

Thomas Jones, for a long time employed with the Yarmouth Steamship Company as a quartermaster, died of typhoid fever, at his home, Jordan Falls, N.S.

W. M. Davis, who for the past thirteen years has been the town engineer of Woodstock, Ont., has been appointed town engineer of Berlin, Ont., at a salary of \$1,500 a year.

Miss Myssie Munro, daughter of J. W. Munro, Pembroke, Ont., the well-known contractor, was married recently to Wm. Russel, jr., of the firm of Russel, Poulin & Co., contractors.

R. H. Cushing, C.E., has received the appointment of assistant engineer of the I.C.R. His special duties for the present will be to look after the terminal works at St. John, N.B.

Thomas Cowan, postmaster, Galt, Ont., died October 14th at the family residence, near Galt. Deceased was one of the first members of the firm of Cowan & Company, machine manufacturers, Galt.

At a recent meeting of the Ottawa city council a resolution was passed discharging the city engineer, Robert Surtees, the dismissal to take effect on November 30th. The applications for the position are very numerous.

Arch. Blue, of the Ontario Crown Lands Department, recently attended the annual convention of American Institute of Mining Engineers, in Buffalo. While there Mr. Blue delivered an address on "Corundum in Ontario."

Henry Wagner, a moulder employed at Clare Bros.' foundry, Preston, Ont., recently met with a terrible accident. He was carrying a ladle of molten metal and in some manner stumbled, with the result that a quantity of its contents was spilled over his right foot, which was frightfully burned.

Manager Keating, of the Toronto Street Railway Co., who was elected vice-president of the association at last year's session, when he was city engineer of Toronto, accompanied C. H. Rust, C.E., Toronto, to the convention of municipal engineers in Washington, D.C., at the end of last month.

Richard C. Boxall, C.E., Sackville, N.B., whose failing health has for some time been the cause of great anxiety to his friends, is now suffering from a mental malady, and all will regret to know that it has been thought best to send him to the Asylum for the Insane at St. John, for treatment.

C. H. Sutherland, mechanical engineer of the Grand Trunk Railway, died very suddenly a short time ago. He had been confined to his residence for several days, but no serious results had been apprehended. However, when one of the family went into his bedroom Mr. Sutherland was found dead in his chair. Heart disease is presumed to be the cause of death.

John Duffy, St. John, N.B., foreman of construction work at the new pulp mill at Mispic, while directing work on the roof, fell over to the ground, 40 feet below. He struck a staging in his descent, thus breaking the force of his fall. His arm was injured, several ribs broken, and he also suffered severe internal injuries.

Word was received in Toronto, Oct. 26th by cable of the death in South Africa of Lieut. Keating, son of E. H. Keating, C.E., general manager of the Toronto Railway Company. Lieut. Keating graduated from the Royal Military College, Kingston, in 1883, and joined the 100th regiment, under Col. Trench, lately stationed at Halifax, N.S., and was about three months ago ordered to Africa.

Prof. Alexander Graham Bell, the inventor of the telephone, owns a whole mountain of 1,000 acres in Baddeck, Cape Breton, upon which he has expended a large sum on roads. Upon its southern slope up toward the summit, and overlooking a wide panorama of lake and mountain, he has erected a mansion, and near it a fully equipped laboratory where he conducts his experiments in electricity.

W. H. Aldridge, the manager of the Trail smelter and refiner, the property in British Columbia acquired some time ago by the C.P.R., has recently visited Montreal, and other Eastern centres. Mr. Aldridge took charge of the works at Trail when the property was purchased from the Heinze syndicate, and since that time a great revolution in the works has been effected. The plant is being worked to its fullest capacity.

Dr. Porter, Professor of Mining and Metallurgy in McGill University, Montreal, is back at the University entirely recovered from his recent severe illness. During the summer Dr. Porter has examined the mining areas in Nova Scotia and British Columbia, and is much impressed with the possibilities of mining in both districts. While in British Columbia, Dr. Porter visited East Kootenay and other districts, but was taken ill before he had examined the West Kootenay country. Dr. Porter's many friends are delighted with his complete restoration to health.

ELECTRICAL POWER TRANSMISSIONS.*

BY R. A. ROSS, E.E., M. CAN. SOC. C.E.

(Continued from last issue).

Owing to the copper losses and induction effects at various loads on the system from the generator shaft to the lamps or motors, the generator voltage must be raised as the load increases. It is very desirable that this increase be kept as low as possible, so that a continual adjustment of the voltage be not necessary, rendering the lights unsteady. To this end the copper losses, and especially the induction effects, must be kept within bounds. The first involves only the cost of the copper, the latter depends upon the nature of the demands and the relative positions of the copper conductors. The induction of lines and apparatus has an effect somewhat similar to that of the inertia of water in long pipes, and causes the current to lag behind the voltage, necessitating a large output of volt-amperes to produce watts, and, as lines and apparatus must be of sufficient capacity to carry the useless increase of current and the generator to allow for the useless additional volts, an increased capacity of plant is necessary. These induction effects may have a larger influence on the regulation than the necessary copper losses, and should be carefully watched. It is well to bear in mind, however, that the increased volt-ampere readings do not represent additional power consumption, as would be the case in direct current, as they have to be multiplied by the cosine of the angle of lag (which is always less than unity) to give the true power. Poor regulation therefore cuts down the capacity of the plant, and renders it difficult to maintain the voltage constant under varying loads. Having thus sketched the main points, which affect the general working of the plants, the apparatus may be taken up in detail.

The reducing transformers necessary for lowering the line voltage to that suitable for the incandescent distribution, arc light motors, and rotary transformers for railway service, must be of the highest grade to stand the line potential, as well as the increases of voltage to which they may be subjected under certain conditions. Of course the efficiency should be of the highest and the regulation good. As the heat developed is great, an air blast or circulation of cool oil is provided. The rotary transformers which form such a large part of the load in this case partake both of the nature of alternating motors and of direct current generators. As an alternating current motor of synchronous type they must be self starting, and in consequence are of either two or three phase. As a generator they must at the speed established by the synchronous motor part give the necessary direct current at the proper voltage for the trolley line, as both the motor action and the voltage generation take place in one set of armature windings, and as the fields are common to both, there is a certain ratio of impressed alternating voltage to direct voltage at the commutator, which is constant, and any change of field strength alters the direct current voltage only indirectly by causing a leading or lagging current in the transmission lines, thus giving more or less volts to the alternating side of the machine. Owing to this effect of over or under excitation of the rotary upon the line currents, causing them to lead or lag behind the voltage, this apparatus may be arranged to keep the current and voltage of the line in phase, thus doing away with the troubles from lagging currents which so unfavorably affect the system in the matter of regulation. On the other hand, where there is no necessity for close regulation, the line induction is encouraged, and is found useful in over-compounding the direct current side of the rotary automatically, thus giving the rise of voltage with load so desirable in railway work. In the present case, if the lighting and railway loads be carried upon separate lines, the latter arrangement is desirable, as the lighting will have good regulation while the railway service will over compound automatically. The total load for railway needs being 6,450 E. H. P., and the average from 7 a.m. to 9 p.m. being 3,000 E. H. P., seven units of 1,000 E. H. P. should cover the demands, and the machines in operation should have a good load factor. For the arc light demands as before stated, eight units would be sufficient. The motors may be either synchronous or induction, the former preferably as they may be useful in assisting the regulation of the incandescent lighting service by proper excitation, as their loads do not fluctuate. This apparatus with the necessary switchboard and in-

*From a paper read before the Canadian Society of Civil Engineers.