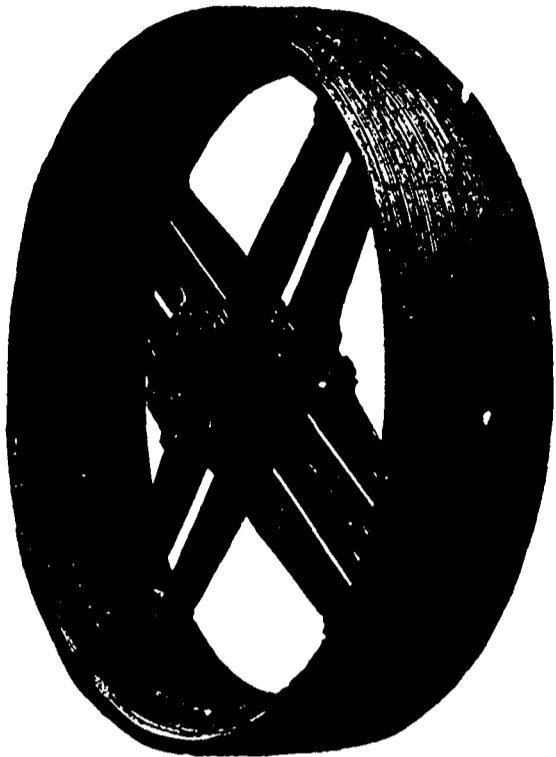


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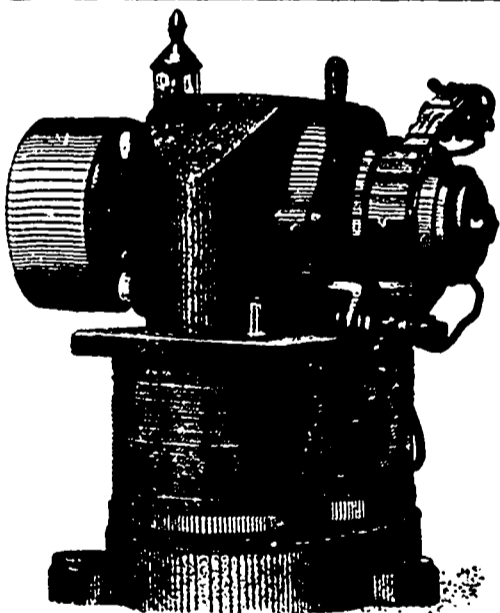
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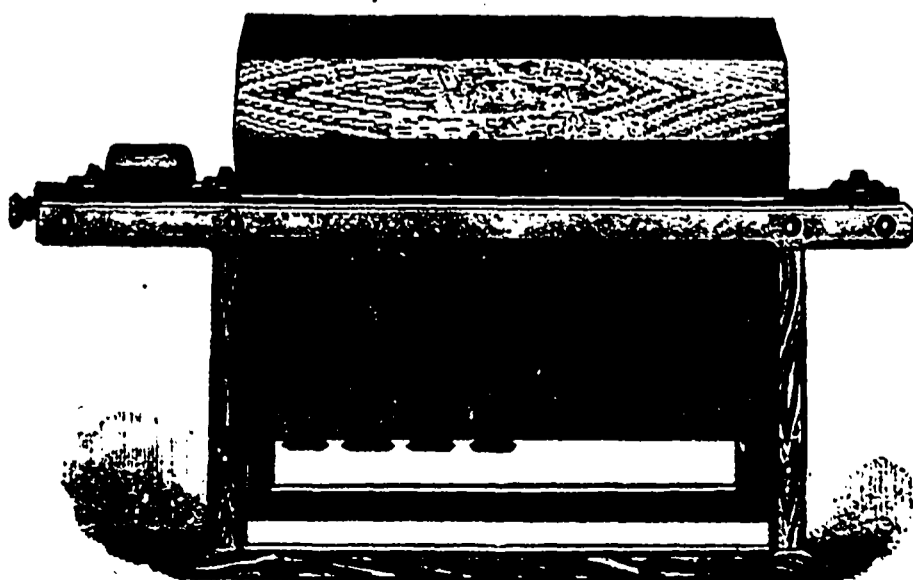
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ELECTRICAL MECHANICAL AND MILLING NEWS

VOL. XIV.—NO. V.

TORONTO AND MONTREAL, CANADA, SEPTEMBER, 1890.

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EDITOR'S ANNOUNCEMENTS.

Correspondence is invited upon all topics pertinent to the electrical, mechanical and milling interests.

TWO more moons have come and gone, and the discovery of the young genius of Hartford has so far failed to materialize as a successful substitute for the dynamo. Perhaps a sufficient number of lambs have not yet been roped into the fold to make the shearing process a success, or it may be the old, old story once more repeated of the smart and enterprising young fraud who is trying to make the "mill grind (for him) with the water that is past, or, possibly, "his apparatus is not quite finished yet."

THE cities of Kingston and Quebec have awakened to the necessity of providing storage accommodation in order that they may secure a share of the grain and flour trade. Kingston has only to build the necessary elevators in order to obtain the grain which the owners have now no alternative but to store at Ogdensburg. The limestone city must, however, make up its mind to provide the required facilities at its own cost. The idea that the Government should undertake the work at the expense of the country is absurd. As regards Quebec, the President of the C. P. R. is reported to have said that had the necessary storage facilities existed, his line could last year have brought down a great deal of flour to that city. The Quebec Corn Exchange is urging traders to provide the necessary accommodation.

THE enterprise displayed by the people of St. John, N. B., in connection with the "International Exhibition" to be held in that city from Sept. 24th to October 4th, is very commendable. The handsomely lithographed circulars which have been sent us by the Secretary, Mr. Ira Cornwall, convey the information that upwards of \$40,000 have been expended in providing suitable grounds and buildings. The premiums will it is said, amount to the handsome sum of \$12,000. Exhibits will be made by Great Britain, the West Indies, and the United States, in addition to those of the Do-

minion. Our Maritime friends are apparently leaving nothing undone to show to the world their progressive-ness, and we sincerely hope that success will crown their efforts. We want to witness in Canada not a one-sided, but an all-round development.

WHEN discoveries of natural gas first began to be made in Canada a year or two ago, experts from the natural gas districts in the United States visited this country, examined the several localities where gas indications were to be found, and reported that the supply was of such a limited character as to be of little value. Subsequent events have not borne out these statements. At one or two places at least, natural gas has been found in great abundance, and extensive capital is engaged in preparing the way for its utilization as light and fuel. In these days of keen competition amongst manufacturers, the cost of fuel is felt to be a serious item. It is not surprising, therefore, to learn that the Kingsville Natural Gas Co. are receiving numerous letters from manufacturers asking what inducements in the way of free gas, etc., would be offered them to locate there. It is a pleasure to note also that the prospect of getting cheap fuel is likely to lead to the establishing there of smelting works. It is reasonably certain that whatever fate may attend natural gas operations in Canada, our manufacturers will ere many years shall have passed, be supplied with gas and fuel at a gratifyingly lower price than is entailed by the present method of coal consumption. Unless means shall be found of producing electric power without the intervention of the steam engine, gas is certain to be the fuel of the future.

FROM the number of applications for charters in Ontario and Canada generally for power to operate railroads in which electricity is mentioned as the motive power, it is very evident that there is to be a boom in the electric motor business in this country. Especially where water power is available will the tram road be a paying enterprise, and there are numberless places in Canada in and between small towns where an electric road would return a good dividend though it might not be a success. Considerable interest will attach to the starting of the electric road in North Toronto, which is expected to take place in a few weeks, as it is to be equipped with the most modern electric appliances. The conditions under which it will operate will be about as difficult as are to be found anywhere—pretty stiff gradients, a road-bed, while good enough for single horse cars, scarcely of sufficient solidity for heavy traffic and considerable loads on special occasions. Negotiations are also all but completed for a complete system of electric street railway in the city of Ottawa, where it is expected the availability of water power will make it a very satisfactory investment. Round Toronto also there are several roads talked of, such as between Mimico and the terminus in Parkdale, and West Toronto Junction to the city, so that on the whole considerable activity may be looked forward to in the near future in this field.

IN view of the considerable wheat surplus which Canada will have on hand this year, our millers should make a determined effort to secure the trade of the West Indies. The Jamaica exhibition to be held in January next will afford an excellent opportunity for bringing the product of Canadian mills to the notice of the people of those islands, and for paving the way for future business. Mr. Adam Brown, the Commissioner appointed to represent the Dominion, in addressing the Toronto Board of Trade on the openings existing for trade with the West Indies, said: "One of the most important manufactures interested in the development of

trade with Jamaica was that of flour. Although the British West Indies consumed a great quantity, \$2,083,433 worth being sent in by the United States alone, Canada did not send one dollar's worth. It had been urged that our flour would not keep in the tropics, but eminent western millers whom he had spoken to the past few days stated that flour made from wheat harvested the past dry season and ground by the improved roller process lately introduced in many mills would keep as well as that of any other country. Failing that, he had no doubt that a system of kiln-drying would be introduced by such millers as care to compete for this trade and produce a quality of flour that would keep in any climate." We are pleased to be informed by Mr. Brown that among the important subjects to be discussed at the forthcoming meeting of the Millers' Association will be this question of devising means to manufacture a grade of flour that would keep in tropical lands.

THE annual meeting of the Dominion Millers' Association for the transaction of general business and the election of officers will be held in Toronto on Tuesday and Wednesday, the 9th and 10th of September. The date of this meeting was fixed during the first week of the Toronto Industrial Exhibition in the hope that a good attendance of the millers would thereby be secured. In view of the important matters which will engage attention at this meeting, it is greatly to be hoped that no disappointment in point of attendance will be experienced, but that every miller who can possibly do so will be present. In view of the fact that Manitoba is likely to have a considerable surplus of wheat for export, the meeting will be asked to consider whether grinding-in-transit privileges cannot be obtained which would enable Ontario millers to manufacture this surplus into flour on this side the Atlantic. Another matter which will probably engage attention will be the advisability of bringing about uniformity in the weight of flour sold by the bag. At nearly all places west of Toronto, a bag of flour consists of 100 lbs., while east of Toronto 98 lbs. constitutes the bag. The western men are especially interested in seeing the adoption of a uniform practice in this particular, and will therefore be consulting their interests by attending the meeting and taking part in the discussion. Not the least important consideration which should prompt a good attendance is the fact that the future usefulness of the Association must to a large extent depend upon a wisely selected staff of officers to direct its operations during the coming year.

THERE is a feeling amongst owners of electric lighting stations which is rapidly being crystallized into the idea that it would be well if an organization could be formed comprising representatives of companies and individual owners of public lighting plants, in fact of all who are directly and indirectly engaged in the production and supply of electric currents for distribution and sale—something probably after the style of the Millers' Association of Ontario, whereby at conventions to be held at intervals and in convenient places, matters of mutual interest might be discussed and suitable united action taken which would be to the advantage of all concerned. Questions of economy in management, utilization of fuel to the best advantage, uniform charges for service both in lighting and in power, and a hundred other matters could well hold the attention of such a gathering and result in increased efficiency of service and a larger margin of profit. There is no doubt that a co-operation of interests, comprising the users of electrical appliances in contradistinction to the interests exclusively engaged in their manufacture and sale, would, if properly carried out, have a tendency to control and

prevent much of the ruinous competition which in some cases is eating the life out of the business and rendering large investments of capital entirely unproductive. United action on the part of central station men would have considerable influence in placing the business on a more substantial basis, and an interchange of ideas would lead in many cases to more profitable working. We shall be glad to have the opinions of electric lighting men on the subject. Those who think the idea a good one should at once express themselves in favor, and if there are any who see objections in the proposition, let us hear from them and we will give their views an equal prominence.

A NEW departure has been made this year by the municipal authorities of Hamilton in exempting from assessment all machinery constituting manufacturers' plant. The chief assessor is of the opinion that no appreciable difference will in consequence appear in the assessment, as nothing like the right estimate of machinery values was formerly obtained. It is said that the foundries owing expensive patterns which come under the head of "plant," will be largely benefited under the new system, the chief assessor stating his belief that one foundry in the city would come out about \$20,000 ahead. A few such instances should be sufficient we imagine, to make an "appreciable difference" in an assessment as large even as that of Hamilton.

WE do not pretend to be an expert in the prophesying business any further than may be attained by the exercise of a medium amount of plain common sense. In a previous issue we predicted that the results of electrical execution would be "more horrible and ghastly than usually produced by the hangman's rope." Now that the experiment has been tried, the opinion then expressed is more than confirmed. It appears that the anxiety of the executioners to do the thing right led to the very catastrophe they were anxious to prevent. They got their electrodes, sponge and so forth, that were intended to make good contact with the victim, in such good order that his electrical resistance was made as low as possible. The result was that as soon as the switch was turned the dynamo was practically short-circuited, and the belt being unable to drive it, slipped round the pulley to eventually come off. Before it could be replaced the poor fellow partially came to life again, and it took two or three successive applications of the current, the engineers holding the belt on the dynamo with pieces of board the while, to complete the work. This is not a nice subject, but as an electrical journal, we feel bound to protest against the agent which is being so rapidly made the docile and efficient servant of mankind being degraded to the level of the brutal business of the executioner. When death by poison or anæsthetic was proposed as a substitute for present means, physicians with one voice protested against their profession being abused, but were quite willing to see electricity substituted. Electricians can with equal or much greater reason protest, and that we hereby do, and at the same time express the hope that the representatives of the people of New York will see their way at the next session of their legislature to wipe out a law that threatens to be a disgrace to any civilized community.

THE judicial killing of William Kemmler has demonstrated, among other things, the fact already well known to electricians who have the handling of heavy currents, that it takes an immense amount of electricity to kill a healthy man. The effect of a heavy shock when taken through the vital parts of the body seems to be for the time being to paralyze the action of the heart. If the current is continued long enough this would undoubtedly prove fatal, but the fact that so many take severe shocks and survive is owing to their being able to get away from the influence in time for the circulation to be restored. In these cases, after the first effect has passed away, no evil results follow. With more or less extremely nervous persons, the effect would last proportionately longer. It is also owing to the comparatively high resistance of the human body that serious results are so seldom recorded. A man may think he received a shock of so many volts intensity, while actually, following out the law of shunted currents, he might not have experienced one hundredth part of the amount. In cases of prolonged contact there is an electrolytic action upon the muscular tissue which produces a very painful sore, the decomposed tissue taking a long time to heal. While it is possible, of course, for men engaged in the work of handling electrical machinery as a means of earning their daily bread now and again to experience a shock from a heavy current, statistics show that the chance of being hurt is greatly less than a many other walks of life which are

not looked upon as specially hazardous. Industries such as the saw and planing mill, and even the ordinary machine shops contribute a greater proportion of accidents than the electrical industries. After all, it is largely a matter of careful and intelligent handling by the individual, rather than any special immunity being connected with particular branches of mechanical manipulation.

PROF. THOMSON, erstwhile of the high school at Philadelphia and now presiding genius of probably the most extensive electrical industry of the world, has once more demonstrated his marvelous ingenuity by evolving a new style of dynamo in which there is no wire on the moving parts and no sliding contacts, brushes or commutator. It is true the current developed is an alternating one, but by the peculiar arrangement of polar distribution an almost entire absence of hysteresis is obtained. From the performance of experimental machines great results are expected, though as most well-built and designed dynamos at present return about 85 per cent. of the energy supplied to them in available current, the margin for increase in efficiency is small. There is room, however, for very considerable improvement in other directions. In mechanical construction, absence of heating and durability there is considerable margin left, and Prof. Thomson has undoubtedly made quite a stride in this direction. Alternating machines have been previously made without sliding contacts, such as the permanent magnet machine of De Meritens, but their commercial efficiency was low as compared with those of more modern date. There is considerable discussion going on amongst electricians as to the possibility of constructing a direct current dynamo without a commutator. If such a thing is attainable, the man who gets there first will be in luck. The commutator is the thorn in the side of the dynamo manipulator and the chief source of expense to the dynamo owner. Some radical change in the construction of a dynamo, while not increasing its efficiency, might possibly eliminate the nuisance, but it seems as though it were the very nature of things that an induced current must be an alternating one and require commutating to straighten it out so as to make it measurably direct. The inductive action of field magnets would not exist were it not for reversals of current in the secondary field of the armature. To produce a direct current dynamo without a commutator—the el-Dorado of all electrical hopes—is a problem that will provide any amount of brain work for our enterprising young electricians.

ONE of the most remarkable indications that the various electrical industries are rapidly cutting loose from the scientific laboratory and taking their place in the ordinary grooves of every-day life and their share in the work of the world, is the attitude towards them of the underwriters and insurance men. It is but a short time ago that the electrical field was looked upon as a *terra incognita* and the dynamo as a monster always ready to explode into fire and smoke on the least provocation, and it was impossible to obtain insurance on an electric plant except at exorbitant rates, and often not at all. When a Canadian firm could get insurance it was probably in some one-horse company in Kalamazoo or the Sandwich Islands, or at any rate far enough away to make it extremely problematical if in case of loss, anything could be realized on the policies. So strong was this prejudice that the electric companies were compelled to unite and establish an insurance company of their own on the mutual basis. So successful has this been that last year a considerable dividend was paid back to the policy holders and the enterprise established on a firmer basis than before. Agents of companies who would not look at electrical risks a year or two ago are now canvassing for the business, and it is becoming a recognized fact that there is no more risk in a dynamo room than in an ordinary mill or machine shop, and not nearly so much as there is in a wood-working establishment or a building in which combustible staples are being manufactured. As far as the electric light itself is concerned, it is conceded by even conservative associations, such as the New England Board of Insurance Underwriters, to be, when properly installed, the safest known method of illumination. More particularly is this the case in buildings where light, loose, fibrous material is being handled, in flouring mills where the dust would be very liable to ignite at an open flame, and in places where inflammable vapor is liable to accumulate. In these places the electric light is the very acme of safety, and is becoming recognized as such. Instead of their former antagonistic attitude, insurance men are commencing to welcome the advent of electricity as an element of safety, and one likely to

lead to a more solid and profitable business being done wherever it is adopted.

TWO important questions present themselves to the minds of Canadian millers at the present time, viz.: What supply of wheat are we to have this season, what the quality and what the quantity in comparison with last year? Having obtained our supply of wheat, where is the demand for our flour to come from? Considering first the question of supply, the statistics obtainable go to show that last year Ontario produced 18,600,000 bushels, and Manitoba and the Northwestern Territories 9,000,000 bushels, making a total of 27,600,000 bushels. The Government's calculation of the yield in Ontario was, however, calculated in measured bushels, and much of the wheat having been from two to five lbs. under standard weight, it will be fair to calculate the entire yield at not more than 27,000,000 standard bushels. From this must be deducted 1,000,000 bushels for seed for the Northwest and 1,850,000 bushels for seed in Ontario, leaving for food purposes only 24,150,000 bushels. Estimating the population of the Dominion at a little more than five millions, and allowing a fraction over five bushels for the necessities of each person, we have a total requirement of say twenty-five and a quarter million bushels, which leaves us face to face with a deficit of something over 1,000,000 bushels. Statistics will show that about this quantity was imported into this country from the United States in the shape of wheat and flour. Prior to the advanced duty on flour, flour was imported; since then our millers have brought in considerable hard wheat from Duluth for consumption within the Dominion. The present outlook goes to show that all this will be changed the coming year. Instead of a shortage we shall have a surplus. While no reliable statistics are at present obtainable, yet from reports to hand from various parts of Ontario it is reasonably safe to calculate that instead of 18,000,000 bushels, the production of the province will this year be not less than 22,000,000 bushels, while the production of the Northwest will be doubled as compared with last year. We may consequently base our calculations upon a total crop of 40,000,000 bushels. Presuming that our food and seed requirements shall have increased to 30,000,000, we shall have 10,000,000 bushels for export. Fortunately for our farmers, Great Britain, the only market to which we can export bread stuffs, is likely to take our surplus at a fair price. Nevertheless, it is better to look the situation square in the face. If no wheat is ground for export, about every fourth bushel of wheat grown this year will have to be exported, and if all the wheat not used for seed is ground into flour, about every third barrel of flour manufactured will have to be exported. The sooner this surplus is got out of the Dominion and its equivalent in money brought in, the better for all concerned. It would be well for our millers to put themselves in communication either with reliable receivers of flour in Great Britain, or with exporters of flour here, at once, ascertain the values for export, and set it down in their minds that for this season that will be the price. While at the moment American markets are excited and higher than our own, their prohibitory tariff against our wheat and flour makes them no criterion for us, and this year, for the first time in six years, our prices for wheat and flour will be measured by prices on the other side of the Atlantic.

THE USE OF FERTILIZERS IN IMPROVING THE ONTARIO YIELD OF WHEAT.

IN view of the fact that the McKinley Bill is threatening to destroy the market for Canadian barley, the question of the possibility of doing something to bring about the return of the wheat yields of 30 and 40 bushels per acre which obtained on Ontario farms a quarter of a century ago is of sufficient importance to demand attention at the hands of our farmers and millers. From the success which has attended recent experiments, the possibility of much being accomplished in this direction is sufficiently encouraging to induce others to make similar trials. We give in this article names and places in connection with the tests referred to. Other important information on the subject is being collected. As it is not available at present, however, we give in the present issue such facts as have already come into our possession.

We are informed that at Smith's Falls, Ont., a gentleman whose name we are unfortunately not able to give, has commenced the manufacture of phosphates for fertilizing purposes. Mr. Woods, the local miller of that town, speaks very highly of the uniform superiority of the product of this manufactory, and we are sure he would be pleased to hand to the proprietor any enquiries on the subject which might be addressed to himself.

We give below the experience of several well-known

millers who have made satisfactory trials of the increased production and improved quality of wheat resulting from the use of phosphates as a fertilizer:

Mr. Cummins, flour miller of Lyn, near Brockville, Ont., a section where wheat is a poor crop this year, states that near him are four acres on which was used 500 lbs. per acre of Smiths Falls phosphates, and which contain more wheat than any eight acres on which phosphates were not used. In this instance the first crop considerably more than pays the extra outlay, besides the benefit which must accrue to following crops.

Mr. McDonald, flour miller, of Oxford Mills, Ont., says that as a result of the use of phosphates three years ago on four acres of land, he doubled his crop of wheat, and the two crops of grass sown subsequently were so large that each year he has been amply repaid for his outlay. We are not aware of the amount of phosphates used in this instance.

Mr. Neil Campbell, Zimmerman P. O., county of Halton, Ont., states that nine years ago he got a quantity of phosphates from Brockville, where it was then manufactured. (This manufactory for reasons unknown to us closed some years ago). He had a large summer fallow which he sowed entirely with fall wheat on one-third using phosphates, on one-third ashes, and on one-third a heavy coat of barn yard manure. He used 250 lbs. of phosphate to the acre. When the threshing time came, the grain grown with phosphates was very noticeable by reason of its greater quantity and superior quality. Being so well pleased with the results, Mr. Campbell made another test the following year—this time sowing timothy grass amongst his fall wheat. The wheat was so heavy it totally smothered out timothy, weeds, etc. He thereupon determined to use phosphates every year for the future, but was greatly disappointed to find on making application for his supply, that the manufactory at Brockville had closed. He purchased in Buffalo, but found the quality inferior. He hopes to be able to secure his supplies for the future from Smiths Falls, of a quality similar to that which he formerly obtained at Brockville.

In view of the experiences given above, 400 lbs. per acre is perhaps the least quantity of phosphates which should be used at the beginning. The cost we understand, is about \$30 per ton, or \$6 per acre.

From the foregoing testimony, which is thoroughly disinterested, it would seem desirable that our Farmers' Institutes should interest themselves in this subject, and ascertain whether an abundant supply of this fertilizing material will be available to meet the demands which a wider acquaintance with its merits should create.

THE USE OF LIQUID INSULATION FOR UNDERGROUND CONDUCTORS.

In a brief address on the above subject before the National Electric Light Association Convention at Cape May, Aug. 20th, 1890, Mr. David Brooks, of Philadelphia, said: Since electric lighting came into use it has been found that the ordinary tests for insulation do not apply; that is, a test with a galvanometer and a voltaic battery of, say, 1 to 500 cells. That has become apparent, and they have adopted other means in Paris and in London for testing the insulation of conductors that have to carry very high intensity currents. We have seen this noticed in many periodicals. Mr. Wm. Maver, Jr., in a recent article states that a cable measuring 20,000 megohms per mile, for insulation in the factory, broke down by a dynamo current of 600 volts after being drawn into a conduit. Now in the ordinary test, if a person should go and measure the insulation of an electric light cable and he found that it was 20,000 megohms per mile, and he took another system of insulation and found that it was only half a megohm per mile, as a general result he would take that which stood 20,000 megohms to a mile; but if you apply to it a current of high voltage from an induction coil or a Holtz machine, you can prove that the one with the 20,000 megohm insulation per mile was broken down by from 5 to 10,000 volts. Now you take the same No. 4 conductor and insulate it in oil for 20 feet, just as an experiment, and raise the temperature to 200 Fahrenheit and apply the galvanometer, and it is not a half a megohm per mile—just about the one-fortieth part of the one that Mr. Maver speaks of; but when you come to apply the induction coil or the Holtz machine and test it to produce what is sometimes called the break-down or a disruption, it can be broken with 10,000 volts when the other can not be broken with 500,000 volts. There is the difference between the testing of the insulation of a cable, or an insulator, or a dielectric, if you please, by testing it with the ordinary delicate galvanometer, static galvanometer, and testing it for standing a current of

high voltage. Now if the current applied to a conductor tests half a megohm per mile, the temperature of the insulation being 212 Fahrenheit, that would not show much; no one on first sight would buy it; but if you are going to purchase a cable and test it as they do in England, or give the guarantee as they do now in England, there would be five parts of current going through the insulation, to 500,000 going through the conductor; and the small portion that goes through the insulation is a mere begatelle, but it stands the current. These are experiments that I have made in Philadelphia, and I would do it here with a Holtz machine, but the atmosphere in the summer and especially on the sea shore is very unfavorable to the use of a Holtz machine. (Applause.)

PUBLICATIONS.

The Arena for September is noticeable for the strength and variety of its contributions. No reader of serious literature who desires to keep abreast with the best thought of the day can afford to be without this magazine. The Dominion's Original Sin is a bold attack by the editor of the *Ottawa Free Press* on the methods resorted to in order to bring about the present Canadian confederation.



Sir W. P. Howland is in the Northwest buying wheat.

An order-in-council has been passed establishing a No. 3 grade in corn.

A large addition is to be built to Campbell's flouring mill at St. Thomas, Ont.

A third elevator will probably be erected by Ogilvie & Co. at Carman, Man.

It is reported that a grain elevator will be built at Cartwright Man., this fall.

The Lake of the Woods Milling Company's new elevator at Griswold, Man., is almost completed.

The work of getting the old Davenport grist mill, Newburg, ready for rollers is said to be progressing rapidly.

An order-in-council was passed on the 20th inst. appointing Mr. John Todd, of Toronto, inspector of flour.

The people of the township of Oliver and of Neebing, Port Arthur district, Ont., are agitating for a grist mill.

Mr. W. H. Hill's mill at Sarnia which is being fitted with roller machinery, will begin operations about October 1st.

It is said to be the intention of the Ogilvie Company and the Lake of the Woods Milling Company to build elevators at Carberry, Man.

The Montreal Transportation Company's new elevator at Kingston has commenced operations. It has a running capacity of 15,000 bushels per hour.

The Hemlock City Gristing and Milling Company has been incorporated by the Ontario Government with a capital stock of \$10,000 to conduct a gristing and milling business.

The Haggerty and Tulloch elevator at Frankford, Ont., has been purchased by Mr. Jordan, of Frankford, who will put it in first class order by the time grain commences to move.

Mr. Geo. A. Hastings, on behalf of the Lake of the Woods Milling Company lately made a tour of inspection of the company's elevators throughout Manitoba preparatory to the opening of the grain season.

Martin Bros. have purchased a site near the railway station, Mt. Forest, Ont., on which they have commenced to erect a commodious grain elevator. *The Representative* says this enterprising firm is one of the mainstays of the town.

All collectors of customs have been furnished with copies of the form to be used by millers in applying for a drawback on corn ground into meal for human food. Millers will therefore be enabled to obtain these forms without delay or inconvenience.

Several sharp advances have already taken place in the price of wheat and flour in Manitoba. It is stated that new wheat flour will exceed old wheat flour in price, something unheard of in Manitoba before. From the present indications new wheat will be worth from 85 to 90 cents.

Advertisements have been posted throughout Ontario asking for 4,000 men to help to gather Manitoba's crops. Tickets for these excursions will be good to return until the end of November, so that those who go there to work will be able to take a hand in threshing and fall ploughing.

Mr. Geo. Cox, late of Presque Isle, has purchased H. Stevens & Co.'s flour mill at Four Falls, Que. Mr. Cox has been continuously in the milling for forty-seven years, and is well and favorably known. He intends to make some improvements in the mill, which will secure a more regular supply of water in the winter season.

Reports received at the Department of Customs, Ottawa, are said to indicate that far more cornmeal is likely to be produced in Ontario this year than in the past, in consequence of the change in the Customs Act of last session, by which a drawback of 90 per cent. is allowed on corn kiln dried and ground into meal in Canada for human food.

Mr. Wm. R. Wadsworth, the well known miller of Weston, Ont., died on August 8th. He left an estate valued at \$103,504.48. His executors are granted practically unlimited power in the man-

ner of the investment of the estate, and are empowered to carry on the milling business at Weston so long as they may see fit, for which purpose they may retain the capital there invested, and advance other capital from the estate if they wish.

A communication received at the Department of Agriculture, Ottawa, from one of the officials of the department in Winnipeg, states that the flour made from the red fife hard wheat of Manitoba and ground at the Kewatin flour mills, has been found much superior for the West Indian trade to that made at the Minneapolis mills. The reason assigned for this is that the hard wheat used at the latter mills was mixed with the soft wheat of the south, and was liable to sour and ferment in the heat of the tropics.

The Lindsay Board of Trade has approved of the proposition of Dundas & Flavelle Bros. to organize the Lindsay Grain Elevator Co., with a capital of \$20,000, to build a grain elevator with a capacity of 100,000 bushels. They have secured a lease for a site and invite subscriptions. The firm will take stock to the extent of \$6,000, or if required to the extent of \$10,000. The affairs of the company to be managed by a board of directors and not more than 6% to be paid. The sum of \$5,000 has already been subscribed.

A despatch from Glenboro, Man., states that the council of South Cypress at their last meeting introduced a by-law to grant a bonus of \$3,600 to some one to build a roller mill in Glenboro, and the adjoining municipality of Argyle will give about \$2,000 more, making \$5,600, which it is thought will soon secure the erection of the mill, as the place possesses so many advantages. There is an abundance of good water and wood, besides being the centre of one of the thickest settled and best wheat districts in the province.

In the three years, 1868, '72 and '77, preceding the protective Canadian tariff, the exports of wheat and flour from Canada to England and the United States were \$3,097,539, \$4,589,046 and \$3,181,187. But in the corresponding three years since 1880 the exports of these articles increased to \$5,690,844, \$4,659,963, and \$7,141,912. The total for the first three years was \$11,867,772, or an average of \$3,955,924. But the total for the last three years was \$17,492,719, or an average of \$5,830,924, an annual increase of \$1,874,982.

The Northwestern Miller says:—W. O. Bolton, who is head miller at Moosomin, N. W. T., was married at Boardman, Wis., Aug. 12th, to Mrs. Hattie Z. Wetsch, of that place. The ceremony occurred at the residence of James Kaye, the local miller, and was attended by a few relatives and friends of the contracting parties. Numerous presents were bestowed upon the couple. Mr. Bolton is spending a few days here, looking after some new machinery which is to be placed in his firm's mill, after which he and his bride will proceed to their home in the far northwest.

A grain crop destroyed by fog is a phenomenon with which we are not familiar, but according to U. S. Consular-General Sander-son it is not uncommon in Roumania, Europe, where it is supposed to have made a difference of 30 per cent. in the yield of wheat last year in some districts. These fogs, he says, are particularly disastrous if they come on when the grain is soft and milky. They are impregnated with salt, and if followed, as they usually are, by hot sunshine, the grain is shriveled up, and the straw is blackened. Whole crops have been destroyed in this way in the course of 24 hours. A plan adopted to mitigate the mischief is for two men to draw a long cord so as to sweep the ears of wheat as they walk along, thus removing some of the moisture, but this, to be of any use, must be done before the sun has come out at all powerfully.

A meeting of the Local Millers' Association of the Midland district was held at Peterboro' on Aug. 22nd. There were present:—President John Hull, Lakefield, in the chair; W. F. Meldrum, Secretary, Peterboro'; Messrs. Dobson, Beaverton; Flavelle, Lindsay; Fowlds, Hastings; McLean, Lakefield; Rathbun, Deseronto; Vanstone, Bowmanville; Smith, Campbellford; Peplow and Mulhern, Peterboro'. The Secretary of the Dominion Millers' Association was in attendance, and reported concerning the proceedings at the various millers' meetings which he had attended in Ontario during the past few weeks. The general object of the meeting was to get an expression of opinion concerning the advisability of endeavoring to secure grinding-in-transit railway rates by which millers would have the same freight privileges as grain dealers, to enable the Dominion Millers' Association to deal with the subject in accordance with the feeling of the local associations. The meeting decided to retain the use of the grain tester. The following officers were elected:—President, E. Peplow, Peterboro'; Vice-president, C. Smith, Campbellford; Secretary, J. McLean, Lakefield.

Messrs. C. Macdonnell & Sons' large flour and cornmeal mill at Collingwood, Ont., took fire at an early hour on the morning of the 10th of August, and despite the efforts of the citizens was totally destroyed. The mill had been running night and day, doing an extensive business. The workmen left off work at five minutes before midnight, and at two o'clock the place was enveloped in flames. Alterations were in progress which, when completed, would have enabled the firm to turn out 300 barrels of cornmeal per day. The mill was insured for \$17,000 in the *North British*, Hartford, Royal Canadian and Norwich Union, and the Western had \$5,000 on stock. The total loss will be \$35,000. Cause of fire unknown. We observe that the local papers are urging the town to assist Messrs. Macdonnell by giving them a free site where they would have the advantage of shipping facilities both by rail and water. As the firm own a good water power at their former location, it is a question whether they will consider improved shipping facilities a sufficient inducement to abandon it. The industry is certainly of sufficient importance to warrant the town in dealing liberally by its promoters whom we shall be glad to see at an early date on their feet again.

A petition has been very extensively signed praying for the appointment of Mr. J. P. Barrett, City Electrician of Chicago, as electrical director of the world's fair. Judging from the commendations bestowed upon the proposal by the electrical press, Mr. Barrett would be the right man in the right place.

British Columbia Letter.

THE lumber business never was so brisk and promising as this year. At the outset the export trade was somewhat depressed owing to the scarcity of ships and the high rates of freight. However, the foreign demand was good, and so far the mills on Burrard Inlet have been doing a good active business. Local trade has also been flourishing and increasing shipments are being made over the C. P. R. to eastern markets. Then if not for the sharp curves on that railway through the mountains an immense trade could no doubt be done in shipping those mammoth sticks of sawn timber which the trees of British Columbia are capable of producing. Hastings' mill is now sending to Montreal a stick 60 ft. long and of an average diameter of four feet.

Moodyville saw-mill, which was established along in the sixties and which has a capacity of about 150,000 feet a day, employs in the mill, logging corps and other departments about 500 men. It is running full blast and loaded a number of foreign ships this season. Not long ago the Hastings Saw Mill Co. and the Royal City Planing Mills Co. amalgamated under the name of the British Columbia Mills, Timber and Trading Co. The latter operate three mills, two at Vancouver and one at Westminster. The Hastings mill which established business about the same time as the Moodyville mills, has been undergoing a thorough refitting, about doubling its capacity and making it of equal capacity with the Moodyville mill. It has also exported a large quantity of lumber this summer. The Royal City Mills, the other branch of this concern at Vancouver, situated on False Creek, does a large local trade and is more particularly a manufacturing industry, turning out shingles, sashes and doors, laths and woodwork of all kinds, as well as lumber. There are about 150 on its pay list. At Westminster the Royal City Mills do a similar business, only with a much larger capacity, employing 400 or 500 men, and doing a foreign export trade. On Burrard Inlet a few miles east of Vancouver, the Pacific Lumber Co., a branch of the McLaren Ross Co., at Westminster, is building a very large mill at Barnett, with a capacity of 100,000 feet. This will cater almost exclusively to the foreign trade. Two other large mills have been recently placed on a solid footing. The Vancouver mill on the Inlet, a little east of the Hastings mill, is sawing 75,000 feet a day. Extensive improvements have been made under the new ownership, and a ship has been chartered to load for China. The Fader Bros.' mill on False Creek was purchased a short time ago by two American lumbermen, Messrs. Norse and Baggs, and is being operated to its full capacity. Besides lumber, sashes and doors and laths are manufactured. Jifkins mill at Port Moody, on Burrard Inlet runs about 10,000 a day, and manufactures shingles, moldings, etc. Messrs. Leacey & Kyle's Commercial mills on False Creek runs about 40,000 a day and does a heavy business. Besides there are three busy industries on False Creek. Cassidy & Co's mill employs about 45 men and manufactures sashes and doors, moldings, shingles, etc. G. F. Slater makes a specialty of cedar shingles and cedar lumber. The Vancouver Manufacturing and Trading Co. is launching out in a variety of wooden manufactures, furniture, woodenware, housefurnishings, cooperage, etc., etc., and has prospects of doing an extensive business, being the only industry of the kind on the coast. This gives Vancouver and Burrard Inlet a 10 hour capacity in lumber alone of about 700,000 feet.

On Vancouver Island the lumber business is also a large one, going well on to a daily capacity of 500,000 feet. W. P. Sayward, at Victoria, is running to his full capacity, 75,000 daily. One of the largest concerns in the province is being established at Chemainus by the Victoria Lumber & Manufacturing Co. The daily cut is estimated at between 200,000 and 300,000. The old mill is still running, but will be converted into a planing mill and machine shop. At Nanaimo, A. Haslan has a mill with a capacity of 50,000, doing in connection with it a general wood working trade. There is also a mill doing a good business at Shawamgan Lake. There are besides these three prosperous establishments at Victoria, the Queen City Planing Mill, Murrehead & Manns sash and door factory, and Samuel Greys woodworking establishment.

Probably the finest equipped mill in the province, and one of the largest capacity, is that built at Westminster by the McLaren-Ross Co., and just completed. It is 450 ft x 72 ft. in dimensions with a cutting capacity of 200,000 daily. It is built for local and foreign trade, and is very complete. The Brunette Saw Mill Co. has completed a very fine new mill, which has just half the capacity of the McLaren-Ross concern. It is 300 ft. x 58 ft. and besides a general lumbering and manufac-

turing business, makes a specialty of salmon boxes, of which it turns out an immense number. Messrs. Acherman Bros. have a new mill at Westminster, sawing about 15,000 a day, and making a specialty of sash and door business. Counting in the Royal City Planing Mills already referred to, the mills on the Fraser river have a producing capacity of over 400,000 a day.

There are mills at Kamloops sawing white and yellow pine, at Revelstoke, at Beaver station, near Donald (75,000 a day), at Paliser station, at Nelson (50,000 feet), at Sproat's Landing, at Golden (10,000), at Gambier Island, near Vancouver, (40,000). All are in active operation, or will be shortly, and doing a prosperous business. The Province is able to rip up about 2,000,000 feet a day or 600,000,000 feet in a year.

Electrical improvements have not been less marked than saw milling. In fact, the progress in electric lighting and propulsion has been remarkable. During the past year, Victoria and Vancouver were lighted up with arc lights of the Thomson-Houston system, and Westminster is now putting in the same system, with prospects of having it in operation within a month. Vancouver expects to have 150 lights lit shortly.

There is a boom in electric tramways. Victoria had the honor of having the first electric railway in actual operation, although Vancouver's railway was projected for about a year and a half before its final consummation, but owing to a change from horse to electric power after the track had been laid and arrangements made for the former, and the subsequent consolidation of the electric lighting company and the tramway company, there was considerable delay. The National Electric Tramway Co., Victoria, is projected from Victoria to Esquimalt and another to Saanich. An electric street railway is talked of in Nanaimo, and likely to become a fact. In addition to the electric railway, three miles in length, in Vancouver, two more have been decided upon—one to Westminster, by the Westminster & Vancouver Tramway Co., which will join those two cities by the shortest route. The contract for the equipment has been given to the Thomson-Houston Co. The Westminster end of the tramway will supply that city with street car accommodation. Another important line of electric tramway has been decided upon, and that is one connecting Lulu Island with Vancouver. This will bring the latter city into touch with the whole lower Fraser valley, and will cross the north arm of the Fraser on the two swing bridges already constructed and connect by ferry Vancouver with Ladner's Landing, the most important point in the Delta country. The Vancouver Electric Tramway Co. will extend its line between three and five miles during the coming season, encircling a very large tract of property in so doing. No part of Canada is showing so much activity in this line as British Columbia.

TO DISCOVER IF ROLLS ARE TRUE.

BY R. JAMES ABERNATHEY.

THERE are a number of ways in which to determine whether rolls are true or not, almost all or any of which will apply very well to smooth rolls. I have, in some instances, placed a strong light inside the frame and directly under the point of contact of the two rolls, then closed the rolls so as to exclude every ray of light from the lamp beneath, then slowly revolved each roll by itself, by holding the other, if there are any low places in the roll being turned around, the light will expose them if a careful watch is kept. It requires two persons, one to turn the roll and another to do the watching. After one of them has been carefully examined in that way then carefully examine the other in the same way. The highest or fullest points of the rolls might not have been found when first closing them; and if not they can be felt while turning them around, and if fuller places are discovered then the two should be set together at the fullest point and a new start made. In that way the openings or low places will be more readily exposed. The examination by light rays had better be done after night, and when ready to make the examining turn of the rolls the outside lamp should be turned down so as to make the light inside of the roller frame very strong and easily detected. If a ray of light can be discovered after all has once been excluded by first closing the rolls, it is an evidence that the roll being turned around is not true, and the stronger the ray of light the greater the untruth.

Another plan is to use two strips of very thin paper, and placing them between the rolls at each end, and then close the rolls tight enough to surely catch them, but not so tight but that they can be held by the thumb and finger while the rolls are being turned around. When a high point is reached a paper strip will be drawn through in spite of the thumb and finger or be broken by the strain. In either case proof will be furnished that the

rolls are not exactly true. If on the contrary a lower place on the surface of the rolls is reached the natural strain needed to keep the strips from being pulled through, will pull them quickly out, thus again furnishing proof that the rolls are not true and require attention. Either of these methods answers very well for smooth rolls, and the paper strip plan will also answer for finely corrugated rolls. Although, as a rule, if corrugated rolls are but a very trifle out it can be detected by carefully setting them together and just as carefully turning them around. When high places are reached they will sensibly grate together so as to be both felt and heard. However, the least troublesome way to prove the truth or untruth of rolls, is with the tram, provided the tram is true, but the misfortune here is that the tram is just as likely to be out of true as the rolls are, and without something to prove the tram true no reliance can be put in that method unless the tram is placed on the rolls in exactly the same position all the time.

Therefore, in order to use the tram to prove the condition of the rolls, the condition of the tram will have to be first proven. This can be done if the old proof-staffs used in keeping the buhrs in condition are still retained. They were necessarily made very exact, and if a roll-tram can be made to fit them exactly, it may be regarded as in good condition and in fair shape for proving a roll. The trouble with roll-trams is that the way they are usually made they are liable to spring out of truth no matter how perfect they may have originally been, and hence there ought to be something kept on hand to prove them by, and I know of nothing better than an old proof-staff or something similar made for the purpose. To use the tram to prove the rolls with they must be carefully trammed, then one or both slowly revolved by turning with the hands, the tram being held in position, or the tram may be removed and the rolls turned, say an inch at a time, and the tram replaced each time. If the operation is carefully done the tram will detect and expose the slightest defect or out of truth.

I think by calling the attention of millers to the last method of proving rolls, many of them will remember and be able to explain some incidents that had before seemed inexplicable. Often have millers, knowing how important it was to have the rolls in perfect trim, carefully trammed their rolls, and finding a material change in the work, again applied the tram, and to their surprise found the rolls again out. They have supposed that the tramping apparatus was defective, and would not hold in position, and so just as carefully undid the work they had previously done by tramping them over again. The trouble was with the rolls and not with the tramping devices. The rolls were untrue, and therefore would not show alike at any two points, or at least could not be made to show alike at all points.

From the foregoing facts all millers ought to know that they should have rolls that are exactly true in all respects, and ought thus to have exactly true trams, not so much for the purpose of proving the truth or untruth of the rolls, as to keep the rolls in perfect trim, because no matter how true the rolls may be, if not kept in perfect trim, they cannot be depended upon for doing good work. Every miller can see that the truest pair of rolls that can be made, if the slightest out of trim, will act on the stock in precisely the same way as though not true; that is, they cannot be made to grind perfectly and evenly, and without perfect and even grinding, good, or at least the best, results cannot be obtained at any stage of the process. Each pair of rolls won't do its fair share from start to finish, or results are bad; true rolls only can do that. — *Miller's Review.*

MELTING ZINC.

ZINC is troublesome to cast and more troublesome when small thin molds are to be cast. Lining the mold with whiting and water, which must be allowed to thoroughly dry, will often cause the metal to fill the mold well. Burning of the zinc (oxidizing) may be prevented by covering the metal, while in crucible or ladle, with a layer of common salt, a little muriatic acid, which amounts to the same, as a coat of zinc oxide is immediately formed on the surface of the melted metal, which effectually prevents further oxidation from action of oxygen in the atmosphere. The coating of oxide forms a protection against oxidation to only a certain degree, while the layer of charcoal tends to reduce the oxide again to its metallic form. Indeed, it is possible to recover lead, tin, zinc and antimony from the "dross" or oxide which gathers in the ladle. It is only necessary to melt the oxide with charcoal, salt and soda, to get it again into useful shape. The dross, salt, charcoal and soda should be powdered. Mix them together and melt. The soda and salt melt into a pasty mass and the carbon unites with the oxygen of the dross, leaving the metal free but burning off the charcoal.

RULES FOR ELECTRICAL INSTALLATION.

We give below a synopsis of the rules and regulations for the installation of electric lighting and motive apparatus as advised by the Boston Manufacturers' Mutual Fire Insurance Company, which have also been jointly adopted by the Boston Fire Underwriters' Union, and by the Electric Mutual Insurance Company. These rules have been carefully prepared by C. J. H. Woodbury, F. E. Cabot, C. M. Goddard and S. E. Burton, and are believed to be consistent with all that is yet known upon the subject of possible fire hazards from electrical apparatus.

Dynamos must be located in dry places, not exposed to flyings or combustible material, and must be insulated upon dry wood, filled to prevent absorption of moisture. They must be kept thoroughly clean and dry. They must be provided with a reliable, automatic regulating device, or a competent person must be in attendance near the machine whenever it is in operation. In wiring for motive power, the same precautions should be taken as with a current of the same volume and potential for lighting.

For motors the directions concerning dynamos are applicable to them. All resistance boxes or devices should be made of non-combustible material, or so located that they cannot communicate fire to any surrounding combustible material. The motor (and resistance box) should be protected by a cut-out, and controlled by a switch.

Motor cars driven by electricity from a single wire with earth or floor return circuit will not be approved. The use of such single trolley tracks may be permitted, after special inspection, in mill yards where there is no liability of other conductors coming in contact with the trolley wire, and where the conditions of the position of the generator are such that the ground circuit will not impose any fire hazard on the property.

Wires for electric lighting or stationary motors will not be permitted in the same circuit with trolley wires with ground return—although the same dynamo can be used, if desired, for both purposes, provided that the connection from the dynamo to each of the two circuits shall be by a double-throw switch so that only one of the circuits shall be in service at the same time.

All circuits should be tested at least twice a day with a suitable magnet or other approved device, in order to discover any escapes to ground that may exist.

All outside overhead wires must be covered with some material of high insulating power, not easily abraded; they must be firmly secured to properly insulated and substantially built supports. All the wires must have an insulation equal to that of the conducting wires.

All joints must be so made that a perfectly secure and unvarying connection, fully equal to the cross-section of the conducting wire, will be secured—and they should be soldered. All joints must be securely wrapped with an approved tape.

Conducting wires should not approach each other nearer than one foot. The wires must never be allowed in contact with any substance other than air, and their proper insulating supports; except that service wires with special insulation may be permitted to touch foreign substances.

Conducting wires carried over or attached to buildings, must be at least seven feet above the highest point of flat roofs, and one foot above the ridge of pitched roofs.

For entering buildings, wires with an extra heavy water-proof insulation must be used from the terminal insulators through the walls from the outside to the inside of the building. They must loop down, so that water may drip off, without entering the building, and the holes through which they enter should, where possible, slant forward.

Wires must not be concealed, and they must be rigidly kept apart at least one foot, unless an approved, moisture-proof, non-conducting, non-inflammable tubing is used. This tubing must be sufficiently strong to protect the wires from mechanical injury. It may be fastened to the wall by staples, provided the tubing is not broken or injured thereby. Wires in this class of tubing may be run as near as three inches to each other.

Conductors in buildings must be thoroughly well insulated with non-absorbent water-proof material, as uncombustible as possible, which will adhere to the wire and not fray by friction, and will stand a temperature of 150 degrees without softening. In places liable to dampness, wires must be thoroughly and carefully run on glass insulators, rubber hooks, or porcelain knobs, of suitable size and shape, and wires must be separated at least eighteen inches. They must also be provided with an approved water-proof insulation, or encased in an approved tubing. When wires pass through walls, floors, partitions, timbers, etc., in-doors, glass tubing or

so-called "floor insulators," or other moisture-proof, non-inflammable, insulating tubing must be used.

All lightning-arresters must be grounded outside of building, and preferably connected to a water-pipe.

The frames and other exposed parts of arc lamps must be carefully insulated from the circuit.

For inside use, the light must be surrounded by a globe resting in a tight stand, so that no particles of melted copper or heated carbon can escape. When any inflammable material is near or under the lamp, the globe must be protected by a wire netting. Unless a very high globe, which closes in, as far as possible, at the top, is used, it must be provided with some protector or spark arrester, reaching to a safe distance above the light. Broken or cracked globes must be replaced by perfect ones immediately.

Every portion of each installation must be equipped with double-pole safety cut-outs, that will interrupt the passage of a current in excess of the amount which any portion of the apparatus is adequate to transmit. A cut-out must be placed where the underground or overhead service joins the inside wires, and at every point where a change is made in the size of the wire (unless the cut-out in the larger wire is intended to protect the smaller). The plug or other device for enclosing or supporting the fusible strip or wire should be incombustible and moisture-proof, and so constructed that an arc cannot be maintained across its terminals by the fusing of the metal. No lead or composition strips carrying more than ten amperes before melting shall be used, unless provided with contact surfaces of some harder metal having perfect electrical connection with the fusible part of the strip. On any combination fixture, no group of lamps requiring a current of seven amperes or over shall be ultimately dependent on one cut-out, but there shall be a cut-out to each pendant and fixture.

Safety fuses must be placed at the junction of all feeders and mains, and at the junction of mains and branches when necessary; also in both the primary and secondary wires of the converter in such manner as not to be affected by the heating of the coils.

The rules for running wires for arc lamps apply also to incandescent lamps on circuits having a potential of over 350 volts. Incandescent lamps in single series on high tension circuits must be provided with a suitable hand-switch, and also with an automatic device capable of shunting the circuit across the terminals of the lamp should the carbon filament break. When incandescent lamps are in multiple series, the hand switches must not control less than a single group of lamps, each of which may be provided with an automatic shunt as above. Electric-magnetic devices will not be accepted as suitable for this purpose. Any method of distributing current to incandescent lamps on high-tension circuits, other than as above provided for, must receive approval before being put to use.

For inside work no wire smaller than No. 16 "B. & S," or No. 18 "B. W. G.," will be approved. Before using any new form of insulation, the approval for its use under the proposed circumstances must be secured. The use of lead-covered wire, or wire the covering of which contains paraffine, is prohibited.

No foreign wires of any kind shall be attached to the buildings insured by this company, for the purpose of carrying electric currents across the yard to any point.

All electric wires which may be required by the insured shall enter the premises at one point, preferably near the headquarters of the night watchman, where they can be kept under supervision; each of said wires shall be guarded by a protector against strong currents, operating by opening the circuit, and by a lightning-arrester.

Such protectors against strong currents shall be located in a dry, accessible place inside the building, and as near the point of entrance of wires as possible, and shall be without ground connection; such protectors shall be mounted on non-combustible and insulated supports, which shall be provided with a receptacle for the burning or melted parts of such apparatus.

The lightning-arresters on all wires must be placed between the protector against strong currents and the electrical portion of the apparatus within the building to which such wires are connected. No ground wires for such lightning-arrester shall be attached to gas pipes within the premises of the insured.

All electric wires which may enter the premises of the insured must be insulated between the line wire on the insulator attached to the buildings outside and the protecting device within, with the best quality of water-proof insulation. Moreover, such wires must enter at a distance of not less than three inches from any other wire or any conducting material.

If any wires carrying high tension or strong currents are to be carried over or under other wires on the

property of the insured, they shall be attached to poles so near to each other, with one wire so far above the other, that if a break should occur the pendent wire between these poles may not be long enough to come in contact with the wire below, or, if not carried on poles, these wires shall be so placed or protected with guard wires as to render a contact between different wires impossible.

If the high and low-tension systems are in use in the same yard, even when developed within the works, the wires must be kept separate, and so wide apart that no contact or cross arc can be made.



Some remarkable results have been the outcome of recent experiments for overcoming the scale in boilers by the employment of magnetism. Mr. Bull, of the Committee on Electrical Boiler Devices, stated at the Convention of the American Water Works Association that in a test on a boiler in a lime-burning establishment the boiler was fed from a well at the edge of a limestone quarry. The water was clear to the eye and free from organic and visible impurities, but chemical tests showed it to be of unusual hardness. The result of the magnetic process was that in ten days a heaping shovelful of sand or disintegrated scale was taken out of the boiler, and in a few more weeks not less than three shovelfuls of the same were removed.

CLEANING FILES.—An improved means for cleaning files, which is claimed to restore them to the condition of new files, is described as follows: After being cleaned and wetted the files are dipped between two carbons into acidified water and the circuit of an electric current is established between the carbons and the file by means of a piece of metal serving as support to the file by which the latter is suspended. The water is then decomposed by the current, the oxygen acting upon the cuttings of the file, while the hydrogen bubbles settle in the teeth and protect them against the action of the acidified water. After immersion for a few minutes the file is withdrawn and brushed in clean water to remove the oxide of iron, and then replaced in the bath. When the cuttings are entirely cleared the file should be immersed in an alkaline bath to remove all traces of the acid, then dried and brushed.

AN INTERESTING MILL VERDICT.—In the case of Slocum et al. vs. Caldwell et al., lately tried by the Kentucky court of appeals, it was held that where the lease of a mill, with the consent of the owner, changed the character of the mill, which had been operated by stones to a roller mill, and to that end detached and removed from the building, though not of the lot, all the machinery not necessary or adapted to making flour by the roller process, the person furnishing and putting in the new machinery had a lien thereon superior to that of the vendor of the lot for purchase money, and also superior to that of the one to whom the owner had mortgaged the property prior to the alteration of the mill, and that to entitle the person asserting this lien to remove the machinery it was not necessary that he should put the old machinery back in the condition it was before being detached. The vendor and mortgagee, however, the court said, still had a lien upon the old machinery, notwithstanding its removal.

TO PREPARE A GOOD LUBRICANT.—A good oil which can be prepared by anyone with little labor, and which possesses superior qualities as a lubricant for close bearings, can be made of neatfoot oil. Procure perfectly pure neat-foot oil and filtering paper placed on a glass funnel. It should be in a room heated to summer heat. Repeat the filtering eight or ten times, the object being, in addition to purifying it, to separate those parts that are likely to oxidize and thicken when the oil is placed in contact with metal. After filtering, the oil should be poured into a tall, thin bottle and stood in a cool place where light is strong. On being exposed in this way the contents of the bottle will separate the heavy portion, which will have a granular appearance, will settle to the bottom, leaving on top a thin limpid oil. Pour this off carefully; if any of the heavy particles have been mixed with the light oil filter it and mix with equal weight of benzoline, and it is ready for use. This oil will not thicken and will wear longer than any other lubricants on the market. It is also very much cheaper than any except the common grease.

The business of brass-making requires intelligence and scientific acumen. The process of manufacture is not in the least uninteresting and may be briefly described: After weighing the proportions of metals, they are melted in crucibles, holding anywhere from 20 pounds up, in a furnace. The metal is then poured into cast-iron molds, made strong, and thus the brass ingots are formed, varying in size, and are from 3 to 14 inches wide, from 1 to 5 feet long and from 1 to 4 inches thick. The ingots are trimmed by cutting off with a huge pair of shears weighing several tons, the rough portions formed in casting by the mouth of the mold, then passed to the rolls, which are of chilled iron, 20 inches or more in diameter and 3 feet or over long, and are reduced by degrees to the required thickness. It can be reduced only a little in thickness at each rolling. After passing through the roll once it becomes hard and brittle, and before it can be reduced further it must be annealed. The annealing is done in furnaces called muffle, which are shaped somewhat like ovens, from 5 x 30 feet and upwards in width and length. Each time, after annealing, the metal has to be cleared of the smoke and oxide, and this is done by immersing it for a time in a bath of sulphuric acid. The temper of the brass depends mainly on the manner of rolling; the color, ductility and other properties depend upon the proportions of the ingredients. Lead, tin and antimony are sometimes added in small quantities to produce brass of a quality suited to a peculiar work.

Our Western Letter.

THE past two or three weeks has been a very critical time in the crop situation in Manitoba. The weather has been very changeable, and boiling hot days have been succeeded quickly by cold dips, during which the thermometer went low enough to cause frost scares. We have had a strange mixture of warm and cold weather, cloudy and clear days, winds and calms, with a severe hail-storm thrown in, which destroyed thousands of acres of crop, and just a little more rain than was desirable.

The most important event affecting the crops since my last letter was the heavy storm of August 2nd. This storm, considering the amount of damage done, was the most severe in the history of Manitoba. A heavy thunder storm, accompanied by a strong wind and a great downpour of rain, extended nearly all over the province. Though the crops were flattened to some extent in places, no damage to speak of was done by the storm, except where it was accompanied by hail. In portions of southern Manitoba the dreaded hail came with the storm, and a large section of country was devastated. Many farmers had their crops entirely destroyed, while others had theirs damaged from ten to fifty per cent. or more. The first reports received in Winnipeg of the storm were of a very alarming nature, and created consternation in the city. All sorts of rumors were afloat, some believing that all of southern Manitoba had been swept clean. The first estimate of the damage placed the area of the crop ruined at 70,000 acres. Grain and implement men and others most largely interested at once sent parties out to investigate the reports. Since the first excitement has passed and people have had time to calmly figure up the loss, it has been made clear that the damage is not nearly as great as at first supposed. Private reports from parties who went through the hail district, estimated the loss at from 30,000 to 50,000 acres. In order to determine closely what the actual loss has been, the crop reporting department of the local government undertook to make a careful investigation. The agents of the government in each township were instructed to prepare a report of the damage done. These reports are now all in and the official report has just been issued. This report shows 31,851 acres of wheat, 8,403 acres of oats, and 1,180 acres barley totally ruined. Besides this, 2,637 acres of wheat, 1,103 acres of oats, and 460 acres of barley has been damaged more or less. This would bring the total loss to between 40,000 to 45,000 acres. On the basis of the estimated average yields in the district (which estimates may be considered high) the department figures out the loss in bushels to be 473,140 bushels of wheat, 240,482 bushels of oats, and 20,908 bushels of barley. This report is no doubt close to the actual loss, and it shows the storm to have been very severe. Though the loss is not so great as to materially reduce the total crop of the province, yet it will be felt severely in the districts visited by the hail, and will be hard upon those who lost their crops, especially as in the same section many had poor crops last year. The hail first started in about five miles west of Deloraine, which town is located at the western terminus of the Pembina mountain branch of the C.P.R. From this point it extended eastward on each side of the railway, as far as Boissevain, destroying the crops in a strip of country from two or three to ten miles wide. Eastward from Boissevain the track of the storm was not continuous, but patches here and there were caught. At Pilot Mound and Killarney some damage was done, and north of Manitoba there was quite severe loss. On the same night little patches were struck by hail in different parts of the province, but the damage would only amount to a few acres or hundreds at most, in each instance, and the total outside of the strip of the Pembina branch would be very small.

The destruction of crops from hail this year has again revived the agitation for an official system of hail insurance. Some slight damage has been done in Manitoba almost every year from hail, but never to anything like such a serious extent before. A system of official hail insurance has been talked of at intervals during the last few years. It has been proposed that the government should levy a tax on all land under cultivation in the province, to provide a fund out of which farmers could be recouped for any loss occasioned by hail. In average years the amount required to meet all the loss would be very small when spread over the entire province, and would not be felt at all, while individual sufferers from hail would have something for their season's work. Some of the insurance companies take hail insurance risks, but their rates are high and they are not patronized to any extent by the farmers. The Government system proposed would be very popular with the farmers,

and it is quite possible that something may be done in that direction at the next meeting of the Legislature.

In addition to the alarm caused by the hail storm, we have had one or two frost scares. Up to the time of writing, however, I am happy to say that I believe no serious damage has been done from frost. So far it has only been a scare. The first alarm of frost was on Friday and Saturday, August 8 and 9. On Friday the weather took a cool dip, clearing up towards night with indications of frost. A good deal of anxiety was occasioned throughout the country that day. The next day (Aug. 9) it was learned that the lowest readings of the thermometer in the Winnipeg district and the eastern part of the province were sufficiently high above the frost mark to at once relieve the fears of the most timid. The lowest readings reported at Winnipeg were 37 to 38 above zero. At some western Manitoba points, however, it was a close shave, two or three points reporting a very light frost, sufficient to be noticeable on tender garden stuff. No damage was done to the grain crops anywhere, according to all reports, and advices have been received from all parts of the country since the cool dip to the same effect. If any damage at all was done, it will be very slight. One of the points which reported a reading of the thermometer which would indicate frost was Minnedosa. This town is situated at the bottom of a deep valley, and in the valley the thermometer always goes a few degrees lower than in the surrounding country. Thus one or two degrees of frost reported by the observatory at Minnedosa would not mean frost in the surrounding country. The United States signal service department has an observatory at Minnedosa, and this reported two degrees of frost on the night of August 8. On 'Change at Chicago and Minneapolis, the cool dip in Manitoba was known as soon as it was here, and it was the talk of the boards at those two points the following morning, the scare assisting in "booming" wheat up 2 or 3 cents higher at Chicago. Before people were out of bed here in the morning almost, telegrams came pouring in from Chicago and other points, asking if any damage had been done, and to what extent.

Our next cold dip came on the nights of August 16 and 17. On this occasion the lowest readings of the thermometer were in the eastern part of the province. All reports from the west state that there was no frost. At Winnipeg the thermometer only registered one point above frost on August 16, and four points above on the night of August 17. Some points in the Red river valley reported light frosts, extending as far south as Grand Forks, Dakota, 150 miles south of Winnipeg. Farmers around claim that the frost has only injured garden stuff, and that grain is not affected, but I would not be surprised if it will turn out later on that some grain has been injured.

Harvesting in Manitoba may be said to have commenced on August 1. During the week ending August 1, some barley and a very little wheat was cut. The following week, ending August 8, was not very favorable, being changeable. The weather was hot and cold by spells and with frequent showers. Harvesting consequently did not make much progress. A great many were preparing to commence cutting on Monday, August 11, but a drizzling rain set in that morning which lasted two days. There were also light local showers during the balance of the week. Though the weather was not as favorable as could have been desired, a good deal of grain was cut, and by Saturday, August 16, the end of the week, some districts were well advanced in harvesting. The Gretna district reported three-quarters of the grain cut, and some sections of south-western Manitoba were nearly half cut by the close of the week. The following week, commencing on Monday, August 18, harvesting became general nearly all over the country, though in some northern sections of the province it was some days later before harvesting became general. In the latter sections there is a good deal of grain which at the time of writing is still on the green side. Grain crops have had an immense growth in the northern sections of the province, and this has retarded ripening. Straw in some fields has attained a height of six feet. The crop is prodigious in this quarter, and if the harvest is completed in good order and free from frost, northern Manitoba will make a wonderful showing this year. In the settled portion of the territory of Assinboia, immediately west of Manitoba, crops were also somewhat later than in southern Manitoba, and harvesting did not become general until the week commencing on August 18. This week also was changeable, cold, warm, clear, cloudy, calm and windy in rapid succession. There were local showers, generally very light, and though the weather was generally threatening there was not enough rain to cause much delay in harvesting. It was not favorable, however, to hasten the maturing of late grain.

By the close of the week, August 22, harvesting was sufficiently advanced to put a large portion of the Manitoba crop beyond danger from frost, though as noted, there is a good deal of grain yet on the green side in some sections. We are now anxiously hoping for more settled weather to complete the harvest. Damp weather could do an immense amount of damage. Harvest hands are very scarce, which delays the work. From \$40 to \$50 per month and keep is being offered for men. One thing about the damp weather is that it has the effect of keeping the grass green, thus preventing the danger of prairie fires, which often in the fall lick up many a stack of grain, leaving the farmer nothing to show for his season's work. Such unfortunate incidents, however, are almost invariably the result of carelessness. With ordinary precaution, stacks can be made safe from prairie fires.

It is a little early yet to say much about the sample of this year's wheat. Damp weather and even frost might yet very materially reduce the quality of the grain. I saw recently in an editorial in the *Montreal Gazette* that Manitoba wheat would be extra fine quality this year. I am sorry to say that so far as can be determined at present, such is not the case. The scorching hot weather toward the end of July has injured the sample in some parts. In sections where wheat is early, the quality is not as good as was expected. I have the best authority for this statement. Later grain it is believed will show a better sample if the harvest is completed in good shape. Though an "extra" sample is not calculated upon by those informed here, yet it may be nearly as good as an average. Much depends on the weather for the balance of the season.

Crop estimates are still being made. The official crop report has just been published, and this estimates the average yield of wheat at 24.6 bushels per acre. This is just one bushel per acre less than was estimated in the report for the crop of 1887. After deductions from the total acreage to cover the crop destroyed by hail, this estimated yield would give Manitoba a total wheat crop of about 17,225,000 bushels, between fourteen and fifteen bushels of which would be available for export, added to which would be a couple of million bushels from the Territories.

The official report estimates the yield of barley at 34.3 bushels per acre, and of oats at 44.3 bushels per acre. These are about one bushel per acre more than in 1887. Besides wheat, Manitoba will have a considerable quantity of oats, barley and potatoes for export this year.

There were light frosts throughout the country during the week ended August 23, the heaviest being on the night of August 21. Most reports claim that no damage was done to grain, but those best informed are dubious. Probabilities are some grain will be damaged in places. About half the grain was cut previous to the date named, and a large portion of the balance was too far advanced to receive much damage. Samples of new wheat are now being shown freely, and as a rule the quality is decidedly below an average, and the yield lighter than expected. All agree that samples of new wheat are of exceptionally poor quality this year. The berry is small and sometimes shrunken. Boom crop estimates made earlier are now being largely discounted.

AN ELECTRICAL CORN MILL.

A CORN mill at Belfast, Me., has been put in operation where the motive power is entirely by electricity, three alternating current dynamos being used. The capacity of the mill is 400 bushels of corn per day, and the mill is equipped with one run of buhrs and one set of rolls, with proper cleaning and separating machinery. The use of electricity, at least for small mills, is a great economy in gearing, shafting, pulleys and belts, as a single generating machine will supply the power by wire to the floor or machine wanted, to which the motors may be attached either to all the machines on a floor or to any particular machine. This economy is especially applicable where water is the initial motive power, but the saving on transmission machinery would be great in any case. Electricity cannot yet be produced as cheaply as steam power, but it can be more cheaply and easily distributed. The mill will be lighted from the same generator that supplies the motive power.

TEST FOR LEAD IN BLOCK TIN.—An optico-chemical method by which the presence of lead as an alloy of block tin may be speedily ascertained without injury to the siphon or other article constructed thereof, has been discovered by a German chemist. Ten milligramme of the suspected metal is scraped off, dissolved in nitric acid, and the solution made strongly alkaline with caustic potash. If this solution turns dark-brown on the addition of sulphuretted hydrogen water, it contains lead. By making it exactly as above, diluting and comparing it with an accurately titrated solution of pure lead, 1 per cent. of the alloy can be detected with certainty, after a little practice.



There seems to be quite a stir amongst the little stone mills in Prince Edward Island. Wm. & J. G. Greey, of Toronto, have recently received orders from there for 5 run of millstones, smut-bags, water wheels and supplies.

Mr. H. W. Petrie, of Brantford and Toronto, has received the order from the Royal Canadian Yacht Club, of Toronto, for an automatic engine with boiler, etc., to be used for driving an electric light plant, pumping water, etc.

The Department of Indian Affairs have decided to meet the requirements of the settlers in the district around Crooked Lake, N. W. T., and have ordered a complete outfit for a settlers' mill from Wm. & J. G. Greey, of Toronto.

R. M. Watson, of Kincardine, is increasing the capacity and adding to the efficiency of his mill, and has placed his order for rolls, wheat cleaners and machinery with Wm. & J. G. Greey, of Toronto, who are also doing the millwright work.

John McLaren & Son, of Renfrew, Ont., are enlarging the capacity of their mills, and have placed their order for a line of con-rolled rolls, consisting of 6 double sets with Wm. & J. G. Greey, of Toronto, who are also furnishing them with other machinery.

Thos. McKay & Co., of Ottawa, Ont., are having their rolls re-rolled. They have 35 pairs in their flour mill, and shipped the whole in one car to Wm. & J. G. Greey, of Toronto, who did the work of regrinding and corrugating in 7 working days and shipped them back.

John Munro, of Chesterville, Ont., has bought out the Hodge mill property at Cornwall, Ont.; he is refitting the mill and adding to its efficiency. He has placed his order for rolls with Wm. & J. G. Greey, of Toronto, who are also recorrugating the old rolls and have furnished new clothing for the bolting teels.

The country about Loehalsch, Ont., has long been in need of a roller flour and grist mill. The residents lately combined and formed themselves into a joint stock company and purchased a mill site. They placed their order for the entire machinery outfit with Wm. & J. G. Greey, of Toronto. The name of the company is The Hemlock City Milling Co.

Messrs. Humphrey & Ireland, of Avening, Ont., have decided to change their mill to the full roller process, and have placed their entire contract with Mr. E. P. Cave, of Thistleton, who furnishes the plans, flow sheet, and does the work. Case rolls will be used. The machines, iron work and supplies are being furnished by Wm. & J. G. Greey, of Toronto.

Campbell & McNabb, of Douglas, Ont., have decided to change their stone mill at that point to the full roller process, 30 barrels capacity, with a full and complete plant. They have given the contract for the whole outfit of rolls, machinery and supplies to Wm. & J. G. Greey, of Toronto, who have the plans in hand and will furnish water wheel and also do the millwright work.

W. W. Hutchins, of Forest, Ont., is rebuilding his elevator at Seneca, Ont., and is putting in a chopping and cornmeal rig. The order for 3 roll-chopper, corn meal bolt and supplies, has been placed with Wm. & J. G. Greey, of Toronto. Messrs. Greey report sales of machinery, iron work and supplies for three elevators for J. B. McKay & Co., of Toronto, and one for E. Murphy, of Mount Forest, Ont.

Wm. Needlar, of Beloeageon, Ont., is adding to the efficiency of his mill, and has ordered his machinery, aspirator and supplies from Wm. & J. G. Greey, of Toronto, who are also re-corrugating the rolls and putting in the beall corrugated furrow. Mr. Needlar's brother, Geo. Needlar, of Millbrook, has been using the beall corrugation for over a year and is so well pleased with the work that Mr. Wm. Needlar decided to adopt it also.

Messrs. Brough & Caswell, of Toronto, who make a speciality of printing manufacturers' catalogues, have just completed for Messrs. Lewis & Son, of this city, one of the handsomest specimens of work in this line that we have yet seen. It consists of a catalogue of 300 pages, profusely illustrated. The paper, typographical arrangement and quality of presswork, are in every respect first-class, the whole being well-bound in covers of appropriate design.

The residents in the vicinity of Norland, Ont., have formed a stock company for the purpose of supplying the needs of the locality with a roller flour and grist mill. They have purchased water power and old mill at that place, and have moved and enlarged the building. They have placed their order for complete outfit of rolls, scalpers, purifiers, dressers and wheat elevators with Wm. & J. G. Greey, of Toronto, who will furnish plans and all supplies and do the work.

Recent sales of Wheelock engines have been made to the following well-known firms and corporations: The Massey & Sawyer Co., Hamilton; Joseph Lowe, Sarnia; Cant Bros. & Co., Galt; Corporation of town of Picton; Coloung Woolen Mill Co., Coloung; W. H. Constock, Brockville; Cunningham & Curran, Stax, N. S.; George E. Full, Charlottetown, P. E. I.; James Manson, Orillia; A. G. Harchen & Co., Toronto; Central Iron Works Co., Peterborough; Wm. Cane & Sons Mfg. Co., Newmarket; Leamington Electric Light Co., Leamington; D. Morton & Sons, Hamilton; James Hough, Jr., Guelph; J. W. Freeman, Brantford; Walkerville Malleable Iron Co., Walkerville; Hess & Co., West Toronto Junction; St. Lawrence Starch Co., Kingston; W. Tallman & Son, Beamsville; Strickland & Co., Wainman, B. C.; D. Robertson, Milton; John Wright & Son, Brantford; R. Forbes Co., Hespler; J. H. Bowman & Co., Brantford; S. R. Warren & Son, Toronto; Metropolitan Street Railway, Toronto; Chas. Krentzger, Waterloo; Beamsville & Acton, Ont.; R. G. McLean, Toronto; English Portland Cement Co., Montreal, Que.; Knight Bros., Popcorn, B. C.; Logwood Corporation, Collingwood.

The Canadian Interior Conduit Company, Toronto, capital \$150,000, will engage extensively in the manufacture of conduits and tubes to contain electric wires.

The extensive foundry and machine works of Messrs. A. Robb & Sons, at Amherst, N. S., were totally destroyed by fire one night last week. The loss is placed at \$50,000.

Chief Ardagh, of the Toronto fire brigade, recently presented a report to the fire and light committee, in which he said that there are many large manufacturing establishments in the city which have no provision whatever for extinguishing fires or saving life in case the necessity for such should occur. The result of a fire in many of these places, he says, would be a panic among the employees, attended by accident and probably loss of life. The committee authorized the chairman to have a by-law prepared to compel the owners of these establishments to provide safeguards in case of fire.

The necessity of having an invention well described, says the *Journal of Useful Inventions*, and every novel feature of the invention defined in both the drawings and specification preparatory to filing in the Patent Office, was well set forth by the late Judge Grier, one of the more distinguished of the patent law judges of Supreme Court of the United States, when he said: "There are few things more difficult, even for well educated and practical lawyers, than to describe a new invention clearly, and point out the principle which distinguishes the subject of it from all things known before. As inventors are rarely experts, either in philology or law, it has long been established as a rule that their writings are to be scanned with a good degree of charity. But it is easy to abuse this liberality to the purposes of fraud."

A German inventor proposes a new method of melting iron, the advantages claimed for which are economy of fuel, greater facility for making sharp, strong castings, and a purer description of metal. The cupola is supplied with blasts through two tuyeres, one above the other, there being 18 in each set, the tuyeres being ports, with the form of a vertical slot, and directly connected with a tuyere ring. The special feature of the cupola is that the bottom is a slightly inverted arch, pierced by two openings, through which both blasts, or, rather, imperfectly consumed gases of combustion and the fluid can flow. Below is a small chamber in which the iron collects. It is heated by gases formed down from the cupola above, these being supplied with the necessary air for combustion by a special tuyere leading to the main pipe, the chamber at the same time serving to preheat scrap, etc., which needs only to be pushed into the bath for dissolving it.

There is one problem in factory economies which the owners of mills can study to their advantage, and that is "The Electric Motor versus Shafting." The advantages in the use of electric motors are now generally admitted, but there are still opportunities to use them with profit which should not be neglected. They are found in mill and factory construction. A large mill in which all the power is transmitted by means of belts and shafting is a costly one to operate, as a certain load has to be carried at all times irrespective of the number of machines actually working. This means a constant expenditure of energy for which there is no return whatever; and moreover there is a constant depreciation on the belts and shafting used for transmission simply, which is by no means inconsiderable. This expense of constant load increases where intermittent work is done. For instance, it may be unnecessary to run the shafting on an entire floor, but the intermediate shafting has to be kept in operation nevertheless. This can be obviated in many cases by the use of the electric motor, for it acts as a governor on the engine, any decrease in the number of machines requiring less energy from the motor, which requires less current from the dynamo, and this means less coal under the boilers. In the transmission of power, practice has undeniably proved that electricity is the most economical agent even for limited distances.—*Modern Light and Heat.*

ELECTRIC POWER APPLICATION.

THE whole system of electric power may be considered as simply a means of putting the mechanical energy of a steam engine or water wheel, into such shape that it may be sent along a wire, and used at any point along that wire, far or near, as mechanical energy again, says the *Journal of Railway Appliances*. It boxes up the rotating flywheel, so to speak, sends it spinning along the thread-like wire, at a speed almost beyond comprehension, switches it off and sets it rotating again wherever desired, and does this with the loss of but a few per cent. of the original energy.

It may be asked what is the advantage of this transmission. Why not just as well place steam engines wherever needed to do the work and do away with the necessity for wires, poles and electric apparatus. Steam or water power is necessary anyway; why not place the engine where power is needed. The first point for consideration is the economy of concentration. A large steam plant with all the advantages of condensing engines, economical boilers and firing, buying supplies and fuel in bulk, can produce power at a much less cost per horse power than it can be produced by small scattered plants. The question of cost is at once settled in favor of electrical distribution from a large central plant. Where water power is available the arguments in favor of electrical distribution are even more forcible. Electric

power commends itself also on the ground of convenience, reliability and safety. It needs little or no attention, is under instantaneous control, and is as safe as any form of power apparatus.

The attention which has been given to the subject in the last few years has naturally developed possibilities of electric power applications far beyond what was originally foreseen. Not only has the electric motor supplanted other forms of power apparatus, but from its adaptability it is doing work which was formerly considered as beyond the possibility of machine power.

Among many novel installations is an underground electric railway, operated in a Pennsylvania coal mine, which has now been in use nearly a year. It is so successful that several similar mine tramways are now in process of construction. Another application which is growing in popularity is that of electric tramways for mills and manufactories. These tramways are serviceable in transporting manufactured products and raw material from one part of the works to another or to the nearest railway station. The motor car may be supplied with hoists and cranes operated independently by electric power and may thus be used in the handling or transportation of heavy pieces of iron, steel or masonry. They are easily managed without skilled attendance and are run with a minimum of depreciation.

Another application of electric power is that to electric transfer tables and turn tables. Such applications have been in various railroad shops, and they are meeting with most gratifying success. We could not get along without the electric system. This is the universal verdict. For a transfer table the motor is applied under the platform and the movement of rotation of the armature is communicated to the axle of the table through a series of gears. The same motor also operates a capstan, which, with its accompanying ropes, moves the cars on and off the table as desired. A friction clutch is used to connect the motor with the driving gear or the capstan. The motor is reversed by means of a reversing switch, and is under the immediate and absolute control of the operator. The current is brought to the motor by means of an overhead wire and a trolley arm attached to the table. Motors for this work are constructed for any desired capacity and to run the table at any desired speed. An electric transfer table recently installed is operated by one man who has two or three assistants in braking the cars, working the capstan, etc., and the work is now being done much more satisfactorily than formerly when the services of twelve men and a steam locomotive were required.

A FUEL ECONOMIZER.

A RECENT improvement in the use of steam power has attracted some attention in view of the very considerable saving effected by it in fuel. In an ordinary tubular boiler the water lowers the temperature of the fire, and each time fresh water is forced in additional lowering follows—so, too, on the door being opened to allow fresh fuel to be added, the temperature becomes lowered, a quantity of gases being thus forced to pass off unconsumed. To overcome this the plan now brought forward is to build a brick arch over the fire so that the boiler is heated by radiation instead of by the direct blaze, the bricks, which become white hot acting as a reservoir of heat, and keeping the temperature at a high pitch—a fierce fire produced with a saving of at least 20 per cent. of fuel. In one instance, where the arrangement is applied to a plant of boilers (with no fuel but coal screenings and a small quantity of wet sawdust) steam is supplied for seven engines, which run 1,200 feet of shafting, the steam being carried a distance of 900 feet to the different establishments, and in order to do this the steam must be intensely dry. No blower is required on the boilers, as would be necessary without this attachment. And it appears that at the rolling mill on one boiler where it was necessary to use twelve tons of coal a week, after adding the arch only eight were required, there being a saving of four tons.—*Tradesman.*

United States Consular-General Bonham of Calcutta, says concerning the Indian wheat crop: "Area sown to wheat, about 36,000,000 acres. The total yield of this year's crop is estimated at about 261,400,000 bushels, the present market price of which in the principal ports of India is 60 to 70 cents per bushel. It is estimated that not more than one-sixth of the aggregate yield this year will be for export. Owing to the difficulties in securing reliable information from many of the native Indian farmers, agricultural statistics in this country are not regarded as entirely reliable; but if the foregoing is approximately correct, I do not think India is as formidable a competitor of the United States in wheat-growing as she appeared to be a few years ago.

A DAILY REPORT.

THAT very useful paper, *The Office*, recently contained the following valuable article on mill book-keeping, contributed by C. E. Freeman. The writer says the accompanying form of daily report was designed and put in use by him as a part of the system of accounting in an extensive flour mill. In order that those who may be interested in the subject may better understand the detailed explanation which follows, he considers it important that they should first be informed of the peculiar circumstances that demanded so frequent and complete a statement, and says:

"The owners of the mill were directly engaged in conducting a wholesale flour and feed business in an eastern city, and a large proportion of the product of the mill was shipped to and disposed of by them, the account covering such goods being treated in the same manner as any other consignment account. They were also owners of another large mill in the west, and being thus so far removed from these two important branches of their business, it was their desire to be informed daily of all the most important 'facts and figures' connected with these western interests, together with information regarding such changes in values as resulted from the work of the mill or the transactions of its direct manager.

Under these circumstances the daily report was made to accomplish several important purposes. It kept the owners constantly informed of the amount of 'stock on hand' of each and every kind, and thereby enables them to govern their sales, in both quantity and price, to the best advantage. From its totals they could determine at a glance which particular grade demanded the most attention in order to prevent the accumulation of a surplus; and they could easily discover when a shortage was liable to occur in any of the various grades. It likewise furnished to the manager of the mill all of the foregoing particulars for his guidance; and by having the reports printed and written in copying ink, letter press copy of each being retained at the mill, enabled him to systematically gauge his purchase of the raw material, as well as the sales of his manufactured product; while the head miller obtained from the same source a knowledge of the kind, quality, quantity and availability of the supply of wheat at any time.

Under favorable circumstances the mill was run continuously from Monday morning until Saturday night; but when a stoppage did occur the fact was noted by a brief statement of its cause and duration in the blank spaces provided for this purpose at the head of the report. The reports were dated and numbered consecutively, the number of each corresponding with that of the page of the impression book on which it was copied. The 'stock' was classified under three important headings, viz.: Wheat, flour and feed; while special columns were provided for recording separately the quantities of the different grades. The location or availability of the stock was indicated by three subdivisions of each class, whereby the wheat was reported as being 'in mill,' 'on track,' or 'in transit,' and similar conditions of flour and feed were reported as 'in mill,' 'on track,' or 'on consignment.' The double columns under the headings provided for the different grades of wheat were used for recording bushels and pounds.

With the above remarks as a general preface I will proceed to an explanation in detail; and with the aid of the letters and figures here added to the report for reference only, will commence with the raw material at its point of entry in items M, R and S, and follows its course until it leaves this record of quantity through the outlets provided by the items numbered 7, 14 and 19, and enters in value the records covered by the trial balance, through appropriate entries made to the debit of the proper accounts in the general set of books.

In many instances contracts for wheat were made with farmers and others for future shipment, when the quan-

ty and price were entered opposite 'contracted' in item R S, the double column of item R being used for bushels and pounds, and those of item S for dollars and cents. When shipments were made to the mill from wheat contracted as above, or of other wheat, and the 'draft with B L. attached' was received and honored (for wheat is cash), it became what was termed 'wheat in transit,' and the quantity was entered opposite item M and added to item L, directly above it. When these cars were reported as received in the railroad's city yard, or arrived on the mill's siding, the wheat they contained was entered opposite item O and deducted from item N above it, thus leaving an item P, below it, the net amount of wheat shipped, but not received, or the total of the subdivision termed 'wheat in transit.'

The same amounts entered in item O, having there left the transit account, were added to the track account in item H. When cars on track were unloaded and then contents transferred to the mill elevator the amount was entered opposite item J and there deducted from the track account, leaving in item K, below it, the net amount of wheat received but not unloaded, or the total of the subdivision termed 'wheat on track.'

The same quantities represented by item J were also entered in item C, as taken in the mill, and there added to item B, above; that denoted the amount in the mill

of barrels of flour manufactured as shown by the registers, the estimated quantity of wheat ground was determined and deducted as explained. The number of barrels of flour made was then entered in item No. 3 and added to item No. 2, above it.

In cases where cars were loaded with flour or feed and held for shipping orders, or their shipment deferred for any other reason, their contents were entered in item No. 5, and subtracted from item No. 4, when the same amount was then transferred to the 'track' account by being added to that account by item No. 10. The city deliveries to local dealers, of considerable importance, were entered in item No. 7 and there deducted, leaving in item No. 8 the net amount then in the mill, or the total of the first subdivision of flour and feed. Item No. 7 being the first point of egress, where the accounts there deducted were taken entirely from this record, they then entered the general set of books through itemized charges to proper accounts, in which the previous records of quantities were changed to represent values, as determined by the terms of their sale.

The shipments made on consignment were deducted from the track account in item No. 12, and a similar amount added to the consignment account in item No. 17. Item No. 14, by being deducted from the total above, became the second outlet, of which corresponding charges in the general set of books were made in the same manner as explained regarding item No. 7, thus leaving in item No. 15 the net amount of stock on track or the total of the second subdivision of flour and feed. No. 19 covered goods on consignment duly reported as disposed of by 'account of sales,' and was the third outlet of quantities from the report. They were then entered into the general accounts in the same manner as item 7 and 14. No. 19, by being then deducted, left in No. 20 the net amount of stock on consignment, or the total of the third subdivision of flour and feed.

The different amounts as classified, were then carried to the 'stock on hand' division, as shown in the report, and there represented the totals of each kind.

In the manufacture of flour, different varieties or grades of wheat are often ground together in order to produce the qualities desired; and the line A under the wheat division was used as there indicated for recording the proportions of each kind ground.

The packages of flour from such mixtures that were different from the regular grades, were marked, and also indicated in the flour division of the report by some particular letter or name that was adopted especially for that grade. The advantages of this part of the record were apparent when at any time it was desired to know the kind of wheat and proportion of mixture that had been used in making any particular grade, for the purpose of duplicating it if necessary. The quality or grade of flour, however, is not entirely dependent on the mixture ground to produce it, but it is also regulated to a certain extent by the 'percentage manufactured,' of which a record was made in line No. 1 of the flour division.

In these conditions we had a record of important conditions in milling that seem to demand attention here, in order to explain the nature of this part of the report. As the wheat was converted into flour, a certain proportion of the finest ground was separated from the rest and branded as 'patent.' The next grade, being separated through a coarser cloth or sieve, was branded 'F,' etc. In this way the patent was but a small percentage of the total production; and when, for instance, it was desired to make a better quality of F, the usual percentage of this grade was increased by running it with a portion of the patent; if a poorer quality was desired, a portion of the next grade was combined with it, consequently the kind and quality of wheat used, together with the proportion of mixture and the percentage manufactured of each grade were all important particulars that it was necessary to take into consideration in determining how to duplicate any particular brand.

UNION MILLS CO. No. _____ Detroit, Mich. DAILY REPORT.									
For 24 hours ending at _____ pm _____ day _____ month _____ year _____									
Number of hours run		Time lost		Hours, caused by					
WHEAT					FLOUR				
No. _____	White	No. _____	White	Wheat	Total	No. _____	Patent	No. _____	Feed
Proportions of mixture, A					Percentage manufactured, 1				
In mill last report, B					In mill last report, 2				
Taken in, C					Manufactured, 3				
D					Loaded out, 5				
Ground—yield at, E					6				
Now in mill, F					City deliveries, 7				
On track last report, G					Now in mill, 8				
Arrived—Cars H					On track last report, 9				
I					Loaded out, 10				
Taken in mill J					11				
Now on track, K					Shipped on consignment, 12				
L					13				
In transit last report, M					Shipped on sales, 14				
Purchased—Cars N					Now on track, 15				
O					Consignments last report, 16				
Ar on track—Cars, P					Shipments on consignment, 17				
Q					18				
Now in transit, R					Sales accounted for, 19				
S					20				
Average price wheat per bushel at above Q					Now on consignment, 20				
Contract—bushels R									
price, S									
Average price flour per barrel at above Q		Average price feed per bushel at above Q		Bushels WHEAT		BUSHELS FLOUR		BUSHELS FEED	
No. _____		No. _____		In mill		In mill		No. 1 white	
No. _____		No. _____		On track		On track		No. 2 white	
No. _____		No. _____		In transit		On consignment		No. 3 white	
No. _____		No. _____		Total		Total		No. 4 red	
No. _____		No. _____		Total		Total		Rejected	
Patent					MEMORANDA				
Bakers					Patent last report				
Low grade					Drafts on customers				
Low grade					Receipts from customers				
Low grade					Disbursements				
Crabapple					Present balance				
R 1/2 mds									
Mixed feed									
Fine mds									
Coarse mds									
Bran									

at the close of last report. In item E the amount of wheat ground was deducted from this side of the report, leaving in item F the net amount of this first subdivision, or the total quantity of wheat in mill, and being then manufactured from item E, was then re-entered as barrels of flour and pounds of feed in item No. 3, under the flour and feed division, on the opposite side of the report. The amounts recorded in item E were either estimated or accurately determined. If obtained by the latter plan they represented exact amounts taken from actual weights of the wheat before it was ground, and this is the only plan here recommended for obtaining correct results. It was found, however, that very satisfactory results could be obtained by the plan of estimating this quantity in the following manner.

As the flour was run through the packers an automatic counting machine attached to each recorded every barrel packed and at the close of the day the figures from these registers were reported and recorded in a book especially prepared for the purpose, thus giving a daily record of the number of barrels made. The term 'yield,' used in item E, is familiar to millers as denoting the number of bushels of wheat required to make a barrel of flour, which amount, from previous actual results and the advantage of long experience and close observation of results under varied circumstances, the head miller could very closely estimate. Then, by multiplying the 'yield' by the number

The 'cash memoranda,' 'scales' and 'shipments' divisions are self-explanatory and I will pass them without further remarks. The report, as a whole was considered to possess many points of importance, among which, besides those already noted, were the recorded facts regarding the location of the stock that would be of advantage in case of fire, this being one reason for separating the stock 'on track' from that 'in mill.' The time necessarily employed in filling each day's report was much less than might be supposed from the space I have occupied in explaining it, as the auxiliary records of the system were so kept that the required totals were easily obtained, and circumstances did not require that all the blank spaces be filled in any one report.

I offer the foregoing as a sample of a system that could be adopted and worked to advantage in many different kinds of business, without resorting to the various sub-divisions that the business for which it was designed seemed to demand. It has also a special bearing on the subject so much agitated of late, of determining profits without invoicing, and when such a system is properly conducted and the auxiliary records are designed with this end in view, it becomes not only a possibility, but at the same time one that is quite easily accomplished."

THE WORLD'S WHEAT CROP AND WHEAT VALUES.*

LEAVING the historical or retrospective part of the question, I now come to the probable outturn of the crops in the present year, which I have no doubt you will find of more immediate interest. I have been in communication with various firms abroad, and with some of the British Consuls, and from their remarks, as well as from careful observation of the various crop reports received by *Beecham's Evening Corn Trade List*, with which I have the honor to be connected, I make the accompanying estimate of the present year's crop:

	ESTIMATED YIELD IN 1890.	Qrs.
Austria.....	About average.....	5,500,000
Hungary.....	About average.....	17,000,000
Belgium.....	Fair average.....	2,500,000
Bulgaria.....	Below average.....	4,000,000
Denmark.....	Average.....	750,000
France.....	Below average.....	55,000,000
Germany.....	Good average.....	12,000,000
Greece.....	Fair average.....	1,500,000
Holland.....	Fair average.....	750,000
Norway and Sweden.....	Fair average.....	500,000
Italy.....	Good average.....	13,650,000
Portugal.....	Average.....	1,000,000
Roumania.....	Good average.....	7,000,000
Russia (incl. Poland).....	Good average.....	50,000,000
Serbia.....	Very good.....	1,250,000
Spain.....	Good average.....	10,000,000
Netherlands.....	Average.....	300,000
Turkey in Europe.....	Below average.....	4,000,000
United Kingdom.....	Below average.....	9,000,000
Total for Europe.....	155,700,000	
Estimated Consumption.....	175,000,000	
Balance.....	19,300,000	

I confess that it is somewhat early to hazard estimates of some of the countries: for instance, the weather may spoil a considerable portion of the English and French harvests; but I believe that whatever modifications become necessary, they will not materially enlarge the total, which is after all the main point. In the case of Austro-Hungary the figures are based on the official reports. For France they are the figures adopted by the French agricultural press; and for Germany they are the result of the most reliable commercial advices. Concerning the Italian crop, I am indebted for useful reports from the British Consul at Leghorn, Mr. Henry Null, as well as to the latest report of the Italian Minister of Agriculture. From Roumania from the British Consul at Galatz. Mr. Percy Sanderson has been good enough to send some reliable information, and the British Consul at Coruna, Mr. E. H. Walker, has kindly supplied me with some valuable reports concerning the Spanish crop. I have estimated the Russian crop a good average, viz., 50,000,000 qrs. (6,250,000 qrs. more than last year); although Messrs. Raffalovich, of Moscow, report that the spring wheat crop, which is by far the most important, has suffered from the great heat; and the Russian Minister of Agriculture also takes a pessimistic view of the crop than some time ago, whether for ulterior motives in connection with the Empire's interests, I am not of course in a position to know. Mr.

T. E. Heenan, the American Consul at Odessa, also expresses the opinion, in a letter dated July 18, that the crop will not be a large one, although he adds that well-informed persons at Odessa do not agree with him: but in the absence of anything like reliable statistics, the American Consul considers it very difficult to form a correct estimate. The English crop I have put at only five per cent. below the average of the previous three years, which you will, I fancy, agree, is not a pessimistic estimate.

The result you will see is that Europe has produced nearly 20,000,000 qrs. less than she requires for consumption. The ability to supply this quantity by non-European countries is rendered more difficult because we know that the American crop is a short one, viz., about 54,000,000 qrs., of which home wants will claim at least 46,500,000 qrs., thus leaving 7,500,000 qrs. for export, to which may be added about 4,000,000 qrs. from the reserves, making 11,500,000 in all, of which, however, the West Indies, China, Brazils, etc., will require about 2,500,000 qrs., thus leaving 9,000,000 qrs. net for Europe; 11,000,000 qrs. is too much to expect the Argentine Republic, Australasia, India, Persia, Chili, Egypt, Algeria, and Canada to supply, although this will to some extent depend upon the result of the next harvest in which the four first-named countries. The present year's harvest in India, too, has proved to be very short, leaving about 3,000,000 qrs. for export.

All this, I think, indicates that the season of 1890-91 will witness a further reduction in the world's reserves, which, as you will have seen in table 2 have already been very largely reduced during the past season, but which may still be more important than is perhaps thought. I do not presume to forecast from this the course of prices next season; we all know that owing to the rapid means of communication before mentioned, supplies are apt to come forward in "lumps," so to speak, a rise of 5s. per qr. at any given time having a wonderful effect in that direction; but I think I have shown enough to convince you that 1890-91 will not, as a whole, be a year of abundance.

I am afraid I have already trespassed too long on your patience, and bored you with statistics, which, however, are inseparable from such a paper as this. I will now, therefore, briefly summarize what I have endeavoured to set forth.

- 1st. That the great decline in wheat values in the past fifteen years has been due to lessened cost of transportation from the exporting countries, to over-production in the first part of the period in question, and to the very favorable state of the Indian and Russian exchanges.
- 2nd. That population has for some time been steadily gaining on wheat production, and that the theory of over-production no longer holds good.
- 3rd. That America is approaching the time when she must considerably increase her wheat acreage, or fall out of the ranks of wheat exporting countries.
- 4th. That the competition of American flour in England next season must perforce be much less acute than in the past season, because of the deficient crop there.
- 5th. That the material recovery in the Russian and Indian exchanges may be expected to assist in raising the platform of wheat values.
- 6th. That Russia and Roumania have taken the first position in the scale of wheat exporters; which is perhaps matter for a certain amount of congratulation amongst us, since those countries are not in the habit of forming "rings" and syndicates for fictitiously raising prices.

And lastly, that the ensuing season is not going to be one of undue abundance, nor of any serious scarcity, as far as wheat is concerned.

WHAT CONSTITUTES AN INVENTION.

THE following extracts are from the opinions of three of the best American judges, and will probably suffice to define what constitutes a patentable invention, which is interesting to everybody:—

An invention, in the sense of the patent law, means the finding out, the contriving, the creating of something which did not exist and was not known before, and which can be made useful and advantageous in the pursuits of life, or which can add to the enjoyment of mankind. In other words, the thing patented must be new; and it must be useful to an appreciable extent, though the measure of that usefulness is not material. Any degree of utility appreciable by a jury is sufficient, upon the question of utility, to sustain a patent. . . . Invention is the work of the brain, and not of the hand. If the conception is practically complete, the artisan who gives it reflex and embodiment in a machine is no more the inventor than the tools with which he works. Both are instruments in the hands of him who sets them in motion and prescribes the work to be done. Mere

mechanical skill can never rise to the sphere of invention. The latter involves higher thought, and brings into activity a higher faculty. Their domains are distinct. The line which separates them is sometimes difficult to trace; nevertheless, in the eye of the law, it subsists. The mechanic may greatly aid the inventor, but cannot usurp his place. . . . The simplicity of an invention, so far as being an objection to it, may constitute its great excellence and value. Indeed, to produce a great result by very simple means, before unknown or unthought of, is not unfrequently the peculiar characteristic of the very highest class of minds. A subject matter to be patentable must require invention; but it is not necessarily the result of long and painful study, or embodied alone in complex mechanism. A single flash of thought may reveal to the mind of the inventor the new idea, and a frail and simple contrivance may embody it. Some inventions are the result of long and weary years of study and labor, pursued in the face of abortive experiments, baffled attempts, and finally reached after the severest struggles; while others are the fruit of a single happy thought.

A LONG ROPE DRIVE.

WE have received from the Dodge Wood Split Pulley Co., of Toronto, the following description of what is probably the longest piece of rope transmission in Canada:

The drive is in operation at the flour and grist mills of Mr. Thos. Cook, Carrville, York County, Ont. Mr. Cook runs his mill by water power, but of late he has experienced considerable trouble in getting sufficient power in the summer months, owing to low water. He therefore conceived the idea of utilizing his waste water a second time by damming it up at lower end of field, some 1,350 feet from the mill, and putting in an auxiliary water wheel at this point, conveying power from same back to the mill by means of the "Dodge" patent system of rope transmission.

As stated the distance between centres in this case is 1,350 feet, power is 20 h. p. and travel 3,400 feet per minute. The driving pulley, 42" diam. with four grooves, is placed direct on the upright wheel shaft. From this two wraps of rope are carried to drive pulley over twelve pairs of carrier or idler pulleys located at intervals across the field at a distance of about 100 feet from each other. The driven pulley is placed on main shaft at mill (horizontal), and is 55" in diam., with four grooves, and in front of both driving and driven pulleys is placed a winder pulley for the purpose of gaining surface in contact. This explains why the laboring pulleys have four grooves and others only two. There is also the carriage pulley travelling carriages placed at driven end, which keeps the rope at an even tension at all times. Both ropes in this case lead directly onto carriage pulley, thence back around a winder and onto driven pulley, the tightener thereby having direct control over the rope at all times, whether running or standing still, the track or carriage run being sufficiently long to either take up all the slack, or to pay out enough to overcome all contraction which will exist where so long a stretch of rope is exposed to the weather.

The stations for carriers consist of poles similar to the ordinary light telegraph poles, which are firmly set in the ground in pairs, braced at the top, the carriers running on loose spindles between each pair of pulleys being neatly housed over for protection from the elements. The rope at lowest point will permit of a load of hay passing under it, and there is no noticeable sag throughout the line.

The driver runs perfectly noiseless, and is as complete a success as it possibly could be. It has been running steadily for two months, and gives perfect satisfaction. By an ingenious arrangement the water at lower wheel is opened and shut off from the mill by means of a light cable which runs over main driver stations and connects with gear at wheel.

The rope used consists of some 5,000 feet of 3/4" pure manilla, tallow laid firmus manufactured expressly for this purpose, and is kept in perfect condition by the use of a special dressing.

Mr. Cook has many visitors looking at his drive and all admit that "it's a great scheme." We think he deserves considerable praise for his enterprise in undertaking this job, and the drive itself speaks volumes for the proficiency of the Dodge Wood Split Pulley Co. as conveyors of power.

Contraction is the order of the day in milling operations, says the *Modern Miller*. To get things closer together and shorten the process in every possible way is the great object. The up and down, round-about, long distance conveying and elevating of middlings from ground floor to cupola, rolls them of their sharpness, makes dust, and is pretty extensively useless.

*Abstract of paper read by James W. Rank at the Convention of British and Foreign Millers, Edinburgh, July 29th, 30th and 31st, 1890.

CONVENTION OF CANADIAN STATIONARY ENGINEERS.

A CONVENTION of representatives from the different Associations of Stationary Engineers was held in this city on the 23rd August, for the purpose of forming an executive head. The meeting was called to order by President Wickens, of Toronto No. 1, and on motion Bro. Ames, of Brantford No. 4, was appointed Secretary *pro tem*.

Moved by Robt. Mackie, Hamilton, seconded by Wm. Sutton, Toronto, that this convention form an executive head. Carried.

Moved by Mackie, seconded by Sutton, that the present constitution of the C. A. S. E. be adopted for the guidance of the Executive. Carried.

Moved by Mooring, of Brantford, seconded by Dickenson, of Hamilton, that Bro. Wickens, of Toronto, be elected President of the Executive. Carried.

Moved by Bro. Mooring, seconded by Dickenson, that Bro. Mackie, of Hamilton, be elected Vice-President.

Moved by Bro. Ames, seconded by Mackie, that Bro. Mooring, of Brantford, be elected Secretary. Carried.

Moved by Bro. Mackie, seconded by Dickenson, that Bro. Sutton, of Toronto, be elected Treasurer. Carried.

Moved by Dickenson, seconded by Mackie, that Bro. Ames, of Brantford, be elected conductor. Carried.

Moved by Bro. Mackie, seconded by Mooring, that Bros. Ames and Dickenson be a committee to examine the accounts of property and stock turned over to the Executive by Toronto No. 1. Carried.

Moved by Sutton, seconded by Mackie, that the second Tuesday in September be selected for the convention meeting. Carried.

Moved by Mackie, seconded by Dickenson, that the next convention be held in Toronto on the second Tuesday of September, 1890. Carried.

Moved by Sutton, seconded by Mackie, that each Association send one delegate for every 25 members or under the expenses of one delegate to be paid by the Executive; if more than one, the Association to bear the expense of the additional delegates. Carried.

Moved by Mooring, seconded by Mackie, that each Association send in a report of members in good standing up to June 30th, 1890; also one year's per capita tax, as per constitution, for year ending June 30th, 1890. The meeting adjourned.

Mr. Wickens, the newly elected President, goes to New York on Sept. 2nd, to attend the convention of the National Association of Stationary Engineers of the United States.

THE DYNAMO AS A MOTOR.

THE easy convertibility of a generator into an efficient motor was demonstrated lately in a very satisfactory manner at the Manningham Silk Mills of Messrs. Lister & Co., Limited, Bradford. During the recent overhauling of one of the main engines, which worked the machines in the batting, shearing and finishing departments, it was found that repairs had to be made which would take up so much time that unless substituted power could be obtained these important departments would be stopped, and a number of hands would be idle. As no ordinary or ready means were available for this object it was suggested by the electrician to the firm, Mr. Edw. Preese, that the dynamo used for the lighting of this department should be tried as a motor in place of the engine under repair. Permission having been granted for this trial, the electrician, assisted by Messrs. Andrews and Preese, Limited, Borough Mills, Bradford, quickly made the necessary arrangements, and the dynamo was very shortly at work driving the shafting.

In an article which we published on June 20th, describing the installation at the Manningham Mills, it was pointed out that one portion of the mills was lighted by a "Preese" 500 ampere dynamo, driven by an independent Robey engine, whilst the other portion of the mill was lighted by a similar dynamo, driven by a clutch arrangement from the main engine of the mill (which was the one broken down). The two systems of lighting were, as explained, connected together by mains governed at each switchboard, by a double plug switch, with only one pair of plugs, in order to avoid confusion; but under the altered circumstances, it was necessary to connect up the plug switch at each board, consequently a second pair of plugs had to be obtained; the arrangement was then complete, after the ropes from the fly-wheel had been disconnected from the main driving pulley in the shaft. The Robey engine was started, driving the dynamo attached to it and generating a current which was transmitted to the second dynamo by means of the conducting wires and the double connection of the switchboards, the second dynamo then—its

brushes being reversed—became a motor, and being clutched on to the main shafting by means of its own counter-shaft, produced sufficient power to work the various machines required in the department.

The whole arrangement was completed in about an hour after the decision had been arrived at, and the machinery was started without the slightest hitch whatever. The current passing into the motor varied from 250 to 500 amperes, according to the different loads at a potential of 115 volts; it was kept running for about 36 hours without one single stop or the slightest interruption whatever. The remarkable self-regulation and regularity of speed under different loads, was an agreeable surprise to the principals of the firm, who were so well satisfied with the new arrangements that in all probability a further development of electricity as a motor may be decided upon. This is, we believe, one of the few instances where a dynamo has been utilized to take the place of the steam motor which usually drove it, and thus enable the operations of the factory to be carried on with but the slight delay due to the necessary alterations in connection. The whole operation reflects credit on those engaged, and demonstrates the extraordinary value of the dynamo-electric machine. — *London Electrical Review*.

TRANSMISSION OF POWER BY ELECTRICITY.

A SATISFACTORY example of the transmission of water-power by electricity has lately been started near Grenoble. The water is dammed, with an effective head of 230 ft., and is conducted by a sheet steel pipe to the turbine. The generating dynamo is coupled directly to the horizontal shaft of the turbine, and is connected to the two cables of an aerial line, through which the power is transmitted to the motor at Montier, a distance of a little more than three miles. The general conditions of working the plant are, according to *Le Genie Civil*, as follows:—

Generator	300 h.p., 240 revs. per min.
Motor	200 " 300 " "
Pressure	2,850 volts.
Current	70 amperes.
Resistance of line	5,474 ohms.
" dynamo fields	0.950 "
" " armatures	0.984 "
" motor fields	0.731 "
" " armatures	0.690 "
" total of circuit	6.829 "
Electrical efficiency	83 per cent.
Mechanical	65 "

Since this plant was started in the November of 1889, it has not ceased to work day and night, and although the care of the machines presents no difficulty, no increase whatever of the staff has been required. Four men are employed, two at the generator and two at the motor, each being in attendance for twelve hours. A telephone line is run on the same poles as the working line. Shortly after it was started a frost set in, entirely stopping the traffic, and since that time until March 15th the communication by the roads was cut off. The line was struck several times by lightning, but both generator and motor were fully protected. The power is used for driving a paper mill, and the economy is found to be very marked as compared with the cost of fuel.

SOME EXPERIENCES WITH ZINC.

ZINC is often used in boilers and hot-water tanks to prevent the corrosive action of the water on the metal of which the tank or boiler is composed. The action appears to be an electrical one, the iron being one pole of the battery, and the zinc being the other. Under the action of the current of electricity so produced, the water in the tank is slowly decomposed into its elements, oxygen and hydrogen. The hydrogen is deposited on the iron shell, where it remains. It will not unite with iron to form a new compound, but if any iron-rust (known to the chemists as *oxide of iron*) is present, it will remove the oxygen from this and deposit the metallic iron on the plates. The oxygen of the water that is decomposed, instead of going to the iron, goes to the zinc, and forms oxide of zinc, and in the course of time the zinc will be found to be almost entirely converted into oxide, only a small fraction of the original metal being left.

On account of the action we have outlined above, it is generally believed, says the *Locomotive*, that zinc is always a good thing to prevent corrosion, and that it cannot be harmful to the boiler or tank under any circumstances. Some of our experiences go to disprove this belief, and we have met with numerous cases in which zinc has not only been of no use, but has even been harmful. In one peculiarly marked case a one-hundred horse-power horizontal tubular boiler had been troubled with a deposit of scale consisting chiefly of

organic matter and lime, and zinc was recommended as a preventative, some few weeks previous to our annual internal inspection. When the inspection was made, large amounts of detached scale from the shell and tubes were found in the bottom of the boiler, and the iron surfaces from which they had been detached showed markedly the action of the zinc, the crystals of which, deposited upon the iron, gave it the appearance of frosted silver work. On the rear portions of the tubes, the scale being much heavier and more obstinate to remove, partially remained; but it was easily loosened and detached, and when it was removed the same frosted appearance of the iron was observed. The beneficial action of the zinc was so obvious that its continued use was advised, with frequent opening of the boiler and cleaning out of detached scale until all the old scale should be removed and the boiler become clean. Eight or ten months later the water supply was changed, it being now obtained from another stream supposed to be free from lime, and to contain only organic matter. This change of feed water was unknown to the inspector, who two or three months after its introduction opened the boiler for inspection, and was greatly surprised at its condition. The tubes and shell were coated with an obstinate adhesive scale, clinging tenaciously to the iron, and composed of zinc oxide and the organic matter or sediment of the water used. The deposit had become so heavy in places as to cause overheating and bulging of the plates over the fire. It was with difficulty that these patches were separated and removed by the use of long chisels made specially for the purpose. This action of zinc when the water supply is changed has been noted by us in many cases, but in no other case that we have yet met with has the contrast between its beneficial action at first and its injurious action afterwards, in the same boiler, been so marked.

Another very interesting instance of the peculiar action of zinc under certain conditions came to our notice not long ago. This time the trouble was with a tank used for heating water, and containing coils of brass pipe through which exhaust steam was passed. The shell of the tank corroded rapidly, and one day a large crack opened in one of the plates, and the hot water (which was under a pressure of 75 pounds) was discharged into the room. An entirely new 5-16 inch shell, 42 inches in diameter, and 8 feet high was then constructed, and when it was placed in position, a thirty-pound pig of zinc was hung between the tubes to prevent the continuance of the corrosion. The zinc certainly did prevent the species of the corrosion that had given so much trouble before, but it gave rise to a very peculiar alteration of the iron of which the new shell was made. After the lapse of two years, the handhole plates were renewed, and it was found that although the old ones had preserved their form, they were softened on their inner surfaces so that a penknife point could be easily thrust into them about 3-16 of an inch. The metal on these surfaces was black and lusterless, and had every appearance of being graphite or black lead. So soft was it that the strengthening ribs on one of the plates was entirely cut away by an ordinary pocket-knife. The interior surface of the tank presented the same appearance, but as the tank showed no signs of distress, it was continued in use, and for six years it has proved serviceable and satisfactory, no leaks or other symptoms of weakness having been observed. The old handhole plates were kept for subsequent examination, but in a short time they hardened up so that a cold-chisel would make scarcely any impression on them. The zinc pig that had been used was removed, and its character was found to be entirely changed. It had preserved its former shape and general outward appearance, but its fracture was no longer bright and metallic, resembling wood from which all the sap had been expelled. By carefully melting it in a clean black lead crucible, it was found that only fifteen per cent. of it remained in the metallic state. The remaining eighty-five per cent. was probably zinc oxide, though no analysis was made.

It appears from these experiences and from others of like nature that the action of zinc is not always as simple as it would appear to be at first thought. In fact, zinc is one of the numerous things that don't always work as we should naturally expect them to do; and in making use of it, the boiler should be frequently opened and the action carefully watched, so that if any undesirable effects show themselves they may be checked in time to prevent serious trouble.

An alloy that expands on cooling, and is suitable for repairing cracks in cast iron, is made with nine parts of lead, two of antimony and one of bismuth.

Messrs. Palmer, Crossman & Laws have established a new foundry and machine shop at Amberst, N. S., where they will manufacture rotary sawmills, shingle, lath and clapboard machines, etc.

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The St. Benface, Man., woolen factory will put in an electric plant.

The trolley wires are being placed in position for the new electric railway at St. John, N. B.

A company is applying for a charter to build and operate an electric street railway between Galt and Preston.

There are about 25,000 telephones in use in Canada, of which number 20,000 belong to the Bell Telephone Co.

The plant which is to be used in lighting the town of Ingersoll is on the ground, and will be placed in position at once.

A charter is being applied for by a company which proposes to supply the town of Lethbridge, in the Northwest, with electric light.

The Company which is about to erect a large corset factory at West Toronto Junction intend putting in an electric lighting plant.

The Brandon Electric Light Company's new building, for which plans have been prepared, will be 42x100 feet in size, constructed of solid brick.

The Brantford Electric Light Company have instructed the Thomson-Houston Company to fit up for them an incandescent lighting plant.

Supplementary letters patent have been issued to the Chaudiere Electric Light and Power Company, of Ottawa, increasing the capital stock to \$500,000.

The Halifax street railway has passed into the possession of the Nova Scotia Power Co. It is intended by the present owners to operate the road by electricity next spring.

The Westinghouse interests in the United States have recently been amalgamated under the name of the Westinghouse Electric & Manufacturing Company, with a capital of \$10,000,000.

The sparrows at St. Catharines are said to breakfast every morning off the hundreds of insects which during the night are attracted by the electric light and meet their death within the globes.

The Improvement Association of the town of Annapolis, N. S., has prepared a prospectus and is asking the citizens to subscribe for stock in a new company which proposes to light the streets by electricity.

Application will be made at the next session of the Legislature of the Province of Quebec, to change the par value of the shares of the Royal Electric Company from ten dollars to one hundred dollars each.

The Ottawa Electric Light Co. have recently been engaged in opening the flume by which the water power is conveyed to the

dynamo house, so that extra light may be furnished to the city streets and stores.

The Widdifield Electric Brake Company of Toronto, limited, capital stock \$300,000, are applying for incorporation. Applicants: A. T. Button, W. P. Widdifield, Uxbridge; S. S. Fuller, Stratford; James Lockhart, S. F. McKinnon, Hugh Blain, T. R. Fuller, Toronto.

Witnesses are being examined by a commission at Ottawa in connection with the celebrated suit of the Edison Electric Light Co., and the United States Electric Light Co., with the view of determining whether the expiration for any cause whatever of a foreign patent obtained after the granting of the Canadian patent, has the effect also of terminating the Canadian patent.

The customs authorities at Winnipeg have seized for undervaluation an electric light plant imported from the United States by the Northwest Thomson-Houston Co. of Portage la Prairie. A representative of the company has made affidavit that it was through an error that the plant was shipped in on the invoice that accompanied it. The matter has been referred to the Customs Department at Ottawa for a decision.

Six years ago, says Mr. Frank Sprague, there were scarcely a hundred electric motors in the United States for any purpose; today there are not less than 15,000 motors in use, applied to not less than 200 different industries, and an industrial revolution is taking place equalling, if not surpassing, in importance that attending the introduction of the steam-engine, and marvellous in the rapidity of its growth.

The New Brunswick Electric Light Company is applying for a charter to handle electricity and electrical appliances in St. John and adjoining districts. Besides the Messrs. Calkin, the applicants are: Silas McDiarmid, Charles H. Dearborn, R. Keltie Jones, W. Watson Allen, George W. Jones, F. Sterling Sharpe, Herbert C. Tilley, Joseph F. Merritt, Daniel E. Berryman, Alfred A. Stockton, of St. John, and Wm. J. Morrison, of New York.

The "Portage Electric Co." has been organized at Portage la Prairie, Man., with a capital of \$200,000. A station will be erected and a plant consisting of a 650 light Thomson-Houston dynamo, run by a 65 horse-power high speed engine. The system is alternating. The dynamo used will be of the Thomson-Houston manufacture, and will supply a maximum current of 2,000 volts. The work, it is estimated, will be finished and the Portage lighted by electricity within two months.

Notice is given in a recent number of the Montreal Gazette that The Central Electric Light Company, Limited, will apply for a charter of incorporation. The object in seeking incorporation is to enable the company to establish in the town of Portage la Prairie and vicinity, a system of electric lighting. The capital stock is to be \$25,000, with shares at \$50. The applicants are: Robert Watson, Member of Parliament; John Watson, machinist; Alexander McLean, sheriff; David Blythe Hanna, accountant; Hon. Joseph Martin, barrister-at-law; and Smith Curtis, barrister-at-law, all of the town of Portage la Prairie.

The Vancouver, B. C., News-Advertiser says: The Street Railroad and Electric Light Company have now got the new Westinghouse incandescent lighting plant in working order, and last night was the last time that the old Thomson-Houston plant at the corner of Abbott and Hastings streets will be used. The boiler and engine room will be moved down to the new power-house, the engine being used to run a second Westinghouse dynamo. At present there is one dynamo of 750 candle power, which is run by an 100 horse-power Westinghouse engine, with a 77-inch fly wheel running at the rate of 300 revolutions a minute.

A telephone war is in progress at Peterboro', as a consequence of the organization of a new company, the provisional board of directors of which consists of Messrs. James Keudry, A. Stevenson, C. H. Clementy, F. E. Bell, George Edmiston, William Wright, manager Federal Telephone Company, Montreal, and R. B. Rogers. The new company will supply telephone service at \$15 per instrument per year; two instruments, \$25. The Bell Telephone Company say they will fight the new company, if necessary putting in instruments for nothing.

Mr. Eugene F. Phillips, President of the American Electrical Works, Boston and Montreal, has for a number of years substituted the members of the National Electric Light Association at a clam bake on the occasion of their annual convention. So enjoyable has this annual affair proved to be, that it is looked forward to with pleasant anticipation and very largely attended. We find in the Providence, R. I., Telegraph, a lengthy account of the festivities this year, from which there can be drawn no other conclusion than that a thoroughly good time was spent. We observe that Mr. John Carroll, L. B. McFarlane and A. J. Corrinet, of Montreal, were among the participants.

The Thomson International Electric Welding Company have made arrangements with Messrs. Holden & Co., Montreal, for the manufacture of their apparatus in Canada. This process has had a remarkable growth during the two years in which it has been operated in a great variety of industries. The rapidity of the work and small amount of labor required insure great economy. The pieces to be welded are never hidden from the operator; the heat is always uniform, and beginning at the centre will weld the interior of the pieces as thoroughly as any other part. No detrimental substance can be introduced to the weld, and any foreign matter which may be in the metal will ordinarily be expelled by the heat caused by the electric current. Beside iron and steel many metals, as copper, brass, zinc, platinum, etc., not welded by other methods, are done by the electric process. The greater part of the large wire works in the United States have adopted the machine and find it an invaluable aid to their work. In waggon and carriage work it can be used in welding tires, axles, fifth wheels, etc. The welding of pipe can also be done, such as welding of safe ends to boiler flues, making long coils for ice machines, and scrap into continuous lengths. The welding of chain, from the smallest jeweller's chain to the largest massive cable, brazing, welding wire cable, rings and hoops is also practicable.

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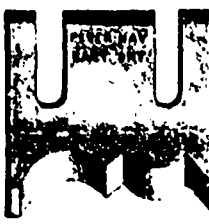
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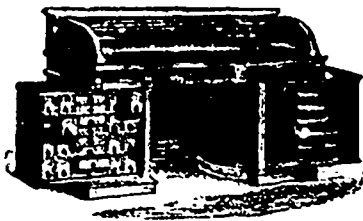


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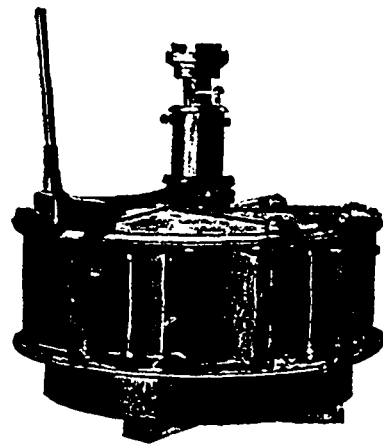
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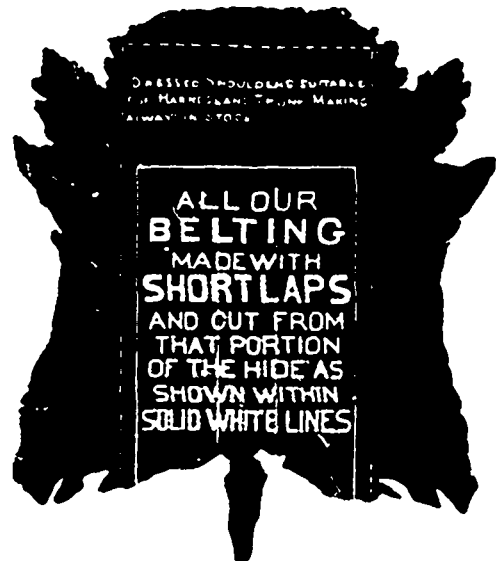
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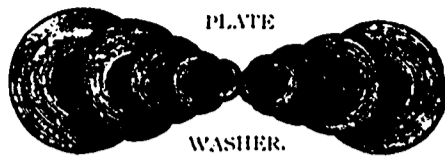
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