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# The Canadian Engineer

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## The Canadian Engineer.

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FOR THE CANADIAN ENGINEER.

### FROM IRON ORE TO STEEL.

A SKETCH OF IRON MINING AND MANUFACTURING IN PICTOU  
COUNTY, NOVA SCOTIA.

BY JOSEPH DIX FRASER, FERRONA, N. S.

(Concluded from last issue.)

I will now describe the process of converting iron ore into pig iron: The brown ores of the East River are best adapted for steel making on account of their containing small percentages of sulphur and phosphorus. During the last year, the ore used has come principally from the Macdonald & Grant mines. Tramways extend from the mines to the washer, where clay, the principal impurity, is easily and cheaply separated from the ore. It is then taken to Ferrona, and stored in the stock-house, ready for use. An average sample of these ores yields from 50 to 53 per cent. of metallic iron.

In order to reduce this ore, it is necessary that there should be present some substance which is capable of ready union with its mineral impurities. These earthly or mineral impurities generally consist of various admixtures of oxides of silicon and alumina, and other metals. The substance which is provided for the removal of these impurities is termed a "flux." By the union of the latter with the former a compound is formed, which is in essential character a sort of fusible glass. The substance used at the Ferrona furnace for fluxing is limestone of a very superior quality, averaging

95 per cent. of carbonate of lime, and obtained alongside of the railroad at Black Rock.

A very important factor in the manufacture of iron is fuel, for upon the quality and quantity of it depends the quality and quantity of the iron. At Ferrona the quality of the coke is such as compares favorably with the "Connellsville coke," which is a standard in the United States. The Ferrona coke yields 84.78 per cent. fixed carbon, 14.20 per cent. ash, and 1.02 per cent. sulphur. As already stated, the three classes of materials used in the manufacture of pig iron are: 1st, the ore which yields the metallic iron; 2nd, flux or carbonate of lime, by which the process of smelting is aided; 3rd, fuel, which supplies the high degree of heat necessary to act upon them both and to produce what may be called the chemical combination effected in the interior of the furnace.

As a rule the proportion of ore in the charge is such as to give about 50 per cent. of iron. Keeping before us this proportion, three parts of ore, two of coke and one of limestone may be given roughly to indicate the average ingredients of material charged.

The blast used at the old furnace in 1829 was simply cold air, but in the present case we have the hot blast or highly heated air; this air is passed from the blowing engines through a large iron pipe, termed "the cold blast main," and is at the temperature of the ordinary atmosphere. It is then passed through the hot blast stoves, and after being highly heated from 500 degrees up to as high as 1,500 degrees, it enters the furnace through another range of iron pipes lined with firebrick, to protect the pipe and to maintain the heat as near as possible to that produced by the stoves.

Let us suppose that everything is in readiness, that the furnace has been successfully lighted, and has, after proper treatment, been dried sufficiently to add more fuel and blow harder. Little by little the burden is increased, that is, charged with ore coke and limestone, until the furnace has obtained her utmost capacity. Beginning at the top of the burden, we find a veritable process of calcination or roasting taking place. The ore is not only affected by the heat of the gases which are evolved from the material below, but it is acted upon by them chemically. The chief substances comprising these gases are carbonic oxide, which is inflammable, burning with a blue flame and forming carbonic acid, which is incombustible; cyanogen and hydrogen, which burns, forming water. Besides these, there are always present various hydro-carbons, more or less numerous. Immediately below the point at which this calcination takes place the ore commences to undergo a certain amount of reduction, which is mainly effected by the carbon of the carbonic oxide in the gases.

Below this region of reduction, we come to the part of the furnace where it is said to be a full red heat, i.e., about the middle of the body or cone of the furnace. At this zone the iron is exceedingly porous and spongy, and so extremely active that it will seize upon and combine with the elements of the nearest substance surrounding it; for this reason it is termed the zone of

absorption. Examination of a piece of spongy iron will show that it is of honey-combed structure, consisting of particles of metal seemingly cohering only very slightly, leaving space between. Iron in this condition is pure or impure, according to the richness of the ore used. If the ore used in producing it contains few impurities and these only of the less injurious sorts, so will the spongy iron be almost perfectly pure. The chief impurities contained in the spongy iron are phosphorus, sulphur, silicon and manganese. Of these debasing elements absorbed by the metal the worst are phosphorus and sulphur. These two are very low in our ores. The spongy iron, active as we have seen, takes up about 88 per cent. of the phosphorus contained in the ore and which is derived from the phosphoric acid present. The presence of phosphorus in the metal is very injurious, as we shall see further on. The sulphur taken up or absorbed by the mass of spongy iron is derived chiefly from the presence of the iron pyrites in the fuel; it is also derived from the bisulphide of iron, which is an impurity found in very small quantities in our ores. The sulphur can, as a debasing element, be largely prevented from absorption by certain methods, of which the chief feature is the use of lime in excess. Silicon and manganese do not rank so highly as debasing elements, still they are debasing, and have to be got rid of as much as possible. Of the two, silicon is generally considered the worst in its effects. The silica is derived from various impurities present in the ore and coke; these are chiefly clay and quartz and present generally in the form of silicates, and they are fused or melted with such great difficulty, even under the high temperature present in the blast furnace, that they are considered practically to be unfusible, hence the employment of limestone. This limestone, by entering into combination with the earthly impurities, changes them into substances which are capable of being smelted or made fusible to a considerable extent; the lime combining, as we have seen, with the clay and quartz, forming the silicate of lime and silicate of alumina, and this being fused into a species of lime glass, otherwise known as slag. About half the manganese contained in the ore unites with the iron, and the remainder goes off with the slag.

Another element taken up by the iron is carbon. This, however, is done in such a particular way that it has given rise to a term which indicates its characteristic, viz., carbon deposition, showing that it is not so much a process of absorption of the carbon by the spongy iron, as that it is mechanically placed or deposited upon the surface of the granules of the iron. Carbon unites with the iron from 2 up to 5 per cent.

Considerable diversity of opinion exists as to the exact position in the furnaces at which fusion of the ore takes place. Chemists know that certain combinations must, in certain circumstances, produce certain results, but it does not follow that they can trace or define the exact position of this fusion. The very condition of the furnace shows that there must be points at which we can only guess at what is going on. It is when the absorbing or combining process is completed that the process of complete fusion commences, it being completed at what is known as the "zone of fusion." The narrowing or decreasing of the area of the furnace just here is rendered necessary by the decreasing bulk of iron now in a state of fusion; it serves also to intensify the temperature at the lowest point, or that at which the crucible of the furnace is situated, at

the point where the furnace is at its narrowest, called the "white heat zone." When the melted iron in its downward course passes through at what is called the "white heat zone," the fusion or reduction is complete. The mass of metal thus assumes the lowest position; the slag being lighter or of less gravity, floats, so to speak, on the top of the metal. This slag is taken from the furnace every two and a half hours, and run into a large "slag ladle," and from thence dumped into the field. When the reduction is completed, which takes six hours, the metal is ready to be withdrawn from the furnace, which is done by opening the tap hole, when it flows into a long channel or sewer formed in the sand, which constitutes the floor. Branching off from the main channel are minor ones or molds, into which the molten metal flows. These molds or channels are called pigs, hence the term by which the bars of cast iron are known is familiar to every one as pig iron; the length of these pigs is about four feet, and the breadth from three to four and one half inches. When making iron for the steel and forge works, the furnace turns out on an average 82 tons of iron every twenty-four hours. This, when cooled, is loaded and shipped direct to the N. S. Steel and Forge Co. in Trenton. These works were erected in 1882, and consist of 2 Siemens-Martin melting furnaces, 20 tons capacity each; 3 gas heating furnaces, 5 reverberatory heating furnaces, 26-inch reversing cogging mill with trains of live rolls, heavy vertical hot billet shears with live rolls, 1 20-inch plate mill, 1 16-inch bar mill, 1 12-inch bar mill, 1 9-inch guide mill, 12 pairs shears (40 tons and smaller), 1 5-ton steam hammer with 15-ton hydraulic crane, 5 smaller ones; machine shop, 175 feet by 75 feet, with 30-ton travelling crane commanding whole shop, equipped with 24-inch slotter, 6 drills (1 a 9-foot radial, 5 spindle), 9 lathes, one of which will swing 8 feet 10 inches in the gap, will take 37 feet between centres; small and large planers, shapers, etc. Power is supplied by some 50 steam and 10 hydraulic cylinders; entire works are lighted by arc and incandescent light; output, 100 tons of steel per day. This company has supplied over 97,000 axles to Canadian railways. The pig iron used in making steel, prior to the erection of the Ferrona furnace, was imported from Great Britain, but as the Ferrona iron is specially adapted for steel making on account of the small percentage of sulphur and phosphorus, the N. S. Steel and Forge Co. are able to use it in large quantities.

Before describing the conversion of pig iron into steel, it might be well first to note what steel really is. On the one side we have pig iron, a hard and comparatively brittle substance, containing carbon from two up to as high as five per cent. On the other, wrought or malleable iron containing very small quantities of carbon. From between these two bodies, therefore, we obtain steel. It is a body or substance intermediate, distinct in itself, yet possessing the characteristics of both. The distinguishing property of steel containing carbon over 0.35 per cent. is the power of being hardened at pleasure by being plunged while hot into water, oil or other medium by which it is rapidly cooled, being intermediate in position between wrought and pig iron. Steel is both fusible and malleable, but requires a higher temperature for fusion than pig iron, and a greater compressing power owing to its lower welding temperature than wrought iron. Those varieties that are richest in carbon are the hardest and most fusible,

and are known as strong steels, while those that are nearer malleable iron in composition are distinguished as mild steels or ingot irons.

We are now prepared to describe the conversion of pig iron into steel by what is known as the Siemens-Martin open hearth process, used exclusively by the Steel & Forge Co. The furnace is constructed with two pairs of regenerators built transversely beneath the furnace bed. Above the regenerators is the furnace, with its hearth supported upon cast-iron plates, between the under side of which and the top of the regenerator chambers air is free to circulate for the cooling of the bottom. The plates are lined with a single thickness of firebrick, and above this is the bottom made of sand, with a total depth of from 12 to 16 inches. The hearth is rectangular in form and slopes from all sides towards the tap-hole, situated at the back. At the front side of the furnace are three doors, used for charging purposes. The two ends of the furnace are constructed of silica-bricks, as is also the roof. The furnace is fitted with the usual valves, etc., for reversing the direction of the current of air and gas, the latter passing from the gas producers through the regenerators to the hearth by the port, where it meets with the heated air required for its combustion, the air having ascended on its way to the furnace through the regenerator. The air and gases are thus admitted at one end of the furnace, and the flame and waste gases escape at the same time by the ports at the opposite end of the hearth, and are drawn down by the chimney draught through the chequer work and pass on until they reach the flue, by which the waste gases pass to the chimney.

The presence of phosphorus over 0.10 per cent. brings about that condition in the steel which is very antagonistic to its constructive strength and to the easy facility with which it may be worked; when in the steel over and above the given percentage it makes the metal "cold short," or brittle when cold.

The way in which sulphur acts as a debasing constituent in steel is in giving it a tendency known as "red short," or brittleness when red hot; this is a very serious defect, as it prevents the rolling of steel in bars or hammering into forgings. The presence of silicon, manganese, and carbon are not so serious, as they can be reduced to small percentages by fusion, and to some extent they modify the exact amount of effect produced by a given quantity of phosphorus or sulphur.

We now turn our attention to the treatment of the iron in the furnace. This consists of mixing and fusing pig and scrap together to form a new metal; the purpose which the scrap serves in the process being the diluting to a certain point of the debasing or weakening constituents present in the pig or cast iron. The decarbonization and desiliconizing of the pig iron is brought about by subjecting the two metals, pig iron and scrap, to such very high temperatures that they are melted or fused—this high temperature being required as the metal becomes more and more refractory as the silicon and carbon disappear. By this process the silicon and manganese can be reduced to a mere trace and the carbon reduced until it stands at 0.10 per cent.; then the iron will become softer, less brittle and capable of being hammered or welded, but much more difficult to fuse or melt than before. In brief, it will be changed into wrought iron at a stage earlier than that at which the carbon is by 0.10 per cent., that is, when the carbon in the metal has been reduced from 2½ per cent. present in the pig iron to 1½

per cent., then metal called steel is formed. At judicious intervals the workmen throw into the bath pieces of ore which, under the influence of the great heat in the furnace, melt into a scum or slag which collects on the surface of the fused and fusing metals in the bath, and which serves the useful purpose of protecting the metal from the action of the flaming gas, which would otherwise oxidize it. This slag contains metallic iron, and from time to time the workmen endeavor to get it to deposit. This depositing, or cleaning the slag, as it is called, is effected by the addition of fusing substances such as lime, etc. When in the opinion of the furnaceman the process is complete, he passes into the furnace a small ladle or spoon attached to the end of a long handle, and takes out a sample of melted metal. After cooling it in water it is then hammered and broken by fracture. The character of the fracture and its behavior under the hammering enables the workman to judge whether the process of fusing has continued long enough to give the highest value to the steel. He may require to take many samples before he is satisfied that the metal is in a proper condition. When he so satisfies himself, the next part of the process is carried out. This consists in throwing into the bath of melted metal a quantity of ferro-manganese, the use of which is that this rich alloy prevents "red shortness." The manganese also being readily oxidized, combines with the oxygen present in the mass of steel; this combination prevents the formation of cells arising from the occlusion of gas in the body of the mass. It also enables the steelmaker to produce sound steel, and to give to the product the necessary percentage of manganese, while on the other hand the percentage of carbon may be decreased.

The furnace is then tapped, and the metal withdrawn from the hearth and emptied into a large ladle, from which it is discharged into moulds, forming what is known as ingot steel.

From the moulds the ingots are transferred to the mill furnaces, and, after being heated to a certain temperature, are rolled into long bars which are cut up into such lengths as required. These lengths or billets are reheated and rolled into flat and round bars, fish plates, nail plates, small rails, etc. The billets are hammered into car axles, shafting, cranks, and all kinds of marine work. We have now gone over all the leading points connected with the manufacture of pig iron and steel, and trust that with such natural resources as we possess, directed by skill not inferior to that found among our competitors, we shall move steadily onward, overcoming all obstacles or difficulties that may appear in our way, until at last we shall attain to what we are destined to be, the manufacturing centre of Canada.

For THE CANADIAN ENGINEER.

#### THE PROSPECTS OF THE GAS ENGINE.

BY J. H. KILLEY, HAMILTON, ONT.

Rivalry with steam power in an economical sense is now the order of the day among advanced mechanicians; perfectly successful gas engines up to 600 h.p. are now in operation, running with the steadiness and the regularity of the steam engine, not taking more than 1 lb. of inferior coal per h.p. per hour, while some builders claim that they can build them to run with ¾ lb. A gas works in the States has a 300 h.p. gas engine running a dynamo, enabling them to supply electric lights in addition to gas light at a net cost far below that of the most economical steam engines and boilers. A

European engineering firm have contracted to build a gas engine of 1,000 h.p., which it is expected will run with  $\frac{1}{2}$  lb. of coal per h.p. per hour. Tangyes, of Birmingham, England, advertises gas engines of 40 h.p., which are guaranteed to work with less than 1 lb. of coal per h.p. per hour—a remarkable result for so small an amount of power.

If gas engines can be successfully constructed and set to work of 1,000 h.p., why not of 2,000 or 3,000 h.p., if wanted? Downton gas can be manufactured for 20 to 25 cents per 1,000 cubic feet. This gas is largely used in gas engines of large power; this is about one-half the cost of the fuel for the most economical steam engines. The combination gas works and lighting by both gas and electricity ought to be a profitable investment, as the power plant by gas engines is less costly than that of steam power, and will still become less as the movement goes on. Gas engines in some forms have been in existence, to the writer's knowledge, for forty years or more, and have only been a commercial success of late years. In Croydon, a suburb of London, England, gas train passenger cars are using them on their local line, some miles in length; they have been pronounced a complete success, and are run at about one-third of the cost of the horse cars previously in use. It is claimed that power costs less than two cents per mile run by cars with the ordinary loads. The gas is compressed to 150 lbs. to the square inch in a tank, by aid of a gas pump and an 8 h.p. gas engine. This rig will easily compress sufficient gas to keep ten cars in full motion, equal to the work done by one 150 h.p. engine on electric trolley roads. It is expected that twenty cars will soon be running on this road. The cost of running these cars, it is claimed, is about one half that on a trolley road, while the amount of capital need not be more than one half. The gas tanks in the cars under the seats hold sufficient to run for ten miles; they can be recharged in two minutes. These cars have this advantage in addition, that no expensive power-plant, central station, including engines, boilers, or electric generator, are required; no wires, poles or trolleys, or danger from electric shocks. Not only have the gas cars been a success, but, in addition to these, gasoline or petroleum cars are also largely coming into use in France and Germany. For some three years past petroleum road carriages have been in use in France. Recently a large number have been built and put into operation. In July last a competitive test took place for prizes of from \$1,000 downwards to \$100 for the best road car to run over the common road from Paris to Rouen. Twenty-five cars started on the test, two of which were run by steam and the rest by petroleum. The distance run over was 76 miles each way. There are some very heavy grades on this road, as high as one in 12, yet all the cars but one, which met with an accident, went over the whole course, the average speed being for each car from  $7\frac{1}{2}$  to 12 miles per hour. The first prize was divided between two of the kerosene cars with what is called Damier Motors, after the name of the German inventor. Not the slightest hitch, in a mechanical sense, is reported by the scientist judges as to the running of the carriages. Now, as to cost of running, the cars carrying 4 persons ran an average of 15 miles with one gallon of petroleum, costing 18 cents in France, or about 11 cents here. This small amount can be accounted for by the fact that the impulses running the cars are generated

from a mixture of 12 parts of air to 1 part of petroleum vapor. The carriages have storage for petroleum for a run of 100 miles. There is scarcely any attendance wanted after the motor is started, further than to oil it and steer it on the road; in other respects they are automatic in their action. A very large number of these cars are now running on the common roads in France and Germany, the demand being continually on the increase. It is thought in the near future that they may become as common as bicycles, being so much cheaper than any other method of travelling. It can be easily understood that a motor that will cheaply run a road car can be applied to a boat or any other kind of machinery. I think that there is an excellent opening in Canada for some speculative machinist or capitalist to go into their manufacture.

Allow me to say a few words about electric cars in Paris, France. In that city they have a line of storage battery cars thirty in number, that have been in operation nearly two years, which have been an electric, mechanical, and commercial success, the storage cells never having given the least trouble during the whole time. It is claimed that these cars, taken collectively, have run over 1,000,000 miles, and are now in perfect order, with a prospect of making another million. Similar, or storage battery cars, have not been a success commercially in America.

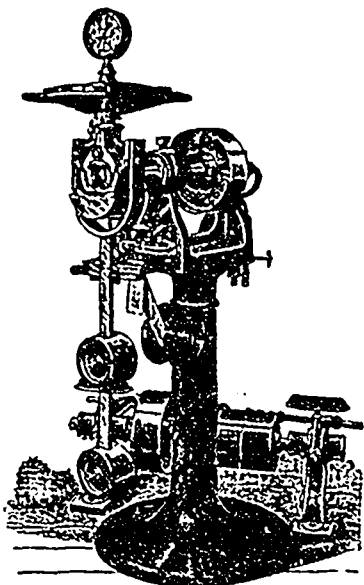
Referring to my communication to you on the Portsmouth electric lighting plan, I wish to state that the *English Engineer* has illustrations and descriptions of this plant in two of its July numbers.

A FRENCH engineer has a simple plan for preventing hard deposits in steam boilers. Each boiler is allowed to go on working for about 500 hours before being cleaned, when it is stopped, with the water in it, and allowed to cool down for about a week; the masonry is allowed to become cold, and then the tap is opened, also the safety valve, so that the water runs naturally out of the boiler, the latter, when empty, being entered and simply swept—the deposit, being in the form of damp mud, is easily swept away, leaving the boiler as clean inside as if it were new. This method has been in use some five years, and might seem to show that the accumulation of deposit is due to the emptying of boilers under pressure while they are yet warm, the crust being thus hardened. It is obvious that this method cannot be applied to every boiler, nor can it be applied where an establishment has only one boiler and that in constant use.

A CORRESPONDENT of THE CANADIAN ENGINEER writes that since the tariff has been settled business in the American manufacturing centres has taken a spurt. Many of the factories are now running night and day, and numbers that were closed down for a year or more have resumed operations. One good result to Canadian trade, apart from the improvement in the export of produce, will be that the American makers of machinery who have been selling their products in the Canadian market at less than cost, will now have their hands full at home and will leave this market alone. An instance is cited in which an American boilermaker sold an upright boiler to a Canadian firm at \$80, the lowest price quoted in Canada being \$120. The American admitted that this was much below cost, but said it was his only way of realizing on his stock. Now this slaughtering will cease, as the American manufacturers will have, for a time at least, all they can do to supply their home market.

## OIL TESTING MACHINE.

The machine illustrated herewith has been designed to ascertain by mechanical means, and under various conditions, the lubricating qualities of oil, and to register the same by means of diagrams, so as to afford valuable and reliable information to oil manufacturers, testing laboratories, and to all who use oil in large quantities or to those who lay special stress upon great uniformity in the lubricating quality of the oil.



As seen from the illustration, it will be noticed that the machine consists of a frame mounted on a pillar; a shaft mounted in bearings in the frame, which shaft carries a hardened and ground pin, on which rides a pendulum provided with two special bearings. There is an arrangement for regulating the temperature by means of water, and an apparatus which registers the throw of the pendulum on a strip of paper.

The main shaft is hollow, and contains a water pipe, the outside diameter of which is somewhat smaller than the hole through which it passes, and the end of which leads into the hardened pin, and is provided with a spraying head. Cold or warm water can be forced through this to cool or warm the pin, as may be desired. This water afterwards flows away through the space round the pipe. By this arrangement, in comparative tests, the temperature of the pin can be regulated as desired. This is very important, as the co-efficient of friction is dependent to a great extent upon the temperature of the lubricant, and in order to arrive at a correct result, only tests which are carried out under exactly the same conditions can be compared with each other. To guard against the stopping up of the spraying nozzle, an arrangement is made by which the water must pass through a finely meshed sieve. The diameter of the hardened pin is  $3\frac{1}{8}$  in., and the length  $2\frac{3}{4}$  in., and it is made, we understand, of the finest cast steel, carefully ground and highly polished. The pendulum hangs free on the pin, and has  $\frac{3}{4}$  in. end play on same. It has, at the upper end, a fixed bearing on each side and a movable bearing on top, which latter is guided in the upper part of the head, and can be pressed against the pin by means of the compressor.

The pressure can be read on a pressure gauge, which is mounted on the compressor. The highest allowable pressure of 90 pounds per square inch corresponds to the highest possible pressure of about 3,000 pounds per square inch on the surfaces of the bearing, which is quite sufficient for the testing of all lubricants.

The compressor and head of pendulum are exactly counterbalanced by a weight at the lower end of the pendulum rod. The bob, which is on the middle of the rod, can be moved up and down a scale, so that the throw of the pendulum can be regulated for the different oils, and the recording point of the registering apparatus will not be thrown beyond the strip of paper. During the test, which it is best should last from one hour to an hour and a half, and during which the variations of the speed of the machine should be as small as possible, the pin dips into a bath of oil that is to be tested. This oil bath, as has been mentioned before, can be cooled or warmed, and its temperature measured by a loose thermometer, while immediately under each of the side bearings a thermometer can be introduced so that the temperature can be measured as near as possible to the rubbing surfaces.

The throw of the pendulum during the test indicates the co-efficient of friction for the observed pressure and temperature, and this motion is by means of a cam, transferred to a slide carried by rollers, which is provided with a scale, in which the constants of the machine are taken into account.

The throw of the pendulum is marked upon the paper of a registering apparatus attached to the machine, by means of a pencil fastened to the slide. The comparison of the curves obtained in this manner in testing various kinds of oil, with the curves obtained from refined acid free linseed oil under the same conditions, gives a clear representation of the value of the oils under test.

This machine is made by Ludw, Loewe & Co., of Berlin, Germany.

APROPOS of the improvement in manufacturing in the States, referred to elsewhere, it is worthy of note that the rates on ore from the head of Lake Superior to the Cleveland iron district jumped from 60 to 80 cents. At the same time there has been a rush of furnaces into blast. In the Mahoning and Shenango valleys, where 3 furnaces were in operation on the 1st of August, 19 were working at the close of the month.

AN English inventor proposes an improved system of wheel construction, claimed to be of special value in the case of heavy fly-wheels, but not of exclusive adaptation. It is proposed to avoid the expensive machinery commonly required for such wheels, and the ordinary wheel arms are replaced by wrought iron rods which are U-shaped and lap around the hub of the wheel, the ends of the U being secured to the rim by nuts. The driving power is transmitted to the spokes entirely by friction, and as the arc of contact of the spoke on the rim is fairly large, the principle of band friction comes into play, so that very great torques can be transmitted without any risk of slipping. For a twenty-ton wheel the plan is to use thirty-two spokes, each two inches in diameter, secured to the rim by split nuts. Such a fly-wheel as usually built would, it is remarked, have six or eight arms, and when running at high speed the centrifugal force tends to bend the rim between, such bending being a serious addition to the direct circumferential tension due to the same force; but the numerous spokes of the new construction greatly reduce this bending, while at the same time the wrought iron spokes are so much stronger that the wheels can be run at a much higher speed.

SAID Nikola Tesla, in a recent New York interview: "I look forward with absolute confidence to sending messages through the earth without any wires. I have also great hopes of transmitting electric force in the same way without waste. Concerning the transmission of messages through the earth, I have no hesitation in predicting success. I must first ascertain exactly how many vibrations to the second are caused by disturbing the mass of electricity which the earth contains. My machine for transmitting must vibrate as often to put itself in accord with the electricity in the earth."

New engines on first being started are frequently injured by the cutting of the cylinders and the valve seats. The surfaces of these important organs, which ought to be perfectly smooth and true, are frequently scratched or scored at the very outset, and damaged more than they would be by a long period of hard service. Often the engine driver is charged with neglecting the lubrication of the valves and cylinders, while sometimes it is claimed that the oil introduced into the cylinders is of inferior quality, and the surfaces are not properly lubricated. A writer in the *Engineering Record* says that in a large majority of cases where these injuries have taken place, it is most reasonable to attribute them simply to the action of grit and foreign matter which finds its way into the cylinders, and its presence is due to the fact that the steam pipes and cylinders have not been properly cleaned and blown out previous to the first starting of the engine. Foreign matter is present in the pipes and cylinders during the process of installation, and unless removed is liable to do injury, and no one should start an engine without making some effort at least to clean out the pipes, and take steps to prevent injurious action of this kind. It is generally thought sufficient to blow the pipes out for a period of only a few minutes, but it would be well if a considerable current of steam were allowed to pass through for several hours' time. If this were done, not only for the piping, but also for the passages in the cylinder leading to the steam ports, there would be fewer cases of cylinders being cut and valve surfaces scored on new engines.

#### INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.

The twenty-second annual convention of the National (now International) Association of Fire Engineers took place in Montreal on August 14th to 17th, inclusive, and from the number of delegates attending and the many entertainments enjoyed, must be voted a great success. Besides the delegates, of whom there were about 450, there were present in Montreal many of their wives and daughters, who seemed to enjoy their outing fully as well as the delegates themselves. The majority of those present were American fire chiefs, some of whom had come from the far South and the far West, but there was also a sprinkling of delegates from our own Provinces.

The proceedings opened on Tuesday, at the Windsor Hall, with addresses of welcome from the Lieutenant-Governor of Quebec Province and the Mayor of Montreal. Colonel Stevenson, chairman of the Montreal Fire Committee, who was the energetic organizer of the programme for the delegates' entertainment, read a letter from the Governor-General, Lord Aberdeen, regretting his inability to be present at any of the meetings, owing to prior engagements.

The Hon. J. A. Chapleau then delivered his address of welcome. He was sorry to have been chosen to open the fire. However, on looking at Colonel Stevenson and veterans like Mr. Perry, he felt some of the old fire returning to his veins. He paid a glowing tribute to the noble calling and heroic devotion of the firemen, and proposed for them the motto of the gallant Francis I, whose shield bore a salamander with the words. "I live in it and kill it." After enlarging on the glory due the modern fireman, and the difficulties and dangers constantly and unflinchingly faced in the performance of a fire fighter's

arduous duties, he went on in eloquent language to speak of the pleasure afforded him by the sight of the mingled Union Jack and Stars and Stripes, a combination which was representative of the mutual feelings of the two great branches of the Anglo-Saxon family, and one which ought to hold always, and doubtlessly would do so more and more as time went on.

Mayor Villeneuve's address was as follows:

"We have pleasantly and constantly looked towards your visit, proud to know that your noble organization was doing us the honor to hold your twenty-second annual convention in our city, and happy to meet brave men, distinguished for their ability, intelligence and devotedness to the interests of their fellow-citizens. We considered that you came not as strangers among strangers, as you were personal acquaintances and warm friends of the heads of our fire department, and I feel confident that the admiration previously based by our citizens on your reputation will be deepened by personal contact into sincere and strong attachment.

"I therefore welcome you most heartily to our city and all the more so because you have done the correct thing in bringing along with you your wives and daughters. I fully realize the devotion, abnegation and self-denial of a fireman's wife, and it is only right that she should partake of her husband's rejoicings as well as of his sufferings.

"For one and all we will endeavor to make your stay in Montreal as agreeable as possible, and we hope that you will take home pleasant memories of our city and our people. I also sincerely trust that your convention will be fruitful, and that it will result in doing good to yourselves as a body and to the different departments you represent. You may rest assured that on our side we appreciate fully the honor you have done our city in selecting it as the scene of the present convention, and that whatever destiny may have in store for you, the good wishes of the people of Montreal will always accompany you."

Chief Humphreys, of Pittsburg, Penn., in reply, said they all felt that they were not strangers in this country. They felt a homogeneous spirit which begot warm and kindly feelings. It might be Ald. Stevenson's ulterior purpose to make them all subjects of the Dominion of Canada. His method seemed to be to win them by the process of friendly absorption. But they were here as representatives of fire departments, and their efforts while here would be directed towards improving those departments.

The police band in attendance here struck up with "Yankee Doodle," a compliment which, as may be imagined, was acknowledged with enthusiastic applause.

After brief speeches by Chief Taylor of Richmond, Ex-Chief Damrell, and Supt. Abbott, both of Boston, the opening session came to an end.

At the afternoon meeting the first business transacted was the presentation and acceptance of the report of the Committee on Credentials. A committee of five on "Exhibits" was appointed.

The next matter discussed was the disgraceful behavior of one of the association's members during the morning and on the journey to Montreal. The members of the convention were one and all indignant at his conduct, especially as it tended to cast discredit on their whole organization, and it was decided to have him brought before the convention for a reprimand. The matter, however, afterwards dropped.

Several communications bidding success to the convention were read from absent members of the association, and then the business proper of the convention commenced.

A paper by W. Paul Gerhard, C.E., New York, on "Theatre Fire Catastrophies," was read. The author gave, in a very exhaustive manner, the statistics relating to the many terrible fires which have occurred in theatres, from which it appears that during the hundred years preceding 1882 theatres to the number of 536 had suffered severely or been totally destroyed by fire. Since that date many other catastrophies had taken place with terrible destruction of human life. In four fires, between 1880 and 1890, over 1,600 persons were killed. The average duration of an American theatre was about twelve or thirteen years, a large proportion being destroyed before the end of the fifth year after construction. Perhaps the majority of fires in theatres were caused by the careless use of lights, fireworks, etc., during the performance. Since a panic was oftentimes worse than the fire itself, it was very essential in the construction of theatres to provide a large number of exits, all plainly marked as such. But probably the only safe method was, in addition to rendering the building fireproof and providing ample means of exit, to institute a thoroughly reliable system of watching and inspection.

In the evening many of the delegates paid a visit to the Sham-

rock Lacrosse grounds, where they had an opportunity of hearing the band of the 5th Royal Scots and of witnessing the "trooping of the colors."

## WEDNESDAY.

Wm. Brophy, of Boston, Mass., read a paper entitled "Some Points in the Transmission of Electric Energy." Mr. Brophy spoke chiefly of the danger of the presence of free electricity in the ground as brought about by the electric street railway companies. It was rapidly destroying the water and gas pipes put in for the service of the public. In the case of gas pipes there was danger to human life added, because a spark might be produced and cause an explosion. There was no reason why an electric company should have, in addition to the privilege of carrying passengers, the privilege of destroying the public's property.

Ex-Chief Damrell, of Boston, moved that a special committee be appointed to collect information on the matter and prepare a report to be distributed among all the municipalities where trolley wires were in use. The National Board of Underwriters were also invited to take part in the investigation.

John Riddell wrote, giving the results of some personal observations on the effect of the electric current on pipes. The electricity jumped to the best conductors, down through the damp ground until it reached the water-pipes, in which its action could be seen by the number of little holes where it met with any obstruction, whereupon it rushed again to the rails. The electrolyzed particles knocked off were curiously light. Upon examination the writer had found that the iron had largely disappeared, thus resulting in a reduction of specific gravity to about one-fourth. The ground around the electrolyzed pipe, however, gained what the pipe had lost. What was the remedy? To reverse the trolley current. That, however, was neither expedient nor altogether practicable. Perhaps the best plan was to make the rails thoroughly good conductors by welding them well. Frequent voltage measurement also should be adopted, and such changes made as were found necessary.

Mr. Brophy said that the system of letting the currents return either along the rails or the earth ought not to be permitted. That cities should allow wires to run from one end of them to the other, with such terrible consequences often to life and property, was disgraceful. In one or two cities there was a system of electric cars without overhead trolley wires, but with two wires placed underneath the ground.

Chief Barrett said it was absolutely unnecessary to place trolley wires overhead, and he believed as improvements went on that underground wires would not be found more costly.

Capt. Damrell wanted to know what would be the effect of electrolysis on gas pipes.

Mr. Brophy stated that explosions had several times resulted from that cause. Sometimes the gas had escaped from the defective pipes and had accumulated in large quantities under the pavement, the consequence being a serious explosion.

Chief John Lindsay related the results of some experiments as to the power of incandescent light wires in causing fires. It seemed that old lamps became the cause of fires more easily than new ones. Wood in contact with electric lamps became charred in 40 minutes, muslin was ignited in 14 minutes, paper in 4 minutes.

Chief Barrett remarked that in old days the great cause of fires was spontaneous combustion. Whenever a fire broke out which could not be accounted for, it was put down to spontaneous combustion. Now, however, things had changed and electric wires had to bear the blame.

The next paper read was one by Chas. A. Rolph, of Chicago, on "The Progress of Electricity in Municipalities," in which were stated its various developments in several American towns and cities. Progress in electricity, he contended, was tantamount to increased fire hazard, unless builders made great improvements in their methods of construction.

Wm. McDevitt, Inspector of Fire Patrol, Philadelphia, then read a paper on "Slow-burning Mill Construction."

He regarded the "Isolated Floor" system a delusion. The trouble was that the architects who generally attempted to build slow-burning buildings did not properly understand what they had to fight against. Any building would burn, no matter what the material, if the flames were only given a slight chance to make headway. The object to be aimed at was to cut off all draft, so as to prevent the flames from spreading before the firemen were on the scene.

Captain Damrell remarked that people as far back as 300 B.C. used to convene in order to discuss measures for the prevention of fires, just as their convention was now doing. Slow-com-

bustion building was very important, and he believed this convention would go a long way towards finding out a true method of building with that object.

Chief Lindsay said the great thing to be aimed for was to reduce the area of combustible material.

Mr. Brophy said there was a misunderstanding as to the line to be drawn between incombustible and slow-combustion buildings. The sort of construction to be condemned was that in which the walls, etc., were made of iron, fireproof, but where there were open spaces in these walls so that often a fire arising in the cellar had reached the roof before anyone was aware of it.

Mr. Brown Flanders, superintendent of the Fire Alarm Telegraph, Boston, Mass., then submitted a paper entitled, "Dynamo Currents as Applied to Fire Alarms," which he stated to be a highly successful method.

F. O. Affeld, representing the fire underwriters of New York, read an exhaustive paper, entitled "Reliable and Uniform Statistics the Basis of Economic Fire Protection and Good Government."

Capt. Damrell spoke eloquently on the other side of the subject, though he indignantly disclaimed any wish to cast any slur on the National Board of Underwriters. He wanted to know whether, if the underwriters decisively said they would insure no buildings where inflammable material was stored, business men would continue to store such material? And seeing that the underwriters did not do this, were they not largely responsible for the number of fires that existed?

Mr. Affeld said, in reply, that it was not the province of the insurance companies to prevent people from insuring; it was their province so to increase rates as to force the public in self-defence to carry out the recommendations advised by the underwriters so long.

Chief Kenfield related a case in point, in which the firemen's attention had been called to a large amount of inflammable material stored in a certain warehouse. The chief represented the danger to the owner of the premises in question, but had been unable to induce him to take the necessary measures for its removal. He therefore then went to the insurance people, who threatened the business man with a withdrawal of their protection unless the inflammable material was removed within half an hour. Needless to say, the danger was soon removed.

Supt. Abbott trusted that the underwriters and the fire chiefs would do their utmost to bring about water facilities in the various towns and municipalities.

Chief Marginell thought the insurance companies were much to blame for the abnormal number of fires on this continent. He thought Capt. Damrell's words ought to be printed in red letters and sent to all the insurance companies.

Mr. Brophy moved that the statistics of fires (including those not covered by insurance) asked for by Mr. Affeld, of the Board of Underwriters, should be prepared so far as was possible.

The meeting then adjourned in time for the delegates and their ladies to take the drive round the city and up to the mountain top, where refreshments were served. In the evening many of the visitors paid a visit to Sohmer Park, where a grand musical entertainment had been provided in their honor.

## THURSDAY.

Part of the morning was devoted to hearing the claims of those who had exhibits at the Victoria Rink, which had been temporarily converted into an exhibition ground for various fire appliances, etc. Mr. Werheim addressed the meeting on the subject of an invention in which he was interested, viz., asbestos clothing for firemen, which could be used for working in spots of particular danger. Among the exhibits was a very fine one by the Bell Telephone Co., in which all kinds of telephones, fire alarms, etc., made at their Montreal factory, were shown and duly admired. Amongst other exhibitors we noticed the names of R. H. Buchanan & Co., Montreal (pumps, hydraulic apparatus, etc.), and John Martin, Sons & Co. (fire helmets and appliances). Another fine exhibit was that of W. A. Fleming, Montreal agent for Reddaway's belting.

Perhaps the finest exhibit in metal appliances was that of Garth & Co., proprietors of the Dominion Metal Works, Montreal. This widely-known firm, whose business was established so long ago as 1828, showed a great variety of appliances used by firemen, such as hose pipes, cut-offs with relief valves, plain cut-offs, controlling nozzles, shut-off nozzles, hose keys, hose couplings, hose reels, leak stops, hose patches, etc. The exhibit was arranged in the form of a pyramid, and drew forth many admiring comments from the visitors. It will be interesting to our readers to know that the first fire engine ever made in Canada was built by this firm. We hope to be able in an early number to give an account of a new stop cock which is about to be placed on the market by



Garth & Co., and which has been pronounced by expert engineers to be the most remarkable thing of the kind yet produced.

A number of delegates visited the Dominion Burglary Guarantee Co.'s office, where they had the opportunity of seeing Mr. J. A. Grose's burglary and automatic fire alarm systems fully explained. They were surprised at their completeness in all details.

The afternoon and evening were devoted to a trip which was fully enjoyed by all, namely, a river excursion to Lachine (and down the Rapids), Varennes and Boucherville, where, in the evening, a grand aquatic spectacle and a ball were given. As usual, the leading spirits were Col. Stevenson and Chief Benoit.

FRIDAY.

The morning was devoted to another business session, the discussions being in the form of "Topics." The president being unavoidably called away, the chair was taken by Mr. Brophy.

Topic No. 1—The best plan to extinguish a fire in a cellar stored with oil, when the only entrance is in the inside of building.

This paper, after giving the flashing point of several of the more well-known oils, stated that water was not efficient in extinguishing oil fires. It was useful, however, after the flames had been smothered, to reduce the temperature.

Capt. Damrell questioned whether the storage of petroleum in cellars below the street should be permitted.

No. 2—Fire in attic of frame building; best plan for extinguishing same; should stream be thrown from both ends or through holes in the roof, or both?

Chief Henniviller, Columbus, O., said that the average attic fire in the stereotyped two-and-a-half story hip roof house was best handled by throwing streams from both or either end of the building, and as most houses of this class have a window in each end of the attic, the means of access were usually very easy, and unless such fire has gained considerable headway, the extinguishment of it should occupy but a short time. One great help for prompt and effective work was to cut a vent in the roof. This would free the attic of smoke, enabling the better and quicker location of the fire, and consequently saving a larger water damage to the floor below. In fighting an attic fire through holes in the roof many of the patented pipes that could be operated through a small opening could be used to good advantage, as the stream from the same could be directed in any quarter, and they have proved their value in many cellar, roof and attic fires where it was impossible to reach the seat of fire by the ordinary methods. Under ordinary conditions the best saving had been effected by venting the fire at the highest point possible in the roof, thus enabling the firemen to locate exactly the seat of fire and get the largest possible amount of benefit from the water used. The average attic roof was one of shingles, and the most successful way, after the fire has taken a good hold, to quickly put out the fire and prevent its spreading, was to wash it down well from the under side, and this could be more readily accomplished by streams thrown from the ends.

No. 3—Should not a uniform coupling be adopted in cities within a radius of 50 miles? and where they are not of the same size and styles, should not interchangeable coupling be provided?

It was resolved that this and the other topics read should be placed on the minutes of the association.

No. 4—Is it not the duty of cities and towns provided with a system of water works to place in the fire stations water gauges, that the fire department may at all times become familiar with the state of water pressure, and keep a daily record of same?

No. 5—The use of standpipes in large buildings.

The consideration of this topic was carried forward to next convention.

No. 6—The proper location of gas meters in buildings.

Supt. Abbott thought it was advisable to so place the meter as for it to get the minimum of heat, which would be as low down near the floor as possible. He then described what he took to be the ideal meter. The main pipe should be put perpendicularly from the point where it entered the building. Connections should be made of iron. A hood should be provided for the meter, with sufficient space between the two to prevent the heat from attacking the solder of the meter.

No. 7—The service and economy of five patrols or salvage corps in small cities.

No. 8—Should not the size of our hose, nozzles, hydrants and engines be increased to keep pace with the large areas and so-called slow burning construction in vogue in mercantile buildings of the present day? and how much can they be increased and be practicable to handle?

No. 9—How best to handle brush and prairie fires, that threaten suburban residences beyond the reach of the water service?

No. 10—How should buildings be constructed to be the least affected by the expansion force of material used therein when exposed to excessive heat?

No. 11—What tests should be required from a water company for a renewal of a ten years' contract by a town of eight to ten thousand people relying exclusively upon hydrant streams for fire duty?

Chief Bundel thought that for a town of, say, 9,000 inhabitants, 1,000 to 1,200 gallons of water per minute, under a pressure of 80 pounds, ought to be sufficient.

Mr. Brophy read a convincing paper on the subject of the removal of efficient fire chiefs from positions which they have perhaps held ably for years, for political reasons. He condemned the practice *in toto*.

It was moved and seconded that Mr. Brophy's paper, that is, in its political aspects, should be taken as the sense of the meeting. This was voted unanimously, though Canadian delegates, for the reason that their circumstances were happily entirely different, took no part in this stage of the proceedings.

The afternoon session was devoted to general business.

The reports of the secretary and treasurer were read and adopted.

The secretary suggested that the name of the association would more properly be the *International Association of Fire Engineers*, which alteration was adopted.

He also proposed that a National Congress of Firemen should be held somewhere in 1896 or 1897, on the plan adopted some little time back in England.

Reference was made to a report which had appeared in a Montreal paper to the effect that a number of American fire chiefs, who had witnessed the fire at the Montreal steam laundry, had censured the method of the firemen who were called to extinguish it. Much indignation was expressed at the report, inasmuch as those Americans who were present, far from casting slurs on the conduct of the Montreal fire laddies, had expressed the warmest admiration for the way in which one of the most difficult fires they had ever met with had been combated. This was the deliberate opinion of those, one and all, who had been present.

After considerable discussion and excitement, it was decided to hold the next year's convention at Augusta, Ga. Chief Devine of Salt Lake City, Utah, spoke so eloquently of the advantages of his own city that it was practically decided to hold the convention of 1896 there.

The election of officers was then proceeded with, Chief Benoit, of Montreal, being unanimously elected president, and Hy. A. Hills (re-elected) secretary, D. C. Larkens (re-elected) treasurer. Hon. J. A. Chapleau was elected an honorary member of the association, and Col. Ald. Stevenson was elected hon. vice-president.

The following new Canadian members were proposed: J. F. Ryan, Fire Commissioner, Halifax; J. D. Murphy, Chief, Halifax.

After votes of thanks had been passed towards Hon. J. A. Chapleau, the mayor and city of Montreal, the Street Railway Co., Chief Benoit and Col. Stevenson, the convention came to an end, the delegates having passed an instructive and pleasurable week in Canada.

## Personal.

J. OCHILTREE MACDONALD, whose contributions on mining subjects are favorably known throughout the Dominion, was in Montreal a few weeks ago and gave THE CANADIAN ENGINEER a call.

J. R. WOODBURN, of E. S. Stephenson & Co., manufacturers of pulverizing machines, St. John, N.B., paid a visit to Toronto on his way to the London Methodist Conference, and gave THE ENGINEER a call.

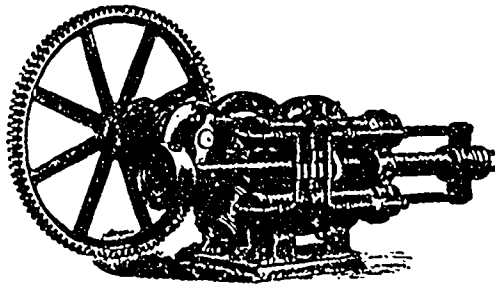
P. A. THOMPSON, chief engineer of the Richelieu and Ontario Navigation Co., has been appointed boiler inspector at Kingston, Ont., to succeed Edward Adams, who has been appointed chief inspector at Ottawa.

HANBURY A. BUDDEN, whose card appears in this issue, has been practising at the Bar for the last six years, having been admitted in 1888, after spending seven years at McGill University, where he obtained the degrees of B.A. and B.C.L. He has recently decided to confine his attention to matters of patent and trade mark law, and having acquired a very complete patent solicitor's library, is in a position to give the greatest care to matters of this nature. He has devoted himself particularly to electrical matters, which at this time are so widespread in their bearings.

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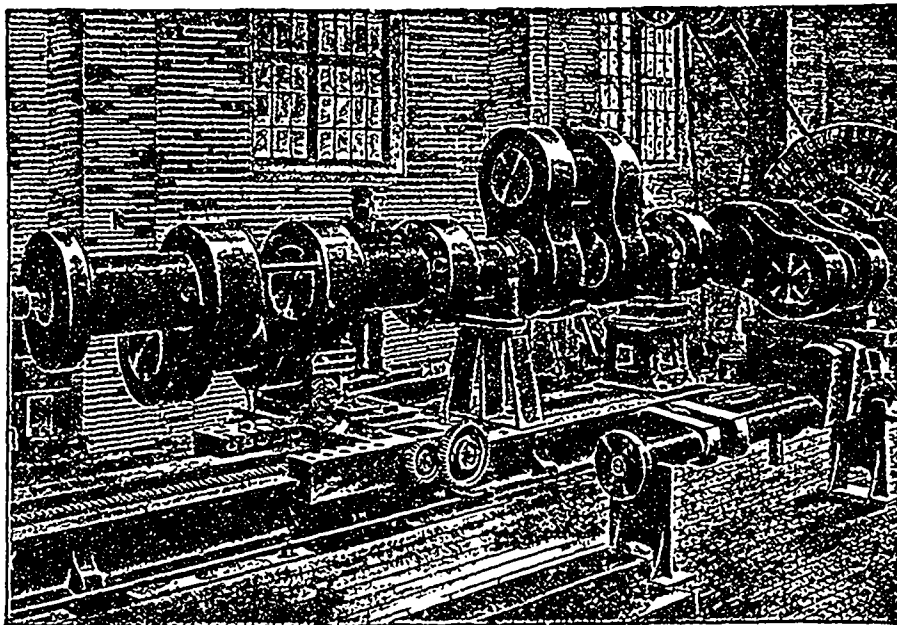
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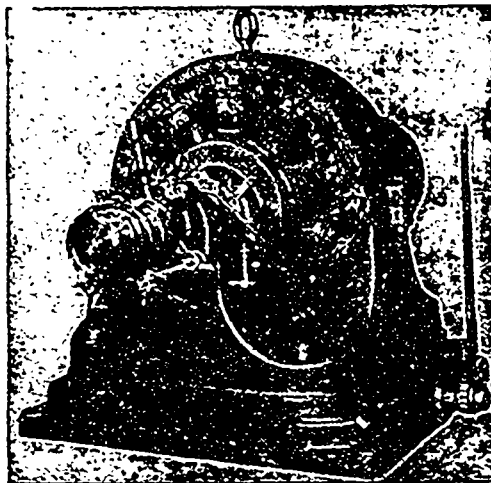
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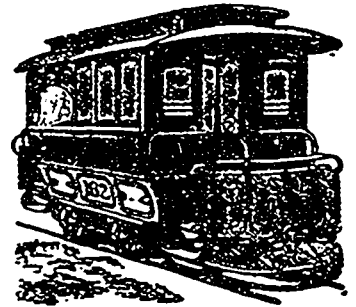
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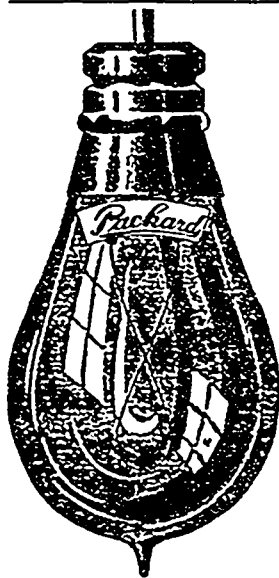
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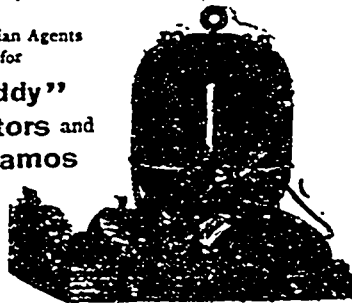
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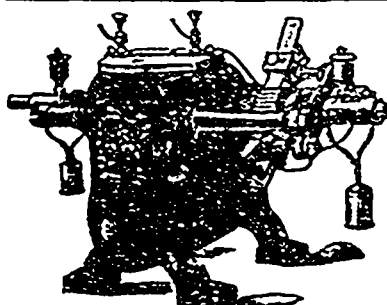
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# Electrical Department.

## THE ELECTRICAL CONVENTION.

In last issue we gave a summary of the programme of the convention of the Canadian Electrical Association to be held in Montreal on the 19th, 20th and 21st of this month. Among other items in the programme will be a visit to the electrical branch of the engineering department of McGill University, where Prof. Carus-Wilson will show the appliances in use there. There will be an excursion by the Montreal Park and Island Railway Co. to Back River, with a dinner at Peloquin's Hotel, and on the last day the Eugene Phillips Electrical Works will give a drive round Mount Royal, while the Packard Lamp Co. will treat the visitors to a luncheon at the St. George's Snowshoe Club House. Ahern & Soper, of Ottawa, have also kindly extended an invitation to the members to visit the capital city at the close of the convention. Among the papers announced are the following: "The Application of Electricity for Medical and Kindred Purposes, from Light and Power Circuits," by W. B. Shaw, Montreal; "Electrolysis," by J. A. Baylis, Bell Telephone Co., Toronto; "Alternating Current Motors," by L. M. Pinolet, Montreal; "Electric Brakes," by Elmer A. Sperry, Cleveland, Ohio; "A Method of Distribution with Equalization of Potential Difference," by D. H. Keeley, of the Government Telegraph Service, Ottawa; "The Possibility of Securing Better Regulation at Central Light and Power Stations by means of Fly Wheel Accumulators of Improved Construction," by John Galt, C.E. and M.E., Toronto; "Municipal Electric Lighting," by E. Carl Breithaupt, Berlin, Ont.; "Telephony Cables, their Construction and Maintenance," by F. J. Schwartz, Bell Telephone Co., Montreal. There are other papers, the subjects not yet being announced. The convention bids fair to be the most successful one yet held.

## GAS VS. ELECTRICITY FOR STREET RAILWAYS.

During the past three years it seems to have become accepted that electricity must displace all other sources of power for the operation of street railways, and when a new railway is contemplated in this country or the United States it is only a question of horse power or electric power.

Although horse cars are cheap and easy of construction, and the vehicles may be lighter than any other that can be devised, yet the horse railway is unsanitary, and the current expenses are really heavy, not only by reason of the cost of forage, etc., but because of the brief life of the poor animals that are condemned to such work.

Street railways operated by small steam engines have been used to a limited extent, but they frighten horses with their noise and are a nuisance because of their smoke and cinders, even when anthracite coal is used. Moreover, they are unsuited to the average Canadian town, because it is only in thickly populated centres where traffic is regular and constant that they pay to run at frequent intervals. It is true that noiseless engines have been invented, giving but little smoke or soot, but these are too expensive.

Cable street railway systems are costly to build, involve a great deal of tearing up of streets, and are too liable to interruption by the breakage of a cable, or an accident to an engine, paralyzing the whole system.

The electric system gets over most of these objections, but as the trolley lines are operated in America they are liable to an alarming proportion of accidents. The cost of operation is also high, for the full strength of the current must be applied along the lines, whether there are five or fifty cars being moved. The storage battery system would get over this difficulty, but unfortunately that system has not yet been made a commercial success. In the cities of Brussels and Hamburg, in Europe, where they have been most extensively tried, it is found that the accumulators have to be changed every three to five hours, and as these weigh from two to four tons per car, this means a good deal of loss of energy and heavy cost of manipulation.

According to a report from W. E. McKay, the American Consul for Germany, that country has successfully set about the solution of the problem of city transportation by means of a power which largely overcomes the objections of horse cars, cable cars, steam cars, and electric cars, viz., a new style of gas engine. Practical trials of the gas engine cars have been made at Dresden, as well as at Neufchatel, in Switzerland. At the latter place a line three and one-half miles long connects the city with St. Blaise. The cars are strong, and run quietly without noise or smoke, each car carrying 20 passengers, weighing about six tons, and costing \$2,856. They can pass curves of 100 feet radius, run back or forward with great facility, and with 7.9 horsepower, traverse any part of the line at a speed of 11 miles an hour. The city supplies the company with gas at \$1.09 per thousand cubic feet, and at this rate the cost of gas is 19.3 cents per car per round trip, or say one cent per passenger per filled car, or half a cent for a single trip. The gas as supplied by the city is compressed to six atmospheres.

But by far the most elaborate experiment, says Mr. McKay, is that at Dresden, where a street railway about three miles in length is operated with gas motor cars invented by a German engineer named Luhrig, and built by a company at that place, the engines themselves being supplied by the well-known Gas Motor Fabrik at Deutz. This system has been in operation for several months, and has been the subject of careful study and investigation by committees and experts from other municipalities which have in contemplation enterprises of a similar nature. Among others the city of Nordhausen sent a commission headed by a government railway engineer to examine and report on the working of the new system, and the report of this committee, while recognizing that there remain some minor difficulties yet to be overcome, declares the system a practical success and recommends its adoption at Nordhausen. At Dessau another line has been similarly built and equipped. Germany has therefore definitely started toward the adoption of gas motor cars for a certain class of roads, and the experiment has reached a stage at which it deserves the attention of practical engineers in other countries.

The Luhrig motor car is built to accommodate 16 passengers seated within, with standing room for 5, besides the motor man on the front platform and 6 on the rear platform. Passengers are not allowed in Germany to stand in the aisles of street cars holding to straps. Under the American system of crowding and packing, one of the Luhrig cars would carry perhaps 40 people. Power is supplied by two double cylinder gas engines of 7 horse-power each, located on either side beneath the seat and carefully enclosed in zinc sheathing, which excludes gas and smells and protects the machinery from dust and contact. Under the framework of the car are located at each end four cylindrical reservoirs, the whole eight having an aggregate capacity of about 360 cubic ft. of gas—sufficient to run the car 11 miles over a road in which the grades do not exceed 1 foot in 20. The cars weigh, without passengers, 7½ tons, and can be made for from \$3,500 to \$4,000, according to the number included in one contract. The cylinders of the engine are kept cool by water circulating through pipes leading from a cylindrical reservoir carried on the roof of the car, the heated water rising and the cold descending automatically, and with such satisfactory results that after a run of several miles the warmth of the cylinders may easily be borne by the naked hand.

Gas is supplied from the ordinary street mains, and is compressed to 8 atmospheres by a simple double-barreled force pump worked by a stationary gas engine or other power, and at this pressure the reservoirs of a car may be filled through a flexible pipe in less than a minute. Gas costs in Dresden \$1.05 per 1,000 feet, and in view of the advantage which such a wholesale, all-the-year-round consumption would offer to gas companies, it is safely assumed that most of them will be quite willing to erect compressing machinery at their own cost and deliver the gas to the motors at the prescribed density. The car is managed by one motor-man standing on the front platform, who, with throttle and governor, regulates the speed at will from 150 to 240 engine revolutions per minute.

As the double engine gives a motive force of 14-horse power, a second car may be attached whenever needed, thus doubling the capacity of the line during hours or days of greatest activity. A loaded car climbs a grade of 1 in 15 at the speed of 4 miles per hour, but for satisfactory work in all weathers and seasons the grades should not exceed 1 in 20.

In an address delivered before the German Gas and Water Supply Association some weeks ago, Chief Engineer Kemper, of Dessau, submitted a comparative estimate for the construction and equipment with gas motor, electrical and horse cars, of a street railway five miles in length and requiring an outfit of 20 cars for ordinary service. In these estimates double tracks for all, two compressing stations at \$2,500 each, sheds, etc., for the gas motor cars, are included; for the electrical roads, dynamos and overhead wires, and for the horse cars 120 to 150 animals, with the requisite stabling and fixtures, the intention being to show the comparative cost of building and putting into operation the same road under each of the three systems. The exhibit is as follows:

Electrical .....	\$150,880
Gas motor .....	142,500
Horse cars .....	133,280

The original construction and equipment account is, therefore, slightly in favor of horse cars as compared

with gas motors, though both are notably cheaper than the electric plant. But this difference in favor of horse power rapidly disappears when the cost of daily operation is taken into account. As the result of careful study, Mr. Kemper states the net operating expense of horse cars in Germany at 5½ to 7 cents per car kilometer, against 5 cents for electric cars and 4 cents for gas motor cars of the Luhrig model per car kilometer. There is thus claimed an economy in motive power of 25 per cent. in favor of gas as compared with electricity, and from 60 to 75 per cent. in comparison with horse power. It may be safely assumed that every town with area and population sufficient to require street car service has already a gas supply, and gas companies will everywhere be willing to favor this new and important outlet for their product by offering long contracts at favorable rates. Otherwise two or more street car companies could profitably combine and manufacture their own gas supply.

We learn from other sources that since Mr. McKay's report was written several improvements have been made to the Luhrig gas motor, giving it still greater economy and efficiency, and in England a car has been placed on the Croydon and Thornton Heath tramway, apparently of the Luhrig type, with very satisfactory results. This car, with a load of 28 persons and a total weight of 5½ tons, is said to have no difficulty in running at the rate of eight miles an hour, the fastest speed permitted by the British Board of Trade. It has carried this load up an incline of from 1.23 to 1.16 at the rate of four miles an hour, and also around a curve of 35 feet radius on a 1.27 grade.

It is expected that it will not be long before experiments with gas motor cars will be tried in Canada, as a company is proposed in Montreal.

Since the above was written we have received an interesting article from J. H. Killey, the well-known engineer of Hamilton, on the same subject. Mr. Killey's article, printed elsewhere, is well worth studying.

On a section of the Vincennes railway in France a telephone system is in vogue, by which at a signal on the telegraph instrument the operator may connect the telegraph wires with a telephone for verbal messages. In Australia field telephones are connected with the telegraph wires without interrupting the telegraphers' work. Another development opens up a field for the telephone, not only on the battle field, but for the peaceful operations of the surveyor and engineer when desiring to be kept in touch with a base of operations. This is by means of a bi-metallic wire, made up of a core of steel surrounded by a coating of copper. Reels carrying 10,000 feet of this wire can be easily carried by soldiers or engineers as a part of their equipments. The entire apparatus necessary for a line one mile long can be the use of this wire be made to weigh only 5½ lbs. The valuable uses to which such an instrument could be applied will be obvious to every one.

NIKOLA TESLA has devised a new steam motor for producing high frequency currents. "This device," to quote his own description, "consists of a spring which requires several tons of force to spring a certain distance, and which is constantly kept in vibration by steam pressure or air pressure. In the beginning I used springs of tempered steel. These steel springs would break, though they had a section of two or three square

inches. So I resorted to air springs. The air springs would not break, but they had no constant resilience. Then I made the chambers of the air springs communicate with the outer air. Then I maintained boiler water round the jacket. Now, you know, this device yields a constant vibration, and as the force which is driving it is many tons, and the friction but a very small matter, it is unaffected by the pressure, and so I have a constant vibration." Mr. Tesla proposes to use a pressure of 350 pounds per square inch, and expects that the amount of electricity generated per pound of coal will be twice as much as it has been heretofore.

A NEW incandescent lamp, invented by John Kammer, has been shown in Chicago and is creating some sensation. The lamp looks like an ordinary 16 candle power lamp, but it is claimed that by actual measurement they give from 160 to 200 candle power, and one of them has given as high as 720 candle power. The inventor alleges that this remarkable result is obtained by a peculiar vapor discovered by himself. The vapor is introduced into the bulb. The report does not say how long a charge of the vapor lasts, or whether it is continuously injected, or what its cost.

#### THE FUTURE OF ELECTRICITY.

The edge of the electric future is bright with the immediate promise for the world's weal. In the nearer foreground I see a practical method for the production of electricity directly from the burning of coal. This achieved, there necessarily follows the universal adoption of the electric motor as a prime mover, the relegation of the steam engine to the scrap heap, and the almost immediate realization of the airship as a means of transportation. Assuming the cause of chemical affinity to lie in the unlike electric charges of the combining atoms, I see the practical realization of electric synthesis, whereby wholesome food products will be directly formed under the potency of electric affinities. I see, too, a marked advance in electro-therapeutics, whereby human life will be prolonged and its sufferings alleviated. Diagnosis and prognosis will be profoundly aided by exact electrical measurements of the various organs of the human body as regards their electro motor force and resistance. The electro therapist of the future will employ electric charges and currents for restoring the normal charges and currents of the body, as well as for the stimulation of nervous or muscular tissues. Back of these achievements I discern a practical apparatus for seeing through a wire, *i. e.*, a device for looking into a receiver at one end of a metallic wire and seeing therein a faithful reproduction of whatever optical images are impressed on a transmitter at the other end, even though thousands of miles intervene. I see the possible use of the step-down transformer for the preparation of road-bed or surface by the vitrification, *in situ*, of clay or other suitable soil, by the intense heating power of enormous currents of electricity. These things I believe I see with fair distinctness. In the further background I faintly see, dimly outlined through the clouds, an apparatus for the automatic registration of unwritten, unspoken thought, and its accurate reproduction at any definite time afterwards.—*McClure's Magazine.*

## Electric Flashes.

A BY-LAW has been passed at Sudbury, Ont., to provide for an electric light system in that town.

THE Dominion Snath Co., Waterville, Que., are putting in an electric light plant at their factory.

THERE is a good deal of talk about constructing an electric line from Galt, through North Dumfries, Roseville, New Dundee, Haysville, to New Hamburg and Baden.

AT the Consolidated Electric Light Station, St. John, N.B., two Thomson-Houston engines have just been put in position. Work on the new railway tracks is going on apace.

THE Toronto Street Railway Company have purchased 250 feet frontage on Roncesvalles avenue, where they will erect a large power-house, to supply power for the Mimico and Weston system.

A PROPOSITION is on foot to build an electric railway from Ingersoll to Tilsonburg.

THE G.T.R. Belt Line, Toronto, will probably be converted into an electric system.

THE new electric railway between St. Stephen, N.B., and Calais, Me., is now open for traffic.

KAMLOOPS, B.C., authorities are on the lookout for an electric light plant, which they would purchase.

PERTH, Ont., council has granted a \$5,000 bonus for the proposed electric railway between that town and Lanark.

WESTON ratepayers have declared in favor of a bonus for the extension of the Toronto Suburban Railway to that village.

A MONTREAL engineer is making estimates on the site of the proposed electric railway and light power house for Hull, Que.

THE electric light plant of the town of Port Arthur, Ont., was destroyed last month in a fire originating in Conmoe's lumber mill.

M. GUAY, of the Electrical Works, Quebec, has a contract to put in an electric plant on the premises of E. Julien, carrier, Hedleyville.

THE by-law to authorize the issue of debentures for \$15,000 for the purchase of the Kamloops, B.C., electric lighting plant, was rejected.

PROF. DAVIDSON, a musician of Peterboro', Ont., was struck by an electric car in that city last month, and died a short time afterwards.

AN effort is being made by F. H. Sleeper & Co., Coaticook, Que., to form a company for the supply of electric light to Huntingdon and Ormstown.

THE route of the proposed Berlin & Preston Railway will probably start from Berlin and continue along the main road as far as below Centreville.

THE Robb Engineering Co., Amherst, N.S., are building two automatic high speed engines for the new plant of the Seaforth, Ont., Electric Light Co.

CHAS. THACKERAY & Co. offer to instal an electric plant, including dynamo generator and necessary wires, etc., at the Montreal Incinerator for \$5,970.

THE Toronto Street Railway Co. will build a car shed in the west end in order to avoid the unprofitable dragging of cars from a long distance to the important centres of traffic.

THE large engine in Kingston Electric Light Co.'s works was struck by lightning a short time ago, being damaged to such an extent that the electric cars were tied up for a while.

NIAGARA FALLS (Ont.) Street Railway Co. have completed the sale of their franchise to a company of capitalists who say they will convert the road into an electric one. The price was \$25,000.

THE new electric light and power house being built by the Temple Electric Co., Montreal, is to be completed this month. The company by the erection of this power house treble their capacity.

THE Montreal Street Railway Co. decided a few days ago to make two further calls of 10 per cent each on their new issue of \$2,000,000 stock; they are due on October 15th and November 15th, respectively.

THE New Westminster, B.C., Telephone Company's cable crossing the river broke loose a few weeks ago on the city side, and on an attempt being made to reel it in, a large portion broke off and was lost.

PETTY OFFICER ISAACS, of H.M.S. "Blake," was knocked down by an electric car in Ottawa, Aug. 29th. He escaped death by clutching the platform, thus saving himself from being carried under the wheels, but he was cut considerably.

THE Galt and Preston Railway Co. have given the contract for the construction of a bridge over the Speed and head race of Cherry's mill, in Preston, to A. McAuslan, Galt. Negotiations are in satisfactory progress for the extension of the line to Hespeler.

A THIRD large leather belt being made by the J. C. McLaren Belting Co., Montreal, for the Montreal Street Railway Co.'s new power house, is now completed. It is 140 ft. long and 54 inches wide, is made of three-ply English oak-tanned leather, and weighs nearly a gross ton.

THE Royal Electric Co., Montreal, have installed two motors for the turning of Curran Bridge, which is accomplished in one minute. The Street Railway Co.'s wiring is also completed, so that cars can now run across the bridge, a through route being thus gained to Point St. Charles.

The people of Hintonburg, Ont., want the Ottawa Railway Co. to extend their line to that village.

The Department of Inland Revenue is organizing a bureau for electrical inspection, under the Act passed at last session.

W. R. KEATING, of Kemptville, will shortly commence operations at Winchester, Ont., establishing an electric lighting plant.

ENGINEER T. S. BELL, of Hamilton, is at Chedoke Falls with the object of reporting on the availability of the water power for electric lighting purposes.

ADDITIONAL power is being placed in the electric station of the St. John Gas Co., Lower Cove. Two new 150 horse-power engines have been put in.

WINNIPEG city council has received from the company which proposes to develop water power at Rat Portage for manufacturing and electric purposes, an offer to furnish the city with 5,000 horse-power.

THE Wm. Hamilton Mfg. Co., Peterborough, have been awarded the contract, by Victoria, B. C., Council, for putting in a 335 h.p. tandem compound Payne-Corliss engine at the Electric Lighting Works.

THE two electric light companies in Sydney, C. B., have amalgamated, and are increasing their plant by the addition of a 90 horse-power Robb-Armstrong engine and a 90 horse-power Monarch Economic boiler.

THE Chambers Electric Light and Power Company, Truro, N. S., are adding to their plant a 90 horse-power Robb-Armstrong engine. This makes three of these engines purchased by them during the past three years.

HAMILTON Board of Works have decided to renew their contract with the Hamilton Electric Light Company for one year, the price being 28 cents per light per night, the usual reductions being made for lamps going out.

IN the case of the St. John, N. B., Street Railway bonds, the Supreme Court has decided that the holders of the old bonds shall only rank equally with holders of the other series, and shall not be entitled to payment in full.

A NEW station is being erected in St. Henri by the Citizens' Light and Power Co., of Montreal. Two 320 h.p. compound condensing Westinghouse engines and Manning vertical boilers with mechanical draft will be put in.

THE Reliance Electric Mfg. Co. (Ltd.), Waterford, Ont., are advertising their plant and stock for sale by tender. The stock and machinery were valued at \$26,763 and the two-storey brick factory and real estate at Waterford at \$8,000.

THE St. George, N. B., Electric Co. (Ltd.) are asking for incorporation. They will obtain power from the falls close by to light the town with electricity. Capital stock of the company, \$5,000. The time for receiving tenders for the electric lighting of Toronto has been extended to the 15th inst.

WE have to thank the American Electrical Works, Providence, R. I., for an invitation to their sixteenth annual clam dinner. This is a genuine Rhode Island clam bake, and we understand that the event has been so successful in past years as to have become quite famous. THE CANADIAN ENGINEER hopes next year to be able to put in a personal appearance at this interesting event.

THE Montreal Belt Line Company will start the construction of their road at Hochelaga, follow the shores of the island to Sault-au-Recollet, and then make a cut across the island to the C. P. R. tracks at Hochelaga. Arrangements will be made with the C. P. R. for an entrance to the Dalhousie Station, over the present tracks. The company now have \$250,000 of subscribed stock, but cannot begin expropriation work till the amount reaches \$500,000.

THE action brought by the Royal Electric Co., Montreal, against the city of Three Rivers, Que., to recover the contract price for installing a complete electric plant, which according to terms of contract was to have been put in operation for at least six weeks before payment could be demanded, has been dismissed by the court. Experts stated that owing to certain defects the contract had not been completed satisfactorily. On appeal to higher courts they confirmed this judgment.

A TROLLEY car came into violent collision with a "tower," used for convenience in overhead work, on Park avenue, Montreal, one evening a short time ago. The men on the "tower" escaped by jumping off as quickly as possible, but the two horses were killed. Motorman Danahan was thrown twenty feet away, when it was found that his leg had suffered a compound fracture. There were thirteen passengers in the car, but they escaped injury in a miraculous manner. The car and wagon were totally wrecked.

STEPS are being taken at Port Arthur, Ont., to build a new electric lighting plant, the one owned by the Port Arthur Water, Light and Power Co. having been burned down.

THE report of the directors of the Yarmouth, N. S., Telephone Company showed a net profit on the past year's business of 26 per cent. on the company's capital and a dividend of 10 per cent. was declared payable. The officers were re-elected as follows.—President, H. B. Cann, secretary, E. K. Spinney, and treasurer, J. M. Lawson.

THE commission appointed by the American Government to ascertain the probable effects of the work done by the different companies having power to take water from Niagara for power purposes, stated that though there was as yet no appreciable detraction from the Falls as a scenic spectacle, yet there was a vast amount of water being taken away. They thought it advisable, therefore, for the Legislature to forbid the granting of any further riparian privileges, and, in cases where actual work had not been commenced, to rescind the existing grants.

AMERICAN insurance agents claim to have devised a method whereby electric currents can be regulated in a manner satisfactory to the companies. The following circular has been issued by them: "Fuse block must be used where wire enters building, and of sufficient length between terminals so as not to hold an arc. A no-arc lightning arrester shall be used and the ground wire from the same shall not be run to the outside. Wiring must be thoroughly insulated so that it does not come in contact with any substance that would cause a leakage of current. Ground wire for motor must be connected with the earth on the outside of the building."

THE Dominion Government are prepared to receive tenders for the construction of a new Pacific cable, contracting parties to find the capital, and establish and work the cable for a term, and the construction to be completed in three years. Tenders can be sent in either of three forms: (1) The cable to be owned and controlled by Government and to be kept in repair by the contractor for three years, (2) cable owned, maintained and worked by a subsidized company, and (3) cable owned, maintained and worked by a company under a Government guarantee. The rates charged for messages between Australia and Great Britain will be 3 shillings per word for ordinary messages, 2 shillings per word for Government messages, and 1 shilling and 6 pence per word for press messages.

THE committee of the Montreal Master Plumbers' Association appointed to draft a constitution and by-laws, have completed their task, and the association has been duly constituted with the following officers: Executive Board—J. Lamarche, president, John Date, 1st vice-president; Alphonse Champagne, 2nd vice-president; Henry Padden, 3rd vice-president; W. M. Briggs, secretary; Joseph Gibeau, French corresponding secretary; J. W. Hughes, English corresponding secretary; P. Leclerc, jr., financial secretary; W. A. Stephenson, treasurer. Sanitary Committee—J. W. Hughes, chairman; John Date, Jas. Mattinson, A. Sigouin, J. C. Jactol. Audit Committee—J. Watson, chairman; P. Desforges, T. Jacotel. Arbitration Committee—P. Carroll, chairman; A. Demers, George Yon, George Rosser, H. Bailey. Apprenticeship Committee—W. Britton, chairman; E. C. Mount, A. Cardinal, J. Sadler, A. Blais. Legislative Committee—F. Brunet, chairman; D. Gordon, D. Ouimet, J. Burns, P. Leclerc, jr. General meetings of the association will be held on the 1st and 3rd Thursday of each month at St. Joseph's Hall, corner of St. Catherine and St. Elizabeth sts.

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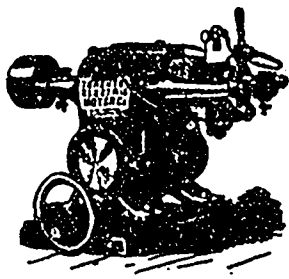
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	OTTAWA—Bell Telephone Building, Queen St.
	QUEBEC—Bell Telephone Building, St. John and Palace Sts.
	WINNIPEG—Forrest Block, Main St.

### Toronto Electric Motor Co.....



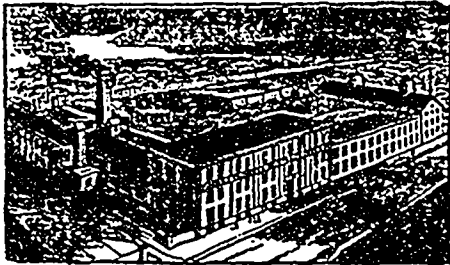
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ALTERNATORS & MOTORS



## Canadian Association of Stationary Engineers.—Convention, 1894.

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1. Thomas Ryan.
2. O. E. Granberg.
3. Thomas Wensley.
4. Richard Shapland.
5. A. Menard.
6. Oliver Shantz.
7. James Walker.
8. F. G. Mitchell.
9. John J. York.
10. A. E. Edkias.
11. Geo. C. Mooring.

12. W. Wilson.
13. Joseph Campbell
14. Geo. Uttley.
15. A. M. Wickens.
16. W. G. Blackgrove.
17. N. V. Kuhlman.
18. John G. Bain.
19. John Graham
- 19a Geo. Steinmetz.
20. E. C. Johnson.
21. Joseph Parks.

22. Geo. Gilchrist.
23. W. L. Outhwaite.
24. Geo. Hunt.
25. E. J. Philip
26. R. W. Green.
27. M. Boyle.
28. Geo. Grant
29. John Fox.
30. R. Drouin.
31. Harry Nuttall.
32. James Devlin.

33. S. E. Cosford.
34. F. W. Donaldson.
35. W. Bate.
36. Thomas King.
37. Frank Robert.
38. R. King.
39. J. Robertson.
40. Arthur Amcs.
41. C. J. Jordan.
42. Ed. Bourne.
43. W. Bell.

44. J. Murphy.
45. Wm. Sutton.
46. Wm. Jamieson.
47. Wm. Webb.
48. Thos. Mungall.
49. John Campbell.
50. Duncan Robertson.

The unnumbered figures on the right are aldermen and visitors. That on the extreme left is Mr. Fax, the comic singer.

## CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

## FIFTH ANNUAL CONVENTION.

The fifth annual convention of the Canadian Association of Stationary Engineers was held in Shaftesbury Hall, Toronto, this month, the first session opening at 10 a.m. on the 5th, with the executive president, George Hunt, in the chair.

The delegates in attendance were: J. Robertson, H. Nuttal, and J. Murphy, from Montreal No. 1; R. Drouin and A. Menard, from St. Laurent (Montreal) No. 2; E. C. Johnson and D. Robertson, from Hamilton No. 2; E. J. Philip, A. M. Wickens, W. Phillips, N. V. Kuhlman, and G. Fowler, from Toronto No. 1; Jas. Walker, from Kincardine No. 12; Wm. Jamieson, from Dresden No. 8; W. Wilson, from Peterboro No. 14; C. J. Jordan, from Guelph No. 6; J. Devlin and R. King, from Kingston No. 10; J. F. Cody, from Warton No. 13; J. R. Uttley, from Berlin No. 9; F. G. Mitchell and Thos. Mungall, from London No. 5; J. H. Thompson and T. Wensley, from Ottawa No. 7; Arthur Ames, from Brantford No. 4; Thomas Ryan, provincial deputy for Quebec; A. E. Edkins, provincial deputy for Ontario; A. M. Wickens, district deputy for Toronto, and F. G. Mitchell, district deputy for London; George Hunt, executive president; Wm. Sutton, executive vice-president; W. G. Blackgrove, executive treasurer, Thos. King, conductor, and F. Robert, doorkeeper.

Richard Shapland, London; O. E. Granberg, Montreal; John Campbell, Montreal; J. Langdon, Hamilton; R. Stuart, Hamilton; W. F. Chapman, Brockville; Oliver Shantz, Geo. C. Mooring, W. L. Outhwaite and others, were present as visitors or visiting delegates.

Before the business of the meeting began, Alderman Burns, on behalf of the Mayor and corporation of Toronto, appeared on the platform to give a welcome to the association. In extending the welcome to the "Queen City," Ald. Burns said he hoped the delegates would enjoy themselves to the fullest extent; and he assured them that they would see many things about the city that would interest and surprise them. He was deputed especially to invite the members to participate in the carriage drive which had been arranged by the Mayor and council for the following morning at 10 o'clock, the drive to be followed by a lunch at Reservoir Park. He was glad that the association were to visit the Industrial Exhibition. The citizens of Toronto were proud of their exhibition, and, notwithstanding the depression in trade, the visitors would find it one of the finest exhibitions on this continent. (Applause.) He also thought they would find Toronto one of the finest cities on the continent. Some present might dispute that, after seeing the beauties of other Canadian cities; but it was the feeling of most citizens Toronto was the provincial capital, and they would admire the new Parliament buildings, and the new civic buildings now in course of erection. He was glad to see so many men present representing so great and important a branch of the industries of our country, and notwithstanding the progress of other sciences it would no doubt be found that the engineers had advanced with equal pace. The steam engine and the engineer would hold their places for years and centuries to come, and he congratulated the association on the remarkable progress it had made. Starting only a few years ago, it had now extended its operations to nearly every city of importance in the Dominion. He trusted their deliberations would prove not only of advantage to themselves, but of benefit to the community in general.

President Hunt observed that he was glad such good arrangements had been made to take care of the members in case they could no longer take care of themselves. (Laughter.)

The formal reply to the address of welcome was drafted by Bros. Thomas Ryan, Wm. Jamieson and Robt. King, as follows:—

"We, the undersigned committee, on behalf of the fifth annual convention of the Canadian Association of Stationary Engineers, held in your city in 1891, in reply to your address of welcome so cordially extended to us by Ald. Burns, beg leave to express the most sincere thanks of our convention for the hearty welcome extended, and the preparations made by you for our entertainment and pleasure during our stay in your beautiful city. We esteem these courtesies all the more from the fact that this is the first time that our conventions have been officially recognized by any civic body in this manner. Trusting that Ald. Burns and confreres may long be spared to look after the interests of the Queen City of the West."

Before leaving the hall Ald. Burns was presented with the badge of the association, which he said he would be proud to keep as a souvenir of the association's visit to Toronto.

On behalf of Toronto Branch No. 1, E. J. Philip, its presi-

dent, said he wished to extend a most hearty welcome to the convention. He hoped they would enjoy themselves and would note some of the many interesting points about the city. The convention were treated so well last year in Montreal, that it was hard to know what to do in order to frame a programme equally interesting. He was proud to remember that in Toronto this association first took its rise. In its beginning it had only about eight members, and it was a great satisfaction to the original promoters to welcome to this city so large a body of members from so many distant points. It must be remembered also that it was very difficult for engineers to leave their posts—even city members could not in many cases be present—and this fact rendered the present large attendance more striking as evidence of the progress of the organization. He trusted they would find the convention enjoyable and profitable, and that they would all carry away pleasant memories of their visit.

The president thanked Bro. Philip for his cordial welcome, and hoped he would, during the convention, look after the stray sheep and see that they did not stray too far from the fold. (Laughter.)

Ald. Burns referred to the fact that a former member of the city council—ex-Alderman Bell—was now a member of the association, and said the convention was indebted to him for the way in which he had interested the members of the council in their behalf.

Upon his leaving the hall the members gave three cheers for Ald. Burns.

The executive secretary read the minutes of the last meeting, which were confirmed.

The various committees were then appointed as follows:—

*Auditing Committee.*—Bros. D. Robertson, chairman; Robert King, C. C. Robertson, C. J. Jordan, and A. Menard

*Constitution and By-Laws.*—Bros. James Devlin, chairman; D. Robertson, A. Ames, F. Robert, and R. Drouin.

*Good of the Order.*—Bros. J. F. Cody, chairman; Robert King, E. C. Johnson, F. G. Mitchell, and Ed. J. Philip.

*Milicage.*—Bros. Joseph Robertson, chairman; J. H. Thompson, F. W. Donaldson, E. C. Johnson, and E. J. Philip.

*Credentials.*—Bros. W. G. Blackgrove, chairman; A. E. Edkins, and A. M. Wickens.

President Hunt then read the annual address, as follows:

I have the honor to welcome you to this our fifth annual convention of the Executive Council.

I do this knowing that your lodges in selecting you as their delegates have done so that you will do what you consider best, and to the advantage of our beloved order; and feeling that it will be the most important meeting ever held by our society, not only on account of the greater number of lodges represented, but also because of the magnitude and importance of the subjects that will be brought forward. May our proceedings and deliberations on the various subjects be so conducted as to be to our credit, and that harmony and good-will may prevail throughout our session.

I trust you will accord me the hearty support that has always been granted by you to the occupant of this chair, and which will result in profit to ourselves and increased prosperity to our order.

We have, during the past year, made gratifying additions to the number of our lodges, four of which have been instituted, and my experience has been that the organizers have very generally adhered to the principles of careful selection of members and useful officers, and I here tender my heartfelt thanks to the many brethren who, though often so little known, have quietly spread the tenets of our order, and as a result founded new lodges.

Whilst we have added largely to our membership, substantial progress and improvement have been made in the general conduct of the lodges; the officers perform their duties more intelligently, and the ritualistic and secret work is done better. I am pleased to hear that in many lodges the use of books is not necessary, and when caution is used to avoid straying from the text, the result will be added impressiveness to the ceremony and increased respect for the officers.

There is a growing desire on the part of brethren to make lodge meetings more enjoyable by the introduction of lectures, discussions, music and other educational methods, and I find that where this system has been carried out most successfully there is greater harmony and less unnecessary argument, better attendance, more initiations and a nearer approach to perfection in the work than in lodges that make no effort in this direction.

I am pleased to report that many of the district deputies have done yeoman service, and have been of great assistance to the grand executive.

Some deserve special mention. They have given evidence of an enthusiasm in the performance of their duties and an interest in the well-being and growth of the order, which should earn for them the gratitude of this grand body. I am of opinion that their valu-

able assistance, and especially the persevering and successful efforts of the majority, have not received the recognition which they deserve.

The order is now becoming too large and widespread to be handled, as in earlier years, directly by the executive, and as a necessary consequence the duties of the district deputies will become more onerous and the office more responsible. It is therefore imperative that the appointments be judiciously made, their duties clearly defined, their annual report duly handed in and their services receive more recognition.

In conclusion, brethren, allow me to admonish you to be ever watchful of our order, guard well the doors of the lodge, cause strict examination to be made into the character of all candidates, suffer none to be admitted whose reputation is not pure and spotless. Recollect that the future success of our order depends very much more on the character than the number of its members. I feel exceedingly grateful to you for the honor conferred upon me a year ago when you elected me to the very honorable position of president of this society, so deserving of the patronage of our fellow-countrymen

Brethren, I have already occupied too much of your time and attention with such remarks as seemed to me applicable to the present occasion, and will, therefore, only add, in closing, that it is my heartfelt wish and desire that your deliberations at this meeting may be so conducted towards each other that whatever we may do will redound to the honor of the C. A. S. E. Commending you to ask wisdom in your legislation from that Great Being who rules and guides us in our every thought of word and work. All of which is respectfully submitted.

Bro. Edkins presented the report of the committee on credentials, which were found satisfactory.

SECRETARY'S REPORT.

The executive secretary, John J. York, then read his report as follows:—

When you conferred the honor of this office upon me in Montreal last year, I said at the time that I did not feel competent to undertake the responsible duties of this honorable position, and now that the year is over and I look back and sum up what I have not done that I should have done, the total is appalling. You will be aware before the close of this convention that the business of this office is increasing very rapidly. This fact, coupled with that of my being so young a member of the association, and consequently knowing very little about the order as a whole, and also the limited time at my disposal, will, I sincerely hope, serve as an acceptable excuse for any and all of my shortcomings and the neglect I have at times so lavishly bestowed on some of the branches or their individual members.

And now to those who won't accept an excuse I will simply say: "Please sit down and read the thousand sheets of letters on the file, then figure out how long it would take you to answer these questions and keep every one in good humor." Then perhaps you will do, as some folks say, "Let me down easy."

There have been formed during the year five new associations, viz.: Kingston, Winnipeg, Kincardine, Wiarton, and Peterboro', with a total membership of 115. In the case of Winnipeg I wrote such complete instructions to Bro Charles Robertson covering several pages of foolscap, and also creating him a district deputy for Manitoba, by order of our worthy president, that he was enabled to open one of the most successful branches in the order and one that is growing very rapidly. All the other new associations are founded on the best possible basis, with men of well-known ability, sound judgment and integrity at the head of affairs.

You are no doubt anxious to know something more of the souvenir which you directed this Council at the last convention to issue. We have, in pursuance of that order, got up a souvenir which I this day place in your hands. It may not be quite as thick or as elaborate as the one issued by Montreal No. 1, nor did we make half as much money out of it as they did, but I tell you, gentlemen, this book represents the Dominion, whereas the other represented Montreal. One chief reason it is not thicker is because of the great depression in trade which we have experienced this year. We also kept this one fact before us at all times, viz., to give our patrons all that was possible for their money. This is borne out by the fact that we have had over two thousand copies printed, and these will shortly be spread all over this Dominion. It is rather soon yet to give you exact figures, but I can assure you that it will net only about \$250 profit. The figures up to date can be had by examining my books. And I take this opportunity of inviting any one that wishes to have a look over all my books, should he feel so disposed.

I have, as you are aware, carried out your further commands, and got up a blank form for the annual and semi-annual reports. I trust you will approve of the design. If so, a large quantity can be printed much cheaper relatively than a small one. I would also bring to your notice the system of book-keeping adopted by most of the associations, it is certainly faulty, and should be amended at this convention and for ever afterwards insisted upon.

You will find attached to this report a statement of my receipts and expenditures, a detailed account of which is not within my province, as I know that your worthy treasurer's report will prove interesting. I also present a tabulated statement which is intended to show the prosperity of the order in much better light than has been done heretofore. And I have every reason to hope that when all become accustomed to the new blanks the secretary's report will be more easily compiled, and contains much valuable information for the members. This point, gentlemen, I would strongly impress on you.

I will now read you the reports of branches in a condensed form, but none the less gratifying, as from it we see that the membership has increased during the year, 132; and I am happy to say that, notwithstanding the dull times, there has been an increase in the assets of several of the branches, as per statement attached.

Name of Association.	Members, 1893.	Members, 1894.	Inc.	Dec.	Cash, 1893.	Cash, 1894.	Total Assets, 1894.	Liabilities, 1894.
Toronto No. 1.....	89	112	32	...	\$316 14	\$467 89	\$617 89	.....
Montreal No. 1.....	76	75	...	1	120 17	199 66	806 66	.....
St. Lawrence No. 2...	69	60	...	...	68 92	28 85	40 85	\$25 00
Hamilton No. 2.....	35	31	...	4	2 90	5 45	163 29	76 30
*Stratford No. 3.....	...	...	...	...	.....	.....	.....	.....
Brantford No. 4.....	15	15	...	...	.....	.....	.....	.....
London No. 5.....	25	15	...	10	11 52	5 11	.....	.....
Guelph No. 6.....	16	16	...	...	32 51	41 11	.....	.....
Ottawa No. 7.....	33	36	3	...	45 85	52 86	.....	.....
Dresden No. 8.....	18	17	...	1	66 16	23 22	.....	.....
Berlin No. 9.....	14	12	...	2	.....	.....	.....	.....
†Kingston No. 10.....	...	39	...	...	.....	.....	.....	.....
Winnipeg No. 11.....	...	49	...	...	.....	.....	.....	.....
†Kincardine No. 12...	...	7	...	...	.....	1 05	6 80	0 63
†Wiarton No. 13.....	...	15	...	...	.....	.....	.....	.....
†Peterboro No. 14.....	...	14	...	...	.....	.....	.....	.....
	372	504	132					

\* No report.

† New associations.

It has been suggested to me since coming to Toronto that the transactions of this and future conventions should be published in pamphlet form for distribution among the members. Now, I heartily endorse this idea, partly from selfish motives, but chiefly for the good of the order, as then the secretaries of the branches would be able to see what kind of a report they sent in the year before. As it is at present, I am forced to say that I do honestly believe that some secretaries consider it of so little moment that they simply guess at the figures they put down; or, perhaps worse still, their books are in such a condition that it is impossible for them to say how they stand.

When I assumed this honorable office, I found it was impossible for me to tell by the books at my disposal just how much any particular branch was indebted to the executive. I have, gentlemen, made some radical changes along this line during my term of office, and the books are now in such a condition that any one present may open them and tell at a glance just exactly how much his association, or any other, owes to the executive council. I sincerely hope that my successor will push on the good work, as there are many improvements to make yet before they are exactly in order, from a business man's point of view. And, as I said before, I also hope that this convention will so legislate that all branch associations will be compelled to keep their books in better shape, so that they may be understood by any one other than the person who posted them up.

In conclusion, gentlemen, I wish to again thank you for the honor you have done me, and for the kind attention you have given to these few remarks and hard facts, and I also beg you to consider the slight service on my part as the widow's mite compared with what I would like to do for this council, were I only able or competent.

On motion of Bro. Robertson, seconded by Bro. A. E. Edkins, the report was received and referred to the auditing committee.

TREASURER'S REPORT.

The executive treasurer, W. G. Blackgrove, read his annual report from September, 1893, to September, 1894, as follows:

Receipts.

8th Sept., 1893, balance on hand.....	\$210 71
13th " " stationery (Berlin).....	70
28th Oct. " per A. E. Edkins, Kingston charter..	15 00
12th Jan. 1894, Toronto No. 1 per capita tax.....	22 50

13th Feb., 1894,	cash, J. J. York, ex-secretary.....	\$96 50
15th June, "	per A. E. Edkins, Wiarton and Peterboro' charters.....	30 00
9th July, 1894,	A. M. Wickens, Kincardine charter..	15 00
24th Aug., 1894,	stationery Toronto No. 1.....	1 40
30th " "	Toronto No. 1 per capita tax.....	28 00
3rd Sept., "	cash, J. J. York, ex-secretary.....	120 61

\$540 42

*Disbursements.*

9th Sept., 1893,	mileage rates.....	161 55
" "	rent of hall for convention.....	5 00
2nd Nov., "	A. E. Edkins, expenses, Kingston.....	2 00
4th Dec., 1893,	J. J. York, for emblems.....	50 00
8th Feb., 1894,	" postage and express.....	5 23
9th July, "	A. M. Wickens, expenses, Kincardine .	9 50
28th Aug., "	Toronto No. 1, on account,.....	25 00

\$258 28

Balance cash on hand ..... 282 14

\$540 42

On motion of Bro. Robertson, seconded by Bro. Sutton, the report, which was considered highly satisfactory, was referred to the auditing committee.

On motion of Bro. Edkins, seconded by Bro. King, it was decided to send, through the president, a telegram of congratulation to the National Association of Stationary Engineers of the United States, now sitting at Baltimore.

The executive secretary read a letter from that association regretting their inability to be officially represented at the dinner, but wishing the sister organization all prosperity.

A letter of regret was read from Bro. Hartenstein, of Montreal, who could not be present.

A letter from the publishers of THE CANADIAN ENGINEER was read, extending an invitation to all members to make use of the office of the paper while attending the convention. On motion of Bro. Edkins, seconded by Bro. Philip, the invitation was accepted with thanks.

A letter was then read from E. J. Kammerer, of the Royal Electric Company's Toronto office, stating that as the change from Montreal water to Toronto water might affect the nerves of the members, they would be welcome to use his office and typewriter. The invitation was accepted amid the laughter of the Montreal delegates.

Bro. Edkins said he had received a letter from Winnipeg regarding the Brandon branch, the writer suggesting that as the Brandon association was virtually defunct, and some of its members had removed to Portage la Prairie, the charter should be transferred to the latter place and a branch formed there.

During the discussion it was thought by some that a transfer of the charter could not be made, but that a new charter would have to be taken out for Portage la Prairie. It was decided to refer the question to committee on good of the order.

A letter was read from Bro. S. H. Weir regarding the branch at Stratford, which was in a moribund condition. It was stated that more than one effort had been made by visiting brothers to revive this branch, though without success, but it was decided, on the suggestion of Bro. Robertson, of Hamilton, to make one more attempt at its resuscitation.

AFTERNOON SESSION.

Bro. Philip invited the members present to visit the engine rooms and electrical department of the T. Eaton Company, which a large number availed themselves of after adjournment.

A discussion took place on a motion to elect officers. Several members pointed out that it was always the custom to make the election of officers the last act of the convention, and that plan should not be departed from, though it was not defined in the by-laws. It was decided to follow the procedure of previous years.

Bros. Thos. Ryan, Wm. Jamieson and Robt. King, as a committee to draft a reply to the city's address of welcome, presented their address thanking the Toronto city council for their cordial welcome and for the preparations made for their entertainment during the convention. They esteemed these courtesies all the more from the fact that this was the first time their body had been officially recognized by a civic body in this manner. The address was adopted and ordered to be presented.

The committee on good of the order reported a recommendation that the charter for Brandon be recalled, and that a new charter be issued in the case of Portage la Prairie, should a branch be formed there. In the case of the Stratford branch, it was recommended that the district deputy be asked to visit them, with a view to reviving the branch.

The report was adopted.

Bro. Thos. Ryan, as district deputy for Quebec, reported that in the early part of the year there was talk of a branch being formed in Three Rivers and in Sherbrooke. In the latter case it is expected that an association will soon be formed with about twenty members. Within the past two months, through the assistance of Bro. Hartenstein, of St. Laurent, No. 2, an interest had been shown in Quebec and Levis, and it was hoped that these cities would soon have branches. They were looking forward to an interesting winter's work.

Bro. Edkins, as district deputy for Ontario, reported that since the last convention they had been instrumental in instituting branches in Kingston and Peterboro'. The former started with about 14 members and now it has over 30, while the Peterboro' branch, starting with 12 members, now has 16, including the best engineers in Peterboro'. At the present time the prospects were good for branches in other Ontario towns during the ensuing year, including Brockville, Carleton Place and Chatham.

W. F. Chapman, engineer of the Brockville Carriage Co., was then introduced and invited to a seat beside the president. Mr. Chapman had come up at his own expense to be at the convention, and said he thought so well of the organization that he would do all in his power to form a branch in Brockville. The announcement was greeted with applause.

An adjournment was then made till the evening, when Bro. J. Murphy, of Montreal, read a paper on "Steam Jackets and Steam Separators." The paper elicited a lively and interesting discussion. Both paper and discussion will appear in next issue.

Bro. O. E. Granberg, of Montreal, read a paper on "Stationary Engineers, real and imaginary," which will be referred to in our next. Votes of thanks were passed to the authors of both papers. At 9.30 the members proceeded, by invitation, to inspect the station of the Toronto Electric Light Co.

WEDNESDAY, SEPT. 5TH.

This morning at 10 o'clock the members, upon the invitation of the Mayor and city council, had a drive about the city, taking in some of the residential streets and the new Parliament Buildings. At noon they drew up at the pretty Reservoir Park, where luncheon was served and speeches delivered. After this the party were driven to the Exhibition, where in the Conference Hall of the Exhibition, a valuable paper was read by A. E. Edkins on "Injectors."

This paper will appear in our next issue. The members spent the remainder of the afternoon in viewing the Exhibition, of which they spoke in high terms.

THE BANQUET.

After a day spent with an agreeable mixture of sight-seeing, business and instruction, the members of the convention, with a number of their friends, assembled at the Palmer House on Wednesday evening, the 5th, for the dinner, which now seems to be a necessary feature of the yearly gathering. The dinner was excellent and admirably served, and the programme of toasts was carried out without a hitch. The arranging of the musical part of the programme, which was in charge of Bro. W. G. Blackgrove and J. G. Bain, was especially appreciated.

Bro. E. J. Philip, president of Toronto No. 1, occupied the chair, and on his right sat Joseph Tait, M.P.P., and J. J. Wright of the Toronto Electric Light Co.

The toast of "The Queen" and "Canada our Home" was followed by the song of "The Maple Leaf," which was capitably rendered by Geo. Grant, with a rousing chorus by the company. On rising to reply, Mr. Tait was greeted with "He's a Daisy." He referred to the fact that many people who settle in Canada from abroad bring their prejudices, as well as their affections, with them from the Old Country, but he thought all people who make this their home should consider Canada "first, last and all the time," for whether we looked at its natural advantages or its method of government as compared with other countries, it was a land of which we all might be proud. It is often said that it is a country of magnificent distances—and this was all right from the engineer's point of view—for his services were called into requisition in surmounting the obstacles of those distances. We boast of 3,500,000 square miles of territory, and it only required that this enormous area should be filled up with people, in the accomplishment of which the work of the engineer is so important. The day of the engineer and the electrician was yet to come, and in the future the essential importance of their work would be more fully realized. He referred to his efforts to get the bill for licensing stationary engineers through the Ontario Legislature last year, and hoped that though he had not succeeded, they would later on get a part at least of what they had sought. The difficulty was that the Local Government had been imposed on by certain

bodies of men who had obtained class privileges through the Legislature, and had afterwards abused those privileges, and this had made the Government cautious in extending class legislation

"Toronto, the Queen City of the West," was responded to by ex-Alderman Bell, now a member of the association. Brother Bell spoke of the attractions of Toronto, and he thought the visitors would go away with the impression that it was a city to be proud of. They would feel that it was not only a handsome city, but a loyal city—loyal not only to our own country, but loyal to the old flag. Since joining the association he had come to think a great deal of it. He was glad that the city council had done their part in making the convention a success, and only hoped that should it be held in Toronto again they and the citizens would do even more.

James Fax, Toronto's character sketcher and topical songster, then rendered "The Ha Ha's" in a style that brought out a vociferous demand for an encore.

The secretary then read letters of regret from Mayor Kennedy and from Mr. St. John, of the Canadian Inland Marine Engineers' Association, who could not be present.

"The Manufacturers" was replied to by Samuel Rogers, head of the Samuel Rogers Oil Co., who, in the course of an interesting speech, said he was glad to have the honor of an invitation to reply to the toast. He was pleased to look around on the many kindly, hopeful young faces before him, as it reminded him of his own start in life. Like most of the younger men present, he was a Canadian born, and like Mr. Tait, he was proud to be able to speak of Canada as his home. His forefathers settled in the neighborhood of Toronto not only before the city existed, but before there were even roads through the country. His grandfather was settled here before what is now Yonge street was laid out as a road, and when the surveyors were preparing to lay out a "corduroy" road to Lake Simcoe, his grandfather went to the north of the city and was able to correct their course and set them right—a circumstance which accounted for the bend in the road near Deer Park. He was glad to be here to say a word of encouragement to the young men who were to look after the greasing of the wheels of the country in the future. He remembered the time when he himself started out to make his way in the world on foot, with a large part of his worldly possessions tied in a cotton handkerchief. He went to a sawmill and got work, and thus got his start in life. For those here who were now starting out in life in the same humble way, he had nothing but the kindest feelings; and he hoped that as days and years went by, and they proved by their industry and honesty of purpose their determination to deserve success, they would find themselves employers of labor and the owners of plant of their own. By keeping a good purpose before them, he trusted they would find chances of climbing up the ladder, and that they would all achieve an honorable position in life.

John J. Main also replied, and said that since he had last sat at the banquetting board of this association he saw many new faces, and he thought he perceived a development in the intelligence of these faces—an evidence, he took it that they had been studying and improving their time. He took a hopeful view of the trade prospects, and had little sympathy with the gloomy way some people had of talking of the outlook. When one man frightened another as to the future, it made times hard where they would otherwise be good. He advised the association to bring in new members, and not to freeze any one out because he was not as intelligent as they were. It was the true policy to bring young men in, and try to educate them and make them capable.

Messrs. Grant and Alexander then rendered in fine style "The Fisherman."

The toast of "Kindred Societies" was replied to by J. J. Wright, who, after thanking the Association for the honor done him, extended a cordial welcome on behalf of the Canadian Electrical Association to all the stationary engineers who chose to come to the electrical convention in Montreal on the 19th to 21st inst.

J. C. McLean, engineer of the Toronto street railway power house, also replied, expressing pleasure at seeing so fine a gathering. He believed the association would expand as it should, and he would do all he could to advance the interests of the engineers.

John Campbell, of the Montreal street railway, followed in a few well-chosen remarks, in which he said he was glad to hear of the great progress the organization had made, and his sympathy would be with them in the future.

Bro. W. G. Blackgrove then sang "The Deathless Army," a martial song, in which his fine bass voice was heard to excellent advantage. It received a hearty encore.

"The Executive" was replied to by President Hunt, who gave a history of the difficulties of the formation of the first stationary

engineers' association in Montreal nine years ago, and of its subsequent amalgamation with the general association five years ago through correspondence with Toronto No. 1. The fate of the association hung by a very slender thread then, but their difficulties had eased up since, and the onward march of the association was now steady.

John Alexander then sang "A Soldier and a Man," and was warmly applauded.

"The Canadian Association of Stationary Engineers" was coupled with the names of delegates from the various branches.

Bro. A. M. Wakens, the first to reply, referred to the growing usefulness of the association, and said that no society had felt the pressure of hard times less than their own. In speaking of the advantages and disadvantages of other departments of engineering, he thought the stationary engineer was the hardest worked and best abused of them all. He was required to be cool and quick and punctual, and was expected to be the first on duty and the last to leave his post, while he was responsible for more lives than men of any other calling. As to the growing importance of the engineers, out of about 9,000,000 horse-power of the continent of America at present nearly three-quarters was the growth of the last ten years. The demand for engineers was so great, in fact, that many poorly qualified engineers were put in responsible positions. The constant changes and developments of machinery required the engineer to be awake and studying all the time, and this was where the usefulness of an association came in, as a means of spreading knowledge. His advice was for them to help one another, and by so doing they would be helping themselves.

Secretary J. J. York responded on behalf of Montreal No. 1, and said that though not one of the oldest members, he felt as keen an interest in it as if he were the founder of the organization, and he had been a "fighter and kicker" ever since he joined. He joined against the advice of his employer, who for three years had kept him out of the association, but he now looked back on the day he joined as the proudest day of his life. He could say to young men that his knowledge of engineering had increased 100 per cent since he became a member, and he could assure outsiders that their minds would never be narrowed nor their intelligence decreased by being in this association. Young members should never be ashamed of asking questions, as it was by this means that knowledge was gained and new points brought out in discussion. He would like to see every steam user as well as every engineer join, as they would find it to their profit, not only that, but he would like to have the steam user submit questions to be answered by the association of his town, as both employer and employee would thus be benefited.

Bro. Drouin, of St. Laurent (Montreal) No. 2, in responding on behalf of his branch, regretted that he was not familiar enough with the English language to make his ideas clearly understood, but he wished to thank the committee for their kind entertainment in Toronto, and would say that their reception showed they were brothers in reality, and all were working for their common good, without regard to nationality. This unity would give them more power and more usefulness, and he hoped it would always continue.

Bro. D. Robertson, of Hamilton branch, was glad to say that his association was making progress, if not in numbers, in knowledge and in finances, too, as he observed by the report. He endorsed the remarks of Bro. York, and would like to see manufacturers come into the association as honorary, if not active members.

Bro. Shapland, on behalf of the London branch, said that he was one of the two who organized the branch in that city, and they found great indifference in getting men into it, as some were afraid of telling others all they knew, and making them as wise as themselves. Experience had shown that this was not only a narrow but a mistaken view, for the exchange of ideas was the most effective way of gaining knowledge, and now London had a fine association.

Bro. Green, engineer of the Ontario Agricultural College, replied in behalf of Guelph, and mentioned some of the drawbacks of their association, but expressed the hope that the present year would be one of prosperity.

Bro. King, of Dresden, said his branch was the baby association last year, but he was glad that there were several infants brought forth this year. His branch was progressing slowly, the membership being limited, but he was glad to say that those who had gone in were staying with them and were profiting by the connection.

Bro. King, of Kingston, said they were doing well and had shown a fair advance in membership during the past year, having now about 30 on the books.

"The Upper Ten and the Lower Five," a serio-comic song, was touchingly rendered by Messrs. Fax and Grant, and in reply to the encore they gave a topical song with the refrain of "Goodness."

Gracious" in which Mr Fax brought in the following hit on the question of the selection of the convention for next year:—

Toronto has welcomed the C.A.S.E.

Oh! Good Gracious!

And wished them God-speed wherever they be,

Goodness Gracious!

They want the convention at Ottawa next year;

They'll start out and land down at Kingston, I fear,

And when they get there they'll remain a whole year.

In reply to the toast of "Ontario Association of Stationary Engineers," Bro. Edkins referred to the impression some had that there were two associations. The Ontario association was a body empowered by the Local Legislature to issue licenses of competency to stationary engineers after due examination. The C.A.S.E. had endeavored to get legislation from the Dominion and Ontario Governments empowering them to examine engineers as to competency and issue licenses, but so far they had not succeeded owing to the causes stated by Mr. Tait. In 1891, however, a bill was passed in the Ontario Legislature under which the O.A.S.E. was formed, and they would never forget the valuable services of Mr. Tait in their behalf. This bill enabled a board to hold examinations and issue certificates, and this was the scope and object of that association. Their certificates, though under the authority of the Ontario Legislature, had been accepted outside the province. The bill provided that the certificate could be cancelled if the holder was proved to use intoxicating liquors to excess, and he was glad that only one case of that kind had occurred, out of between 500 and 600 certificates issued, the holders residing as far away as Halifax and Victoria. In Quebec they now had a Government licensing law which is compulsory, and no doubt that law would be the means of raising the standard of qualifications of engineers in that province. If Ontario would pass an Act under which the Government would issue certificates, they would be willing to let the present Ontario association lapse in its favor.

Mr. Alexander then sang "No Surrender," which elicited an encore.

Bro. Thos Ryan proposed a toast and vote of thanks to the gentlemen who had made the time pass so pleasantly with their songs and music. The vote was carried with three rousing cheers.

Mr. Fax responded with two or three of his comic songs, which were received with delight.

Three cheers were given for Toronto No. 1 for the way in which they had handled the entertainment of the convention.

Bro. York then read, as follows, the address in reply to the address of welcome:—

*E. J. Philip, President, Toronto No. 1:*

DEAR SIR AND BROTHER,—We, as a committee appointed by the 1894 Convention of Canadian Association of Stationary Engineers, on behalf of that convention, tender to you, as representative officer of Toronto No. 1, our cordial thanks for your hearty welcome extended to this convention. And also their very great appreciation of the efforts of your entertainment committee in providing a programme for the entertainment and amusement of this convention—a programme which has certainly never been equalled and could hardly be surpassed.

On behalf of the convention, we trust they will accept our sincere thanks.

Committee—Thomas Ryan, William Jamieson, Robert King.

"The Press" was replied to by E. B. Biggar, of THE CANADIAN ENGINEER.

After another song by Mr. Fax, the evening closed at 1.30 a.m. with a capital recitation by Bro. Hunt in Dutch dialect.

THURSDAY, SEPT. 6TH.

This day was very pleasantly spent in an excursion to Niagara Falls, which had been arranged, as the other items had been, by the reception committee, composed as follows: Bros. A. E. Edkins, E. J. Philip, Wilson Phillips, W. L. Outhwaite, J. Fox, Wilford Phillips, J. C. McLachlan, J. G. Bain, W. G. Blackgrove, W. Bell, with A. M. Wickens as chairman, H. E. Terry, secretary, and Geo. Fowler, treasurer.

The party, accompanied by a number of lady friends, assembled at the foot of Yonge street wharf, where they took the Niagara Navigation Co.'s new palace steamer "Chippewa" at 7 o'clock. The weather proved lovely, and the trip across the lake was much enjoyed both going and coming. After getting passing glimpses of old Fort George, Brock's Monument and Queenston, where the Canadian volunteers won renown in the war of 1812, the party proceeded to the Falls by the Niagara Falls Park and River Railway, the picturesque scenes along which were much admired. Crossing the river by the new suspension bridge, the party paid a visit to the

power-house of the Cataract Construction Co., now in course of erection. Here, under the care of De Courcey May, engineer in charge, they viewed the remarkable works, an account of which will appear in another issue. Returning to the river, they went down the elevator to the foot of the falls, where they went on board the "Maid of the Mist" and donned oil-cloth suits to make the trip through the spray which is flung forever from the bottom of the greatest of the world's cataracts.

Regaining the Canadian side, the party enjoyed a hearty luncheon and then a visit was paid to the electric railway power house, where are installed two waterwheels developing 1,000 horse power each, and providing more than enough power for the company's line of 14 miles in extent. Only one wheel is required at a time, and this generates electric force for three generators of 350 horse power each. For the steep grades at Queenston Heights a steam power house is used, situated below the village. After a trip to Chippewa the party returned to Queenston, stopping for a trip down to the whirlpool on the way. Finding Ross Mackenzie, the general manager, J. C. Rothery, the assistant-superintendent, and Wilford Phillips, the mechanical superintendent, on the platform, a deputation stepped forward to thank those gentlemen for the courtesies so kindly extended to the engineers, and Mr. Wickens decorated Mr. Mackenzie's breast with the badge of the association. Mr. Mackenzie's short speech of thanks was received with three cheers and a stave of "He's a Daisy." President Hunt complimented the officers on the excellent equipment of the road, and said that of the many electric roads he had travelled over he had not found one to surpass this. Some of the Montreal members then caught Mr. Phillips and gave him a genuine Montreal snow shoe "bounce"—an experience which he relished more at the end than at the beginning. The party reached Toronto about eight o'clock, after a delightful day.

FRIDAY, SEPT. 7TH.

This, the last day's session, opened at 10 a.m.

The committee on good of the order reported that the question of granting graded certificates to members of the C.A.S.E. having been referred back to them, they now reported that they would not recommend the issue of such certificates, as they did not consider it wise for the association to be responsible for any member's ability or grade of standing as an engineer.

This subject, in connection with the report of the committee on constitution and by-laws, gave rise to a prolonged discussion, during which it seemed to be the general opinion that it was better for the association not to go beyond the scope of its prime object—a means of mutual improvement and education. It was also thought that the issue of even a formal certificate of membership might lead to abuses which would work harm to the standing of the association. The report was adopted.

The report of the committee on constitution and by-laws was as follows:

1. Your committee recommend that Sec. I., Art. 5, be amended to read thus: "That it be constitutional hereafter to have the nomination of candidates for office on the executive council precede the election of said officers, and may be taken up at any time after the opening of the annual convention, providing notice thereof has been given."

2. Your committee recommend that a new section be added to Article II., to be known as section 2, whereby subordinate associations shall issue to any member in good standing a withdrawal card, which, upon presentation thereof, shall entitle the holder to the full privileges and membership in any other association in the locality to which he may remove without the payment of initiation fee, and that Article II., section 1, on the laws of subordinate associations, be so amended.

3. Your committee also recommend to this convention that the executive committee formulate some scheme of insurance and benefits for members; the executive to be instructed to draft such scheme, and that the secretary of this convention notify each of the subordinate associations of the same not later than two months previous to the annual convention next ensuing.

4. That Article IV., sec. 2, on the laws of subordinate associations, be corrected; also that sec. 2 of same article (which is omitted from one edition of the constitution) be inserted, and that Art. III., section 4, be amended by erasing all after the word "each," and inserting instead the words "semi-annual."

It is the opinion of your committee that the rule appointing district deputies be more closely adhered to, there being no need for provincial deputies. A certain number of district deputies should be appointed at each convention, and such appointments to be made by vote of the convention.

The first paragraph was thrown out, as it was thought that

more interest would be taken in the convention if the election of officers were left to the close, and as this plan had worked very satisfactorily in the past, there was no reason for changing it now.

The second clause relating to the certificates was thrown out, as was also the third, on the ground that it was going beyond the primary objects of the association and would entail the work of salaried officers.

The fourth recommendation was adopted, but with regard to the last it was explained that the appointment of deputies was a prerogative of the president.

The auditing committee reported that they had found the books, vouchers and reports correct, and recommended the refund to the Kingston branch of an overcharge of \$3.87½ on per capita tax.

Bro. York reported the results of issuing the souvenir. The total receipts for advertising amounted to \$842.50 net, of which \$442.50 came from Montreal. The net surplus was estimated at \$300, and it was expected that the accounts would be closed within a few weeks.

The surplus revenue from the souvenir will be applied to the expenses of the convention.

An interesting contest took place as to the fixing of the next annual convention, the cities in the field being Ottawa and Kingston. After a test vote it was agreed to make the choice of Ottawa a unanimous one.

At the close of the afternoon session a visit was made to the power house of the Toronto Street Railway, and, after a visit here, the company placed a couple of cars at the disposal of the members for a trip around the "belt line."

#### OFFICERS FOR 1894.

The evening session was chiefly taken up with the election of officers, which resulted as follows:

President—John J. York, Montreal.

Vice-President—W. G. Blackgrove, Toronto (acclam.).

Secretary—James Devlin, Kingston (acclam.).

Treasurer—Duncan Robertson, Hamilton (acclam.).

Conductor—E. J. Philip, Toronto.

Doorkeeper—J. F. Cody, Warton.

Upon the installation of officers, the newly-elected president appointed the following as district deputies:

For Quebec—O. E. Granberg, Montreal.

For Ontario—A. E. Edkins, Toronto.

For Manitoba—Chas. C. Robertson, Winnipeg.

The president-elect gave it as his opinion that the appointment of local district deputies for Toronto and Montreal, as had been done in the past, was a duplication of official work, and was unnecessary. In this opinion the majority acquiesced, and the president decided not to renew these appointments, but have the work done by the provincial deputies he had named.

A pleasing feature connected with the election and installation of officers was the presentation to the retiring president of a handsome jewel. It was pinned on his breast by Bro. A. E. Edkins, who complimented him on his ability and fairness in filling the presidential chair.

Bro. Hunt gratefully accepted the token, and regretted that his services had not been of such value as he could have wished.

After brief speeches by the newly elected officers, the convention closed at 11.30 p.m. with "God Save the Queen" and "Auld Lang Syne."

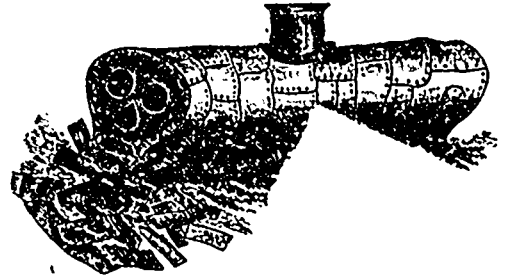
### REVIEW OF THE METAL TRADES.

MONTREAL, SEPT. 8TH, 1894.

The passing of the American tariff bill has, as in other industries, made the outlook brighter for the metal trades. Prices seem to have an upward tendency, especially tin plates, though no actual changes have been made in this city up to the present. A more active business, at improved prices, may however be looked for, especially as business of all kinds across the line seems likely to improve rapidly. There are no special features to report.

JOHN DATE's plumber supply and brass works, Montreal, have been partly destroyed by fire, the cause of which is unknown. The two upper storeys were gutted. Loss nearly \$20,000; covered by insurance. Sailors from the British warships, then in harbor, lent friendly aid to the fire ladders.

It was lucky that Montreal council purchased the new Worthington pumps and equipment (described in our last issue) when they did. Otherwise citizens would have experienced the inconvenience of a water famine, for last month one of the old pumping engines of 12,000,000 gallons capacity broke down. It was repaired after a few days.



THE BOILER THAT JACK BUILT.

BY W. J. COLESTON, ST. JOHN, N.B.

This is the boiler that Jack built,  
These are the plates marked B for best  
That for use in tanks may stand the test,  
But don't use them in boilers is our request,  
If you don't want a boiler like Jack built.



This is the way the plates were bent,  
Making fractured holes and serious dents,  
And time and labor foolishly spent,  
In making the boiler that Jack built.



These are the drift-pins tapered so fine,  
Driven into blind holes to force them in line,  
And driven hard in with murderous clip,  
Starting cracks from the holes, causing  
deadly seam rip,  
In the plates of the boiler that Jack built.



This is the chisel so easy to prove,  
That is foremost in starting the treacherous  
groove,  
By scoring the plates with its corners so  
keen,  
And gouging in deep along the whole seam,  
That little strength's left is easily seen,  
In the plates of the boiler that Jack built.



This is the boiler looking so slick,  
For both inside and out the paint laid on  
thick,  
And all ready to test for the owner to see,  
And as the pump starts, so the boiler leaks  
free,  
Owner is dodging the streams squirting  
round,  
Gauge kicking hard to pass fifty pounds.

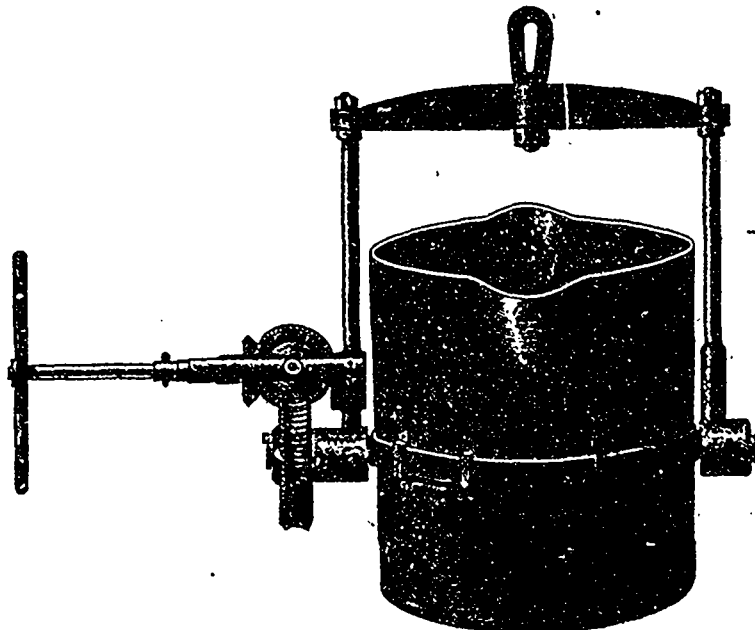
Pumping is stopped as crack goes a seam,  
Owner's told 50 cold's good for hundred in steam,  
And that all new work leaks some, but that little sup,  
Why when steam is on will all take up, and soon will be as tight as  
a cup,  
So off goes the boiler that Jack built.



This is the take-up sure enough,  
Of boilers built of doubtful stuff,  
And fractured plates and drifted holes,  
And sledge blows used in place of rolls,  
And deadly grooves with chisels keen.  
The result of such is often seen,  
That in such a take-up means a general wake-up,  
And the homes of many break up, as loved ones lives they gave up,  
In the bursting of the boiler that Jack built.

## FOUNDRY LADLES.

By examining the accompanying cut of a foundry ladle, the reader will readily see that parts are all accurately fitted. The worm and worm wheel are cut gear, which prevents any loose motion while in operation, and is so easily worked that a boy can attend to it.



The bowl is made of steel plate from  $\frac{1}{4}$  to  $\frac{3}{8}$ , and the bottom from  $\frac{3}{8}$  to  $\frac{1}{2}$  inches thick, and of 2,000 to 12,000 lbs. capacity.

Particulars regarding this ladle may be had of the Hamilton Facing Mill Co., Hamilton, Ont., manufacturers for the Dominion.

## LITERARY NOTES.

*Dictionary of Electrical Words, Terms and Phrases*, by Edwin J. Houston, Ph D (Princeton). Third edition, greatly enlarged. New York: The W. J. Johnston Company, Ltd., 253 Broadway, 1894. 669 double column octavo pages, 582 illustrations. Price, \$5.00. The above book has long been well known, and its popularity is demonstrated by the fact that a third edition has been called for. It will prove useful, not only to the electrician, but to the masses in search of enlightenment on subjects which are so often under discussion nowadays. It is well printed and bound, and, as all such often-handled books should be, is metal cornered. The edition now to hand contains an addition of about 20 per cent. of matter and brings down the work to the year 1894. During the last two years many new electrical words and terms have been introduced, particularly to the classes relating to scientific nomenclature and alternating currents, all of which will be found in this latest edition of the dictionary. Among the former is included the result of the work of the World's Fair International Electrical Congress and of the Committee on Units and Standards of the American Institute of Electrical Engineers, while proposed nomenclature from less authoritative sources, but nevertheless likely to be encountered by the reader, has not been neglected. The comparatively recent development in the field of electrical transmission of power, exemplified by the great Niagara plant among others, has brought forward the subject of multiphased alternating currents, the rotary magnetic field and many phenomena new to industrial electricity, which as yet are scarcely to be met with in electrical book literature. All of these receive careful attention. The scheme of treatment is as follows: First, the words, terms and phrases are invariably followed by a short, concise definition, giving the sense in which they are correctly employed, second, a general statement then follows of the principles of electrical science on which the definition is founded; third, when, from the complexity of the apparatus or from other considerations, it has been thought desirable to do so, an illustration or diagram of the apparatus is given; fourth, to facilitate study, an elaborate system of cross-references has been adopted, so that it is easy to find the definitions, as the words and aliases are readily detected and traced. In applying these rules great care has been exercised to secure clearness, to the end that while the definitions and explanations shall be satisfactory to the expert electrician, they shall also be simple and intelligible to those who have no training at all in electricity or are novices in the art. This is a work of some difficulty, and it is fortunate that the task fell to Professor Houston, in whom the exposi-

tory faculty is most happily united with a wide and exact knowledge of both the practical and theoretical sides of the subject. To the editor or journalist, to the intelligent reader of scientific periodicals, as well as of the newspapers and magazines; to the school teacher, the college professor, the lawyer, the doctor, the professional man generally, it supplies a work of reference no less indispensable than the general encyclopedia, whilst to students of general electricity and of electrical engineering, and to those actually engaged in the electrical industries, it is not only an aid but an absolute necessity.

When *The Monetary Times* undertake a thing they do it well, and their special fall number just issued bears out their reputation in this respect. The cover of this special number is, beyond all comparison, the most artistic piece of work ever turned out from a Canadian printing office. As might be expected, the advertising pages of this special number are extensively patronized by the leading firms of the Dominion.

## THE CAPTAIN'S DREAM.

There died recently at East Jordan, Mich., says an eastern paper, a man, the sunshine and shadows of whose life were intermingled with a peculiar fulfilment of superstitious prophecy, the loss of his vessel in a collision, and death of his mother, following a dream announcing the fact. His own death came after a deep sleep that had haunted him for years. All make up a peculiar and strange combination of related facts and superstitions.

Capt. James Ward was born in Nova Scotia sixty-eight years ago. He left the land of his birth at the age of seventeen, after earning the hardships of sailing the perilous coast of his native land, and secured work as a sailor before the mast on the lakes. He became well off, had a good home on the shore of Lake Erie at Port Burwell, Ont. He sailed for forty years his own and other vessels, and had the reputation of being even reckless about the weather; but his great fear was of being run into by other vessels, and that presentiment could neither be coaxed nor slamed out of him.

On the night of September 20, 1881, while going down the Detroit river in the schooner "Victor," Capt. Ward was in his berth asleep. He had a most distressing dream that his mother was dying in far-away Nova Scotia, and that his two brothers, then long dead, were standing at his bedside. He was so troubled by the vision that he went on deck, only to see a big black boat directly ahead, which crashed into them. The "Victor" sank almost immediately, and the captain, with his daughter and son, narrowly escaped drowning. It was a collision with the steam barge "S. J. Macy," just opposite Windsor.

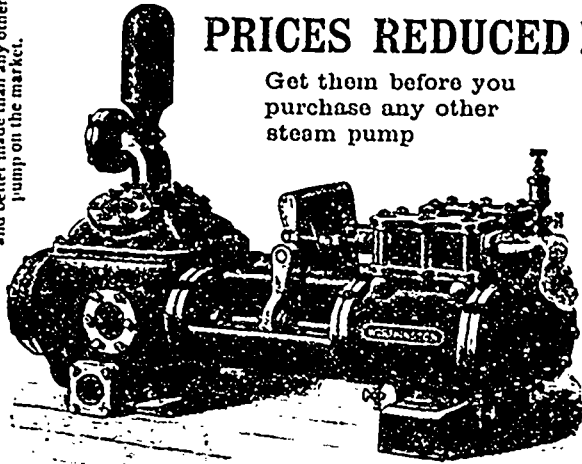
Capt. Ward, upon going to the telegraph office to announce to his family the news of the accident, found awaiting him a telegram announcing the death of his mother the night before. He quit sailing at once, sold out and went to farming in Michigan, a discouraged and disheartened man. He was still haunted by his vision of trouble. He died after a lingering sickness of the most distressing sort, after lying in a deep sleep or trance for five or six days, exactly as he had feared and predicted.

The Reeves Pulley Co. have issued to their customers a very useful little diary and memoranda book, containing amongst other useful information, some reasons why they consider pulleys made of wood to be the best on the market. It is illustrated with explanatory cuts, and will prove a useful little book.

The record of a year's service of the "Campania" is published, voyage by voyage, in *Engineering*. It appears that the mean speed attained in nine round trips was 20.3 knots. The mean speed of the "Lucania" in six round trips was 20.4 knots. This is from April 23 of one year to March 30 of the next, but includes no time whatever between December 1 and March 11 for the "Campania," and between December 16 and February 25 for the "Lucania," during which weeks both ships were laid up. So these ships escaped some of the roughest weather of the year. Three years ago the same journal published detailed returns of performances of six competitive trans-atlantic lines, and the highest mean speed was about 19.1 knots. The "Campania" and "Lucania" have doubtless made a better average record for speed than any of the other trans-Atlantic liners for the same length of time.



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R. H. BUCHANAN & CO., Canadian Agents for H. R. Worthington Duplex Steam Pumps, 684 Craig Street, MONTREAL.

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"Hematite" and  
"Foundry"**

**Pig Iron**

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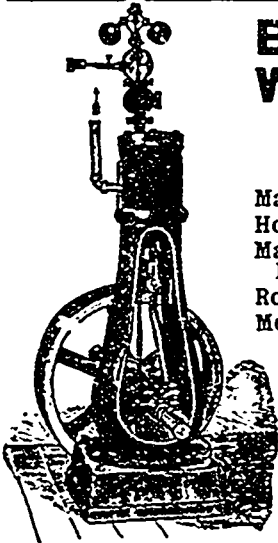
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Complete analysis furnished when required  
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HARVEY GRAHAM, Secretary



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Successors to Doty Engine Works Co. and John Doty Engine Co., Ltd.

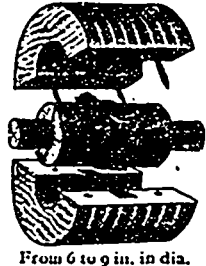
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Prompt shipment and satisfactory fulfilment of all contracts.  
Estimates and prices on application.

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From 6 to 9 in. in dia.

**Wood Split Pulleys**

We manufacture Wood Split Pulleys of all sizes from six inches diameter up.

If you use Pulleys write us for our Catalogue and Price List.

**REEVES PULLEY CO.**

Pearl St., TORONTO, Ont.



**Foundry Facings  
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**MINING and MILL MACHINERY**

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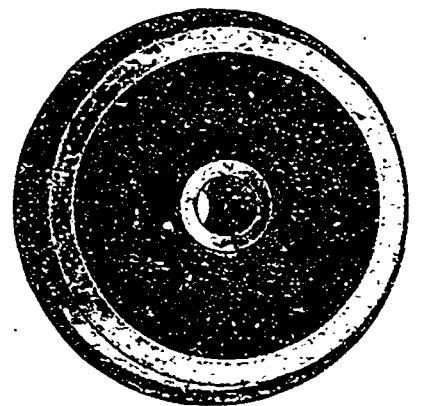
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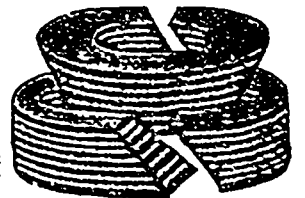
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Common Rubber and Rainbow Sheet Packings, Rainbow Tube Casket Packing, Square Flax Water Packing, Asbestos Wick  
and Millboard Packing, Leather and Rubber Belting, Lace Leather, Asbestos Magnesia Sectional Steam Pipe and Boiler Cover-  
ing, Champion Tube Scrapers, Boiler Purger, etc. Write for Circulars, Price Lists, etc.



## Industrial Notes.

W. N. ROBERTS is building a sash and door factory in Renfrew.

Two new boilers are being put in at Barsalou's soap factory, Montreal.

ALEXANDRIA, Ont., will put in a system of waterworks at a cost of \$16,000.

THE Imperial Oil Company will build a barrelling station at Hamilton.

THE proposed Woodstock, Ont., hospital is estimated to cost about \$14,000.

G. A. BRITAIN is building an addition to his grist-mill at Bristol, N. B.

THE Canadian Oil Co. have decided to build works at Sarnia, Ont., on a larger scale.

HEYDON BROS., plumbers, Toronto, have assigned Liabilities \$5,000; assets very small.

NIAGARA FALLS, Ont., voted against a by-law to provide \$88,000 for sewerage improvements.

THE Page Wire Fence Co., Walkerville, Ont., have closed down their works for two months.

MANNING'S mill, at Stonewall, Man., has been burned down. Loss, \$8,000; only partly insured.

J. R. BOOTH has decided to build a small sawmill on the site of the one recently burned down in Ottawa.

MCKEE'S sawmill at Durham, Ont., has been burned; cause, incendiarism. Loss nearly \$20,000; not insured.

FIRE did damage to the amount of \$5,000 at Wm Harris' suet and tallow factory, Toronto. Insurance very little.

JOHN KING is thinking of forming a company to build a pulp mill at Fort William, Ont., at a cost of \$300,000.

THE British Columbia Automatic Lighting and Oil Co., Vancouver, has been incorporated. Capital, \$350,000.

THE by-law to raise \$10,000 for the purpose of extending the electric light plant at Collingwood has been defeated.

THE Fleming wood and lumber mills in Tay township, Ont., have been consumed by fire. Loss, \$15,000; insured.

PICARD & SON, Quebec, have the contract for supplying heating apparatus for Levis College. The amount is \$6,000.

MCKECHNIE BROS.' sawmill at Durham, Ont., has been burned down, with some valuable machinery. Loss, \$12,000.

C. J. & F. W. ODELL will put in a 3 h p steam engine and boiler in their new soda water factory at Sherbrooke, Que.

THE contract between Ottawa City Council and the Ottawa Electric Company for electric lighting has come to an end.

T. L. CLARKE, nickel plater, Montreal, has assigned at the demand of B. & S. H. Thompson. Liabilities nearly \$30,000.

THE Milwaukee Lager Beer Company, Sherbrooke, Que., propose to erect an 8-horse power engine and boiler in their factory.

THE Gurney-Tilden foundry at Hamilton is now in operation again after a close-down owing to the shortness of suitable coke.

PLANS and specifications are being prepared for the new bridge to cross the stream running into the Kennebecasis near Sussex, N. B.

WORK has begun with vigor on the rebuilding of the portion of the Lincoln Paper Mills, Merritton, Ont., recently destroyed by fire.

DUNLOP & HERIOT, Montreal, are preparing plans for a \$75,000 red-sandstone house on Sherbrooke street for Hugh Graham, of the Star.

THE Montague Paper Company's Pulp Factory at Magog, Que., is in full blast, though there is a scarcity of pulp wood at present.

FINDLAY, DURHAM & BRODIE, Victoria, B. C., have the contract for supplying cast iron water pipe to that city, at a price, delivered, of \$12,075.

W. B. KELLY'S saw-mill at Bridgenorth, Ont., has been destroyed by fire, together with 50,000 feet of lumber and 1,000 ties. Loss, \$6,000.

THE artesian well water supply at Chatham, Ont., having failed, that town is in a difficulty for a water supply. Probably water will be taken from the river Thames, but many in the town object to filtered water.

THERE is a project on foot in Waterloo, Ont., to spend \$6,000 in the erection of a singing hall.

PETER McLAREN'S sawmill at McLeod, N. W. T., was last month destroyed by fire. Loss, \$12,000.

W. B. KELLY'S saw-mill at Bridgenorth, Ont., has been burned down. Loss \$6,000; insurance \$3,000.

J. BOWES' sash and door factory at Orangeville, Ont., has been burned down. Loss, \$8,000; insurance, \$2,000.

MONTREAL carriage builders complain of Ontario competition and talk of forming a combine, with a capital stock of \$100,000.

E. A. MANNY & CO., founders, Beauharnois, Que., with a branch at Montreal, have assigned, with liabilities of about \$40,000.

CHAS. WILSON, formerly manager of the Victoria, B. C., Iron Works Co., has opened a new foundry and machine shop in that city.

E. G. ANDERSON & CO., Victoria, B. C., have the contract for supplying the lead piping and brass goods for the Vancouver water works.

BARRIE, Ont., town council has in contemplation the purchase of the local waterworks system. At present it is owned by an American company.

THE Sclater Asbestos Manfg. Co. have established themselves in a large store at Nos. 48 and 50 Foundling street and 35 St. Peter street, Montreal.

W. W. ROWE and H. E. Smith, two Americans, are thinking of establishing a factory in Moncton, N. B., for the manufacture of typewriter ribbon.

A BY-LAW has been passed in Bracebridge, Ont., to provide for the construction of a system of waterworks and an electric lighting plant in that village.

EXTENSIVE bottling works are to be built in connection with the Walkerville brewery. The building is to cost \$6,000 and will be 120 feet long.

W. C. HARRISON'S sawmill, planing mill, and sash and door factory at Norwood, Ont., have been burned down. Loss, about \$11,000; insurance, \$3,000.

SPECIFICATIONS are being prepared by the Public Works Department for new heating apparatus for Rideau Hall. For this purpose \$13,000 was voted last session.

O. E. KONKLE, of the Hamilton Lumber Co., in connection with an American syndicate, will build a five-storey hotel and opera house in Hamilton, at a cost of \$200,000.

A FOUR-STOREY addition to the Corticelli Silk Co.'s factory at St. John's, Que., has been completed, thus giving the works an increase of floor space of 15,000 square feet.

THE Pembroke Milling Co. are applying for incorporation, when they will take over the flour and oatmeal mills at Pembroke, owned by W. B. McAllister. Capital, \$75,000.

THE Dominion Millers' Association has elected the following officers: President, H. Barrett, Port Hope; vice-presidents, Alex. Dobson and Jas. Hodd; treasurer, Wm. Galbraith.

THE Canada Engraving and Lithographing Co., Montreal, are applying for incorporation. Capital stock, \$150,000. Geo. B. Burland and J. H. Burland are interested in the company.

A LARGE grain elevator at Forest, Ont., was burned down last month. Six thousand bushels of wheat and 27,000 bushels of oats were destroyed. Loss, over \$6,000; insurance, \$5,000.

A FIRE broke out last month in A. E. Sinesac's flour mill at Harrow, Ont., and spread so rapidly that a large portion of the village was destroyed. Total loss, \$30,000, insurance, \$15,000.

THE G. H. Harper Milling Co., Dundas, Ont., who have operated the Webster flour mills since 1891, have assigned owing to the unsatisfactory state of that industry, and the business will be wound up.

HUMPHREY & TRITES' new saw-mill at Petitcodiac, N. B., is now in operation. The St. John Telegraph says it is a well-equipped mill, though somewhat smaller than the one destroyed by fire some time ago.

D. A. GRANT'S carriage factory at Woodstock, N. B., has been destroyed by fire. Loss \$20,000; insured for \$7,100. Twenty-seven men are thrown out of employment. The works will probably be rebuilt.

THE Wilson Fire Extinguisher Co. (Ltd.), Toronto, have been incorporated, with a capital stock of \$24,000. Among the prominent shareholders are A. C. Hammond, J. J. Foy, Q. C.; Hy. Moffatt, of the Phoenix Fire Insurance Co.; C. E. Good, C. E., and E. C. Foster, of the Western Assurance Co.

A. A. TUTTLE is making quick progress with the rebuilding of his wood-working factory at Moncton, N.B., which was burned down recently.

THE Dominion Bridge Co., Laçhine, Que., have completed two steel bridges at Meteghan, N.S., one at Keene's Corner and the other across the river.

NORTHEY COMPANY (Ltd.), Toronto, pump manufacturers, are putting in a duplex steam pump at the Montreal Cold Storage and Freezing Company's premises.

PETERBOROUGH, Ont., has declared in favor of a by-law providing \$21,000 for the construction of a main outfall sewer from Townsend street to the river.

THE Sisiboo Falls Pulp Co., Weymouth Bridge, N.S., is applying for incorporation, for the purpose of manufacturing paper pulp, etc. Capital stock, \$30,000.

CHARLES M. BOWMAN, Southampton, Ont., is applying for the incorporation of the Southampton Lumber Company, whose object is to manufacture laths, shingles, etc. Capital about \$10,000.

A MOYER's grain elevator at Listowel, Ont., has been destroyed by fire. Loss \$10,000, insured. The fire was caused by the carelessness of some young lads in throwing away unextinguished matches.

THE water committee of Montreal City Council, under the advice of Superintendent Davis, have accepted the new Worthington engine, which, owing to the break-down of the old engine, had to be set to work recently.

THE Goldie Milling Company have practically finished putting in the new machinery at their mill at Greenfield, Ont. This mill will be the second largest one in Ontario, and will be capable of turning out 800 barrels per day.

E. D. DAVISON & SONS (Ltd.), Bridgewater, N.S., have been incorporated, with other lumber merchants, as a company to carry on a general lumber business and manufacture paper, wooden goods, etc. Capital stock, \$250,000.

THE Union Card and Paper Co., Ltd., Montreal, capital stock, \$100,000, are applying for incorporation. They make playing cards, cardboards of all kinds, staple and fancy papers, printers' and photographers' supplies, etc.

AMONG recent shipments by the Robb Engineering Co., Amherst, N.S., are a 40 horse-power Robb-Armstrong engine, a 40 horse-power Monarch boiler and a Perfection rotary sawmill to John E. & G. Lake, Fortune Bay, Nfld.

G. MIDDLEDITCH, of Ridgeway, Ont., has made an offer to Amherstburg, Ont., council to the effect that if the latter will give free water and exemption from taxation for ten years, he will establish a machine shop and foundry there.

THE Dominion Glass Co., Montreal, are applying for incorporation under the Joint Stock Companies' Act. Capital stock, \$100,000. Henry Hogan, hotelkeeper, Montreal, and H. P. Schnellback, glass mfr., of Stubenville, O., are interested.

THE by-law to provide for the building of a system of waterworks, sewerage, and electric lighting at Sudbury, Ont., was carried by a majority of 49. The estimated cost of the improvements is: Waterworks, \$30,000, electric light and sewerage, \$10,000.

THE Canadian Oil Company's premises at Sarnia, Ont., suffered last month from a disastrous fire, which destroyed the barreling houses, agitator tanks, and bleacher, besides many outbuildings and a large quantity of oil. Loss nearly \$40,000, partly insured.

THE Sheep Creek Irrigation Co. (Ltd.), capital stock \$1,000, headquarters Calgary, N.W.T., is applying for incorporation in order to sink wells, construct dams, cribs, embankments, etc., for the purpose of providing irrigation for lands in the North West.

THE foundry and appliances belonging to the insolvent firm of Boyd & Co., Huntingdon, Que., and their sash and door factory at Athelstan, have been taken over by the Montreal Trust and Loan Co., who held a \$12,000 mortgage on the properties. The former was appraised at \$6,750 and the latter at \$2,600.

THE Warren-Scharf Co. have been awarded the contract for the asphalt paving of Cecil street, Toronto, at \$9,057, and Wellesley street at \$11,235. On McCaul street, also, they will put in scoria at \$3.25 per sq. yard, concrete at \$5.20 per cubic yard, asphalt at \$1.40 per square yard, and gravel at \$1.15 per cubic yard.

JUDGE DE LORIMIER has issued an injunction restraining the Consumers Gas Co. from supplying gas in Montreal, chiefly on the ground that though defendants had obtained a right to open the streets, yet it was on condition that they respected the prior rights of the Montreal Gas Co. They were forbidden, therefore, to supply gas through the city's streets before May, 1895.

ROBERT GRANT has the tender for construction of sewerage extensions in Belleville, Ont. The price is \$2,380.

TANGUAY & VALLEE, Quebec, have been awarded the contract for constructing the sanitary department at Beauport Asylum, at a cost of \$25,000.

W. F. VILAS, an agricultural implement maker of East Farnham, Que., is going to start a large foundry and bicycle factory at Cowansville.

AN elevator belonging to the Northern Elevator Co., at Winnipeg, was burned down last month with all its contents. Loss, between \$40,000 and \$50,000. Insured.

THE Goyotte & Melanson Pottery at Iberville, Que., has been sold under foreclosure of mortgage (held by the town) for \$6,000, to A. Melanson. The plant is worth \$20,000.

C. & S. GOGGIN's tub factory at Elgin, N.B., has been consumed by fire, which broke out in the planing mill. Insured. A considerable number have been thrown out of employment.

THE Montreal Chambre de Commerce has decided to purchase a piece of land bounded by St. James street, St. Lambert Hill, and Fortification Lane, upon which it will erect a \$100,000 building.

THE Frosell Safety Scaffold Co. (Ltd.), Montreal, are applying for incorporation. Capital stock \$50,000. They will acquire the patent of Frosell's Safety and Movable Scaffold or Traveling Platform.

JOSEPH McVEY, who has the contract for constructing the sub-structure of the new bridge at Ferry Point, N.S., has commenced work. He has opened a new quarry at Dufferin, where thirty men are employed getting out material for this purpose.

TEW & MARSHALL's flour mill near Plattsville, Ont., has been destroyed by fire, together with a large quantity of flour and grain. Loss about \$20,000. Insurance only \$6,000. The fire is supposed to have originated in a spark from a defective chimney.

ALBERT BRASEAU, an employe in Desjardins' foundry at Papineauville, Que., was polishing at an emery wheel when the casing he had in his hand got jammed, causing the grinding wheel to break into a hundred pieces. Braseau was killed almost instantaneously.

THE Alma Lumber and Shipbuilding Co.'s mills, at St. John, N.B., were last month suddenly ordered to be closed by Fishery Inspector Stewart. An infraction of the fishery laws, by dumping sawdust in the stream, was the alleged cause.

A BY-LAW to authorize the construction of an aqueduct at St. Paul's Bay, Que., at a cost of \$10,000, was recently passed by a majority of seven. It is claimed, however, that several voted who were not *bona fide* proprietors, and there is a chance of the by-law being set aside.

THE Montreal Gas Company have reduced the price of gas all over the city to 95 cents per 1,000 feet, for both lighting and heating purposes. One meter to each consumer will be allowed free. Doubtless the cause of this considerable reduction is the competition brought about by the Consumers' Gas Company.

THE Dominion Rubber Reclaiming Co., Ltd., Montreal, are applying for incorporation. They will manufacture rubber goods and reclaim the rubber from old articles which have contained it. Capital stock, \$100,000. The applicants are Wm. Clendenning, W. Currie, W. T. Costigan, and W. D. Lighthall, all of Montreal, and F. Dagenais, of St. Henri.

ALD. MEYER and a local company are starting a new industry in Vernon, B.C., in the shape of a factory for the manufacture of tiles, from clay found in the neighborhood, for walling and roofing houses. Similar tiles are used to a very considerable extent in Japan, where it has been found that they go a long way towards rendering the houses fire-proof.

J. R. BOOTH, of Ottawa, has become the victim once more of a disastrous fire, between six and eight million feet of lumber belonging to him at Rochesterville, valued at about \$150,000, having been burned on the 26th ult. Insured for about \$30,000. The public school at Cedar street, valued at \$8,000, was also destroyed. The fire is supposed to have been the work of an incendiary.

THE Montreal Steam Laundry was last month destroyed by fire. The efforts of the firemen were much impeded by the presence of innumerable electric wires, which made the conflagration one of the most dangerous to life on record. Loss nearly \$100,000, insurance, \$27,500, besides \$1,000 on goods which belonged to the Pullman Co. A few of the visiting American fire chiefs were present at the blaze, and complimented the Montreal fire laddies in high terms on the prowess and ability which they showed on the occasion.

GEORGE UPHAM is building a new saw-mill at Hartland, N.B.

A BY-LAW to provide a sewerage system at Niagara Falls, Ont., was defeated by a small majority.

ALEX KELLY & Co's flour mills at Brandon, Man., have been totally consumed by fire. Loss, \$60,000; insurance, \$30,000

CARLETON PLACE council, who are thinking of building a town hall and fire engine house, have received a design from a Detroit architect, the estimated cost of which would be about \$18,000.

A FIRE broke out in the blacksmith shop at Bogg & Rowcliffe's carriage works at Alton, Ont., and speedily destroyed the factory and some other buildings in the vicinity. Loss \$8,000; only partially insured.

TOURVILLE Co.'s lumber mill at Pierreville Mills, Que., has been destroyed by fire, of which the cause is unknown. A general conflagration ensued, in which a large portion of the village was destroyed. Loss to Tourville Co. \$15,000. Insurance, \$4,000.

TORONTO City Engineer Keating estimates the cost of making a thorough survey, with borings, in order to calculate the expense of procuring water from Lake Simcoe by gravitation, at about \$10,000. Test pits in addition would cost about \$12,000 more.

TEW & MARSHALL's flour mill at Plattsville, Ont., was last month destroyed by fire, everything including about 400 barrels of flour and 1,000 bushels of wheat, being totally consumed. The fire was caused by a spark from the chimney. Loss about \$15,000; insurance \$6,000.

THE new carriage manufacturing company at Gananoque, Ont., have now a subscribed capital of \$25,000, and have commenced building operations. Dr. Bowen has been elected president, J. B. Abbott vice-president, and J. O. Bedard secretary. The town council has agreed to exempt the company from taxes and to pay interest on \$10,000 for ten years.

THERE is a good deal being said at St. John, N.B., just now as to the formation of a cold-storage warehouse, which, it is believed, would pay handsomely. A local firm, it is said, would build a warehouse 50 x 54, x 53 ft. high, three storeys and basement, and with a floor space of 80,000 or 100,000, for \$9,500, the machinery costing about \$5,000 in addition.

HORACE R. RIDOUT, Montreal, has had an agent at work in Ontario selling his "stick-fast" belt preservative, and it seems to have met with great demand. The peculiarity of this preservative is that immediately upon its being applied to the pulley there is no slipping of the belt. Another valuable feature consists in the fact that when a certain amount of the "stick-fast" has been applied and expended, no greasy trace of it is left on the belt or pulley, and the accumulation of dust is impossible.

THE creditors of Stevens & Burns, machinists, &c., London, Ont., held a meeting recently at which a statement of the assets and liabilities was presented. The cause of the firm's difficulties seems to lie in their inability to realize immediately on their customers' paper. The assets were placed nominally at \$240,000, and the gross liabilities at \$180,000, thus leaving the fair balance to credit of \$60,000. The meeting finally decided to postpone discussion for two weeks, in order to give the firm an opportunity to settle the more pressing claims and resume business without delay.

P. J. GAGE, of Providence, R.I., is thinking of establishing no less than three new industries in Montreal. One is the manufacture of a new machine for applying gold leaf for decorative purposes, which he claims will save from 35 to 50 per cent. in material and in time upon old methods. Another invention which he intends to push is a blind-stitch attachment for sewing machines. The third industry which Mr. Gage has in mind is the manufacture of biscuits and cakes by a new process, in which the ferments are added after making, thus saving loss by evaporation.

THE Fensom Elevator Works, Toronto, have in hand the following contracts: Three electric elevators for R. Simpson's new store, Toronto (two for passenger service and one for freight); three hydraulic elevators for S. F. McKinnon & Co.'s new office building, including an electric pumping system, two of these elevators being for passengers and one for freight; one electric pumping system to drive the elevator in Rice Lewis & Son's warehouse; two electric freight elevators for George Pears' buildings in Front street west; one electric freight elevator for Sanderson, Percy & Co., Bay street; one hydraulic elevator for the Hudson Bay Co.'s new warehouse, Vancouver, B.C., and one freight elevator for the Hudson Bay Co.'s warehouse, Edmonton, N.W.T. The same firm is also manufacturing a quantity of ornamental iron and brass grilles for elevators and counter-railings, and are prepared to furnish all classes of this work.

## Railway and Marine News.

THE G. T. R. will build an iron bridge over the Otter River, near Burgessville, Ont.

THE rails are being laid for the new railway between Port Morien and Glace Bay.

THE Grand Trunk Railway propose to build a new passenger depot at Berlin next spring.

THE (postponed) sale of the Moncton and Buctouche railway is to take place on December 20th.

THE iron steamship "Codorus," of the Anchor line, ran aground last month on Point Pelee.

THE Lake Erie and Detroit Railway have prepared plans for a new railway depot at St. Thomas, Ont.

THE Gulf Shore Railway Co. expect to commence construction work on the Caraquet railway almost immediately.

THE bridge over the G.T.R. crossing on Notre Dame street, St. Henri, Que., is to be replaced by a superior iron one.

HARLING, RONALD & Co. have chartered a small steamer the "Johansuerdiup," for a new service between Montreal and Halifax.

THE thirteenth semi-annual convention of the American Association of General Baggage Agents took place in Montreal last month.

THE Hamilton Boat Propeller Co. are applying for incorporation, with a capital stock of \$40,000. They will chiefly manufacture row boats.

IN the fire which destroyed J. R. Booth's lumber piles at Rochesterville, Ottawa, last month, a Parry Sound Railway bridge also fell a prey to the flames.

IT is probable that the work of extending the Canada Eastern railway, by means of a branch from Cross Creek Station, N.B., to Stanley, will be commenced shortly.

AN English engineering firm, Pearson & Sons, are willing to assume a contract for the completion of the Chignecto ship railway provided an extension of time be granted.

AT a special meeting of the Richelieu and Ontario Navigation Co. a new issue of bonds to the amount of \$600,000 was authorized in accordance with the Act passed last session.

THE Joliette and St. Jean de Matha Railway Co. have obtained permission from the C. P. R. to use that portion of the line on which the latter's trains used to reach St. Felix de Valois.

THEIRS & Co. are starting a new boat-building establishment at Sherbrooke, Que. If the council should decide to grant a bonus, the firm will agree to employ at least twenty hands at the start.

THE propeller "Ocean," which was sunk in a collision near Rockport on the St. Lawrence, and was raised by the Dominion Wrecking Co., has been thoroughly repaired at Deseronto and was re-launched last month.

THE C. P. R. Co.'s steamship "Empress of China," bound from Vancouver to China, went ashore a few weeks ago on the bar at Shanghai. The bar consists of soft mud, so the vessel was probably but slightly damaged.

THE Canada Coal and Railway Co., Joggins Mines, N.S., are putting in a 300 horse power Lancashire boiler, fitted with Gallo-way conical tubes. It was built by the Robb Engineering Co., who have another of the same size under construction for them.

CAPT. GEO. PLAYTER was in town recently arranging for the proposed trips of the "City of London," which it is said will ply along the shore, taking in Meaford, Owen Sound, Wiarton and Lion's Head, as soon as arrangements can be made for securing fuel.—Owen Sound Sun.

THERE was a good deal of talk a few weeks ago in connection with a proposed extension of the I.C.R. from Quebec to Montreal, it having been rumored that a strong syndicate had been gradually obtaining control over a number of small lines between those points, with the object, it is supposed, of connecting them and offering them to the Dominion Government, with a terminus at Montreal.

THE Great Northern Transit Co. will build immediately at Collingwood a first-class passenger steamer, to have an average speed of 16 miles per hour, and to be superior to any at present traversing the lakes. Completion is looked for early next spring. The engines and boilers are being designed by Logan & Rankin, Toronto. The engines are 2 cylinder compound ones of 1000 h.p. each. The vessel will be 220 feet long by 35 feet beam.

AMHERSTBURG, Ont., Council want power to grant a bonus of \$9,000 towards obtaining the construction of a branch of the Michigan Central to that town.

THE work of deepening the Lachine canal to a uniform depth of 15 feet will cost about \$250,000, and will shortly be started, to be finished about the fall of 1896.

NOTICE was given of additional railway subsidies as follows. Metford Colonization, Argenteuil county, 12 miles, \$38,400, Caraque, N. B., railway, extension, 12 miles, \$38,400.

DANIEL JOHNSON, of Combermere, Ont., has purchased a two-decked steamer, and will put her on Barry's Bay in connection with the O. A. & P. S. Railway from Combermere to Havergal.

THE C. P. R. has laid off twenty-five per cent of its hands at Hochelaga on the 1st inst. The remainder are on half time. The shops will be closed for the first half of the week during the present month.

THE boiler of a locomotive on the mountain division of the C. P. R. burst near Winnipeg a short time ago, the engineer and fireman both being killed instantly. A brakeman also was badly injured.

CAPT. LEWIS, of Rat Portage, Ont., is building a new steamer 110 ft. long and 22 ft. beam, a stern wheeler, with a speed of 15 miles an hour. She will be fitted up for the Lake of the Woods and Rainy River traffic.

THE Dominion Government Department of Public Works will before long call for tenders for the construction of a new steel dredge for salt water service, at a cost of \$40,000. Her hull is to be built entirely of steel.

THE annual convention of the Brotherhood of Locomotive Engineers took place at Brockville, Ont., last month. There were, including ladies, about 500 delegates present, and a very enjoyable week was spent in social entertainments.

IT has been decided to proceed at once with the construction of the railway between Carp and Bridgewater, so as to have it completed this fall. This link will form a connection, *via* the Parry Sound Railway, with the G. T. R. at Bridgewater.

A DIFFICULTY has arisen connected with the Lake Erie and St. Clair canal. Various townships want the syndicate to build and operate bridges over 20 roads which the canal will cross but the company at present decline to build the canal at all under such conditions.

E. D. LAFLEUR and a party of Dominion engineers are making a hydrographic survey of Richibucto Harbor. They are endeavoring to make a complete chart of the bottom, showing depth of water, the action of tides and currents, etc., and will make a report as to the best means of deepening the entrance.

ENGINEER RUEL, of the Canada Eastern Railway, has accomplished about a mile of grading near Chatham, on the extension from Chatham to Black Rock. The work of grading is also being carried on at the Black Rock end. It is hoped to have the line completed by the end of this month.

H. KESLER has drawn up plans and specifications for a second marine railway in Victoria, B. C., to be completed by October 15th. Double engines, with a high-pressure boiler, and other machinery capable of raising upright fifty tons, will be employed in the ways. The line will be capable of accommodating vessels up to 500 tons register.

A SCHEME is on foot to build a railway line between Batavia, N. Y., and Oak Orchard, N. Y., to connect by steamers with the G. T. R. at Port Hope, which place is exactly opposite Oak Orchard, on Lake Ontario. The chief object of the line is said to be the transportation of coal from the Pennsylvania mines into Canada.

THE Railway Agents' Association held a meeting in Boston last month and selected the following officers: President, R. W. Wright, Cleveland, O.; vice-presidents, P. P. Lynch, York, Ont., J. P. Griest, Reading, Pa., A. W. Montague, Wiltsport, Tex., and E. M. Simmons, Carthage, Mo.; Secretary and treasurer, W. W. Spear, Jamestown, N. Y.

THE verdict of the railway commissioners in the terrible accident which took place on the C. P. R. recently near Moosehead, Me., and the cause of which was said by some to have been a defective trestle structure, was as follows: "That the cause of the accident was that some person or persons unknown during the preceding night had withdrawn the bolts and taken off the fish plates used to connect the same on two opposite joints of the rails that extend from the bank about three feet on the bridge, that the end of one or both of the connecting rails on the bridge were raised and

carried to one side and a cedar tie placed underneath the same and that the new cedar ties were used in the same manner to complete the obstruction, and that no blame for the accident attaches to the railroad corporation or any of its officers or employees."

THE "Cambria," an excursion steamer running between Detroit and various points on Lake Ontario and Georgian Bay, was seized by the United States marshal on three libels issued by Detroit ladies, on the ground that the state-rooms, for which they had paid, were not available, the accommodation having been previously taken up by other parties.

THE Richelieu and Ontario Navigation Co. find that the service between Montreal and Toronto is not sufficient to accommodate the increasing number of passengers, and two or three large steamers on the "Carolina" model are likely to be added to ply between Toronto and Prescott, the steamers now on the route being utilized for traffic between the latter place and Montreal.

THE Toronto, Hamilton and Brantford Railway Co. propose to abandon the Toronto branch, but to ask for \$275,000 from Hamilton to aid in constructing a line from Hamilton to Brantford, giving the former direct connection at Waterford with the Michigan Central and the west, and one from Hamilton to a point on the Michigan Central near Welland or Melrose.

THE Richelieu and Ontario Navigation Company's steamer "Algerian" met with a somewhat serious accident in the long Sault Rapids last month. The vessel had nearly passed through the rapids, when she got into extremely rough water and listed, when the heavy sea forced in her bulkhead on her port side, and flooded the engineer's room, the dining saloon, etc. She was badly disabled, but managed to make her way to the lower wharf at Cornwall.

IT seems strange that a city like Montreal, the head of navigation, should have no adequate dry dock accommodation. It is true that there are two dry docks, *viz.* Cantin's and Tate's, but these only provide for river steamers and such small vessels, and are not situate in the harbor at all, but within the canal. Now, however, there seems to be a chance of this defect being remedied, a petition for this purpose having been signed by the chief steamship lines and shipping men of the city and forwarded to Ottawa.

THERE is a chance of the work of construction on the eastward extension of the Canada Atlantic Railway being started immediately. The proposition is to build from Lacolle, through Clarenceville, and round the northern end of Missisquoi Bay to Philipsburg, where connection could be secured to the north. The line would then continue to the southeast *via* St. Armand to Highgate Falls, Vt., where it would connect with the Boston & Maine road. Should such a line become a *fait accompli*, the United Counties Railway would also probably be extended south from Irberville through Henryville, and connecting with the main line west of Clarenceville.

## Mining Matters.

THE Fairview, B. C., Placer Mining Co. are commencing active operations on Rock Creek.

FIFTEEN men are now at work on the "Slocan Star." No 4 crosscut tunnel is in 200 feet.

FREDERICK TAYLOR, of Oldham, N. S., has purchased the Nova Scotia Gold Mining Co.'s property at Waverly.

MR. NASH, of the Kemp, N. S., gold mines, recently showed a bar of gold weighing 75 ounces, the result of four men's labor for a month.

SAMPLES of gold from Franklin Creek, three miles south of China Creek, B. C., have been assayed in Victoria with very satisfactory results.

THE Waneta Co. are reported to have got an ounce of gold dust per day when cleaning up the gravel in their diggings on Cariboo Creek, B. C.

RECENT assays of ore from the "Bunker Hill" and "Theresa," on the south fork of Kaslo River, show results ranging from 140 to 200 oz. silver and 70 per cent lead.

FROM all accounts the "Reco" mine is looking very bright in its prospects just now, and will no doubt before long take its position among the best of the "Slocan" district.

THE Kaye-Symon syndicate plant, etc., at the Montague, N. S., gold mines, has been attached by the sheriff upon the claims of E. Warner, S. Cunard & Co. and McDonald & Co., of Dartmouth.

ANOTHER ledge of gold-bearing rock has been discovered on Mineral Creek, B. C.

THE Golden Era Mining Company (Ltd.), Vancouver, has been incorporated. Capital stock, \$8,000.

THE Londonderry, N.S., Iron Works have closed down for a few weeks, in order to make the usual repairs to the furnaces.

THE sand in the northwest arm of the St. Mary's River, N.S., is said to show the presence of a large quantity of mercury.

THE concentrator at the mouth of Silver Creek, about a mile and a half below Three Forks, is making rapid headway, and by the time the railway gets here the structure will be ready.—*Nelson Miner*.

JOHN F. STEVENS, owner of the Little Donald and Black Diamond mines, in Ainsworth district, will begin operations on the former as soon as the Pilot Bay Smelter Company is ready to handle ore.

S. Fox, C. Dempsey, and J. W. Grahame, of Nanaimo, B. C., have discovered a rich placer diggings on Pavilion Creek. They have staked off claims, and sent in an application for a 20 years' lease.

THE Northern New Brunswick Mining Co., owning gold mines on the Tobique, have elected the following officers: President, Solomon Perley; vice-president, F. H. J. Dibblee; secretary, J. C. Hartley, and treasurer, John Graham.

GEO. RANKIN, of the Cleveland, O., Rolling Mills Co., is testing the district round about the Portlock iron mines, Algoma, and, if found satisfactory, will establish works and carry on the industry of iron mining and manufacturing with vigor.

THE American syndicate who recently opened an iron mine at Belle Isle, Newfoundland, having met with encouraging results, are preparing to push operations on a large scale. Enough ore is said to be visible to allow the mining of 250 tons per week for the next five years.

THE Anglo-American Gold and Platinum Mining Co., New Westminster, B. C., has been incorporated. They will hydraulic for gold and platinum in the Similkameen district. The officers of the company are: President, J. B. MacLaren; vice-president, G. D. McKay; managing director, Capt. S. T. Scott, and secretary, treasurer, A. E. Tregent.

ASSESSMENT work is being done on about 60 claims in the Lardeau. On the north and south fork of the Lardeau River about 50 men are placer mining, although high water still bothers them. Some are working for wages at \$3.50 per day, but most of them are hoisting the gravel entirely in their own interests.—*Nakusp Ledger*.

DR. A. P. COLEMAN, who has been making a geological survey of the Rainy Lake gold quartz district, reports that many prospectors are at work in the country to the north of Rainy Lake, in the vicinity of Manitou and Wabigoon Lakes. Some good free-gold specimens have recently been discovered near Tache, on the C.P.R.

DR. G. A. MARTIN, of Franklin, Mass., left Boston with a party of capitalists for Nova Scotia on Tuesday. It is said they have in view the formation of a syndicate for the purchase of a tract of plaster rock in Nova Scotia, about twenty acres in extent, and supposed to be many feet deep above tide water. About \$25,000 is required to make the purchase and begin mining it.—*Halifax Herald*.

THE Standard Oil Company has secured control of the gas-fields and franchise of the Erie County Natural Gas Fuel Company. The fields are situated in Welland County, Ont., near the United States border. It is reported that the acquiring of the rights of the Erie County Company is part of a plan to buy up all the existing and prospective gas-fields in the neighborhood of Buffalo. The price paid the Erie Company is said to be between \$60,000 and \$75,000.—*Canadian Colliery Guardian*.

NUMEROUS new locations have been made lately on the granite belt at the head of Four-mile Creek. Ben Finnel is to the front with a new strike about a mile to the south of the Thompson group on Finnel Creek. The ore is galena, and the samples of the crop-pings he brought in look all right. Allan McPhee has also made a rich find in the same locality. An assay from the samples he brought in gave 104 ounces silver and \$16 to the ton in gold. It is dry ore. Brindle & McMartin have staked two claims on Four-mile Creek. They have not as yet had an assay on their rock, but it is similar in character to McPhee's. The probabilities are that after the district is opened out it will be as famous in the annals of West Kootenay as Sandon or Cody, or any other of the creeks in the Slocan.—*Nelson Tribune*.

WARD BROS. are putting in a five-stamp gold mill at their mine near Rainy Lake City.

AN extensive discovery of arsenic has been made in the Big Bend district, B. C.

SAMUEL WISE claims to have discovered a rich vein of gold quartz at Preston, N. S.

THE "American" vein, Rainy Lake, is now 26 feet wide, and it is proposed to build a stamping mill close by.

THE "Deadman" and "Wild Goose" claims, Slocan district, have been bonded to Frank Cutter, and active development work has commenced.

THE Nelson Hydraulic Mining Co. have expended about \$15,000 in flumes, ditches, pipes, sluice-boxes, etc., for their property on Forty-nine Creek.

W. H. BAINBRIDGE has been surveying the claims on China Creek, Alberni, which extend for about a mile and a half, and finds they all consist of good pay dirt.

ALL the ground on Hiawatches Creek, Alberni, B. C., has been taken up by Hansen and his associates. They are putting in sluice-boxes, and expect to have their first clean-up in a day or two.

ACTIVE work is now being carried on at the Rico group, Slocan. The ore consists of galena and carbonates of high grade. A thousand tons are now on the dump, sampling 75 oz. silver and 25 per cent. lead to the ton.

THE B. C. Government assayer recently assayed a sample of ore from the "Copper King," in White Grouse Mountain district, which showed \$3 in gold, 4¾ oz. in silver, and 21¾ per cent. in copper to the ton.

THE Richardson gold mine, at Isaac's Harbor, N. S., which has been closed down for a time, is now in full operation again, new machinery having been added, with the result that 1,000 tons of ore per month will in future be handled.

S. S. FOWLER, mining engineer, Golden, B. C., has been making an examination of the Calgary company's claims at Nakusp, and gives a favorable report. There are good signs for rich placer grounds. Mr. Fowler found traces of platinum and iridium.

RAPID progress has been made lately on the buildings and machinery at the "Silver King." The engine and boiler, air compressor, rock crusher, picking table and pump are in position, and pipe connections made with the diamond drill on the Kootenay Bonanza, a short distance away.

THE vein on which three claims west of the forks of the Salmon River, B. C., are located is described as being a contact, with dolomite for the hanging wall and granite for the foot wall. It is 30 ft. wide on the surface, is free milling and carries \$10 in gold. The ore seems to improve with depth. This rich find is situated about 20 miles south-east of Nelson.

J. D. MACDONALD, who has five claims in the Lardeau, known as the "Sir John" and "Glengarry" groups, has two tons of ore on the dump. The ledge from which it is taken carries a 22-inch vein of ore and is 15 ft. in width. The average assay is 315 oz. silver, with strong tracings of gold and gray copper.

THE Bonanza Nickel Mining Co. held a meeting in Berlin, Ont., recently, at which F. Walter was elected president, Dr. J. Morton, vice-president, and C. A. Ahrens, secretary-treasurer. The financial report showed the receipts to have been \$12,683, and payments \$12,476. The issue of 200 additional shares was authorized.

MESSRS. Low and Eaton, of the Dominion Geological Survey, who have spent a large portion of the present year exploring in Labrador, have now returned bringing with them specimens of iron ore from the iron-bearing formation, extending from latitude 50° to Ungava, or an area 400 miles long by 200 miles broad. The ore seems to correspond in quality and composition with that from Marquette, Mich.

A COMPANY is being formed to work a newly-discovered coal mine, near the Oromocto River, four miles from Fredericton Junction, N. B. The seam now being tested is 20 inches thick, broadening as it goes down. If preliminary work proves successful, a railway will be built and connection established between the mine and the river steamers.

THE Pembroke Hydraulic Co.'s machinery at Thompson Siding, near Kamloops, has been augmented by a duplex pump, capable of elevating an 8 inch stream 200 feet high. Col. Underwood, a representative of the company, has just patented a novel dredging machine, combining a dredge with a suction process. It is shaped like a plough, with heavy steel bars terminating in a plough point, far enough apart to admit only such boulders as will readily pass through the suction pipe and thence to the sluice boxes. A machine of this kind will shortly be tested on the Quesselle River.

## GOOD WORDS FROM SUBSCRIBERS.

SIR.—Please find subscription enclosed, with thanks for back numbers, which I have received. I am pleased to see a great improvement in the new volume. Wishing you success with THE ENGINEER, I am  
HENRY C. CREIGHTON, Chatham, N.B.

A retired civil engineer, now resident in Ireland, writes: "THE CANADIAN ENGINEER is very well got up, and is very readable."

Brussels, Ont., June 1st, 1894.

SIR.—Your May number of ENGINEER just been looked over by me, and am surprised to find such a large collection of newsy, interesting items—something we feel we cannot do without. The mechanical get-up is unusually well done. Please find enclosed subscription, \$1, P.O. order, for coming year beginning with 1st May.  
JNO. RONALD, manufacturer Fire Engines

Trenton, July 9th, 1894.

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S. M. WHEELER, Manager Trenton Electric Co., Ltd.

St. John, N.B., June 12th, 1894.

THE CANADIAN ENGINEER, Montreal—

DEAR SIRS.—Enclosed please find \$1 in payment of subscription. I also enclose copy of an advt. for quotations. Am very much pleased with your paper.

J. S. CURRIE, Mill, Steamboat and Railway Supplies.

NIAGARA FALLS, Ont., 1st Sept., 1894.

We have had very satisfactory results from our advertisement in THE CANADIAN ENGINEER. We have had orders and enquiries from the most distant provinces of Canada, and a number from England, France, Germany and Australia.

KERR WATER MOTOR CO

ONE hundred and one subscribers have been added to the lists of THE CANADIAN ENGINEER this month in Montreal alone, up to date of going to press.

## WELDLESS STEEL CHAINS.

The London newspapers contain an interesting account of a newly invented process by which a Birmingham manufacturer has succeeded in making weldless steel chains. Hitherto it has been found impossible, it is said, to make steel chains without heating the metal, or to produce steel links with a stud or cross piece. These difficulties are now reported to have been solved by a number of ingenious mechanical devices. The chain is made from a steel bar of cruciform section, and of the greatest length obtainable. This bar is put through a series of machines, in each of which pieces are punched out, so that after five operations the links are perfectly formed, but are still connected together at the point where the inner side of the bow of one link crosses that of the other. In fact, the bar represents a rigid chain, but on being passed through another machine it comes out as a roughly formed but perfect chain

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Stock in Foundry	...	...	\$ 1,503 84
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Stock in Warehouse and in Bond	...	...	650 60
Office Fixtures and Furniture	...	...	613 50
Stock of Coal, Wood, &c.	...	...	126 60
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Two storey brick factory and 13 acres land	8,000 00
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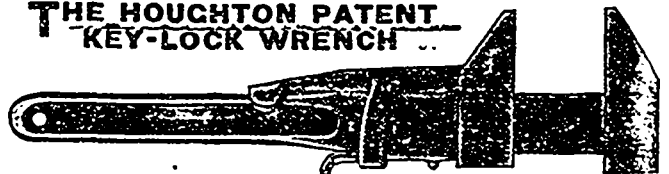
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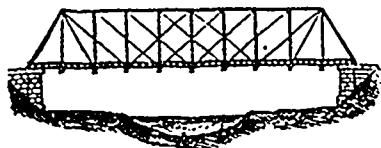
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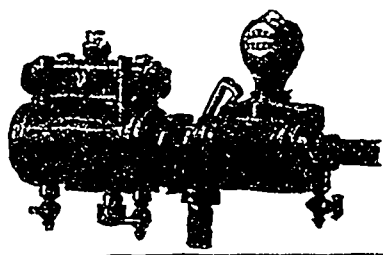
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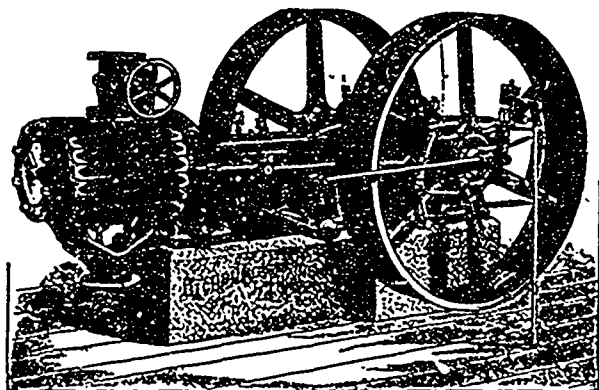
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**Saturday, the 15th of Sept., 1894**

For the installation of a complete electric light plant for the

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Separate tenders will be received for the various portions of the works, viz.

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A deposit in the form of a marked check, payable to the order of the City Treasurer, for the sum of 25 per cent. on the value of the work tendered for, must accompany each and every tender, otherwise they will not be entertained. All tenders must bear the bona fide signatures of the contractor and his sureties (see specifications) or they will be ruled out as informal.

The Committee do not bind themselves to accept the lowest or any tender.

W. T. STEWART.

Chairman Com. on Fire and Light.

Committee Room, Toronto, July 26th 1894.

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### For Lighting the Streets of the City of Toronto.

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For the lighting of the streets, avenues, squares and lanes of the city of Toronto with electric light and gas for a period of five years from the first of January, 1896. Specifications and forms of tender can be obtained upon application at the office of the Secretary of the Fire Department, Bay Street Fire Hall, on and after Wednesday, August 1st.

Cash deposit or marked check, made payable to the order of the City Treasurer for the sum of \$3,000, must accompany each and every tender, together with the bona fide signatures of two responsible persons who will become sureties for the due fulfilment of the contract. The deposit accompanying the tender will be forfeited to the city in the event of the person or persons whose tender is accepted failing to execute the contract or give satisfactory sureties for the due fulfilment of the same. Deposits of unsuccessful tenderers will be returned. Lowest or any tender not necessarily accepted.

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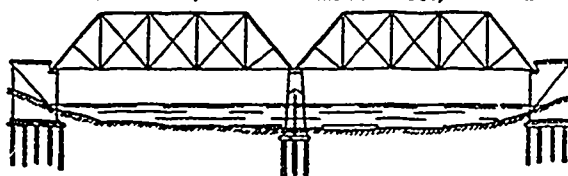
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# The Patent Review.

- 45.408 Morse Potvin, Angers, Que., threshing machine
- 15.112 Alard E. Du Bus Raymond, Berlin, Ger., electrical tramway.
- 15.113 David H. Wilson, Chicago, Ill., dynamo-electric machine.
- 45.417 Wm. Shedlock, London, England nail or spike
- 45.423 Andrew J. Shaw, Connelville, Penn., draw-gear for cars
- 45.424 Joseph W. Vermilion, Newark, Ohio, cutter bar for mowing machine.
- 45.425 Edward Seitz, Blackburn, Victoria, Australia, centrifugal pump.
- 15.427 Wm. H. Emerson, Chatham, Ont., lumber meter
- 15.428 John Duncan, London, Eng., ventilating fan
- 45.429 James R. Layton, Ottawa, Ont., indicator for detecting and registering the opening of car doors

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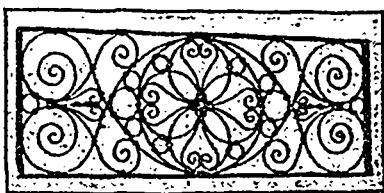
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### Rust-proof Compound

for Iron Patterns. Cheaper than wax, easier to apply, and patterns do not require to be heated.

Bright Iron or Steel cannot rust when covered with

### Rust-proof Lacquer

It is transparent. Easy to apply or remove.

STEAM-FITTERS'

### Bronzing Lacquer

for Radiators, Coils and General Iron Work. It will not scale or burn off.

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