utilized for lighting and power purposes. The expectation was, that when this water power was made available, the city would become a great manufacturing centre, and the authorities had probably in view the idea of securing the lighting of the streets at little or no expense. The

ratepayers, with these arguments before them, sanctioned the issue of bonds, bearing interest at five and six per cent. repayable in forty years, for the sum of \$1,750,000, to cover the cost of construction of the works. The project has resulted in total failure both as regards the engineering work and the commercial results. Since its construction, serious leakages have taken place below and beneath the dam resulting in the lowering of the water to such an extent that very little power is now available. Apart from this is the serious fact that not a single manufactory has been brought to the city as the result of this power, so that the total expenditure has been practically thrown away, and the city finds itself placed under a burden of operating expenses and interest charges amounting to \$174,000 per year, against which the revenue is only \$60,000 per year. Added to this is the fact that sufficient power cannot be obtained, and the installation of an auxiliary steam power plant is now under consideration. The undertaking will probably bankrupt the municipality.

In connection with this subject of municipal control, we observe that the National Electric Light Association submitted a proposition to the League of American Municipalities at its recent convention in Syracuse, New York, to pay one-half the cost, not exceeding the sum of \$5,000, to investigate and determine the cost of operation of five municipal lighting plants. The Municipal League accepted the proposition with the amendment added that the investigation should also include five private plants. It was pointed out that this amendment would prevent the carrying out of the proposition, as no one had authority to give the privilege of examining private plants, and owners of such plants could not be expected, under present circumstances, to disclose particulars of their business. The manager of a Canadian electric lighting company was asked by the National Electric Light Association to state what amount his company would be willing to contribute towards the cost of the proposed investigation. He laconically replied, "Not one cent," and proceeded to give the reason for his refusal, viz: That as a rule the promoters of municipal control of electric lighting do not look at the question from the standpoint of economy of the public funds, the aim being rather to obtain a larger control of public patronage to their own advantage and the advantage of their friends, and that therefore no figures which could be published showing from an economical standpoint the disadvantage of municipal control would have any effect in checking the agitation for municipal control. A proper method of procedure is the one which was also made at the Syracuse convention, namely, that the legislatures should make it compulsory upon the management of all public utilities to present detailed annual statements in such form as would permit of comparison being made between the items of expenditure of the different plants whether operated by the municipality or by private companies. We are in accord with Mr. Francisco's statement at this convention, that the remedy is not municipal ownership but regulation. So far as Ontario is concerned, the Conmee Bill passed at the last session of the legislature is well calculated to protect the interests both of municipalities and lighting companies, so that the situation in this province is much improved as compared with the conditions which prevailed prior to the passing of this enactment.

MONTREAL

Branch Office of the CANADIAN ELECTRICAL NEWS,
New York Life Building.

MONTREAL, October 30th, 1899.

ELECTRICAL DINNER.

The first annual dinner of the Y. M. C. A. Electrical Club was held on Friday, September 29th, in the Association building, at which there was a good attendance of members and their friends. The menu was as follows:

MENU.

ELECTRIC JUICE.	ONION SOUP, Fresh Malpeque.	A la Submarine.
HOOSTER.	CHICKEN PIE.	A la Micro Farad.
JOINTS, SOLDERED AND TAPPED.	ROAST BEEF.	Leather Belting.
	ROAST TURKEY.	Carbon Trimmed.
SHUNTS.	MASHED POTATOES.	SWEET CORN.
	Grounded.	Dismantled.
	LOBSTER SALAD.	A la Accumulator.
ISOLATED PLANT.	CHEESE.	
DESSERT.	INSULATING COMPOUNDS.	JELLY.
	CHARLOTTE RUSSE.	Multiple Series.
	ASSORTED CAKES.	
	ICE CREAM.	WATER ICE.
	Self Cooler.	A la Frazil.
FRUITS.	PEARS, APPLES, GRAPES, BANANNAS.	
	INTERNAL RESISTANCE.	
	CHEESE.	CRACKERS.
TERMINALS.	LEMONADE.	CAFE NOIR.
	50,000 Volts.	High Potential
Are You Finished?	Ring Off.	Transfer.
		"30."

The chair was occupied by the president. Mr. F. B. Horn, who explained that the object of the club was to visit electrical plants and to promote the social and educational welfare of the students of the electrical class in connection with the educational depart-



PROF. L. A. HERDT, E.E., M.A.E.,
Honorary President Y.M.C.A. Electrical Club.

ment of the Y. M. C. A. There were two main toasts, that of "Electricity" and "Our Association," which was responded to by Prof. Herdt, lecturer in electricity at McGill University, and honorary president of the club, and Mr. D. A. Budge, secretary of the Y.M.C.A. "The touch of electricity," said Prof. Herdt, "makes a great city. Take, for instance, the street railway power house, with its dynamos generating 10,000 horse power. Think of 10,000 horse power under one roof, saddled and ready for a start. Electricity has changed the manners and the customs of mankind."

Mr. D. A. Budge, on behalf of the Association, gave an instance of the value to the members of the evening educational classes. He knew of a young man engaged in the G. T. R. shops who took up the study of mechanical drawing, acquiring knowledge that soon secured his advancement. At the time of the United States declaration of war with Spain, the Baldwin Locomotive Works, of Philadelphia, were under contract to equip a railway in the northern part of Spain, and had already shipped the loco-

motives. They did not wish, under the circumstances, to send a United States citizen to equip the road, and applied to the G. T. R. for a Britisher. The young man above referred to was sent and accomplished the work. On returning, he was sent to Cuba to report on the condition of locomotives wrecked in the Cuban war. Mr. Budge said that he became acquainted with these facts by a chance meeting with the young man on a recent holiday trip, the latter being then bound for South Africa to set up fifty locomotives for the Baldwin Company. He remarked to Mr.



MR. F. B. HORN,
President Y.M.C.A. Electrical Club.

Budge that the improvement of his time in the evenings had had much to do with his promotion.

The secretary of the club, Mr. J. F. C. Bray, gave a resume of the summer's work, which included lectures on "The Theory of the Telephone," by Fred B. Horn; "Interior Wiring," by T. F. Pickett; "The Electric Motor," by Prof. Herdt. Visits to the electrical plants were also made.

During the evening a programme was contributed by the following gentlemen: Mr. Crawford Grantham, piano solo; Mr. A. F. Cameron, song; Mr. R. H. Gibson, recitation; Mr. W. R. Wilson, song; Mr. Will Sutton, selections on the gramophone. The



MR. J. F. C. BRAY,
Secretary Y.M.C.A. Electrical Club.

evening's enjoyment was brought to a close by the members joining hands and the hearty singing of "Auld Lang Syne."

INTERIOR WIRING.

Nearly every illuminating company in Canada, and in fact in the neighboring republic, have given up doing interior wiring. The Royal Electric Company, of Montreal, however, are unique in this respect, inasmuch as they still tender for such work. In a great measure success in this line depends on how the superintendent of that branch handles his customers. The Royal Company have a man who can do this to perfection, giving courteous

treatment all round, looking to giving satisfaction in the work, and also after the interests of his employers. Such is Mr. J. Douglas, in charge of the wiring department of that company. That he has had training in other branches of electric construction, from the common house bell to telephone and telegraph systems, no doubt forms a valuable auxiliary when looking after "trouble." He seems the right man in the right place, and would be hard to replace.

AN UNPROFITABLE PURCHASE.

A certain professional gentleman was prone to purchase in the United States some nice running motor, projecting arc light, etc., which might be useful to him in his business, only to find that the alternating current in use in Montreal was not healthy for the instruments when connected upon their arrival. Professional men are the first to complain if their patients do not take them into their confidence; the local electrical fraternity may well say ditto. By a little consultation, the fee not being forthcoming as in the professional man's own case, he might have been saved a few almighty dollars.

"TRAMP ELECTRICIANS."

A nuisance has developed in Montreal, in the shape of miscreants who detach incandescent bulbs from corridor and hall brackets in public buildings and purloin them. As free renewals are given by both the Royal and Lachine companies, and as such lamps are not offered for sale so that the offender might be apprehended, it is to be inferred that these lamps are appropriated by "tramp" electricians who carry their office, etc., in their hat. They know the value of the goods, and can use them in their work. No wonder the legitimate business cannot tender against these gentry, and it is an injustice for any architect or citizen to employ such.

NEW BUILDINGS.

The new factory of Messrs. Tooke Bros., now being erected at St. Henri, near Montreal, will be well equipped electrically. The plant will consist of two new 54 k.w. generators, to be run on the three-wire system, supplying from an up-to-date switch-board of blue Vermont marble 900 incandescent lights, three 15 h.p. motors, two 8 h.p. motors, one 6 h.p. motor, and one 5 h.p. motor. There will also be a heating plant separate, consisting of their present factory generator and 60 enamel pattern sad irons. The new switch-board and generators will be supplied by the Canadian General Electric Company, as well as the 15 and 8 h.p. motors. The wiring and construction work is in the hands of the Montreal Electric Company.

The new Mount Royal Club building is probably the most exclusive as well as the most elaborate in Canada. It is the house built by the late Sir J. J. C. Abbott, used by Lord and Lady Aberdeen as their vice-regal residence in Montreal, and now entirely remodelled and extended by Messrs. Maxwell & Shattuck, architects, to suit the views of the gentlemen of the Mount Royal Club, who are some of the wealthiest in the Dominion. The wiring was done by Messrs. Lewis & Co., of Boston, and the fixtures specially designed by the architect and manufactured in the United States. They were hung and connected by the Montreal Electric Company.

The conduit for the new building of the Merchants' Bank of Canada in this city has just been installed, construction being by the Montreal Electric Company. The plant will be two wire, at 270 volts, and is thought to be the first of its kind here using 220 volt lamps. Although not at first contemplated, it is the intention to have their own private plant. The Royal Electric Company have been successful in securing the order for generators and switchboard. Sprague electric elevators will be used, supplied through the Montreal agents, Messrs. Jack & Robertson. The architects are Messrs. Maxwell & Shattuck.

MUNICIPAL REGULATIONS.

The proposed new building by-law for the city of Montreal contains the following regulations governing the installation of electrical apparatus:

All the electrical apparatus, wires, etc., for the generation or supply service in any central station or isolated plant, and all wires, lamps, motors, etc., used for light, power or heat in any public or private building, shall be installed according to and in conformity with the rules and regulations of the Canadian Association of Fire Underwriters, and in order to secure conformity to said rules and regulations, all such installations shall be subject to inspection and issuance of a certificate to that effect from the electrical inspection department of the city of Montreal. In order that proper inspection may be made, due notice shall be given the building inspection office of any intention to install any such electrical wires or apparatus for the purposes herein mentioned, in

order to allow of inspection of the installation as the work progresses, and before any portion of the work is covered or concealed, and no installation shall be considered complete and in conformity with said rules and regulations until a certificate shall issue from the inspection department to that effect. In all cases, the inspection department shall have power to decide and determine whether such work has been done in a safe and proper manner, and the issuance of a certificate therefor shall be in evidence thereof.

All materials, switches, wire or any other auxiliary apparatus or device pertaining to said installations shall be subject to the inspection department before being used for such purpose.

All wires of any description, either for telegraph, telephone, electric light, heat or power, on, or entering any building, public or private, shall be subject to the supervision of the inspection department, and with power on the part of said department to compel the placing of those wires in a proper and safe manner.

All theatres and all public halls for scenic display shall be subject to inspection at least once a year.

In case of any installation, already in operation, either of generating plant, motors, wires, or other electric apparatus located in any building or premises, becoming defective to such an extent as to threaten immediate danger to life or property, the inspection department, having notice thereof, shall have immediate power to suspend the operation of such pending the necessary repairs.

The said inspector shall, at proper hours, have the right to enter any building or premises where electric power or light is being used, to inspect all electrical wires or apparatus, in order to ascertain if the proper regulations have been complied with, and no person shall refuse to allow such inspection.

No alterations or change shall be made in the plan of wiring any building without notifying the building inspector and securing a permit therefor, and subjecting the plan of wiring to inspection as herein provided.

NOTES.

The Electric Repair and Contracting Company have taken up new premises at 617 and 619 Lagachetiere street, where they are doing a larger business, now having two stores.

The contract for the electric plant for Messrs. Henry Morgan & Co.'s building has been awarded, the generators going to the United Electric Co., Toronto, and the switchboard to the Canadian General Electric Company.

The Canadian Bryant Electric Company were slightly damaged by smoke and water recently by the fire in Messrs. Agnews' (dry goods) premises, over which their Montreal factory is located. They have decided to close down their Canadian branch.

For hustling around looking after his men, commend Mr. J. Bennett, foreman for the Montreal Electric Company's outside department. Covering mile after mile on his bicycle, and rushing things, is his usual occupation. There surely cannot be complaint of slow attention there.

Mr. John Forman, of Montreal, has recently been on an extended visit to New York and other American cities, ostensibly to witness the international yacht race. It is rumored, however, that he has not been becalmed, and that he brought home some new agencies. Mr. Forman intends moving at once into the more commodious premises which he has lately leased and which are located about a block west of his present stand on Craig street.

The Canadian General Electric Company are to be congratulated in their chief at Montreal. Mr. Dean is universally esteemed by the trade in general. The thorough knowledge he has of his subject, and the quiet, gentlemanly way he has of impressing that fact on his customer, might serve as a "pointer" for others in electrical lines. Mr. Dean's first lieutenant, Mr. J. W. Pileher, who has lately been promoted to the Halifax agency, has been replaced by Mr. Bell, who bids fair to become popular.

Strange when giants fight, how the small one makes a quiet, comfortable living right in amongst the fighters. Mr. Chas. Morton, manager of the Standard Electric Co. (formerly the Temple Electric Co.), of Montreal, with station located on Chenneville street, has reason to be proud of his management. As possibly the profit division may not be public, your correspondent will reserve the actual figures, merely stating that it is more satisfactory than certain others in Montreal. This may partly be due to Mr. Morton's desire to avoid legal proceedings with a customer whenever possible, and to try and give satisfaction all round. That he manages to do so is evidenced by his keeping old customers with him. The current furnished from this station is principally 250 volt direct current for motors, the lighting current now being obtained from the Lachine Company and is, of course, alternating.

CORRESPONDENCE.

SEARCH LIGHTS ON VESSELS.

MONTREAL, October 27th, 1899.

Editor CANADIAN ELECTRICAL NEWS:

SOME time ago the idea was broached by some person in Montreal to use search lights on vessels, by means of which it was intended that pilots could pick out the river buoys and guide steamships, etc., down the channel by night as well as by day. Referring to a back number of the CANADIAN ELECTRICAL NEWS, where the item appeared, I notice that storage batteries were also suggested for such vessels as did not possess their own dynamos.

The writer purposely refrained from referring to this matter before, thinking that possibly he might damage the promotion of some scheme, but seeing that the close of navigation is now upon us, and that no one has adopted the brilliant (?) idea, a few words on local conditions may not be amiss to show just what an undertaking this seemingly simple scheme means.

First, let us take vessels equipped with dynamos: The writer knows that some have alternating machines on board, which, although in itself no obstacle, would prevent any search-light which the harbor commissioners might keep on hand (or even the steamship line) as common property being utilized, as, of course, most of the equipments are direct current. The question would then be, shall two different types at least of search lights be kept on hand? Again, no matter what current was used, has any vessel got from 20 to 40 amperes to spare, which would be required for a search light to be at all useful? From a considerable experience the writer emphatically says "NO."

Without going further along this line, let us proceed to the storage battery suggestion. This the writer regards as worse than the first proposition, for at least 200 ampere hours capacity would be required, at say 45 volts, using no less than 43 heavy cells!! Now, the decks are pretty well hampered until Quebec is reached without adding this additional litter (even were it possible). To "charge" these cells we have available (unless a special plant were installed on shore for the purpose) an alternating service or direct current arc circuit, the latter being only in use from dusk until day-break, and furnishing 10 amperes!

Enough has been said to show the futility of the scheme, although why ship owners do not provide their original installation on each vessel with a permanent search light is hard to say, seeing that such a piece of apparatus would be a valuable adjunct in many ways.

Yours truly,

"HARBOR."

N.B.—What is the matter with Pintsch gas buoys?

REMINISCENCES OF THE OLD MONTREAL
ELECTRIC CLUB.

MONTREAL, Oct. 19, 1899.

Editor ELECTRICAL NEWS:

Looking over some old files of the NEWS, it struck the writer, who was connected with the club, and who like many others that were in it still takes the NEWS, that a few words on the subject might be interesting, not only to those whose idea is to form a similar club, as is mooted for the forthcoming winter, but possibly to some of the old members themselves.

First, let it be known that the club met every cent of its financial obligations to the last, and both finances and club terminated with its last meeting. That this was so was due to the untiring work of the then secretary-treasurer, Mr. Doure, as latterly there was a most discouraging turn-out to the meetings in point of numbers. The question will be asked as to why such a flourishing club originally slowly died out? The reason was simply "lack of new blood," i. e., of effective new blood, of members willing to take their share in submitting papers or in pertinent discussion of those which were submitted.

One of the first to leave "per force" was the first vice-president that the club had, Mr. H. Woodman, who left to assume the position of electrician for the town of Joliette, Que., and who later bettered himself as electrician for the North Shore Company's transmission plant at Three Rivers, Que. As he took an exceedingly active interest in the club's affairs, his loss was keenly felt. The next member (another of those interested members) to leave was Mr. L. Burran, who left the Royal Company at

Montreal to assume the duties of electrician to the Montmorency Electric Power Company's plant at Quebec. Then followed Mr. H. Brown, who went to St. John, N. B., to manage the electric light plant at that city. Mr. L. Pignolet, who now conducts his own business in electrical specialties on Cortlandt st., New York, and many others, could be mentioned.

A few of the old boys are still quartered in Montreal, such as: Mr. J. Douglas, now superintendent of the wiring department of the Royal Electric Company; Mr. W. Shaw (former president of the club), together with his brother, Mr. J. Shaw, who now constitute the Montreal Electric Company; Mr. J. Burnett, first secretary of the club; Mr. T. Murphy, of F. Thomson & Co., now well known for his inventive genius; Mr. G. Hill and Mr. C. Doure, both with John Forman, Montreal, and others.

The hardest work naturally fell on the secretary, which like all offices, was a purely honorary position, and it is doubtful whether Mr. Burnett the first, or Mr. C. Doure the last holding the office, bore off the palm in that sense; certainly both were a credit to their club.

By the foregoing remarks it is clearly shown that the club was not an electric light monopoly, as there was as much interest displayed in Mr. W. Graham's (of G. N. W. Tel. Co.) paper on telegraphy as on Mr. Ritchie's (of Can. Gen. Elec. Co.) paper on alternate current machinery. Mr. Ritchie, by the way, replaced Mr. Pignolet as vice-president, only in turn to leave for Toronto himself soon after.

The club may or may not have helped some; certainly, however, it does not appear to have done any harm, as every name mentioned is holding a higher position than when members of the old club.

The papers in the main were excellent, and the only thing necessary to keep a new club going is a little more active interest. It will go, is in fact bound to go, if every member will make it a point to discuss something in papers submitted, and do their share either collectively or individually in preparing papers so that this will not be the lot of a special few. With best wishes for a resurrection,

I am yours respectfully,

"CLUB."

ELECTRIC LIGHT VS. ACETYLENE GAS.

TORONTO, October 25th, 1899.

Editor ELECTRICAL NEWS:

DEAR SIR,—I notice that the Canadian Manufacturer takes exception to the statistics compiled by the Canadian Electrical Association (not by the CANADIAN ELECTRICAL NEWS) re acetylene; and why? Has acetylene an association composed of men of integrity all over Canada who have compiled a contrary report? I think not.

Do the construction firms who are busy installing wiring for incandescent light find the demand for acetylene such as is interfering with their business? Ask them!!

Are the insurance regulations governing the installation (properly) of acetylene plants more stringent than those governing the installation (properly) of electric plants? Read them, and even a lay-man will say that they appear so.

Acetylene has its place; but that it will drive out the incandescent light from dwellings, stores, theatres, or churches yet remains to be seen. There are several companies manufacturing acetylene generators and similar fittings (I do not refer to those manufacturing carbide); have any of these paid any dividend?

Yours truly,

ONE WHO HAS STUDIED BOTH.

QUESTIONS AND ANSWERS.

A Montreal subscriber writes: Would it be possible to light a dwelling and barns in a country like Manitoba by using electric light, the motive power being a wind mill? Has it ever been tried? Would require about 25 lights. What would be the cost of a dynamo and shafting for such a plant, and for a storage battery if one was required?

Answer: It would be possible but not profitable to operate a plant in the manner suggested. If the plant was large enough and an expert electrician was put in charge of it, it might be done, but even then the cost of the light would be altogether out of proportion to its value. Unless a man is willing to put a few thousand dollars into a hobby and devote leisure to looking after it, we would not advise him to have anything to do with an experiment of this kind.

THE LATE T. G. HAZLITT.

On October 12th there passed away a prominent business man and respected citizen of the town of Peterborough, Ont., in the person of Mr. T. G. Hazlitt, president of the Peterborough Light & Power Company. Mr. Hazlitt was born in the county of Armagh, Ireland, in the year 1823, and came to Canada when twenty-four years of age. He was for some years a teacher in the Picton Grammar School, and in the year 1852 removed to Peterborough and embarked in mercantile pursuits. In 1865 he became associated in the lumber business with the late Samuel Dickson, and upon the demise of the latter gentleman in 1870, the management of the estate was placed in Mr. Hazlitt's hands. In this connection he exhibited much ability, steadily building up a profitable business. In 1885 The Dickson Company of Peterborough, Limited,



THE LATE T. G. HAZLITT.

was organized for the purpose of carrying on the business of the estate, and Mr. Hazlitt was appointed managing director and president.

Mr. Hazlitt was the pioneer of electric lighting in the town of Peterborough. Upon the formation of the Peterborough Light & Power Company, nine years ago, he became its president, a position which he has occupied ever since.

BURLEIGH FALLS-PETERBORO-LINDSAY TRANSMISSION.

Mr. J. Alex. Culverwell, of Toronto, one of the owners of Burleigh Falls, and promoter of the Burleigh Falls-Peterborough-Lindsay electric power enterprise, states that he has succeeded in making financial arrangements with a prominent New York banking house for the completion of this undertaking. The company will be designated as the Central Ontario Power Company.

The Canadian directors have been announced in the local press as:—Hon. Richard Harcourt, Minister of Education for Ontario; James Hendry, M.P., Peterborough, president Auburn Power Co.; F. W. Barrett, Toronto, manufacturer; R. J. McLaughlin, Lindsay, barrister and director Victoria Loan & Savings Co.; Dr. Edward Adams, Toronto, and J. Alex. Culverwell, promoter, Toronto, late local manager for Toronto and Central Ontario of Royal Victoria Life Insurance Co., and formerly with Edison General Electric Co.

Burleigh Falls is situated seventeen miles from

Peterborough and 39 miles from Lindsay on the same circuit. Plans of dam and power house, to be located in Perry's Gorge, have just been completed, which are said to prove that the hydraulic development will cost less than any proportionate power development on the continent. The head of water is twenty-seven feet, and the minimum flow of water in the dryest season by official reports show three thousand horse power, while the magnificent reservoir capacity adjacent to the falls (and which can be used) will give 4,500 horse power during the hours of heavy load.

The original syndicate organized early last summer purchased all the private interests at the falls, and Mr. Culverwell conducted and completed the negotiations with both governments for the acquirement of the balance of the interests.

Contracted revenue for lighting and power in the several towns was secured during the past summer to the amount of \$50,000 per year of five and ten years' duration, including the street lighting of the town of Lindsay for ten years, and all the necessary franchises for the different municipalities have been secured. This revenue will be increased materially at once. It is understood that work will be commenced this fall—the hydraulic development being not a great undertaking, the main dam being built and maintained by the governments as part of the Trent Canal system, while a natural flume (Perry's Gorge) already exists, which together probably makes a saving of an expenditure of some \$100,000, which would otherwise be necessary. Three 700 horse power generators and other requisite apparatus will be installed at the beginning, and allowance made in the power house for further increase.

PERSONAL.

Mr. David A. Williamson has been appointed Fellow in Electrical Engineering at the School of Practical Science, Toronto.

The resignation is announced of Mr. Geo. F. Evans, manager for Canada of the Westinghouse Manufacturing Co., Limited.

Mr. Birchard, who has been employed at the electric light works at Amherstburg, Ont., has accepted a position in the shops of the Toronto Railway Company.

Mr. W. W. Brown, who has had charge of the lighting plant at Petrolia, Ont., since its establishment, has gone to Camp McKinney, B.C., to take charge of the plant of the Minnehaha Mining Company.

Mr. John P. Northey, president of the Northey Manufacturing Company, Toronto, was married on October 24th to Miss Adelaide Wadsworth. The ceremony took place in St. Thomas church, Toronto. We extend congratulations.

The *ELECTRICAL NEWS* extends its congratulations to Mr. Edward Slade, the well known electrical engineer and contractor, of Quebec, upon his appointment to the position of general manager of the Jacques Cartier Electric Light & Power Co. Besides being a thorough electrician, Mr. Slade possesses sufficient energy and progressiveness to make a success of that which he undertakes, and under his management we predict prosperity for the company. It is expected that the company will shortly be in a position to supply light and power. The poles on the streets are now being erected, and plans are in course of preparation for a handsome building to be built on the corner of St. John and d'Autueil streets to be used as the head office. In the meantime, temporary quarters have been secured.

Incandescent lamp makers will be interested in the statement that a Frenchman, L. C. Dumas, has discovered that an alloy of nickel and steel has practically the same coefficient of expansion as glass, and may be used as a substitute for platinum in the leading-in wires of lamps. The proportion of the metals is said to be: Nickel, 45 per cent.; steel, 55 per cent. The exact composition of the steel is not stated. If this statement proves to be true, it will be of considerable importance to manufacturers of lamps.

TELEGRAPH and TELEPHONE

WIRELESS TELEPHONY.

The Carnarvon and Denbigh Herald states that for some weeks past experiments of great interest in wireless telephony, as distinguished from Signor Marconi's wireless telegraphy, have been carried on near Carnarvon by Sir Henry William Preece. Four high poles have been erected near Llanfaglan church at the south end of Menai Straits. On a sandbank across Gwyrfal river, half a mile off, four similar poles are erected. Half a mile still further, at Belan Fort, is a high pole supporting a coil of wire, one end being anchored in the deep water. Between these points Sir William has succeeded, without any intermediary other than the ether, in transmitting the sound of a succession of taps. These taps were made with a view of sending messages by the Morse code. They were distinctly heard at the receiving station by placing the newly-invented ethereal telephone to the ear, messages being sent without interruption for several days. Further experiments from Belan Fort to Llanddwyn lighthouse and to Carnarvon castle are contemplated. So far the system yields much more rapid results than Marconi's, although the sounds are not quite distinct.

CONSOLIDATION OF TELEGRAPH COMPANIES.

In answering the question of a correspondent, the Monetary Times gives the following concise particulars of the consolidation of the telegraph companies :

" In 1881 the Great Northwestern Telegraph Company of Canada leased the wires and other property of the Montreal Telegraph Company, extending over all the Eastern provinces of Canada, and over part of Manitoba and several of the northern States. It also leased the wires of the Dominion Telegraph Company in Canada. These two sets of lines were merged into one for purposes of economy. The terms of lease were that eight per cent. upon the \$2,000,000 capital of the Montreal Company, and six per cent. upon that of the Dominion Company, should be paid annually. For this bargain the Western Union Telegraph Company of the United States became guarantor. For several years the G.N.W. Company was able to pay this enormous rental, even with the low rate of tolls (25 cents for ten words). But when the C.P.R. Telegraph came into existence, and the Bell Telephone Co. built lines connecting towns, the business was so divided that the G.N.W. Telegraph Co.'s revenue fell off. It has not paid dividends to its shareholders for years. But the payments to the lessors have gone on regularly every year, and the shareholders of the Montreal Telegraph Company and of the Dominion Telegraph Company get their dividends regularly of eight per cent. and six per cent respectively. The extent of wires handled by the G.N.W. Company is 40,000 miles, and by the C.P.R. about 25,000 miles."

Wm. Kennedy & Sons, Limited, of Owen Sound, Ont., have purchased a 500 light electric plant from the Canadian General Electric Company, consisting of one of the latter company's latest type H multipolar generator, with marble panel switch-board and wiring material for their work throughout.

SHORT CIRCUITS.

The North American Telegraph Company is installing a new telephone exchange for the town of Tweed, Ont.

The Yarmouth Telephone Company is building a line between Belleville and Springhaven, N.S., a distance of eight miles.

The C.P.R. is constructing a telegraph line from Harriston to Listowel, Ont. Mr. C. Hacking will be manager at the latter place.

The directors of the British Columbia Telephones, Limited, have issued their first annual report to June 30th. The statement shows a profit of £4,111.

The Bell Telephone Company has decided to construct a long distance line between Winnipeg, Portage la Prairie and Neepawa, Man. The line will be a copper metallic one.

For the supply of 165 tons of wire for the proposed telegraph line from Quesnelle, B.C., to Atlin, the contract has been awarded by the Dominion government to Mr. J. A. Seybold, of Ottawa.

Mr. W. F. Snyder, of Sydney, C.B., for some years telegraph and cable manager for the Western Union Telegraph Company in Cape Breton, and one of the best known telegraphers in the maritime province, died on October 9th, after a long illness. He was a native of Philadelphia and was fifty-seven years of age.

The telephone systems of Victoria, Vancouver and New Westminster are reported to have been acquired by a syndicate of eastern capitalists, who, besides improving the system, will establish a long distance telephone service between Victoria and the mainland. Mr. A. C. Flumerfelt, of Victoria, represented the purchasers.

Mr. J. R. MacMurty, representing the owners of the Dodge system of telephony, has made application to several municipal councils in Canada for permission to erect poles on the streets and for other privileges necessary to a telephone system. Many of the municipalities have given an exclusive franchise to the Bell Telephone Company, and are not in a position to consider the proposition.

The Merchants Telephone Company, of Montreal, held its annual meeting a fortnight ago, Mr. A. S. Hamelin presiding. It was reported that the business of the company was increasing, and that it was the intention to connect their system with as many outside lines as possible. The election of officers resulted as follows: President, A. S. Hamelin, vice-president, J. E. Beaudoin; secretary, J. M. Marcotte; treasurer, L. E. Beauchamp.

The announcement was made during the past month that Mr. Chas. R. Hosmer, manager of the Canadian Pacific telegraph system since its inauguration, is about to retire from that position. For some time past he has been gradually relieving himself of the details of the telegraph business, and before the close of the present year expects to be entirely relieved of his official duties. Mr. Hosmer's management of the telegraph branch of the C.P.R. has been such as to stamp him a man of great resource and enterprise. Rising from the "key," he knew well the details of his department, and this intimate knowledge was responsible in no small degree for his remarkable success. He has just been appointed to the directorate of the C.P.R.

The Dominion government Telegraph Department announces the completion of the telegraph line from Skagway, Alaska, to Dawson City. The line is over 600 miles in length, and with the exception of forty-one miles from Skagway to Lake Bennett, constructed by the White Pass Railway Company, was built entirely by the Dominion Government. The schedule of rates to be charged as given below shows that a ten word message to Dawson City costs \$4.35 :

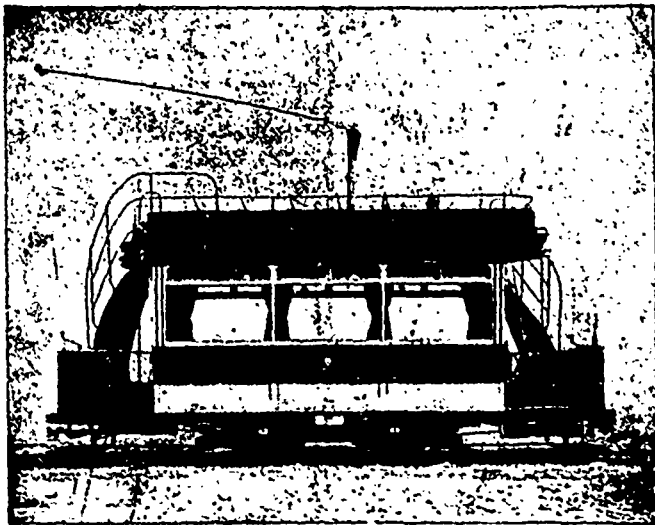
	Ten Words	Each Additional Word.
Skagway, Alaska.	\$0 35	
Bennett, N.W.T.	1 35	5 cents.
Cariboo Crossing, N.W.T.	1 85	10 cents.
Tagish, N.W.T.	1 95	10 cents.
Miles Canyon, N.W.T.	2 10	10 cents.
White Horse, N.W.T.	2 10	10 cents.
Lower Labarge, N.W.T.	2 35	15 cents.
Hootlinqua, N.W.T.	2 60	15 cents.
Five Finger, N.W.T.	3 35	20 cents.
Fort Selkirk, N.W.T.	3 85	20 cents.
Dawson City, N.W.T.	4 35	20 cents.

A resolution has been passed by the town council of Pembroke, Ont., authorizing the Fire and Light Committee to negotiate with the Pembroke Electric Light Company for the purchase of its plant.

ELECTRIC RAILWAY DEPARTMENT.

ENGLISH TRAMCARS.

FROM the Electrical Engineer, of London, England, we learn that the Liverpool corporation have accepted the tender of Messrs. Dick, Kerr & Co., Limited, for 200 complete electric tramcars. This brings up the whole number of motors and cars ordered by the Liverpool corporation from this firm to 304 cars, with 620 motors. The whole of the cars and motor equipment will be manufactured in England. All the work will be done at Preston, the car bodies being made at the workshops of the Electric Railway and Tramway Carriage Works, Limited, while the motors and controllers will be manufactured by the Electrical Equipment Syndicate. The workshops of this syndicate are to be completed by December 31. These new works at Preston are designed and equipped to turn out 3,000 tramway motors and dynamos up to 50,000 h.p. in the aggregate in the course of a year. Although these figures may



AN ENGLISH TRAMCAR.

seem large, if looked at by the side of the above-mentioned order, the wisdom of fixing the possible output high is readily seen. Thus five such orders as the company has now in hand for Liverpool would take the output of the works for one year. As regards the delivery of these cars, the guarantee is that 50 cars should be supplied quarterly. The illustration we give herewith showing the general design of these Liverpool tramcars will be interesting to Canadians.

THE MONTREAL STREET RAILWAY COMPANY.

THE annual meeting of the Montreal Street Railway Company was held on Thursday, November 2nd. The annual report submitted by the directors showed a net profit of \$630,870.61 for the year, as compared with \$601,704.18 for the previous year. Out of this amount there were declared four dividends of two and one-half per cent. each, amounting in all to \$478,333.33, leaving a surplus of \$152,537.28, of which amount the sum of \$50,000 was added to the contingency account, and there was charged against that fund an amount of \$8,575 expended during the year for fenders and other special renewals. The percentage of operating expenses

showed an increase of 3.08 per cent. as compared with last year. New car shops and other buildings were erected at Hochelaga. The rolling stock was increased during the year by 64 closed motor cars, 100 open motor cars, one pay car, and 12 electric sweepers, and there are under construction 30 closed motor cars of increased seating capacity. The Sleeman type of fender was adopted. The result of the cast welded rail joints introduced last year was satisfactory.

There were carried during the year 40,186,493 passengers, against 35,353,036 in 1898, 32,047,317 in 1897, 29,896,471 in 1896, and 25,877,758 in 1895. There were granted 12,060,807 transfers last year and 10,508,603 in 1898. The gross receipts last year were \$1,660,775.93, against \$1,471,939.65 in 1898. The operating expenses for the two years were \$912,949.66 and \$764,883.35 respectively. The annual report was accompanied by a statistical statement showing the enormous growth of street railway traffic in Montreal during the past seven years.

THE BELT LINE TROLLEY SYSTEM AT NIAGARA.

THE new bridge across the Niagara river between Lewiston, N.Y., and Queenston, Ont., completes the belt line trolley system which extends about eight miles up and down the river above and below the Falls and encloses all the Gorge. The bridge carries a single track electric car line with a roadway on each side. The main span consists of a 25 foot half-deck roadway platform carried by a pair of riveted Warren stiffening trusses suspended from four main cables 1,040 feet long between centres of towers. The end of the trusses are pivoted to rocker bents which are continued about them in the same vertical transverse planes to their intersections with the main cable, to which they are pin connected. From the ends of their stiffening trusses the roadway is carried to solid ground by skew pans 34½ feet long on the New York side and 19½ feet long on the Canadian side. The New York span consists of plate girders and the Canadian span of I beams. The cables are designed to support two trolley cars weighing 86,000 pounds on a wheel base of 60 feet plus a uniform load of 1000 pounds per lineal foot over the whole span. The trusses are made of medium open-hearth steel and are proportioned for the same load, except that one-third of the span is assumed free from the uniform loading. The floor system is designed to carry the same trolley car load on eight axles, plus a concentrated load of 8,000 pounds at any point on each side of the roadway.

There is some talk of an electric railway being built between Bracebridge and Muskoka Lake.

A movement is on foot looking to the construction of an electric railway from Bear River to Digby, N.S.

The St. Hyacinthe Electric Railway Company is seeking incorporation from the Quebec government, to build an electric railway from St. Hyacinthe, Que., to adjacent points.

Messrs. Ickes & Armstrong have accepted the franchise for a street railway offered by the town of Woodstock, Ont., and it is understood that they will shortly commence the work of construction.

ENGINEERING and MECHANICS

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

ANNUAL DINNER OF TORONTO NO. 1.

Following the custom of past years, the annual re-union and banquet of Toronto No. 1 was held on Thanksgiving Eve, October 18th. It was the thirteenth annual dinner of the association, and took place at Webb's parlors. The event was a complete success from every standpoint. The attendance was large, probably 150 persons, the accommodation of the best, and the arrangements for entertainment most complete and carefully carried out. Mr. H. E. Terry, president of Toronto No. 1, wielded the gavel, discharging his duties in such a manner as to earn the distinction of a most efficient presiding officer. Around the head table sat Mayor Shaw; Ald. Hallam; Ald. Frame; R. C. Pettigrew, Hamilton, executive president; G. C. Mooring, executive vice-president; A. M. Wickens, executive secretary; Chas. Moseley, executive treasurer; E. J. Philip, past-president; A. McRae, chief engineer Toronto waterworks; and A. E. Edkins, of the Boiler Inspection & Insurance Company. Among the other visitors were noticed A. E. Lewis and F. N. Vanzant, of the Atlantic



MR. H. E. TERRY, President Toronto No. 1.

Refining Company, Toronto; J. J. Bain, traveller Atlantic Refining Company; G. B. Towers, Vacuum Oil Company, Toronto; Wm. Sutton, Wm. Sutton Compound Company; Mr. Sinclair, Eureka Mineral Wool Company.

An excellent menu was served in Webb's usual good style and heartily partaken of. The chairman, in a few well chosen words, welcomed the engineers and their friends to the thirteenth annual banquet. He spoke of the success of Toronto No. 1, and pointed out that it augured well for the association that at the present time only two members were out of employment. The past year had been most successful, and he looked for greater things in the future. He then called upon Mr. John Alexander for a song, which was rendered most acceptably.

Proceeding to the toast list, "The Queen" was honored by the singing of the National Anthem, followed by "Canada, Our Home," with which the president coupled the name of Ald. Hallam. In responding, Ald. Hallam spoke of the great extent of Canada, pointing out that it was 2,500,000 square miles larger than the United States and only 300,000 square miles less than the whole area of Europe. Touching on municipal affairs, he announced his intention of being a candidate for the mayoralty of Toronto, a city which he had served for twenty-eight years. A duet was then rendered by Messrs. G. W. Grant and John Alexander, who gave as an encore "Boys of the Old Brigade."

With the toast of "Toronto, Our City," were coupled the names of Mayor Shaw and Ald. Frame. Mayor Shaw was sure the engineers were sharing in the general prosperity which prevades the whole Dominion and especially the city of Toronto. The city council this year, he thought, could claim a fair measure

of success, inasmuch as the encouragement given to manufacturers had resulted in the building of new factories and large additions to existing establishments. The engineers would certainly benefit by these new industries. Referring to the delay in completing the city hall, he said that it had not been an unmitigated evil, as it had given employment to workmen during the times of depression. The building was certainly a creditable one, and he thought that large buildings inspired great and noble thoughts. Upon resuming his seat he was heartily applauded. Ald. Frame complimented the chairman upon his position and for his ability as a presiding officer. The engineers, he said, were an intelligent class of men, and were entrusted with the safety of many lives. Mr. Wilt Prestwich then favored the guests with a humorous song, which called forth a hearty encore.

Mr. George Baker and Mr. John Main responded to the toast of "The Manufacturers." Mr. Baker said that the next few years gave every indication of being a period of prosperity. He had noticed that high prices for iron and good times came hand in hand. Pig iron which six months ago could be purchased for \$12 per ton was now selling at \$24, and there was almost a famine in steel. He was pleased to learn that the engineers were banded together for educational purposes. Here Mr. Powers sang, after which Mr. Main, the friend of engineers, was called upon. Mr. Main said that he had been present at ten of the thirteen banquets held by Toronto No. 1. Speaking from the standpoint of a boiler manufacturer, he reported business exceptionally good, and did not know of one boiler maker who was out of employment. Work from Halifax to Vancouver was coming into Toronto, but notwithstanding this he found competition as keen as ever, but thought that in the near future prices would advance. He noticed many engineers present who were at the dinner thirteen years ago in the old Montreal house on King street. To-day the engineers had better opportunities for improvement than they had at that time. Mr. Main obtained his technical education in the old Mechanics Institute at the corner of King and Church street. In his opinion, technical education fitted a person for engineering and mechanical work as nothing else can do. He advised the older men to seek to obtain this education, otherwise they would be replaced by the younger men. Mr. Main said that the enrollment of the Technical School this year was 800 and the average attendance 300, but at the present time the school was in an unsettled state owing to the necessity of new quarters. He expressed surprise that the city representatives had said nothing about a permanent building for the school. Ald. Hallam asked for the privilege to say a few words in reply to Mr. Main. The position regarding the Technical School, he said, was that the council had voted \$75,000 which had been legalized by parliament, and another \$25,000 was yet required. The council had appointed a committee to make a report on the question, but as yet this report had not been forthcoming. As soon as this \$25,000 was voted the building would be erected. He was a firm believer in the technical school. He knew a young man who had obtained his rudimentary education in the Technical School in this city who was now in New York receiving a salary of \$4,000 per year as electrical engineer.

The chairman then read a telegram from Chicago from Mr. C. H. Rust, city engineer of Toronto, regretting his inability to be present and wishing the engineers success. A trombone solo by Mr. Grey was much appreciated, after which came the toast of "The Executive," to which Messrs. Pettigrew, Mooring and Moseley were the respondents. Upon rising to speak, Mr. Pettigrew, the president of the executive, was loudly cheered. He characterized the Canadian Association of Stationary Engineers as the greatest institution in existence. The executive was prospering and was reaching out both east and west. From an educational point of view they hoped to put still more energy into the association. The secretary was sending out question papers to the different associations with a view to helping the engineers in rural places who had not as good facilities for education as are enjoyed by the members of the larger places. Mr. Alexander was called upon for another song. Mr. Mooring, vice-president, spoke particularly of compulsory legislation. This year a committee had been appointed to endeavor to obtain a law from the Ontario legislature, and he hoped every engineer would do what he could to assist the movement. The steambo

men now had such a law, and it was quite as necessary that stationary engineers should give proof of their ability to take charge of steam plants. The treasurer, Mr. Moseley, was pleased to state that the finances of the executive were in good condition. He also spoke of legislation, stating that the Ontario permissive law, granted in 1891, had not had the desired effect in establishing the engineering business. A compulsory law would result in placing steam plants in charge of competent men. Another humorous song by Mr. Prestwich followed.

Next came the toast "Sister Associations." Mr. Robert Mackie, in responding, made some humorous comparisons between the cities of Hamilton and Toronto, and expressed his regret that the mayor had not remained until he (Mr. Mackie) could give him a few pointers. He said that the Hamilton association had commenced their winter educational work, holding two meetings each month, one being private and the other open to the public. Mr. Alex. McRae, a member of the Marine Engineers' Association, also replied, giving it as his opinion that a stationary engineers' law was as much required as was one for marine engineers. He instanced the case of a boiler that was taken out of a tug, condemned, and laid away as useless. This boiler found its way to a second hand dealer, who sold it to a saw mill man for his mill.

A song by Mr. Grant was encored.

A toast not found on the list was then proposed by Mr. Pettigrew and heartily drunk, it being that of "Toronto No. 1." With it were coupled the names of Messrs. H. E. Terry, A. M. Wickens and James Huggett. Mr. Terry said that as the banner association Toronto No. 1 was endeavoring to do its part. He appreciated the honor which had been conferred upon him by his election as president, and was pleased that there was such a large gathering of engineers and friends at their dinner. Mr. Wickens, in replying, said that he had been connected with the Stationary Engineers' Association since its inception. In no line of business did there exist greater necessity of advancing than in steam engineering, excepting, perhaps, in the electrical business. But the best mechanical engineers were gaining experience every day from the stationary engineers, therefore a man should take every opportunity to improve himself. In Toronto there were about 600 engineers, 220 of whom were members of the association. Any organization with education for its platform was, he thought, bound to succeed. Speaking of legislation, he contended that boiler explosions were not accidents, but were the result of carelessness, ignorance or parsimony. If the engineers were granted a compulsory law, it would be better for employers, as it would save them fuel. Mr. Huggett referred to the representation on the Technical School Board. In his opinion the stationary engineers, who were really the founders of the school, should still be represented. The association was in no way identified with the Trades and Labor Council, as some supposed.

The concluding toast was that of "The Press," responded to by Mr. E. B. Biggar, of the Canadian Engineer, and T. S. Young, of the ELECTRICAL NEWS AND ENGINEERING JOURNAL. The singing of "God Save the Queen" concluded the programme of the evening.

The untiring efforts of the members of the Dinner Committee was responsible in no small degree for the success of the dinner. This committee consisted of A. M. Wickens, chairman; Geo. Thompson, secretary-treasurer; G. C. Mooring, James Huggett, Alex. Storer, A. E. Edkins, Chas. Moseley and James Bannan. The pianist on the occasion was Mr. Harrison.

MATHEMATICS FOR ENGINEERS.*

By T. R. FENSENDES,
[No. 1.]

If you divide any one thing into a number of equal parts and take one or more of these parts, you have what is called a fraction. Thus, if we divide a line into seven equal parts and take three of them, we have the fraction three-sevenths, written thus, $\frac{3}{7}$, the number below the line showing into how many equal parts the line is divided, and called the denominator, and the number above the line telling how many equal parts are taken, and called the numerator.

A proper fraction is one whose numerator is less than its denominator, as $\frac{3}{7}$, $\frac{1}{2}$. An improper fraction is a whole number and a fraction, called a mixed number, reduced to the form of a fraction; thus $8\frac{1}{2}$, a mixed number, equals the improper fraction $\frac{17}{2}$.

If we multiply or divide both terms of a fraction by the same number the value of the fraction is not changed; thus, 2 and 3 are the terms of $\frac{2}{3}$; now, if we multiply both by 5 we have 10 and 15, or $\frac{10}{15}$, which is equal to $\frac{2}{3}$, for if we have a unit divided into three equal parts, and again divide each of these thirds into five equal parts, or 15 in 3, we have 2×5 of the 15th, or $\frac{10}{15}$. Also, if

we divide 10 and 15 by 5 we obtain 2 and 3, or $\frac{2}{3}$. Take the fraction $\frac{1}{2}$, if we divide 16 and 24 by 4, we obtain 4 and 6, or $\frac{4}{6}$, and, dividing both terms by 2, get $\frac{2}{3}$. Thus, if we have two or more fractions of different denominators and wish to add their values together, we can obtain by multiplication equivalent fractions having the same denominator, or a common denominator, thus, $\frac{1}{3} + \frac{1}{5}$; the denominators are 3 and 5, and a common denominator is 15:

$$\frac{15}{15} \times \frac{1}{3} = \frac{5}{15}, \quad \frac{15}{15} \times \frac{1}{5} = \frac{3}{15}, \quad \frac{5}{15} + \frac{3}{15} = \frac{8}{15}$$

Again, $\frac{1}{4} + \frac{1}{8}$. The denominators are 4, 7 and 8, and a common denominator would be $4 \times 7 \times 8 = 224$, but for ease in working we use the smallest common denominator, or 56, which is the least common multiple of the denominator. Now $56 \div 4 = 14$, $56 \div 7 = 8$, $56 \div 8 = 7$:

$$\frac{14 \times 3}{56} + \frac{8 \times 1}{56} = \frac{42}{56} + \frac{8}{56} = \frac{50}{56}$$

The common way is thus:

$$\frac{3}{4} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$$

Draw a line below the fraction and place the common denominator below it. Under each fraction place its equivalent value in the common denominator, add the numerators thus obtained to form the new numerator, and place the common denominator as the new denominator. If we have mixed numbers, add the fractions, and if answer is an improper fraction, reduce to a whole and mixed number and then add the whole numbers.

In subtraction of fractions we must again reduce to fraction having a common denominator and then subtract. If we have to subtract mixed numbers, the figures are placed in this way when the fraction to be taken away is less than the fraction of the number to be subtracted from, as $1\frac{1}{2} - \frac{1}{3}$; the common denominator is 12. $1\frac{1}{2} = 1\frac{6}{12}$; $\frac{1}{3} = \frac{4}{12}$; thus $\frac{6}{12}$ from $1\frac{6}{12} = 1\frac{2}{12}$. When the subtracting is greater, as $7\frac{1}{2} - 2$, after reducing the fractions to twelfths, one unit is borrowed from the greater number 7, when the subtraction is proceeded with as above.

To multiply a fraction by a whole number, multiply the numerator by the whole number, and place the result as a new numerator over the denominator. When both numbers are fractions, we multiply the numerators together for the new numerator,

and the denominators for the new denominator, $\frac{2}{3} \times \frac{1}{5} = \frac{2 \times 1}{3 \times 5} = \frac{2}{15}$. When one or both numbers are mixed numbers, reduce to improper fractions and proceed as above.

To divide a fraction by a whole number, divide the numerator or multiply the denominator of the fraction by the whole number. To divide a whole number by a fraction, we invert the fraction, i.e., change numerator for denominator, and multiply. To divide a fraction by a fraction, invert the divisor and multiply the dividend by the inverted fraction, thus $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{3}{2}$. When we have mixed numbers, we reduce to improper fractions and proceed as above.

A compound fraction is one whose numerator or denominator is a fraction, as $\frac{1}{\frac{1}{2}}$. In adding, subtracting, multiplying or dividing, reduce compound fraction to simple, and then proceed as above, thus:

$$\frac{1}{\frac{1}{2}} + \frac{1}{\frac{1}{3}} = 2 + 3 = 5$$

Decimal fractions are fractions whose denominator is 10, or some power of 10, as 100, 1000, etc., and this denominator is not written but expressed by the means of a point placed to the left of the numerator, and called the "decimal point," or "point," thus $\frac{25}{100}$ is written .25. When the number of figures in the numerator is less than the number of ciphers in the denominator, we place enough ciphers to the left of the numerator to make up the number in the denominator, thus $\frac{15}{100}$ is expressed in decimals as .15. When the fraction is a mixed number as $3\frac{1}{10}$, write the whole number 3, then the point and the fraction, thus 3.1. $478\frac{1}{1000} = 478.002$. In the second case, we have three figures in the numerator and four in the denominator, and put one cipher between decimal point and the first figure in the numerator. In expressing decimals as common fractions, place figures to the right of decimal point as numerator, and for denominator 1 followed by as many ciphers as there are figures to the right of the point, thus .45 = $\frac{45}{100}$. To express a common fraction as a decimal, divide the numerator by the denominator, affixing ciphers to the numerator until there is no remainder, or it appears that there will be no remainder, pointing off as many figures in the decimal as there were ciphers added to the numerator; thus $\frac{1}{2}$, by adding one cipher to the numerator and dividing by 5 = .2. In the case of $\frac{1}{3}$ two ciphers have to be added to the numerator, making the result .02. In case of such fractions as $\frac{1}{7}$, where the answer does not end, we would place the point at .1428, using only as many figures as are necessary for exactness.

To add or subtract decimals, write them under each other, with the decimal points in one line, then add or subtract as with whole numbers, and place the decimal point in the answer under its position in the column. To multiply decimals, multiply as with whole numbers, and point off in the answer as many decimal points as there are in both factors taken together. To divide decimals, divide as with whole numbers, and point off as many places as the dividend has more than the divisor.

A decimal which does not end, such as .3333 — —, which is decimal of $\frac{1}{3}$, is a repeating or recurring decimal, and it is sufficient to carry to four places, thus .3333. It is sometimes written with a dot above the numerator repeating, as . $\dot{3}$, showing that it repeats.

* Paper read before Hamilton No. 2, C.A.S.E.

SPARKS.

Ingrum & Donaldson are installing an electric light plant at Wroxeter, Ont.

An electric light plant has recently been installed in the hosiery mill at Kingston, Ont.

Cronkhite Bros. have installed an electric light plant in their woollen mill at Thessalon, Ont.

An electric light plant for the town of Thessalon, Ont., is said to be under consideration.

The ratepayers of St. Thomas, Ont., have voted in favor of an electric fire alarm system, to cost \$4,000.

D. Roche & Co. purpose installing 75 additional incandescent lights in their establishment at Newmarket, Ont.

The Coaticook Electric Light Company have commenced the erection of a new power house in which they will install their arc machine.

The ratepayers of the town of Almonte, Ont., have defeated the by-law to raise \$30,000 with which to establish a municipal electric light plant.

Patrick O Toole, assistant electrician of the city of Halifax, N.S., was killed on October 14th by touching a live wire while doing some repair work.

The West Kootenay Light and Power Company have ordered another 30 h.p. three phase induction motor from the Canadian General Electric Company.

The Canadian General Electric Company are installing an electric lighting plant of 150 lights capacity for the Georgian Bay Cement Co., of Owen Sound, Ont.

The Strathroy Electric Company has refused an offer made by the council of 23 cents per lamp per night for 15 arc lamps of 2,000 candle power, on a three years' contract.

The Canadian General Electric Company are furnishing the Montreal Street Railway Company with 20 of their standard General Electric 100 railway motors.

It is said that the American visitors at Murray Bay, Que., purpose organizing a company to establish an electric plant for lighting Murray Bay, Pointe a Pic and Cap a l'Aigle.

The corporation of Bothwell, Ont., have made considerable extensions to their electric plant recently, the work having been carried out by the Canadian General Electric Company.

Robert Anderson, of Ottawa, who has been given a contract to light the streets of Arnprior, Ont., has completed arrangements to install the necessary plant in the saw mill of Geo. Malloch.

C. M. B. Lawrence, proprietor of the Oakville Electric Light Company, has purchased from the Canadian General Electric Company one of their standard single phase alternators of 1,000 lights capacity.

The General Engineering Company of Ontario has been given permission to increase its capital stock from \$40,000 to \$750,000. The St. Thomas Gas Company will increase its capital from \$60,000 to \$100,000.

A member of the Board of Trade of St. John, N. B., has given notice of motion to appoint a committee to consider the expediency of municipal ownership of gas lighting, electric lighting, and street railway transportation in that city.

The Montreal Cotton Company, of Valleyfield, Que., are continually increasing their factory power plant, and have just placed another order with the Canadian General Electric Company for six 50 h.p. and one 100 h.p. induction motors.

The village council of Weston, Ont., has accepted the tender of the Canadian General Electric Company, Toronto, for electrical apparatus, and that of the Goldie & McCulloch Co., Galt, for engine and boiler for electric light plant. The total cost is \$6,690.

The Hospice St. Joseph de la Delivrance, of Levis, Que., is about to build an aqueduct, for which plans have been prepared by David Ouellet, architect, of Quebec. There will be 5,500 feet of cast iron piping, with brass valves, etc. A hot air engine will be used to raise the water in the building.

The Royal Electric Company, of Montreal, are installing in the head office of the Merchants Bank of Canada, of that city, two 50 k. w. direct connected generators, with Robb-Armstrong engine, complete with switchboards. These generators are to operate at 250 volts, and the building is wired for lighting to operate lamps at 220 volts and also two Sprague elevators. We believe this is the first complete electrical installation in Canada fitted out with 220 volt lamps.

At a recent meeting of the city council of Hull, Que., a motion was submitted to enter into negotiations with the Hull Electric Co. or the Ottawa Electric Co. to light the streets of the city. It was decided to leave the matter in abeyance until the legal dispute now pending between the two companies is settled.

According to the New Westminster Columbian, a company has been organized at New Westminster, B. C., for the purpose of manufacturing electric light carbons. We are told that they have secured water power rights on Stave river and will transmit electric power to the proposed works in New Westminster.

The town of Paris, Ont., is to have a second electric light plant, Mr. W. H. Meldrum, with a number of local people, having formed a new company. They have purchased a complete outfit, consisting of Leonard Ball engine and boilers, and from the Royal Electric Company a complete S.K.C. two-phase plant, the dynamo having a capacity of 50 k.w. The work of installing the new plant is now under way.

Regarding the market for mica in Australia, Mr. J. S. Larke, of Sydney, in a report to the Dominion Government, says: "Some ground or rather finely broken mica is used here for making a covering for steam pipes. It at present comes from India, where £8 per ton is paid for it. As there may be considerable refuse mica in Canada from which this article is made, I send a sample of the article with this report."

The Soulanges canal connecting lakes St. Francis and St. Louis, in the province of Quebec, has been completed, and was officially opened last month. The length of the canal is 14 miles. Nine miles from the lower end is situated the power house, where 500 horse power is developed, under a head of 20 feet, and used for generating electricity for lighting the canal and for operating the bridges, sluice gates, etc. The electrical apparatus in the power house was furnished by the Canadian General Electric Co., of Toronto, and the water wheels by the Stillwell-Bierce & Smith-Vaile Company, of Dayton, Ohio.

The Canadian General Electric Company have just received an order from the Trenton Electric Company for a 75 light equipment of their alternating series enclosed arc lamps, with automatic regulating transformer and switchboards. These are to be used for lighting the streets of the city of Belleville, Ont., the current being taken from the three phase transmission lines coming from Trenton, a distance of 13 miles, where the power is generated. This is the third installation of this kind which is being put in in Canada, 100 lights capacity having been installed in Sherbrooke, Que., and 100 lights in Halifax, N.S., both of which are giving eminent satisfaction.

The Trent River Paper Company, of Frankford, have placed an order with the Royal Electric Company for one of their 40 k.w. S.K.C. two-phase generators, with full complement of transformers and supplies. It is the intention of this company to not only light their own large premises, but also the following villages, viz.: Frankford (one mile distant), Stirling (nine miles distant), and possibly Foxboro and Wooler (six miles distant). Work of excavation for the new mill of this company was commenced on the 27th of May last, and the fact that within the next two weeks this company will be making paper is an evidence of the capabilities of the genial manager, Mr. Walter S. Miller.

Canadians will be interested in learning that Prof. Carus-Wilson, late professor of electrical engineering at McGill University, Montreal, and who is now in England, is preparing plans for an undertaking having for its object the utilization of the tunnel which some years ago was constructed in the heart of London. This tunnel was built in 1859 by the Pneumatic Despatch Co. for the purpose of carrying mails and parcels from the general post-office to the North-western Railway station by means of an underground chute, but the difficulties of utilizing pneumatic pressure on such a large scale proved insuperable. The idea was that a train of cars hermetically fitting the tube should be pumped from the post-office to Euston. Sufficient allowance, however, was not made for air leakage and other disadvantages, and after increasing the horse power from 300 to 800 horse power, the scheme failed, and \$850,000 lay wasted underground. Recently an enterprising engineer conceived the possibility of accomplishing by means of electrical traction that which could not be done with compressed air, and with this end in view the services of Prof. Carus-Wilson have been retained. He is said to be preparing plans for fitting the tube, which is two miles long, with an electric train and lighting it with incandescent lamps. The proposed train will draw four cars, each carrying nine tons, at the rate of from 25 to 30 miles an hour.

SPARKS.

Geo. Thompson, of Belleville, has installed an electric light plant in the drill shed in that city.

The city of Belleville, Ont., will likely install an electric fire alarm system, for which tenders will shortly be invited.

The name of the Montreal Island Belt Line Railway Company has been changed to the Montreal Terminal Railway Company.

Messrs. T. J. Duncan and W. A. McDonald, of Rossland, B. C., have applied for incorporation of the Rossland & Sophie Mountain Electric Railway Company.

The first electric tramway in China has been opened for traffic. It extends from the Pekin railway station at Machiupu to the south gate of the capital, a distance of four miles.

The Ashcroft Water, Electric Light & Improvement Co., of Ashcroft, B.C., purposes installing additional electrical apparatus with a view to furnishing light and power for mining purposes.

The Dominion Cartridge Co., Lachute, Que., are increasing their electric lighting plant, and have placed their order for a 20 k.w. generator and switchboard with the Royal Electric Company, Montreal.

The Richmond Electric Company, of Richmond, Que., have installed a second 75 k.w. S.K.C. generator to meet the increasing demand for electric lights. They have also installed a number of motors, from 5 to 15 h.p., which operate from the S.K.C. system.

The Pacific Coast Power Co., Limited, has been granted a provincial charter, to construct a dam across Powell river in New Westminster district, and to convey water to some point on the sea-coast to be used for the development of power. The capital of the company is \$50,000.

The Grand Forks Water, Power & Light Co., of Grand Forks, B.C., has submitted the details of its undertaking to the government. It is proposed to build a dam across the north fork of Kettle river about one mile from Grand Forks, and to construct a flume to carry the water to the point of development. Work must be commenced within twelve months.

Prof. Rutherford Macdonald, Professor of Physics at McGill University, Montreal, recently gave the first of a series of lectures on "Electric Waves and Oscillations." Prof. Rutherford has made considerable research work in this subject, and some years ago devised an apparatus with which he could transmit messages a distance of half a mile without any connecting wire.

Since Saturday, the 21st of October, the town of Dundalk has been basking in the rays of the electric light, their new plant being started on that day. The plant is owned and operated by the municipal council, and consists of Leonard engine and boilers and an S.K.C. 30 k.w. dynamo. The streets are lighted with incandescent lamps and make a very attractive appearance.

Mr. R. G. McLean, of Toronto, has given a contract to the Waterous Engine Company, of Brantford, for a 50 horse-power McEwen engine for his printing establishment, to be installed immediately. This will replace the 30 h.p. Wheelock engine now in use, Mr. McLean's business having so increased as to demand additional power. His steam plant is under the superintendence of Mr. H. E. Terry.

The Montreal Street Railway Company have appealed against the assessment of their poles, wires and rails under the new tax imposed in the city charter. The assessment placed upon these is \$280,000. The company have 96 miles of single track, making the valuation \$3,000 per mile. The company claim that the valuation for a similar tax in the city of Toronto is only \$1,050 per mile, and they ask that their assessment be reduced accordingly.

The steamer Sardinian, which is transporting the Canadian contingent to South Africa, is well supplied with artificial illumination for "The Soldiers of the Queen." The Royal Electric Company, of Montreal, started to install a complete electric lighting equipment on this steamer on Saturday, October 21st, and turned over the plant, consisting of one 20 k.w. direct current generator, with 325 lights installed, complete in operating condition, on Thursday, October 26th.

The Niagara Central Railway Company have commenced the conversion of the road between St. Catharines and Niagara Falls into an electric line, and it is expected that cars will be running by January 1st. The cars are being built by the Ottawa Car Company, and will be 50 feet long, with baggage and smoking compartments and accommodation for forty-eight passengers. They will be heated by steam, supplied with Nightingale air brakes, and will rest on double trucks.

TRADE NOTES.

The Geological Survey Department of the Dominion Government have ordered a large iron show case from the Goldie & McCulloch Co., Limited, Galt, Ont., for the Paris Exposition.

Messrs. Richardson & Sons, Bedford, N.S., have purchased a complete electric lighting plant for their factory from the Royal Electric Company. The Maritime Electric Co., of Halifax, are making the installation.

The Goldie & McCulloch Co., Limited, Galt, Ont., have recently received some very nice orders for wood-working machinery from the Maritime provinces. They are also busy on orders for similar machines for different parts of Ontario.

The Goldie & McCulloch Co., Limited, Galt, Ont., have just completed and shipped to Mexico, via Vera Cruz, 15 large bagasse filters for sugar plantations there. They also have a large order for special machinery for the St. Charles Condensing Co., a United States firm who are opening a Canadian branch manufactory at Ingersoll.

The Palmerston Carriage Company, Limited, of Palmerston, Ont., have decided that the old-fashioned kerosene lamps are not good enough for them, and have placed their order with the Royal Electric Company for a complete electric lighting equipment, consisting of a 100-light dynamo, switchboard, and all necessary wiring throughout the factory.

Readers of the ELECTRICAL NEWS are reminded that Mr. C. E. Shedrick, of Sherbrooke, Que., is still manufacturing the Whitney electrical instruments for Canada, as well as the Wright discount meters. Mr. Shedrick reports that he has orders on hand far in excess of the capacity of his factory, but next spring he hopes to overcome this drawback by enlarging his buildings and plant.

The Ogilvie Milling Company have contracted with Sadler & Haworth, manufacturers of leather belting, of Montreal and Toronto, to supply them with a mammoth leather belt for their new mills at Winnipeg, Manitoba. It will be 72 inches wide, three ply thick, and over one hundred and thirty feet long. This belt, when finished, will be the widest and heaviest leather belt in use, or ever made in Canada. - Toronto Globe.

Messrs. Ahearn & Soper, of Ottawa, have closed contracts within the last few weeks for nearly 5,000 h.p. in Westinghouse induction motors for use in the city of Montreal. The motors will be operated from the circuits of both the Royal Electric Co. and the Lachine Rapids Hydraulic & Land Co. The contracts include a 100 h.p. motor for operating the new factory of the Dominion Oil Cloth Co., a 20 h.p. motor in Peter Lyall's stone works, three motors of 5 to 15 h.p. in the new factory of the Wire & Cable Co., and about twenty motors running from 50 to 300 h.p. each for the mills of the Dominion Cotton Co. The motors in each case are of the Westinghouse Tesla induction type.

MOONLIGHT SCHEDULE FOR NOVEMBER.

Day of Month.	Light.		Extinguish.		No. of Hours.
	P.M.	H.M.	A.M.	H.M.	
1....	5:30		5:30		12.00
2....	5:30		5:30		12.00
3....	5:30		5:30		12.00
4....	5:30		5:30		12.00
5....	5:30		5:30		12.00
6....	6:30		5:40		11.10
7....	7:30		5:40		10.10
8....	8:40		5:40		9.00
9....	9:50		5:40		7.50
10....	11:00		5:40		6.40
11....	11:00		5:40		5.40
12....			5:40		
13....	A.M. 12:10				5.30
14....		1:20		5:50	4.30
15....		2:30		5:50	3.20
16....	No Light.		No Light.		
17....	No Light.		No Light.		
18....	No Light.		No Light.		
19....	No Light.		No Light.		
20....	P.M. 5:10		P.M. 8:30		3.20
21....	5:10		9:30		4.20
22....	5:10		10:30		5.20
23....	5:00		11:30		6.30
24....	5:00		A.M. 12:30		7.30
25....	5:00		1:00		8.00
26....	5:00		1:30		8.30
27....	5:00		2:30		9.30
28....	5:00		3:30		10.30
29....	5:00		4:30		11.30
30....	5:00		5:30		12.30

Total..... 212.20

THE EFFICIENCY OF 220-VOLT LAMPS.

The Elektro Technische Rundschau quotes the results of some experiments recently carried out in Karlsruhe to ascertain the life and efficiency of 220-volt incandescent lamps. No less than six different makes of lamp (all German, it is presumed) were subjected to the test, the first measurement with the photometer taking place after the same had been burning 15 hours, when the energy consumed was also determined. Subsequent to these measurements the lamps were subjected to an endurance test on a 220-volt circuit. After 344,792 and 1,150 working hours respectively, measurements were again taken to determine the energy consumed and the candle power of the lamps. The graphic representations of the values so discovered show that the lamps, when new, consumed from 3.8 to 4.3 watts per candle, while the actual candle power of 16 c.p. (nominal) lamps amounted to between 11.4 c.p. and 14.9 c.p., that of 10 c.p. (nominal) lamps being only 8 c.p. After 600 working hours the 16 c.p. lamps were found to consume four to five watts per candle power, the intensity of the light given varying between 11.7 c.p. and 14.2 c.p. Thus, says the Electrical Engineer, the test proved anything but favorable relative to the bulk of the samples. The energy consumed is considerable compared with lamps of lower voltage, and the candle power decreases rapidly with the hour's run. This is especially the case with 10 c.p. lamps, which must, indeed, be termed unserviceable. Individual lamps supplied by the same firms differed considerably, both as regards candle power and efficiency, which must be ascribed to careless grading. A variation in the voltage amounting to 1 per cent. effected a change in the candle power of 6 to 7 per cent., which agrees with observations repeatedly made in regard to 110-volt lamps. In conclusion, it is remarked that the introduction of high voltage lamps will be of little advantage so long as their efficiency remains so much behind that of ordinary lamps.

Here is part of the Montreal Transvaal Company, now en route to South Africa: H. H. Walker, age 25, 54th Battalion, Richmond, electrician, birthplace Stockport, Eng.; D. Middleton, age 27, Prince of Wales' Fusiliers, electrician; Michael Kelly, age 22, Prince of Wales' Fusiliers, electrician, birthplace Ottawa.

PUBLICATIONS.

Catalogues received during October include a very complete one from the Brown & Sharpe Manufacturing Company, manufacturers of machinery and tools, Providence, R.I.

Wessrs. Wilber B. Driver & Co., of 126 Liberty street, New York, have issued a useful booklet entitled "Resistance Wires," which contains many useful tables of the resistance, temperature, coefficient, specific gravity, etc., of their well known makes of wire. These include the "Climax," "Adamance," "D" and "Hercules" binding wire.

Two hundred and twenty pages represent the number contained in the October issue of the Street Railway Review of Chicago. This is a souvenir number, issued just previous to the annual meeting of the American Street Railway Association held in Chicago from October 17th to 20th. The issue reflects great credit upon the publishers. The letter-press pages are replete with half-tone illustrations pertaining to Chicago and to the various railway enterprises in the vicinity, which include every type of motive power, horse cars, cable cars, trolleys, third rail, three-phase, storage battery and compressed air systems. During the progress of the convention the publishers of the Street Railway Review issued a daily edition containing full information concerning the programme of the day and an account of the previous day's session.

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RECENT PLANTS INSTALLED: - Lachine Rapids Hydroelectric & Land Co., Montreal, Que., 12,000 h.p.; Chambly Manufacturing Co., Montreal, Que., 20,000 h.p.; West Kootenay Power & Light Co., Rossland, B.C., 3,000 h.p.; Dolgeville

Electric Light & Power Co., Dolgeville, N.Y.; Hork Falls Power Co., Ellenville, N.Y.; Hudson River Power Transmission Co., Mechanicsville, N.Y.; Cataract Power Co., Hamilton, Ont.

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Scientific American, Oct. 14, 1899.

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

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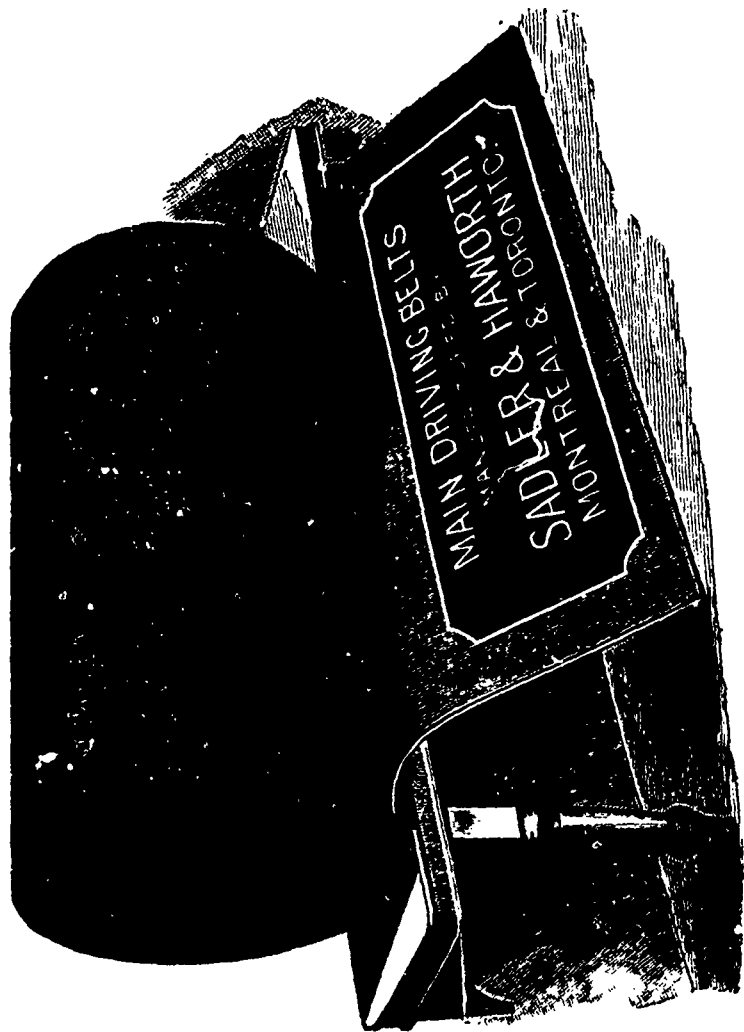
\$3.00 A YEAR.

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

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

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SPARKS.

It is reported that Mickle, Dymont & Son are considering the lighting of the streets of Severn Bridge, Ont., by electricity.

The streets of Palmerston, Ont., have recently been in darkness, due to friction between the town council and the electric light company.

John Penman, of Paris, Ont., is installing a model electric plant for the lighting of his residence, purchased from the Canadian General Electric Company.

The corporation of Neepawa, Manitoba, has contracted with the Canadian General Electric Company for one of their standard 75 k.w. monocyclic alternators, with switchboards, transformers and wiring supplies.

The tender of the National Carbon Co., of Cleveland, Ohio, for the supply of 18 x 14 inch coppered carbons, has been accepted by the city council of Winnipeg. The price is \$13.50 per thousand f.o.b. Cleveland.

The Canadian General Electric Co. are installing two of their standard 45 k.w. multipolar generators for Messrs. Tooke Bros., of Montreal, Que., together with switchboards and three 15 h.p. direct current motors.

Mr. J. E. S. Trelawney, of the Anglo-Canadian Syndicate, has applied to the Quebec government for a lease of a water power at Bryson, Que., with the object of developing the power for electrical and other purposes.

The Canadian General Electric Company have received an order from the Acadia Edison Co., of Wolfville, N.S., for two of their standard 25 kilowatt, multipolar, direct current generators, with switchboards, etc., complete.

A new electric company has been formed in Dutton, Ont., for the purpose of supplying light, heat and power to the corporation, merchants and residents of the town. The Canadian General Electric Company are supplying all the electrical apparatus, transformers and wiring. Their initial order is for a 30 k.w. single phase alternator.

It is said that the Deschenes Electric Co., the Hull Electric Co., and R. & W. Conroy, mill owners, will claim damages from the Metropolitan Electric Co., on the ground that the works now

under construction by the latter company at Britannia will divert the waters of the Ottawa river from the natural channel and damage the properties of the above parties. The power houses and mills of these companies are located on the side of the river opposite the Metropolitan Company's works.

D. G. Whidden, of Antigonish, N. S., has placed an order with the Canadian General Electric Company for a 500 light direct current plant.

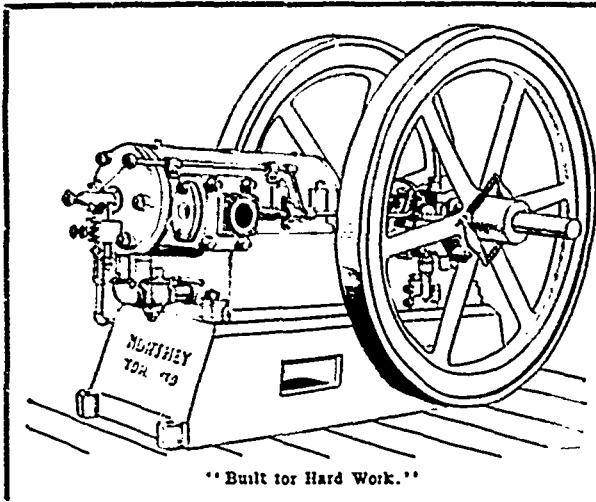
The Canadian General Electric Company have received an order from the Summerside Electric Company, of Summerside, P.E.I., for one of their standard 120 kilowatt single phase alternators.

The corporation of New Westminster have contracted with the Canadian General Electric Company for one of their standard 150 kilowatt monocyclic generators, with switchboards, etc., for the supply of light and power throughout the city of New Westminster.

Mr. D. P. Tobin, of Lancaster, last winter experimented in ice cutting with a "Model" gasoline engine. So well did the experiment work that the Goldie & McCulloch Co., Ltd., Galt, has received orders for Mr. Tobin for two more engines to be used this winter for the same purpose.

The Nelson Electric Tramway Co., of Nelson, B.C., have placed an order with the Canadian General Electric Company for their entire requirements electrically, consisting of one standard 325 k.w. railway generator with panels, one 500 h.p. three-phase revolving field synchronous motor with panels, together with full complement of cars and motors. They have also contracted with the West Kootenay Power & Light Co., of Rossland, B.C., for the power necessary to operate their plant.

Among recent orders for Ideal engines placed with the Goldie & Culloch Co., Limited, Galt, Ont., are the Dominion Bridge Co., LaCline, Que.; Kennedy & Sons, Owen Sound; Intercolonial Ry. Co., St. John, N. B., and others. Among the orders for Wheelock engines are the Standard Shirt Co., Montreal; Barrie Electric Light Co.; Vulcan Iron Co., Winnipeg; R. C. Ennis, Neepawa, Man; corporation of Prescott, Berlin; Rubber Co., and others. The firm are running overtime to keep up on orders.



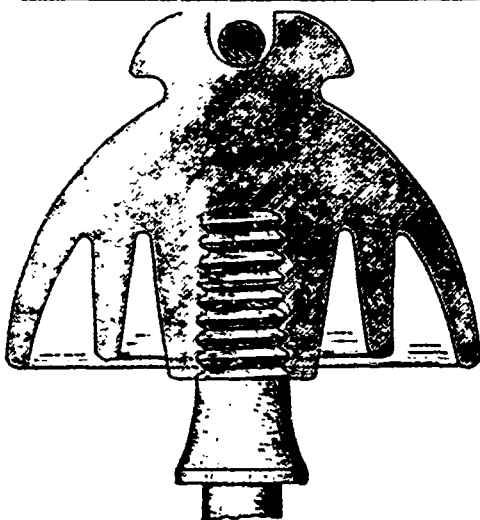
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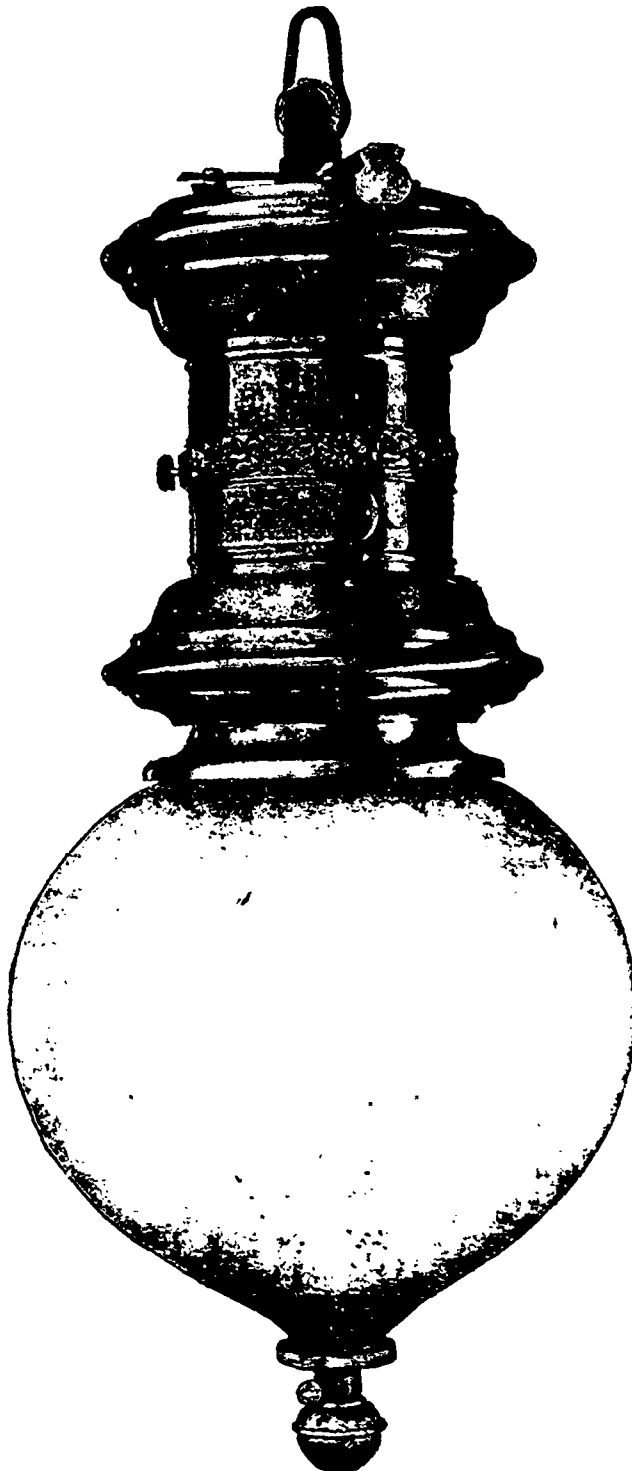
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SPARKS.

The Orillia power scheme is being pushed by the contractors as rapidly as possible, although it is probable that the work will not be completed this year.

The council of the town of Woodstock, Ont., is wrestling with the question of municipal ownership of the electric plant. A special committee has recommended that a vote of the ratepayers on the question be taken on the first Monday in January.

It is expected that the new electric light plant at Neepawa, Man., will be completed and put in operation some time this month.

The electric light plant at Morden, Man., is owned by a gentleman residing in England, who has decided to close down the plant unless he succeeds in finding a purchaser.

The town council of Newcastle N. B., has invited tenders for the installation of an electric light plant, to be operated by water power. The plans for same were prepared by Mr. Duncan.

The Canadian General Electric Company have closed a contract with the Imperial Oil Company, of Sarnia, Ont., for one of their standard 40 k.w. direct current generators, direct connected to Ideal engine.

The Dartmouth Electric Light Company, of Dartmouth, N.S., have placed an order with the Canadian General Electric Co. for one of their standard 30 k.w. single phase alternators with switch-board, transformers and wiring complete.

Mr. A. M. Wickens, chief engineer for the Ontario government, has condemned the boiler at the Ontario Agricultural College, Guelph, used for threshing, chopping and grinding. It is probable that a new engine and boiler will be purchased.

The town council of St. Marys, Ont., recently invited tenders for supplying street electric lights for one year from December 31st. Only one tender was submitted, it being from the present contractors, Weir & Weir. Their tender, \$43.50 per lamp per year for 31 lamps, has been accepted.

The Massey Harris Company, Limited, have decided to equip their Toronto factories with a modern system of electricity for light, heat and power. They have contracted with the Canadian General Electric Company for two 100 k.w. direct current generators, direct connected to Ideal engines. In conjunction with these they are installing generator and feeder panels, arranged for controlling the system of lighting throughout all the different departments. This plant will be one of the largest isolated installations in Canada.

Another large manufacturing business is being established at Sault Ste. Marie, Ont., which promises to reach vast proportions in the near future. Mr. F. H. Clerque, president of the Lake Superior Power Company, has been instrumental in interesting American capital in the formation of the American Alkali Company, of which he is vice-president. They purpose manufacturing caustic soda and other similar products under electrolytic processes, and their initial plant will require 1000 h.p. for its operation. They have placed an order with the Canadian General Electric Co. for three 330 h.p. specially designed generators, to be direct connected to water wheels. The plant is expected to be in operation by November 1st.

The Ingersoll Electric Light Company has recently installed additional machinery, including a 125 h.p. Leonard high speed engine, 150 h.p. Goldie & McCulloch boiler, steam pumps, etc.

Mr. C. H. Mitchell, hydraulic engineer, of Niagara Falls, Ont., has made a report to the town council of Bracebridge, Ont., on a plan of increasing the power for electric lighting purposes. The increase will be about 600 horse power, the power house to be built at the foot of the falls, and the cost being estimated at \$20,000.

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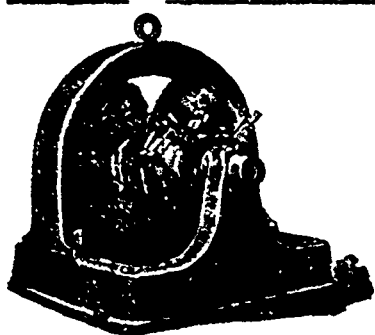
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