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ELECTRICAL,
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CHAS. H. MORTIMER,
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ADVERTISEMENTS.

Advertising rates sent promptly upon application. Orders for advertising should reach this office not later than the 25th day of the month immediately preceding our date of issue.

Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach this office as early as the 22nd day of the month.

SUBSCRIPTIONS.

The ELECTRICAL, MECHANICAL AND MILLING NEWS will be mailed to subscribers in the Dominion, or the United States, post free, for $1.00 per annum, 50 cents for six months. The price of subscription may be remitted by currency, in registered letter, or by postal order payable to C. H. Mortimer. Please do not send cheques on local banks unless 25 cents is added for cost of discount. Money sent in unregistered letters must be at senders' risk. The sending of the paper may be considered as evidence that we received the money.

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The Publisher should be notified of the failure of subscribers to receive their papers promptly and regularly.

EDITOR'S ANNOUNCEMENTS.

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

WE learn from the *Mail* that some of the Farmers' Institutes are expressing doubt as to the fairness of the wheat testers prescribed by the Millers' Associations to be used in determining the value of wheat. Such doubts are needless. A guarantee of the reliability of these machines is the fact that they must be inspected and approved by Government authority.

THE Dominion Trades and Labor Congress will ask Government to declare that eight hours shall constitute a day's work. One prominent delegate to the recent convention expressed the hope that they would ultimately get the public educated up to the point of recognizing six hours as a fair day's work. If our observation is not astray, there are not a few "labor representatives" who secretly cherish the hope that eventually they will get paid for doing nothing.

THE local paper of a town in Western Ontario says "the combination of millers is likely to seriously affect our grain market. They have, in our opinion, shot too high, and will have to regulate their sight a little lower." If the meaning of the above is that the millers are aiming to pay too high prices for their wheat, we think the advice to "regulate their sight a little lower," is well-timed. Shooting too high was a too common practice last year, which we hope will not be repeated.

IN Boston and other American cities electric street railways are in operation, and are giving the best of satisfaction. They can be operated at a much higher rate of speed than horse cars, and at considerably less expense. We hope to see electricity substituted for horses in our largest Canadian cities at an early date. The charter of the Toronto Street Railway Co. will shortly expire. The new agreement between the company and the city should provide for the use of the improved motive power.

SOME of our American contemporaries are publishing the statements of Prof. Green, of the Minnesota Experimental Farm, regarding the wonderful germinating power of frosted wheat as demonstrated by experiments recently made. Without trying to discredit in any way the results which are said to have been obtained from frosted seed, we desire to express the hope that the publication of them will not induce farmers to try the experiment. We have little fear that such will be the effect among the farmers of our Canadian Northwest, as no doubt a sufficient number of them have already demonstrated to their own satisfaction, and at the expense of their pockets, that it does not pay to sow frosted wheat.

ACCORDING to the *Lumber World*, "Canada wishes, wants, needs, pines for reciprocity with the United States." If our contemporary means "unrestricted reciprocity," we are at liberty to say that Canada wants none of it. The majority of Canadians, we believe, are agreed that reciprocal trade in certain classes of productions would be advantageous for both countries. The evidence given by business men before the Congressional Committee on Trade Relations with Canada, is a strong proof that the desire for some kind of reciprocal trade arrangement is by no means confined to Canada. Michigan saw mill owners, for instance, are "pining" for Canadian pine.

THE people of the United States have decided upon holding a World's Exposition in 1892. Where shall it be held? is the question now to be decided. Chicago and New York both want it, and public opinion seems agreed that the choice lies between these cities. Chicago, with western enterprise, has already raised a guarantee fund of large proportions and is pushing its claims in a way to command admiration. There is force in the argument advanced in a circular received from leading Chicago journalists that the Exposition if held in the heart of the country would be easier of access from every part, and would enable foreigners to see more of the country and form a correct estimate of its development.

WE wonder how many members of the Central Millers' Association, or of the Local Associations, have taken the trouble to talk to the farmers doing business at their mills on the subject of the injustice imposed by the tariff on the farmers as well as the millers? "I haven't any time to waste," said a miller who called on us the other day, "but I never lose an opportunity of getting two or three farmers around me in the mill and of making clear to them the identity of the farmer's interest with that of the miller in respect to the operation of the duties on flour and grain. If the facts are properly presented to them, they see it at once, and are then prepared to work with us for the removal of our mutual disabilities." It is of the utmost importance that the farmers should be enlightened on this subject, in order that through lack of knowledge they may not cast their influence against the millers, and by so doing also stand in the way of their own interests. It is as clear as anything can be, that the importation into Canada of 265,000 barrels of American flour every year destroys the Canadian farmer's market for upwards of a million and a quarter bushels of wheat. The millers are perfectly content that the farmers should continue to enjoy the protection of 15 cents per bushel on their wheat. What they ask is that American flour shall not be allowed to come in to displace the product of the Canadian farm and the Canadian mill. Upon this common ground Canadian farmers and millers should stand, and unite their efforts for a readjustment of the tariff. The millers should see to it that the farmers obtain a correct understanding of the situation.

THE opening day of the Toronto Industrial Exhibition of 1889 was fixed nearly a week later than in previous years. The change proved not to be a profitable one. Bad weather was encountered this year, whereas formerly "Old Probs" almost invariably smiled on the big show After the second week in September the weather is usually uncertain, and the management of the Industrial would do well in future to open the Fair a week earlier. Under the present system exhibitors are given nearly the whole of the first week to get their exhibits in position. The public have found this out, and accordingly stay away until the close of the first week or until the second week, when they can see everything that is to be seen. Thus the attendance, instead of being distributed over two weeks, is crowded into one. Should a couple of days of that one week be rainy, as happened this year, there is a shortage in the receipts. If every exhibitor was compelled to have his goods in position on the day fixed for the formal opening, a fair proportion of the visitors would attend during the first week, and thus the receipts would not be likely to suffer should a day or two of wet weather be encountered the second week. Wednesday of the second week of the fair this year was marked by the largest attendance which has ever been witnessed on the grounds, and it is fair to assume that if the weather throughout had proved propitious, the total receipts would have been considerably in excess of any former year. Taken as a whole, we believe the exhibition was about on a par with that of 1888. In some departments, such as that of carriages, for instance, the display was better than ever before. In other departments, among which may be included Machinery Hall, the exhibits fell short in number, if not in quality, of those of former years. Dissatisfaction was expressed by manufacturers at the "fakes" introduced into the horse ring, in the shape of ballet dancers, female gymnasists, etc., which occupied the attention of thousands of people who would otherwise have inspected the exhibits. Indeed this feeling of dissatisfaction was so intense that a number of manufacturers talked of signing a paper pledging themselves not to exhibit again until something should be done to remedy the grievance. There is this much to be said on behalf of the manufacturers, that they exhibit at the cost of a very large outlay of time and money, and they have a right to expect that their interests shall receive proper consideration. The argument is heard that the "fakes" referred to are a necessary feature in order to draw the crowd. This may or may not be the case. One thing however is certain, which is, that if the "fake" business be carried much farther, the name "Industrial Exhibition," will justly be regarded as a misnomer, and those who must be depended upon to contribute to the interest of the "industrial" departments, will be likely to be conspicuous by their absence. In the long run these "fakes" must fail to supply the place of more legitimate exhibits, and the management therefore should be careful in future not to give them a prominence which they do not deserve.

THE Dominion Trades and Labor Congress at its recent meeting in Montreal, discussed the subject of technical education. Its views thereon are embodied in the following resolution: "That this congress, while favoring a judicious system of technical education, considers that the system of manual training in our schools, such as proposed by the Minister of Education in Ontario, is perjudicial to the interest and welfare of mechanics and wage earners generally." The discussion which took place on the above resolution shows that the

proposal to introduce a system of manual training in the public schools is opposed by the representatives of the unions through fear that it may add to the competition in the labor market, and that some of the "botches" which it is claimed such a system would produce might supplant some of the skilled union laborers. One delegate is reported to have said that 'The element he most feared was the theoretical mechanic, who, having friends and influence, crowded practical mechanics out in the cold." Could anything be more absurd than such a method of reasoning? It is a well known fact that a botch cannot do the work of a skillful mechanic, and that a theorist cannot fill the place of a mechanic trained in the school of practical experience. Yet here we have the spectacle of men calling themselves practical skilled mechanics, acknowledging themselves afraid of the competition of a lot of botches and theorists. Surely such men show but little confidence in their own mechanical ability, and will have no cause to complain if employers of skilled labor take them at their own estimate.

The tenor of the discussion throughout clearly showed that the delegates to the Congress misunderstood the objects of the system of training which the Minister of Education proposes to introduce. It is not the intention, we believe, to attempt to teach trades in the pulbic schools. Such a proposal would be impracticable in the short period which a boy usually devotes to acquiring an elementary education in the public school. The purpose of the Minister of Education, as we understand it, is simply to make the pupil familiar with the underlying principles of mechanical laws, provide means by which he may become acquainted with the purpose for which different tools are used, and perhaps acquire a certain amount of adaptability in their use. This we believe to be the very outside limit to which such a system of instruction could be carried in the public schools, and the effect of it would be to give the boy who intends to learn a trade a start under more advantageous circumstances than at present. It can readily be seen that a boy who enters the work-shop possessed of such a preparatory training, will make more rapid progress and ultimately develop into a more intelligent and competent workman, than the lad who commences to learn a trade without any knowledge whatever of mechanical theory, and is compelled to grope for years in the dark before finding out the why and wherefore of things. The youth who would be most benefitted by such a course of instruction would be the sons of mechanics, who are in many instances without the means to pursue a University course and enter the ranks of the over-crowded professions. In view of this, the opposition of those professing to speak on behalf of skilled labor, seems singularly ill-advised and ungrateful. It would be interesting to have a definition of the "judicious system of technical education" favored by the Trades and Labor Congress.

WE have received, too late for insertion in this number, copy for a change of advertisement from the Hercules Mfg. Co., of Petrolea, Ont., in which they inform Canadian millers that they have made arrangements to manufacture the Cochrane roller mill, and are in a position to fill all orders promptly and satisfactorily. Millers will consult their own interest by addressing the company for full particulars, and noting their future announcements in this journal.

WE wish to express our regret that an error should have appeared in the advertisement of the Ball Electric Light Co. in our last issue. One of the cuts designed to illustrate a cut-out for street lamp was described as a "street lamp." The error, which was overlooked in the hurry consequent upon going to press, was fortunately one which any person familiar with electrical appliances would readily perceive at first sight.

WHEN the idea was first put forward that it was possible to operate high candle power incandescent lamps, in series with arc lamps, it was looked upon with suspicion by the electrical fraternity, but within the last year there has been quite a change of opinion as it has been clearly demonstrated that by using a properly constructed cut-out, the incandescent lamps can not only be successfully but economically operated on the arc circuits. Of course this system can never be as satisfactory as either the direct or alternating systems, but for small towns, where the number of incandescent lamps is not sufficient to warrant the purchase of a separate plant, it fills the bill to a nicety.

IT is time that the Bell Telephone Co. of Canada began to recognize the fact that the only way to make their monopoly popular, is to render good and efficient service. There are some of the largest cities in Canada where it is next to impossible to hold a conversation over the majority of the lines with anything like satisfaction. We would not refer to the subject so openly were it not for the fact that we know that the Canadian Co. put out if anything better instruments than the American Co., and we also know of several Canadian towns where the service rendered is excellent in every respect, so that we are forced to conclude that the trouble is not the fault of the equipment, but that it is due entirely to unqualified local management in the towns and cities where the bad service exists.

Our Western Letter.

IN my last letter I made estimates of the probable wheat crop of Manitoba for 1889, based on the official crop report of the Manitoba Government. The Government report placed the average percentage for the Province at 14.8 bushels per acre, on an area of 623,245 acres. This would give about 9,000,000 bushels of wheat, to which could be added about 1,000,000 bushels from the territory west of the Manitoba boundary, and not included in the official report of the Manitoba Government. Since giving these figures, based on the Government report, I have had a run through some of the principal wheat districts of the Province, and from personal observation I have come to the conclusion that former estimates are too high. I do not now look for a total crop reaching the amount indicated by the Government figures, by probably 2,000,000 bushels, perhaps more. This year's crop, however, is a very difficult one to estimate even approximately, as within a limited area, the greatest diversity in the condition of crops existed. There are streaks of good crops and streaks of very poor crops all over the country, and this uneven condition renders an aggregate crop estimate the merest guess. In a few districts the crops are really fine, and individual yields of 40 bushels per acre and more are occasionally found. But large districts on the other hand have decidedly poor crops, and the average for the Province must be light.

In one particular the crop of 1889 is entirely satisfactory to everybody, and that is in point of quality. A better crop as to quality has never been harvested. The harvest has been concluded under very favorable conditions, and a large amount of threshing has been done, showing the grain everywhere to be of fine quality. The grain is very hard this year, and is fit for grinding right from the thresher. The millers will therefore be able to turn out a fine quality of flour this season. A little smut in some samples of wheat is the only drawback to the quality of the grain heard of.

Gophers and drought, it is well known, are accountable for the light crop this year. These two agents always come together. In a wet year the gophers do not attack the grain to any extent, but in a dry year, as soon as the grass becomes dry, they leave the prairie and attack the grain crops, which are more moist and green than the prairie grass. This year, fields of grain which were eaten down by the gophers, took a second growth after the rains in July, and some fields so far matured as to be cut. The most of the fields, however, were very late, and were caught by frost about the second week in September, so that they were not much good. At the time the crop was eaten down, farmers did not expect that the grain would grow again, and this second growth was quite a surprise. A good many fields which were badly damaged by gophers in the early summer, were plowed up at once, and consequently were not given an opportunity to recover.

Farmers feel very much disappointed at the low prices being offered for wheat here this season. Up to the time of writing, prices to farmers at country points here have ranged between 60 and 65 cents per bushel. After the high prices paid here last year, ranging as high as $1.15 per bushel, the prices offered this year seem very low to the producers. The result is, that though a good deal of wheat has been delivered by farmers, at some country points, very little has yet changed hands. The farmers are hauling in the wheat and storing it in the elevators, where they intend holding it for a rise in prices. They are encouraged to this policy by some of the country newspapers, whose editors really know nothing about the wheat situation, but who predict higher prices, probably from the reason that "the wish is father to the thought." On the other hand, the grain men, most of whom were bitten badly by the foolish "bull" boom of last fall and winter, are inclined to be very cautious, and they are not likely to pay higher prices this year than the current prices in outside markets will admit of being paid here. Last year it is well known that wheat prices throughout the spring wheat region north and west of Chicago averaged very considerably higher than export values during the greater portion of the season, and higher proportionately than ruling prices in eastern and southern fall wheat markets. As a result of this peculiar course of prices, the past season has been an unprofitable one to millers throughout the western spring wheat region both in Canada and the United States. Manitoba grain dealers have also lost heavily by their operation in last year's wheat crop. Manitoba wheat is now held at Port Arthur and Montreal, which cost from $1.20 to $1.30 per bushel delivered at the latter place, and which is not now worth over 90 to 95 cents at Montreal. This shows the loss Manitoba grain men have sustained in their operations for the past year. It was very lucky for them that our wheat crop of last year turned out much smaller than had been expected. If the crop had been a large one, western grain men would have been ruined, for the more wheat they had, the worse they were off.

One result of the fancy prices paid for wheat in Manitoba last year is the loss of the British Columbia markets to our millers. Manitoba millers had about succeeded in driving out Oregon millers from British Columbia, but prices for wheat have ruled so much higher in Manitoba during the past year, than relative values in the Pacific Coast States, that the Oregon millers were enabled to once more gain control of British Columbia markets. Now that prices have returned to a reasonable basis here, in comparison with export values, our millers hope to soon again resume shipments on a considerable scale to British Columbia.

MANUAL TRAINING.

THE subject of industrial education has been brought prominently before the public by the opening recently of a Manual Training School in connection with Woodstock College, at Woodstock, Ont. During the past six years many such schools have been established in various parts of the States, notably in New York City, Philadelphia, Cincinatti, Cleveland, Toledo, Chicago, St. Louis and New Orleans. These schools are all more or less intimately connected with high schools or colleges in which the student receives training during part of the day in the ordinary branches of a liberal education.

A brief description of the Woodstock School, the first to be established in Canada, will undoubtedly be of interest to our readers. A brick building, two and a half stories high, 32 by 80 feet, thoroughly lighted, has been erected. On the first floor is a ten horse power gas engine, connected with suitable line shafting to drive a combination planer, moulder and matcher, a combination rip and cross-cut circular saw, a large 20 inch wood lathe and a scroll saw, in the wood turning department; a scroll lathe, a planer, an emery wheel and a milling machine, with gear cutting attachments, in the iron working department; a forge and anvil in the blacksmith department, to which many more will be added as soon as the first class reach that stage in their course. On the second floor are benches and very complete kits of carpenters' tools, for a class of twenty. During the winter a dozen wood lathes will be fitted up. A roomy attic is used for storage.

Regularly the class will spend the day until three p. m. in the College class rooms, and from three to five in the Manual Training School. They begin with carpentry, proceed to wood turning, wood carving, forgeing and machine work, through a four years' course. From the beginning, drawing will form an important feature of the course. Every piece of work attempted, be it small or large, must be fully and accurately drawn to scale. No expectation of deriving any revenue from the sale of manufactured articles is entertained. The object is to utilize tools, machinery and material in the education of the practical side of the boy. In the morning the pupil is discussing the theoretical side, in the afternoon the practical; in the morning he investigates principles in the abstract, in the afternoon he applies those principles to the concrete, the wood stone or metal.

The object is not to teach a *trade*, but to give an all round and practical education. At the same time the pupil will gain some degree of dexterity in the use of both wood-working and iron-working tools, some considerable ability to express any thought by means of the draughtsman's pencil, and to interpret drawings, a fair knowledge of woods and metals, which will be of the greatest value to him in after life. Should he afterwards enter a factory, his intelligence and knowledge of principles would soon advance him from the bench to the position of foreman, and from the position of foreman to that of master. Brains are in demand in our shops.

Persons wishing further information about the manual training department of Woodstock College will obtain it by addressing the Principal, W. H. Huston, M. A., or F. Wolverton, B. A., the Superintendent of the Manual Training Course.

ORGANIZATION OF ANOTHER MILLERS' ASSOCIATION.

A MEETING was held in the Toronto Board of Trade rooms, on Sept. 11th, for the purpose of organizing a local millers association representative of the Counties of Halton, Peel, York, Simcoe, Wellington, Ontario and Dufferin. The following millers were present: Messrs. Bracken, of Boston Mills; Williams, of Glen Williams; W. Parish, of Rockwood; James Hannant, of Malton; J. Spink of Pickering; Green, of Greenwood; W. Galbraith, of Toronto; Wareup, of Oakville; Denne, of Newmarket; Bruce, of Streetsville; Wheelihan, of Milton; Plewes, of Salmonville; J. Hamilton, of Toronto; Wright, of Owen Sound; J. Brown, of Toronto, and Haynes, of Cheltenham.

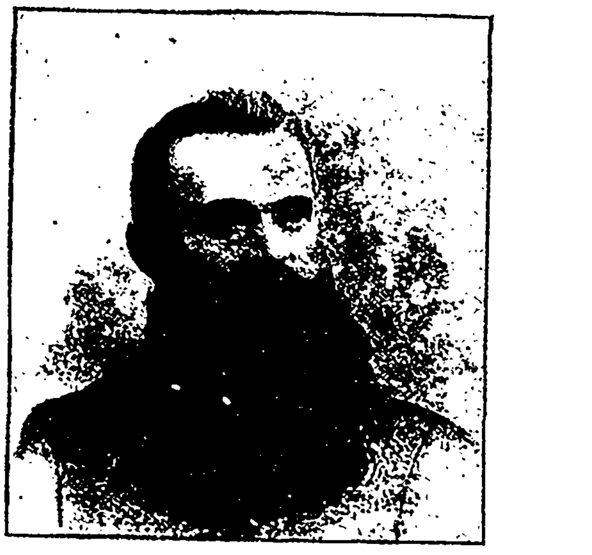
The meeting was presided over by Mr. J. F. McLaughlin. The following officers were elected: J. E. Edmonson, Oshawa, president; Joseph Williams, Glen Williams, vice president, and William Galbraith, secretary and treasurer. It was decided to adopt the exchange tables of London district and to buy wheat by tester, 60 pounds being the standard.

A discussion took place on the subject of export prices. The next meeting will be held at Brampton on the call of the secretary.

A WORD TO MILLERS.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

SIR: The condition of the milling industry is about the same as it was a month ago. Notwithstanding the fact that it is now known to a certainty that Canada will have this year several millions bushels of wheat for export, the millers are still paying from 4 to 13 cents per bushel above export prices. Of course the



JOHN HULL, PRESIDENT.

W. H. MELDRUM, SECRETARY.

OFFICERS OF THE MIDLAND COUNTIES' LOCAL MILLER'S ASSOCIATION

... wheat has not yet begun to move, and the scarcity for ... use no doubt contributes largely towards this result, but it is equally certain that during the next month deliveries will be very large, and if the present prices should rise, some one is going to be badly left. The great authorities may and do differ in many points as to the correct estimate of the world's crop, but they are agreed upon one point, that is, that the exporting countries ... more wheat to export than those who import require. In other words the importing countries will just about make the price what they like. With these facts staring him in the face, I cannot readily understand how any miller can be insane enough to buy and store any considerable quantity of wheat at present prices. However, so long as such men do not hurt any one but themselves by their insanity, I am quite sure no one would grumble, but when they proceed to make others suffer thereby, they become a menace to the whole trade. During the past fortnight reports have been coming in to the central office of the Dominion Millers' Association concerning a large firm buying at Norwich, Milton, Cheltenham, Alliston and Guelph. They are reported as paying from 3 to 4 cents more at outside markets than they are at home. Now I fail to see how they are going to gain anything by this course, since, should they succeed in crushing out of existence a miller or two, the mills will be there still, and some one is going to run them. Then they have not got a monopoly of the New Brunswick or Nova Scotia market, and the mills over the country where reasonable prices rule will be able to undersell them every time. Now to those millers who have had their market spoiled in this way let me say, the pinch is now over, and unless these buyers are absolute lunatics, the rush of grain to the markets will soon cure their folly. In the meantime, the best plan to pursue is to buy just as little as is absolutely necessary to fill orders or keep running, and let the others have all the surplus of dear wheat. Throughout the entire Province of Ontario the millers and many of the dealers have adopted the system of buying by tester, and reports from all quarters go to show the unqualified success of this change, and the only regrets we hear are that the system was not adopted years ago. It is a matter of regret that the executive of the D. M. A. have had to reduce the *Bulletin* to a weekly publication, owing to the refusal of the Government to allow it the same privileges of free postage granted to other newspapers and magazines. However, the Association have not yet ceased to move in the matter, and the decision of the postal authorities may yet be reversed, so I will make no further comments about it in my present letter. Before closing, allow me to thank you on behalf of the millers, for your able and accurate estimates of this year's crop, and your very timely comments thereon in your last issue.

Yours truly,

JOHN BROWN.

Toronto, Sept. 25th, 1889.

THE HEISLER ELECTRIC LIGHT SYSTEM.

PROMINENT amongst the exhibits of electrical appliances at the recent Toronto Industrial Exhibition was that of the Heisler Electric Light Co., which has recently entered the Canadian field. The headquarters of the Heisler incandescent system are in St. Louis, where upwards of 3,000 of its lights are in use. The Canadian business is under the management of Col. R. B. Hamilton, a well-known citizen of Toronto. The company had on exhibition in Machinery Hall, at the Toronto Exhibition, a dynamo of a capacity of 160 30 candle power lights. This machine generated the electricity to supply 145 lamps of 30 candle power each, lighting Floral Hall, Fleishmann Yeast Co.'s display, Pure Gold Co.'s display, Dunbar & McMaster's thread display, the Dominion Organ Co.'s display, as well as a number of booths. The faithfulness with which the almost infinite variety of shades of color in Floral Hall and Dunbar & McMaster's exhibit were brought out, served to show the adaptability of this system for stores, etc., where it is desirable that the shades of color in goods should be as distinguishable at night as by daylight. The Heisler Company claim many advantages for their system, among which may be mentioned the following:

The circuit armatures are stationary. The field revolves, being directly connected with the exciter on one and the same shaft, by which a saving is effected in belts and power. Two armatures are supplied by one set of field magnets. Other machines, with armatures revolving, have greater resistance to overcome, and consequently require more power.

The Heisler dynamo is a slow running machine, making only 650 revolutions per minute, while those of other systems make from 900 to 1,500. But four and a half amperes are carried at the commutator, and the brushes can be short-circuited with perfect safety. Under this system there can be placed on one and the same circuit, being in direct series, a 10 candle power lamp succeeded by a 100 candle power lamp, with no change required to line or socket. An advantage is also claimed in wiring. For outside work, a No. 8 Brown & Sharpe gauge is used; for inside, No. 11. In comparison with multiple arc systems, for 160 16 candle power lamps, there is required to start the machine, No. 1 Brown & Sharpe copper wire, carrying two wires to a central point of distribution, and graduating out from this point with two wires at all times.

The company claim to have the only perfect automatic regulator, the operation of which is controlled by the action of resistance on the wire.

The first cost of putting a Heisler plant in operation is said to be somewhat greater than in the case of some systems owing to superior workmanship in the dynamo, but the company claims that this increased first cost is offset many times over by future economy in operation.

The above are some of the advantages which the owners of this system lay claim to, and as we are informed it will shortly be in operation in several Canadian towns and cities, the public will have an opportunity of deciding whether or not they are well-founded.

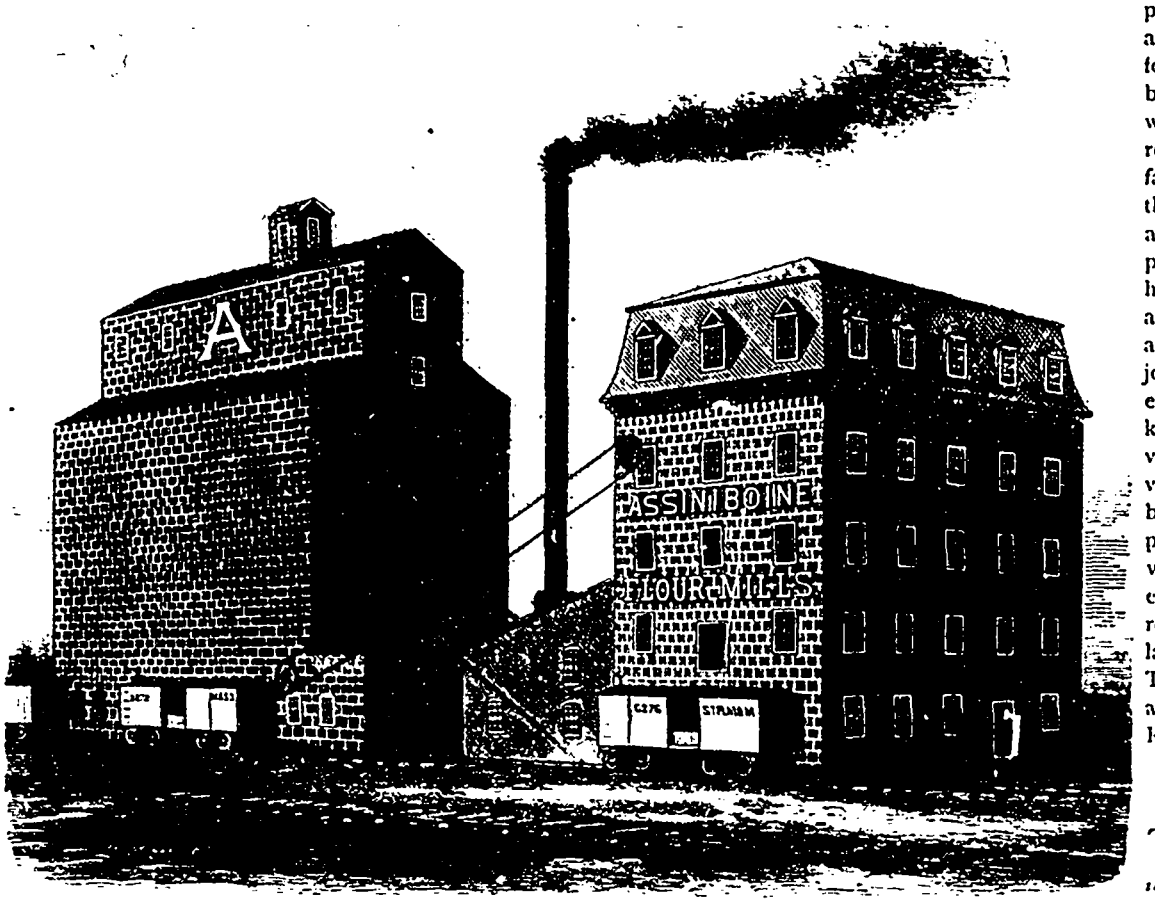
CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

SOME two years ago, says the *Stationary Engineer*, the stationary engineers in Canada started an association on the same lines as the N. A. S. E., in fact modeling their constitution, by-laws, etc., upon those of the association on this side of the border, looking up to it as being in effect the parent organization. They have pursued a different policy from that of some other associations which were so started, and instead of trying to destroy the original association, they have always looked to it for advice and fraternal co-operation. The success of the Canadian association is evinced by the large and strong local associations in Montreal, Toronto, Hamilton and Stratford: associations made up of the best and most progressive engineers in the Dominion. Their meetings are well attended and much prominence is given to the educational and helping features of the order. Taken altogether, the Canadian associations will compare favorably with the best associations this side the line. They have all along looked towards the parent order, and within the past year have been in correspondence with the national officers of the N. A. S. E., with a view to affiliation.

Our esteemed contemporary, the *United States Miller*, is kind enough to say that "The August number of the ELECTRICAL, MECHANICAL AND MILLING NEWS, of Toronto, Canada, is a most excellent one. It shows enterprise and thrift and deserves the esteem and patronage of every Dominion miller. The Dominion Millers' Association will find it a valuable ally in carrying out important work which they have taken up for the benefit of Canadian milling interests."

MILLING AT PORTAGE LA PRAIRIE, MAN.

THE settlement around the town of Portage la Prairie, Manitoba, is the oldest in the province west of the Red River. The earliest colonists located, as it is well known, along the banks of the Red river, but in time the fine agricultural country around Portage la Prairie, now so famous as the Portage plains, began to attract attention and quite a settlement was formed in the district. Before Manitoba became a part of the Dominion of Canada, the Portage settlement was one of the most important in the Red river colony, especially in point of farming operations. When Riel got up his first rebellion, a company was raised at the Portage to oppose the leader of the half-breeds This would show that the farming or white settler element was proportionatey stronger at the Portage than in the Winnipeg district, whereas in the latter the half-breed element predominated. Naturallyen ugh the first grist mills in the settlement, outside of the Winnipeg or Red River district, were started at the Portage. Early in the seventies two stone mills were established in the Portage district, the parties connected therewith being Wm. Smith and Logan and Edgar Likewise the first roller mill established in Manitoba outside of Winnipeg was located at Portage la Prairie; indeed Portage was very little behind Winnipeg in this matter, as the first roller mill in Winnipeg was completed in July, 1882, and in the fall of the same year a roller mill was in operation at the Portage.



The first and only roller flour mill so far established at Portage la Prairie is the mill of the Portage Milling Company, a cut of which accompanies this article. The Portage Milling Company was organized in the fall of 1881 and the mill was completed the following year.

The mill as first erected had a capacity of 150 barrels per day. An elevator one of the first to be built in Manitoba was erected the same year that the mill was built. The elevator, which is shown in the cut with the mill, has a capacity of 140,000 bushels. The mill was operated very successfully up to the year 1887, when, owing to the increasing demand for the product, it was remodelled and increased in capacity to 350 barrels per day. Since the enlargement the mill has been in operation almost continuously, and with exlent results. When the mill was remodelled in 1887, a full line of Geo. T. Smith rolls and purifiers were put in. The stock of the company is all held by residents of the district, and is now in few hands. The present officers of the company are: H. M. Campbell, President; W. B. Answorth, Vice-President; Jas. McLaughlin, Manager; R. S. Thompson, Secretary. About two years ago the company opened a branch in Winnipeg for the sale of the product of their mill, and they are now doing a good business in the city. In addition to the local trade, the company have a number of customers in the east who handle their flour, and the mill is represented by a traveller in Eastern Canada. No difficulty is experienced in disposing of the entire output of the mill, and often orders are in excess of milling capacity.

The Portage Milling Company has exceptional advantages in that a large portion of the wheat required for grinding can be purchased right at the mill door. Grain warehouses have also been established at several points on the railway, whence wheat can be supplied when required. On the Portage plains in an average year about 1,000,000 bushels of wheat are produced. Many of the farmers grow grain on a large scale, and individual farmers market from 2,000 to 10,000 bushels each. McLean & McRobil, a firm of farmers on the plains, will this year have 40,000 bushels of wheat, grown on 1,300 acres, or an average of about 30 bushel per acre. In driving about the country in the neighborhood of Portage during the harvest season, the country presents a beautiful appearance, and looks like one vast wheat field. Later on, when the grain is in stack, the stacks can be counted by the hundred from almost any point In a favorable season, such as the past harvest, a great deal of threshing is done directly from the stook. It is estimated that about seventy five threshing outfits are now at work in the country tributary to the Portage. The crop this year is a fine one, despite the dry season, and the quality of the grain is exceptionally good, so that the mill will have no trouble in turning out a fine quality of flour This will show some of the advantages enjoyed by the Portage Milling Company. The mill itself is the largest in Manitoba, outside of Winnipeg, and one of the most successful in its operations.

In addition to the mill above described, Portage la Prairie has another important milling industry in the Pioneer Oatmeal Mill, owned by Johnson & Barclay.

PIONEER OATMEAL MILL.

A cut of this mill is given herewith. The oatmeal mill was built in 1883, by the Owen Sound and Northwest Milling Company, of which Mr. David Johnston was manager. Associated with him were Messrs. Corbet, Russell, Laidlaw and Breckenridge, of Owen Sound, Ontario. The company was a joint stock affair, and built a roller flour mill at Fort Qu'Appelle, Assiniboia Territory, in 1884. The flour mill at Fort Qu'Appelle was sold out, after it had been in operation about a year, to private parties. About the same time Mr. Johnston, who had superintended the construction of both mills, bought out the interests of his associates in the oatmeal mill at Portage, and operated it alone up to 1887, when he formed a partnership with Mr. Peter Barclay, since which time the mill has been operated by Johnston & Barclay. Mr. Barclay was previously in the milling business in Manitoba. He established a stone process flour mill at Birtle, in 1882, which he gave up in 1887 to join in the oatmeal enterprise at Portage.

The oatmeal mill proper is 30 x 36 feet in size, four storeys, dry kiln, 22 x 22 feet, engine house, 20 x 36 feet. There is also an elevator in connection with the mill, with a capacity of 20,000 bushels. The mill turns out granulated, standard and rolled oatmeal and rolled oats, and also pot and pearl barley. The capacity of the mill is 50 barrels of oatmeal, 20 of pot barley and 15 of pearl barley per day. The mill has three runs of stone, one stand 9 x 30 cutting rolls for oatmeal, and one stand, 9 x 12 smooth, for rolled oats. The mill has been operated successfully and continuously, and has been improved with additional machinery on several occasions. This fall a new line of cleaning machinery is being put in, also feed choppers. Nearly the total supply of oats required are purchased from farmers at the mill door, and any additional requirements are purchased at other points in car lots. The market for the product of the mill extends from Montreal to the Pacific coast, though in some years when the oat crop is heavy in the East and prices low, oatmeal cannot be profitably shipped from here to Eastern Canada markets.

The description of these two mills will show the importance of Portage la Prairie as a milling town Portage formerly had two flour mills, but the older mill, operated with stones and partly with rolls, was burned down in the fall of 1888. In addition to the grain ground in the place, a considerable quantity is shipped. The Ogilvie Company have a 40,000 bushel elevator at the Portage, and there is also an elevator owned by joint stock company of farmers, resident in the vicinity known as the Farmers' Elevator Company. Another elevator has just been completed by the Martin Elevator Company. This last named elevator is located on the Northern Pacific Railway, which road was completed to Portage la Prairie early last month. The other elevators and mills are on the line of the C. P. Railway.

ABOUT RE-SAWING.

THE following points on re-sawing are from the *American Cabinetmaker*. In using thin saws for re-sawing, the segment circular has proved very desirable, owing to its disinclination to buckle under friction. It will stand up to its work when it is so hot as to be unbearable to the touch.

For very light stuff, such as blind slats, re-saws are best fitted with the feed overhead instead of below, thus forcing the stuff down on the table instead of permitting it to spring away from it. In one design the same steel strip which serves as a shield to the saw acts as a hold down for the stock.

One disadvantage of the ordinary segment circular saw, is that the collar or centre has a tendency to split the lumber ahead of the saw and leave "stub shorts" upon the ends. This can be got around by placing a board of requisite width between the rolls and fastening it there, feeding the lumber on top of the board, but this does not give the lumber a good support, and it destroys the delicate centering adjustment necessary for fine work. Another way is providing for a perpendicular adjustment of the saw of about a foot or 18 inches, it being desirable to present to the work being cut only enough blade to reach through it. This makes easier cutting, as the blade, if cutting with the grain, instead of across it, is less liable to dodge.

In some modern styles of re-sawing machines the ends of the frames are open, so that the saw may be rolled out of the machine when necessary, instead of it being necessary to lift it out over the frame.

In re-sawing siding, the lower edges may be left rough or ragged by the edge of the saw; so in some machines there is an under cutter for jointing the lower edge of the board after passing the saw.

While the segmental circular saw will do good work in re-sawing thin lumber, it will not work in heavy stuff. The band saw will do both grades of work well.

SHRINKAGE OF CASTINGS.

In locomotive cylinders—1-16 inch in a foot.
Pipes 1 8 inch in a foot.
Girder, beams, etc.,—1-8 inch in 15 inches.
Engine beams, connecting-rods, etc., 1-8 inch in 16 inches.
Large cylinders, say 70 inch diameter, 10-feet stroke, the contraction of diameter 3 8 inch at top.
Ditto 1-2 inch at bottom.
Ditto in length 1-8 inch in 16 inches.
Thin brass 1-8 inch in 9 inches.
Thick brass 1-8 inch in 16 inches.
Zinc 5-16 inch in a foot.
Lead 5-16 inch in a foot.
Copper 3-16 inch in a foot.
Bismuth 5 32 inch in a foot.
Tin—1-4 inch in a foot.

TURNING POINTS IN SCIENTIFIC MILLING.*

IN this paper I shall not presume to present anything new, but only to point out some of the essential rules in successful milling.

The money value of the product daily passing through a mill of ordinary capacity is so great, that seemingly insignificant matters become instrumental in making the successful or the unsuccessful mill. A mill having a capacity for turning out £500 worth of flour daily, if a profit of 2 per cent, is realized on the output, will yield in round numbers, £3,000 annually. Two per cent. margin is not excessive, yet, if by some small imperfection in the details of the mill the percentage on the profit side is reduced by the figure 4, and the mill loses £3,000, the amount will appear quite large, for no miller cares to pay £3,000 annually for the glory of operating an unsuccessful mill. I give this illustration to emphasize my point, which is, the necessity for close attention to minor details or the turning points in scientific milling.

There are some fundamental principles in roller milling of such vital importance that the changing of one spout, and the delivery of the material from that spout to the right place or the wrong place, will make the mill either profitable or unprofitable. It is no infrequent occurrence for a milling expert to make changes in the mode of dealing with some special product, representing a cost of some £2, which makes many hundreds of pounds profit in the aggregate results of that mill during the year, and, in fact, produces such a revolution as to change the mill from an unsuccessful to a successful one. If this be conceded, and I dare say no thoroughly informed milling expert will deny it, then how vitally important to the millowner these minor points become. In a short essay I can only touch upon them briefly, but I give five essential rules :

1. Make the reductions with special reference to broad bran, small amount of chipped wheat, large percentage of semolina, and least abrasion of bran possible.

2. Make the separation so that there shall be no return of material from the tail toward the head of the mill.

3. Never permit granular stock to reach the tail of the mill, or become intermingled with low grade products.

4. Make a separation of impure materials at every point possible and send it to low grade stock or the feed bin.

5. Select your machines with special reference to the work to be done, and see that they are kept in perfect order.

These five rules embody the essence of scientific roller milling, assuming, of course, that the wheat has been well cleaned, which is a matter of vital importance.

In relation to the first rule, the reduction of wheat to semolina, there exists a great diversity of opinion as to the best plan. The tendency is in the direction of a less number of breaks, and to a more extended length of roll surface on each break. This matter of rapid reduction at the head of the mill has many advantages ; it produces a much higher grade of break flour, and, if the corrugations are properly adapted to each break, there is also an equal or larger quantity of semolina produced, and a broader bran.

When partly broken wheat is passed successfully through corrugated rolls, as in the extended reduction system, and only gently operated upon, there is a gentle scraping of the bran, which produces a bran dust, and which, on account of its extreme fineness, passes the meshes of the silk along with the flour, and thus discolors it. If, on the other hand, we perform a large percentage of the work of reduction at the head of the mill, instead of producing this fine bran fibre that will bolt, we are producing a coarse bran scale that will not bolt, and herein lies the principal advantage of rapid reduction.

To illustrate this more clearly, as it is an important point, I would say that if you take a knife and scrape a wheat berry three or four times gently, you will find bran powder produced so fine that it will bolt with the flour. Now instead of three gentle scrapings, make one severe scrape, and you will find a bran scale produced that will not bolt with the flour. With this material advantage in favor of rapid reduction, if other favorable conditions can at the same time be sustained, it is unquestionably the superior system.

I think it can be proved that four reductions, with adequate length of roll surface and proper main break corrugations, is sufficient for any kind or condition of wheat, and that as large a quantity of semolina will be produced, a better break flour, and, at the same time, a broader and fully as well cleaned bran. If this be true, then the matter of the number of breaks becomes one of the points in successful milling. In making this statement of the number of breaks, I do not take into account the wheat-splitting machine, if used, as that can only be regarded as a wheat cleaner.

The second rule, "make no returns," is of vital importance. It not infrequently happens that some material, rich in flour, but intermingled with impure stock, is passing off at some point in the mill. The miller thinks it too good to go to low grade or feed, and therefore sends it back to the break chop or some point ahead in the mill, but while this may reduce the quantity of low grade and also make a cleaner offal, yet, at the same time, it will reduce the value of the flour, sometimes from 2s. to 4s per sack. But suppose it reduces it but 1s. in a plant of 300 sacks, we have a loss of £15 per day, or £4,500 per year. One spout is doing this disastrous business.

The milling engineer having left his newly-constructed mill in good condition and running well it not infrequently happens that after a time the rolls get out of trim, the bolts more or less filled up, and machines generally not doing their work properly for want of adjustment and attention ; then these rich tailings appear, and the miller shoots them back into the break chop or to some roll or bolt in advance, and thus loads the mill with impure stock, which is wallowed back and forth until it is sufficiently reduced to bolt with the flour.

In all cases where there is a rich product either passing into feed or into the low grade stock, if the mill, when in good running condition, will not handle it properly, the millowner should put in the necessary machines to do so. Sometimes an extra roll and bolt will pay for themselves half a dozen times over in the course of a year in the matter of making a clean finish and preventing returns

The third rule, "Do not let granular stock reach the tail of the mill," is of almost equal importance. This rule is violated more than any other, and costs the millers of Europe and America a fabulous sum of money annually.

It is not infrequently the case that inexperienced milling experts (?) so diagram the mill that a large quantity of fine semolina reaches the tail of the mill and becomes intermingled with the low grade stocks. That which ought to be patent flour either goes into low grade or feed—generally a large percentage of it into the latter, since fine semolina will not grind well with second germ stock or bran fibre. The woody substance holds the rolls apart so that the fine semolina is not reduced, and hence tails off the feed. The mill should be so diagramed that it would be impossible for fine semolina to reach the tail of the mill. This can only be done by the proper numbers of cloth, and a sufficiency of smooth roller surface to insure perfect reduction. I am an advocate of a short system at the head of the mill, but a proportionately elongated one at the tail. By this means the quantity of low grade flour can be materially decreased and a perfect finish of the offal secured, and in many cases I would change a part of the corrugated rolls into smooth rolls, and the extra break scalpers into separating reels, and thus greatly improve the general results without additional machines.

The fourth rule given, that is, "to separate pure from impure stock at every point possible," is also important. Milling reduced to a science is simply an extended system of separating. When a reel or purifier or any other machine can be made to tail off a deleterious material it should be done at once, and this material sent to the low grade rolls or feed instead of carrying it through a successful number of rolls and reels, which is often done. Neither is it advisable to wallow semolina around through half a dozen grading reels, elevators, dusters, etc., which is sometimes done, to the great detriment of the general results. The aim should be to get every stock to its legitimate place, and the flour to the sack as soon as it can possibly be done, thus saving the continued abrasion and intermingling of impure stock with the pure in such a condition that it cannot be separated.

In relation to the machines to be used, I am not here to advocate for any special make. Every engineering firm of respectability in the milling line is making good machines, but it often occurs that they are not arranged in a manner to produce the best results. The centrifugal reel is a machine of recognized merit, yet it may be used where it should not be, or where some other bolting machine would be better. A perfectly equipped mill is one that possesses a specially constructed machine for each description of work, and each machine should be so arranged with regard to the others that no one should have either too much or too little to do. It is as great a mistake to have a bolt or purifier operate upon too small a quantity as it is to charge them beyond their capacity ; in either case it is vain to look for satisfactory results. This, I need scarcely point out to you, applies to the whole of the machines. A mill, in short, should resemble in its operation the organic action of a healthy human body, wherein each organ discharges its special function, each is dependent upon the other, and the whole cooperate in producing that just balance of the system which is essential to the maintenance of good health.

I may be permitted to mention one machine, which, so far, has not been introduced very extensively to European millers, and that is the "inter-elevator bolt." This style of reel is now being made by every prominent American milling engineer, and no milling machine in America has ever met with such universal favor. As a separating machine on the break chop and the dusting of semolina it is unquestionably superior to any other class of reel. It is gentle in its action, and has a capacity almost equal to the centrifugal. It is used in America for all purposes except the dressing of low grade material, for which purpose the centrifugal is still in request.

Now in relation to the operation of a mill, I shall assume that every miller in Great Britain and on the continent is a good miller, and that each attends to his duties properly, although I have known some millers that do not. I have seen purifiers running with a thick stream of semolina down the center, the cloth bare on each side, and tailing off "rich" to low grade, and I have said, "there goes the two per cent. margin.' I have seen rolls running with a feed half way across in a thick stream and chopping the bran up, and the semolina rolls in the same condition and stock going through unground, and I have said, "there goes the two per cent. loss." I have seen, in the same mill, bolts clogged up until they tailed over one-fourth of their stock to the low grade department of the mill, and I have said, "there goes enough good material into low grade flour and feed to 'break' this miller in six months."

You have no such millers on this side of the water, I am sure, but it would be well that the intelligent European millowner should study these points and measure the importance of employing first-class talent to operate his mill. The miller is a most important financial personage to his employer ; he is lending out, so to speak, often several hundred pounds of the mill owner's money daily, and the interest received upon it or the interest paid upon it will depend largely upon his efficiency.

Furthermore, the millowner, in order to properly direct these "turning points" in his favor, should know every part of the mechanical operation of his mill ; and he should not only know this but he should "dob" his hand up in dough frequently. It won't hurt them. The dough will wash off and the hands be the whiter for the "dob," and probably the flour whiter too the next day, for the miller will then know that his employer has got a practical eye on him, and he will put forth every effort to excel.

There is much more that might be said upon these vital points and upon others of almost equal importance, but I refrain from taking up more of your time.

In conclusion, I would say, there is no business that offers greater opportunities to the enterprising, or dangers to those who fail to appreciate the importance of perfection in every mechanical detail, however small. The wheat bin is like the ore bearing rock of Colorado, which contains gold, silver and lead, and as the miner who employs the most improved machinery extracts the largest percentage of the precious metal, so the miller who intelligently avails himself of the most improved system and appliances which scientific milling has placed at his command, may confidently look for the highest results.

*Paper read by J. Murray Case before the International Congress of Millers, [illegible]

WHO MAKE ENGINES FOR ELECTRIC LIGHT PURPOSES?

PORT HOPE, Sept. 17, 1889.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

DEAR SIR,—Would you oblige a subscriber who is interesting himself in electrical matters by giving me the name of a Canadian firm who make a specialty of building engines adapted for driving electric light plants? I have looked through the pages of your paper without seeing the advertisement of such a firm.

Yours truly,

DYNAMO.

[We understand that the Wheelock engine, manufactured by Messrs. Goldie & McCulloch, of Galt, is being used to a considerable extent for driving electric machinery. There are doubtless other manufacturers in Canada of engines adapted for this purpose, but they have not as yet acquainted us of the fact.—THE EDITOR.]

STEAM PLANTS FOR ELECTRICAL SERVICE.*

By Wm. H. Bryan.

NEW industries of modern years have shown the wonderful growth that has characterized the manufacture and use of the various forms of dynamo-electric machinery. Less than ten years ago the arc electric light was just becoming known and the incandescent lamp was scarcely more than a curiosity, while the electrical transmisson of power was hardly thought of. To-day there are few towns of 3,000 inhabitants but boast their arc or incandescent electric lighting plants, and many smaller places are fully as progressive. In the large towns and cities the great business houses have their own plants, and central stations whose capacities are measured by the thousands of horse power are not uncommon. Add to these the electric railway, which has now demonstrated its success, and we get an idea of the vast possibilities of this field of energy which is still in its infancy. While many of the earlier stations did not prove as successful financially as was anticipated, the test of continuous and regular service has pointed out the weak places, and they have been remedied. When careful business sagacity and caution are exercised as they must be in any successful venture the electrical industries to-day offer excellent returns to the capitalist. Perhaps the best evidence of this lies in the gross capacity of plants now in operation, estimated at 750,000 horse power, and fast nearing 1,000,000.

The world waits impatiently for that immortal inventor whose genius shall show us how to produce electricity direct from coal. We must take things as we find them, however. Our boilers and furnaces give back in steam less than 80 per cent. of the energy of the coal burned. This steam does work in a woefully imperfect engine, utilizing less than 15 per cent. of the heat units. This engine, in turn, drives the dynamos by which the electric current is generated. After distribution, the current reappears in the form of the electric light there being a further loss of say 10 per cent. in each of the last steps. It is evident, therefore, that in the best plants less than 10 per cent. of the energy in the coal consumed is reproduced in the form of light. The poor plants, which are far more common, do not reach 5 per cent.

And yet within these appallingly low figures there is abundant room for study. The conversion of fuel into electric energy has caused the development of steam plants adapted specially for this service. The business of these stations is, in fact, the selling of power, and the steam plant is therefore of prime importance. It is not too much to say that permanent commercial success is conditional, first of all, upon a properly designed steam plant. Many companies have found, to their sorrow, that a cheap outfit has proved wonderfully costly to operate and maintain. Others have shown that a somewhat higher first cost has been fully justified by reduced expense of operation and greater reliability. The furnishing of electric light and power may now be regarded as a permanent industry, and the installation of plants presents a broad field of usefulness to the engineer.

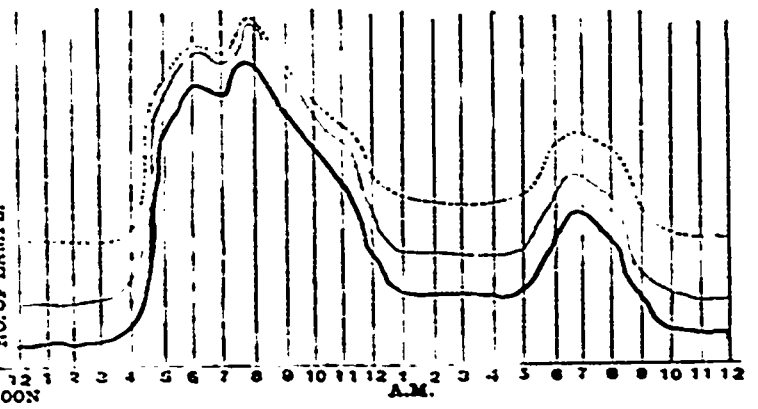
Too often the selection of the motive power is left to some one wholly inexperienced, who bases his conclusions upon considerations which are far from being the ones of first importance. The results are as might be expected. We see on every hand instances of mistakes which are costing thousands of dollars unnecessarily in fuel bills, repairs, power wasted, etc. Machinery is now built capable of maintaining one horse power one hour on one and one half pounds of good coal. When we remember that in most plants five to six pounds are required, and instances are not uncommon where it reaches ten and even fifteen, we see that great improvements are possible. The wonder is, not that electric lighting has sometimes proved unremunerative, but that it has ever paid under such conditions. The inevitable conclusion is that the fierce competition which now exists, and which bids fair to continue, will result in the "survival of the fittest" only. That electrical station which builds its steam plant in strict accordance with the best principles of modern engineering, has already won more than half the battle, and will surely distance the one in which those principles are considered of minor importance.

Some further explanation of the percentages given above may not be out of place. A boiler efficiency of 80 per cent. is the best attainable under ordinary working conditions. The purposes of combustion necessitate a good draft. This is proportional to the difference in temperature between the chimney gases and the outside air. It is, therefore, necessary to discharge the gases at a temperature considerably above that of the steam in the boiler.

Nor is the case of the engine as bad as appears at first sight. Its efficiency also is limited by the range of working temperatures. The higher the initial temperature of the steam, and the colder it is when finally discharged, the higher will be the efficiency. This is best shown by the well known formula $E = \frac{T_1 - T_2}{T_1}$, where T_1 is the initial and T_2 the final temperature of the steam, both measured from the absolute zero.

Practical conditions, however, confine us to narrow limits. High initial temperatures mean greater pressures, more costly plant, increased liability to accident, and difficulty of maintenance and repairs. The lowest temperatures which can be reached in practice are far above the absolute zero. These losses are inherent in the theory of the steam engine, and but little increase of efficiency is possible. As a matter of fact, that engine which can furnish one horse power with 13 pounds of water evaporated per hour, is very close to the highest that is possible under the best conditions of modern practice.

Economy of fuel, however, is not always the most important consideration. Conditions frequently arise which render a sacrifice of fuel necessary to secure other and more desirable ends. The work required of an electrical station differs in important respects from other plants in public service. Gas and waterworks have their storage reservoirs, enabling their work to be done under conditions favorable to high economy. Electrical plants, however, must supply the current directly as needed. Every increase or decrease in the number or candle power of the lamps burning must be instantaneously met by a corresponding change at the dynamo and steam plant. This state of affairs must continue until some of the many storage batteries now being exploited are shown to be sufficiently efficient, durable and cheap to justify their general adoption. Until then, those plants which do commercial lighting



must necessarily, at times of greatest output, be forced to their utmost capacity, and at other times do little or nothing. Under such conditions economy of steam is out of the question. The *real* efficiency must be measured from the plant as a whole, and is a problem of considerable complication. To ascertain the actual cost per lamp hour, the items of fuel, salaries, oil, and other supplies, lamps or carbon, interest, depreciation, repairs, losses due to poor service, interruptions, etc., must be given due weight. In the designing of a new station, it is of even greater importance to give each element of cost its proper consideration. No general rules can be laid down for guidance in studying a problem as complicated as this one. Some of the more important factors may, however, be mentioned.

Whatever the general design of the plant, whether arc or incandescent lighting or power, whether high or low tension, large or small, whether fuel is high or cheap, space costly or not, the one condition to which all others are secondary, is complete reliability under severe and continuous service. The public has a right to demand, and does demand, that the lights be always ready, and maintained to their full candle power. An interruption means, not only a loss which cannot be regained, but an injury to the standing and record of the enterprise which months of steady running cannot counteract. Reliability can be secured by using only the best of machinery, as simple in construction as possible, cared for by good men. The plant should be divided into such units that in case of accident to any part of it that may be thrown out of service, and the work assumed by the remaining apparatus, without straining the machinery or interrupting the output. This means a reserve sufficiently large to carry the work of any unit of the plant.

The particular electric system in use is the consideration of next importance. The cost of conductors, space required, closeness of regulation necessary, capacity and number of dynamos, all affect the steam plant. Low tension systems require costly conductors, and must be located close to the centre of maximum lighting. Ground is here very valuable, and the most important requirement is to get the plant into the least number of cubic feet. High-duty engines occupy too much space and water for condensing is usually not available. On the other hand, high tension systems are less affected by distance and should be located where land is cheap and, if possible, where cars loaded with fuel can be switched alongside the boilers, and where an abundance of water may be had for condensers, or best of all where water power is available.

The cost of the ground occupied, therefore, affects the arrangement of the plant and type of machinery.

The cost of fuel, as compared with its heat value, is of scarcely less importance than the system itself. If fuel is cheap, costly and complicated machinery to economize it is not justified. If high, it should be adopted as far as other conditions will permit.

The cost and quality of the water supply are important in selecting the type of boiler, heater, etc., and deciding the question of condensors.

The distribution of the load through the hours of the night is worthy of careful consideration. High economy is attainable only under certain fixed and favorable conditions. Among these the most important is the point of cut-off in the engine at which its efficiency is a maximum. The best authorities place this at between one-fifth and one-quarter for single cylinder engines, working with initial pressures of from 80 to 100 pounds above the atmosphere. Both earlier and later cut-offs mean more fuel per horse power. In the latter case we exhaust the steam at too high a pressure, and in the former the cylinder condensation increases too rapidly as to nullify gains from higher expansion. It does not pay, therefore, to use large engines when the load is at times small. The units of power should be so selected as to enable the engines to be run close to the point of cut-off of maximum efficiency. As the load changes, engines may be started or shut down, so that at most only one small engine is worked at a disadvantage. Having selected the size of engine best adapted for the work, there are advantages in the way of simplifying the attendance, care, repairs and general arrangement, by reduplication of parts throughout the plant.

Other conditions, which, while of minor importance, must not be lost sight of, are: The nature of the plant, whether permanent or temporary; the amount of capital available, which however promising the returns, cannot always be secured to carry out plans in the best manner; and provision for growth. This latter is too frequently overlooked. No industry is capable of greater expansion by means of good service and reasonable charges. It often happens that after only short service the demand becomes such as to require extensive enlargements. If this necessitates the remodeling of the entire station it can only be done at greatly increased expense, and sometimes with serious interruption to the service.

All the large steam plants in this country are arranged on one of two general plans, which differ in essential characteristics. One school advocates the use of large slow-speed engines, belted to counter shafts, which run at increased speeds, and on which are placed friction-clutch pulleys and clutches, enabling any dynamo or engine to be thrown in or out of service at any time. To get the full benefit of this system the engines must be large and few in number. In practice two engines are generally used, belted to opposite ends of the counter shaft. The other school prefers smaller, independent engines, of the high-speed type, belted direct to the dynamos. Each plan has its warm advocates, and arguments are not lacking on either side. Which of these plans to adopt is the question which confronts us at the outset. The answer in any given case involves a careful study of the points I have discussed, and presents a problem of no small magnitude.

Two important advantages are claimed for the system using slow-speed engines. First the long stroke engine, with four independent valves, represents the highest *known efficiency and requires smaller boiler plant and* less outlay for fuel. Second, the use of shafting and clutch pulleys admits of the greatest interchangeability. Any dynamo can be run from any engine, and a dynamo or engine can be thrown in or out of service without affecting the rest of the plant.

On the other hand, the advocates of direct connected engines claim, 1st, that no power is lost in driving shafting, and, that as stations are actually run under widely varying loads, the small engines can be operated at

* Read before the Engineers' Club, St. Louis.

near their best point of cut off, and will, therefore, do the work at less fuel cost per lamp hour; 3d, that one or two dynamos to an engine offer all necessary interchangeability; 4th, that one small engine affords ample reserve; 5th, that electrical conditions demand close regulation of speed, from stroke to stroke, and under changing load and steam pressure, and that experience has shown that this is best secured by high speed engines; 6th, that a short circuit in a dynamo would slow down a small engine, thus giving warning of danger, while a larger engine would pull it through, regardless of results; 7th, that the plant occupies the least space; and last, but by no means least, the first cost, including erection and foundation, is less than for low speed engines with shafting, etc.

That there is wide difference of opinion among prominent engineers on this question is shown by the fact that there are now being erected stations costing hundreds of thousands of dollars on both principles. Let us examine the claims made in the light of the requirements already laid down.

First, as to reliability: Both plans claim simplicity of construction, but in my opinion "honors are easy." Two engines are, of course, easier cared for than a dozen, but as each of the large engines is not only much heavier than one of the smaller ones, but is more complicated in valve gear, and the plant is further encumbered by the shafting, with its necessary bearings, couplings and clutch pulleys, we see no difference in the two. The large countershaft is a source of weakness, however, an accident to it means a suspension of the whole plant. The service required of it is severe, and it is not always easy to preserve the alignment. When out of line it consumes great power, and is a source of constant worry and danger. An accident to one of the large engines means a serious loss of capacity, while it is insignificient if the engines are small. In the latter case a reserve engine means a much smaller investment of idle capital and space. It appears, therefore, that independent engines are preferable on the score of reliability.

Second, as to the electrical system. If the plant can be located where there is abundant space, it may be planned with a view to the highest efficiency. If other conditions permit, all the advantages of high expansion and condensing engines may be utilized. On the other hand, if ground is valuable the use of direct belted high-speed engines is necessary. In those systems requiring close regulation of speed, they are also preferable, although slow-speed engines are being greatly improved in this respect by new designs, better workmanship, and the use of heavier fly wheels.

Third as to their fuel economy. It is here that the advocates of long-stroke machinery make their strongest claims. I have been unable to secure exact and reliable data as to the water consumption of the two types of engines per horse power per hour. From the best information I can get, however, I am inclined to place the water consumption of the low speed at about 20 per cent. less than the high speed under similar average working conditions. Where fuel is expensive, and where the other limiting conditions mentioned above do not prevent, the low-speed engine should therefore be adopted.

There are, however, two important points which must be considered in this connection. The useful power delivered to the dynamos is always less than that exerted by the engine, by the amount of the friction of the engine and power-transmitting devices. In direct connected engines this loss is from 7 to 10 per cent. of the total, while with the shafting system it is usually from 15 to 25 per cent., and if the shaft is out of line, may be much more. It thus appears, therefore, that a large part of the superior economy of the low-speed engine is offset by the increased friction loss.

The economy is further affected by the amount and rate of loading. If the work done is large and constant, as is the case with plants operating contracts for lighting, the low-speed engine has still a good balance in its favor on the score of fuel economy. If, however, the load is subject to wide fluctuations, as it is in commercial lighting—especially incandescent plants the case may be different. The *real* efficiency cannot be measured under the best conditions, but for a whole day's run. The accompanying sketch may be taken as a type of the work of all incandescent plants doing commercial lighting. The lower curve represents the actual output of the dynamos measured in lamps burning; the next line shows the additional work done in friction, which is constant for all loads. It will be noticed that a single large engine doing this work must, for three-fifths of the time, cut off at times decidedly unfavorable to its economy. That is to say, that the steam required to operate the engine under these conditions, would, if used in an engine cutting off nearer its point of maximum efficiency, do a great deal more work The upper line represents the work which the steam consumed is capable of doing, if properly used. You will, no doubt, be struck by the amount of steam used wastefully as shown by the irregular space between the upper and lower curves.

By dividing the work among several smaller engines, which can be shut down and started up as required, but one engine, at most, works at a disadvantage. The friction loss is also less, and when each engine shuts down its proportional amount of friction ceases. It is evident, therefore, that independent engines have a decided advantage in net economy under variable loads.

I had intended to submit sketches of plant of say 1,000 horse power arranged in both ways, making a calculation of the efficiency of each, under variable loads. On investigation, however, I found that the ground had already been covered in an able paper by W. L. Church read before the National Electric Light Association, at its meeting at Pittsburg in February, 1888. Mr. Church presents data from two actual stations in which the ratio of fuel per lamp hour is as 70 to 126, in favor of independent engines.

Summing up it appears that long-stroke engines are to be preferred where the load is approximately constant, provided sufficient space can be had, and provision is made for reserve. But for variable loads, and where space is valuable, as well as for greater reliability and closer regulation, the use of high speed engines appears to offer most advantages. The most prominent promoters of incandescent lighting in this country have adopted direct connected engines for their central stations.

A brief discussion of the intergal parts of a steam plant for electrial service may be of interest.

The engine we have already considered at some length. The advantages of compound, triple expansion and condensing engines, are well known, and these principles may be applied with benefit to both low and high speed types. It must not be forgotten, however, that their recognized fuel economy is secured by greater complication of parts. A higher degree of skill is therefore required to operate them, and the liability to accident and derangement is increased. The full benefit of these principles can only be obtained where the load is large and approximately constant. It is evident therefore, that these high types of engines cannot always be used with benefit. The success of stations now being equipped with high pressure boilers, and triple expansion condensing engines, will be watched with interest.

All sorts of boilers have been used, from the long cylinder, where fuel is cheap, or the water bad, to the water tubular. Each has its advantages. The horizontal tubular boiler is a quick steamer, occupies little room, is not high priced, and is fairly efficient. Among these, my own preference is for the boiler with four inch tubes, as it seems a happy mean between the flue boiler and the multi-tubular. The water-tube boiler is being widely adopted in electrial plants. Its advantages are: high efficiency; small space occupied; capacity for overwork; quick steaming, and safety. The type of boiler to be selected is usually determined by the quality and price of fuel, the space available, and the scale making properties of the feed water—although it is claimed the latter has now been eliminated by the invention of purifiers guaranteed to keep boilers free from scale.

The design of furnace and grate is also determined by the fuel. The furnace is modified by the question of whether *capacity* or *fuel economy* is of more importance. Rocking grates and mechanical stokers have points of value, but cannot be used successfully with all fuels. The use of petroleum as a fuel is increasing, as was shown by the interest in the subject at a recent meeting of the National Electric Light Association, at Chicago. Comparing Illinois coal, a pound of which evaporates six pounds of water, and which costs 8 cents per bushel in St. Louis, with petroleum having an evaporative efficiency of 16 to 1, the oil must be furnished at less than 2 cents per gallon to make the fuel cost of evaporating 1,000 pounds of water the same in both cases. When we consider the greatly reduced cost of handling petroleum, and the exactness with which it can be regulated and controlled, and the fact that it is smokeless, it seems destined to wide adoption.

A handsome brick stack seems to me a desirable feature of any plant. Its solidity, strength, beauty, efficiency and absence of repair bills are worthy of consideration.

I have found the following formula useful in stack calculations: $a = \frac{100\,w}{d\sqrt{2gH\frac{D-d}{D}}}$ in which H = height of stack in square feet. a = area of stack in square feet. w = pounds fuel to be burned per second. D = weight of one cubic foot of air. d = weight of one cubic foot of chimney gases. g = 32.2, the acceleration due to gravity. If the outside temperature be 100 degrees F. and the inside 450 degrees F., the formula becomes

$$a = \frac{460\,w}{\sqrt{H}}, \text{ or } H = \frac{211{,}600\,w^2}{a^2}$$

In non-condensing plants the exhaust steam should always be used for heating the feed water. The quality of the latter is the determining factor in selecting a heater. There should be ample settling capacity, and the water should be outside of the tubes, which should be of brass or copper. There should always be a relief valve on the feed pipe near the heater, so that overpressure cannot injure the tubes. If the water is very bad, it should be further purified by live steam. Heaters and purifiers should be so arranged that they can be frequently blown off, and also examined and cleaned without interrupting the service of any part of the plant.

For boiler feeding I prefer a direct acting, single pump, brass fitted. It should pump cold water through the closed heater, and if the water is gritty, should have outside packed plungers. The boiler feeding apparatus is perhaps the most sensitive part of the plant. Instead, however, of providing two pumps and heaters, a first-class injector can be used. It is not only perfectly reliable, but ties up very little capital, occupies little space, and can, when called upon, take the place of either the pump or heater, or both.

The pipe system connecting boilers, engines, heaters, pumps, etc., is worthy of careful study. The points to be borne in mind are: Abundance of area, as direct lines and as few bends as possible; suitable provision for expansion and contraction, and drains. By means of return traps all condensation in the live steam pipes can be returned to the boiler. These pipes should be well-protected by non-conducing material.

Belting is also of great importance. Its slip must be a minimum. It must be well made and of good material, to be durable and reliable at speeds of a mile a minute or more. I have here a sample of a leather link belt which is proving popular. It is so heavy and pliable that its arc of contact on the pulley is much greater than with ordinary belting. It can, therefore, be run very slack, thus avoiding the great strain on engine and dynamo journals which is usually required to prevent belt slip. It also prevents air cushion. The driving and driven pulleys can be brought very close together. Transmission of power by ropes instead of belts is now being tried, and has some advantages. They are very cheap and easily replaced. The ropes run in V-shaped grooves, which render slip impossible. Sometimes a single rope is used, which encircles the pulleys a number of times, and is kept tight by passing over an idler, in the same manner as street railway cables. This arrangement is open to the serious objection that an accident to the rope means a shut-down. This could be obviated by dividing the rope into a number of parts, each independent of the other. The number should be sufficiently large that in case of accident to one, the other ropes could carry the load until the engine could be shut down. As there is some elasticity in the rope, it is not certain that tightening devices would be required, but if they were they do not seem to be impracticable.

It will be seen that this discussion applies to the driving of dynamos of all kinds, without reference to the work being done. In arc lighting, the load is frequently nearly constant, but in incandescent plants, and for street railway work, the power required at different hours of the day and night varies greatly. The amount and hours of loading seem, therefore, to be the factors upon which the selection and arrangement of the steam plant are most largely dependent.

English machine shops make extended use of a tool which is but little used in America. It is a band-saw for metals. Its construction is similar to that of a heavy band saw, with a third carrying wheel for the saw, the object of which is to remove the up-moving side of the blade from the vicinity of the table and thus leave a deep throat through which a large piece of work can be passed or a wide plate turned. This third wheel is placed at the back of the machine, about midway in the vertical height of the saw blade. The temper of the saw is slightly harder than that of those used for wood. The teeth are sharpened straight across the blade by a cutter, with its teeth at the right height to suit the teeth of the saw-blade. The tool is used to cut off the spines from steel castings, the ends of bolts, to saw up steel, iron and copper plates to any form, and to rough out the jaws of eccentric rods and other forgings which would require the use of slotting-machines. It cuts as well on a circle as upon a straight line. The blade is lubricated with soap and water, and in a cut six inches long through a steel connecting-rod jaw it works freely and satisfactorily. Not infrequently circular saws of large dimensions are used for the same purpose, and, being mounted on heavy frames and fed carefully up to their work, cut off large pieces of steel, leaving a nearly smooth surface on the face of the cut.

OBSERVATIONS ON THE COLOR OF WHEATEN FLOUR CONSIDERED FROM THE STANDPOINT OF THE MANUFACTURER AND THE MERCHANT.*

By Frank Ashby.

IT was after much hesitation that I consented to read a paper at the meeting of the National Association of British and Irish millers to be held in London, and now that I am honored by an invitation to present the notes which I made for that purpose before this still more important Congress, my increased hesitation has been overcome only by the kind encouragement of the esteemed President of that Association, Mr. Harvey Daw.

So many subjects of special importance to millers have already been dealt with in recent valuable papers, that it might seem as though little material could be left for further elucidation on the general subject of flour milling, but as we are ever advancing, I think there may be room in our milling literature wherein to treat of the facts which I now propose to bring under review, and upon which I hope to awaken some discussion: indeed it is for this purpose the subject is thus introduced to your notice, because this Congress embraces many men of great experience men who bring to bear a breadth of knowledge invaluable alike to the present, and to every succeeding generation of millers.

I propose firstly to consider

COLOR AS AFFECTED BY THE PROCESSES OF MANUFACTURE, CONTRASTING, OR RATHER COMPARING, AUTOMATIC WITH NON-AUTOMATIC MILLING.

We are too liable to forget that in milling we are dealing with a living organism—that we are not, as quartz crushers, engaged in grinding inorganic rock which simply has to be reduced and granulated; for though the wheat berry lies passive in our hands, to be scrubbed and blown and set hopping over our sieves, and though we design finally to dissect him skin from skin, and cell from cell, we must do this tenderly, and with the least possible friction, for he is worthy of our respect. Were the iron upon the globe to be reduced to a single ounce, the supply of that metal would be irrecoverably lost, but a single grain of wheat saved, and in a very few years the world's population would be again fed with bread.

I emphasize this because I wish to impress the point that we must give the wheat berry time to *die*.

Disregard to this fact, I admit, is a defect in our modern automatic roller milling. The wheat berry consisting of a kernel with several protecting skins, germ an embryonic membrane in a state of dormant life, we need, after cutting these asunder from each other, to allow the fine skins or membranes to *wither*; but the germ should be removed as soon as possible, for in it resides the principle of life, quite independent of the rest of the grain. As a consequence the germ will grow even after being dissected from the grain if only some equivalent nourishment be provided for it; and it is often to be observed that in the spring of the year flour newly ground will, when kept in a warm place, work through the sack, showing an amount of restless vitality which the process of disintegration has not wholly destroyed.

To illustrate the thought I am endeavoring to bring forward, as to the need of time to wither the fine membranes and skins, we gather a hazel nut from a bough, and while green pull off the outside husk. You will find it adheres tenaciously to the shell, but if kept a while and harvested these separate, the skin withering, and the nut hardening.

This, I believe, is the process going on when a sack of meal is kept for a few weeks before dressing, which system was so highly approved by our forefathers; and in modern milling, if the unpurified middlings are kept for a time, the light inner skin still adhering or being in mixture with the small kernel or semolina requires time to dry and wither, after which a much more perfect purification can be effected and the hardened kernel more quickly reduced to flour; and the flour is more granular and is more in the condition suited to the growth of the yeast plant in fermentation.

This pause in the manufacture also enables the miller to make his selections for his highest grades.

But knowing the impossibility in large mills in England to allow this pause and the manual grading or selection, on account of its great cost, the balance of advantage is doubtless on the side of automatic milling, though in our mills at Croydon the finest flour, and that upon which we can place the most dependence, is still made on a small non-automatic plant.

Would it not be possible to provide an artificial harvesting of the middlings at this point of the reductions by heating the air supplied to purifiers or drying the material over heated rollers? No doubt constant and unremitting acts of purification have largely this drying harvesting effect, and are not the least of the advantages gained by those millers who follow up the process of purifying with the greatest continuity to the very end; machines for this fine work being of very modern production, and cannot be too eagerly sought after.

I conclude this branch of the subject by reminding you how wonderful is the life principle in the wheat berry, when wheat grains preserved in the mummies of Egypt for 6,000 years have grown when planted in good soil, and have propagated after their kind as though but of yesterday.

OVER-HEATING IN GRINDING.

The effect of over-heating in manufacture has been so largely treated in other papers that from fear of getting my paper too long and merely repeating others, I forbear going into detail further than to say it is one of the most mischievous forms of discolouration, as it not only lowers the colour, but if the heat is over 112 degs. Fahr. the gluten is much injured and loses its power of elasticity. Over-heating also indicates many other evils sure to be in attendance, such as cutting up the skins, etc. The rule to bear in mind is, make as little flour as possible while the outer skins are presenting large proportions, right through the reductions and granulation, grind with light pressure till the woody fibre is scalped, sifted, dressed or purified from the chop.

ATMOSPHERIC EFFECT UPON COLOR.

We are familiar with the words in our flour contracts, "Due allowance being made for bleaching," and how almost impossible it is to keep in condition a standard sample of flour unchanged for any length of time, and doubtless the presence of germ and branny particles greatly increase the danger of early deterioration. Upon this subject there is room for much difference of opinion. The deterioration may, perhaps, be called simply decay, but it is not always this, for in pure flours there is much less change than in flours with large admixture of germ and bran.

1. Then I submit the change arising from the particles of branny matter, softening with the moisture in the flour and atmosphere, and a consequent fermentation set up, the oxygen then combines with the carbon of the vegetable matter in ferment, and the coloring matter being decomposed first goes off with some of the oily property in carbonic acid gas.

2. In the process of grinding the oily matter residing in the germ (which is largely the coloring property so far as yellow is concerned in it) comes in contact with the alkaline salts which exist in very small quantities in the wheat berry (according to Dr. Kick's analysis), the oily matter is dissolved (soap formed) and the heat of the atmosphere causes exhalation. It may be a debatable point whether the alkalies are free to unite with the oily matter until they are reduced to the ash state, which has been done in the analysis mentioned, but having regard to the fermentation in the first place, I should submit that both processes are concerned in the result. We know that light, temperature, and moisture are the agents affecting the changes. Yet no rule or regulation or system is adhered to in keeping flour samples awaiting delivery of bulk, and therefore arbitrators have great difficulty in estimating the degree of bleaching which may have taken place in the bought sample.

Such samples are often packed away in the blue paper so usually employed in the trade, which paper is not suitable for this purpose, and is, I believe, one of the factors in bleaching the flour so packed. I had a quantity of this analysed by Mr. Lester Reed, F.I.C., F.C.S., of Croydon. He says:

"I have been doing some experiments with the blue paper, which lead me to the conclusion that some organic coloring matter has been used, very probably indigo, which the blue of the paper closely resembles in its properties.

"I find a trace of sulphur in some form I am told that such blue paper cannot suitably be used by jewellers for packing silver articles in on account of its tarnishing them, although they attribute the effect to arsenic. Now the presence of sulphur might perhaps account (although whether it would do so not would depend upon the form in which it is present) both for the tarnishing and for the bleaching.

"It is quite unlikely that the bleaching action of the paper is due to chlorine, as the blue of the paper, and so can hardly be present in it, and sulphur is, I think, the only other likely thing to account for the effect."

Flour for the above purpose should be packed in canvas bags, placed in a room away from strong light, in an even temperature of, say, 60 degs., in not less than 2 lb. samples, and in a place free from damp.

PHYSIOLOGICAL CAUSES OF COLOR.

The color of flour is not only affected by the various tints of the wheat used, but also by the impurities with which we find it admixed. Assuming that even after most methods of cleaning there yet remains some of these impurities in what we technically call cleaned wheat, I am about to demonstrate the effect of this upon color in the flour. We commence our process of grinding upon material of the following colors:—Red, yellow . the outer skin, according to the varieties of wheat, and the yellow tint of the germ and oily particles, the white grey and orange of the gluten and starch cells, and the blue or milky tints of the inner skins, and the black and blue tints added by such impurities as cockle, barley, rye and dirt; these colors are by grinding more or less mixed, and are seen in the flour when marketed.

The flour then is compound of granular particles differing in color, density, form, size, and degree of transparency, and consisting of woody matter, gluten, starch, etc., and in color, red, yellow, blue and black, with every variety of shade in these colors mixed in various proportions. We examine this compound in a light which may be strong or weak, white light of noonday or tinted with the prismatic rays of early morning or evening, or perhaps in a light which is tinted by objects from which it has reached us by reflection; the eye also being affected by the constant change of the angle of incidence, the retina itself being subject to an extraordinary and interesting number of delusions, by which the judgment is liable often to be misled.

This part of my subject may be illustrated by noticing the effect made upon the eye by particles in motion, which are all of one size, shape, and color. Obtain two pieces of perforated zinc, holes, say, 1-32 inch, cut two discs three inches in diameter, rivet together in the centre, and revolve one on the other, notice the number of patterns in the holes associated with each other, and the remarkable half-tones and patterns thrown up from the surface. It would be a hopeless task to attempt to count the numberless combinations possible of form and light and shade upon this simple instrument, and how the rays of light play among the particles.

In this interesting question of permutation of numbers Rev. S. Kines, Ph.D., mentions that at one period a bell ringer, E. White, had been in charge of the splendid peal of 12 bells in St. Bride's, Fleet Street, London, and on his cottage wall was hanging an account of an achievement upon them which came off December 13, 1841, when 4,136 changes were rung by his company in 3 hours 53 minutes. Now the number of possible changes on 12 bells would be 479,001,600. Supposing 12 men for 300 days in every year were to repeat this, it would take them 300 years to complete all the possible changes upon 12 bells.

The same writer points out that a lock has been supplied to the Bank of England, the key of which has 15 levers; there is a million million to one against the man who attempts to pick it, and this means that if a burglar tries a key every second of his life, night and day from birth to 60 years of age, he would have to live 500 such lives, employing the whole of his seconds of existence, before he could try all the possible changes in the keys with 15 levers. This will help the mind to value the possible changes in the disc of zinc before us.

But in a sample of flour we have items of all shapes and sizes, and varying in density—a fact which adds immensely to the possible combinations of light and shade when the flour is presented to the eye in motion and placed in various lights. The great difference, however, remains to be explained, viz., color. We must, therefore, go back to our original material. Red or a reddish brown is present when wheat has not been carefully cleaned and brushed, too much of the episperm being left upon it; or when in wheat reduction the last break roller has gone too close to the "bone," and the gluten cells have been removed with too much woody matter attached, we then have red.

Yellow is present, but is not so objectionable unless it arises from germ. The gluten cells often have a yellow tint. Blue and black are present when the wheat has been imperfectly cleaned, or when the first break flour, and with it the fine milky blue skin, is present, which skin should undoubtedly be removed by the rotatory scalper. This is the best scalper for the first four breaks.

Now with these three colors we can account for all the tints found in flour, for in mixing pigment out of these, three colors can be produced in secondary combinations—orange, green, purple, and in the tertiary, brown, broken green, and grey, and a very small quantity of blue and black will affect the whole mass. It has been said by Bacon, that to produce harmony in a

*Paper read at the International Congress of Millers, Paris, Aug 29, 30, and 31.

landscape all the primary colors must be present ; but this is all changed in our work, for to produce harmony in the bakehouse, two at least must be absent.

I will write these colors down again and proceed to cancel them. Primary, red, yellow, blue or black ; secondary, orange, green, purple ; tertiary, brown, broken green, grey.

It may be said, whoever saw green or purple flour? These two colors may not be seen in dry flour, nor until the fine dusty powder goes into solution, but green or broken green is often found in the gluten when the starch has been washed out, and a deep brown purple is also occasionally found, while grey is the prevailing tint.

It is well known to painters that representation in all colors can be produced with very few pigments, and that red, yellow, blue and indigo, or lamp black will produce almost any tint required. This again confirms my statement accounting for the great number of shades found in flour.

Now, if by cleaning and washing wheat and making perfect separation of impurities we cancel blue and black, we thus get removed nearly all the objectionable colors, for with these must follow the compounds, green, purple, brown, broken green and grey.

And then if by polishing and brushing the wheat and purifying, the coloring matter is removed of the red color, the orange and foxey tint must follow, and we have left only the pure yellow and white flour—and it is perfectly wonderful to see the result when, in the careful manufacture of flour, this is properly done, when compared with the neglect of so doing.

To demonstrate the neglect, I have here some copper filings, which is the nearest metallic powder I can use to represent the fine red branny particles of the outside coat of the wheat berry, and some powdered sulphur to represent the floury part. Mixed together you get a dirty blue green, all the beautiful yellow has entirely gone and no sign of red remains, yet, if placed under the microscope, it is seen to be merely a mechanical mixture, "with, *as it were, spoiled in color and yet not changed.*" And so it is with the flour ; the mischief done by bran dust is out of all proportion to the weight it brings to the grist.

The remarkable effect of colored particles brought into close mixture, is shown in shot silk, where the warp and weft are of different colors, in some light looking one color, and the slightest change of position giving a different reflection of tint to the observer ; and while upon this subject I may be pardoned the digression to instance the interesting fact known to fishermen, that all freshwater fish in our mill-ponds and streams can change color by expanding or contracting their spots of red, yellow, black, and after a few trials match the bottom of the river or pond in which they may be at the moment, no doubt assisted by the medium in which they float, to lend the color to the eye to an observer, to the end of self preservation ; a pigeon's breast and a peacock's plumage also give results showing the effect of small particles differing in color ever changing in position, and delighting the eye with endless changes.

If we need further proof of the mischief arising from mixing a grade with bright colors, I instance the practice of sending back returns to nearly finished early products in our flow-sheets, commonly practised in early days of roller-milling experience—and how soon results show us the error. And again, many of us have had to deal with the problem in this way ; you have in the mill 20 sacks of fine flour, say patents, 20 sacks of medium, 20 sacks of thirds, and you have an order for 50 sacks of medium flour ; you perhaps order 20 sacks of thirds to be mixed with 10 patents, hoping to make a medium not equal to your stock, but you will be entirely wrong ;—you *will find the 20 bad ears blighted* with mildew wind swallow up the 10 good ears. "And when the wind had eaten them up it could not be known that the wind had eaten them, but they were still ill-favored as at the beginning."

WHICH FLOUR IS EXAMINED, AND THE OBJECTS WHICH REFLECT IT.

A sample of flour held in 20 different lights will probably reflect to the eye as many shades or tints, for when we remember that all different objects reflect some, and many colored light, we see that the tints of our flour under these circumstances depend not only upon its own proper color as seen in pure sunlight, but also upon the presence of its surroundings, not merely from reasons which I shall consider presently, but the tints due to rooms. Note, for instance, an extreme case in the Blue Cavern, at Capri.

The flour if the flour we wish to examine is a slight yellow, and is in the neighborhood of something green it will incline to orange. If near some yellow objects the tendency will be more deeply marked ; and again, if the same sample is placed in light reflected by a blue or violet curtain or blind the result will be a deeper red or slight purple. The amount of light also makes much change in the appearance of flours, and also whether we look close up to them, or some distance away, or whether we examine them with eyes half closed or wide open.

Flour too of a bright yellow color would contrast differently when compared against a dull grey flour, in different amounts of light in practice a larger bran was obtained if the grain were worked at once. With regard to the mixing of different flours to make a straight grade, that was a mistake, as it entailed a greater loss through the lowering of better flour below the level of the brand which it was intended to produce. The better way would be to take out as much as possible of good flour, while the less pure and darker grades should be sold for what they would fetch. He had found that 68 per cent. of flour from wheat would realize more money than 74 per cent. of flour from the same wheat. There was not he considered, 70 per cent. of good flour in wheat, and only about 60 per cent. of pure flour without grey tints could be obtained. With regard to the Pekar test, that was a test of great value. Mr. Ashby held it to be sufficient to simply wet the flour and leave it until it was dry, but he himself preferred to watch it while drying, and note how the different flours "shade off." A north light was very essential for the Pekar test ; reflections from surrounding objects should be avoided, and the room should be of a slightly neutral grey tint, and no prominent color should be present. At certain times of day the reflection from a brick wall, even at a certain distance, would render it impossible to correctly judge the right color of flour. The large piece of cardboard recommended by Mr. Ashby was a matter of great importance, and would no doubt be found very beneficial.

Mr. Bryan Corcoran (London) said the paper they had just listened to dealt with a subject of great difficulty, and he must thank Mr. Ashby most sincerely for *opening up a new field. It was quite refreshing to have* another subject than the old cry of millstones v. rollers. This question of color would require great attention as the mixing of pigments was not all. For instance, polarisation must be not lost sight of. The dissecting of one color from others, and the noting of the result was most important.

Mr. W. Evans (Leicester) would be glad to know something regarding the use of hot air for purification. In the mill of his firm they had been using the same air over and over again, and no doubt some benefit had been derived from the use of the warmer air. With regard to a standard of comparison, it was perhaps best to keep a sample of flour which was known to be desirable in every way by which the new samples could be tested.

Mr. Daw said he must take this occasion of publicly thanking Mr. Ashby for his kindness in consenting in February last to read a paper before the Association. As President he had enjoyed the privilege of a previous perusal of the paper just read, and it had made clear some difficult points which he had encountered in the testing of flour, and which he had never been able to satisfactorily explain. Previously to the perusal of this paper he had had several little disagreements with his foreman respecting the color of flour. For instance, his foreman would come and say that the flour which the mill was making was superior in color to a given standard, whereas when the two flours were compared in his office, the foreman was obliged to admit that the color was not so good. But Mr. Ashby had enlightened him on a matter he had before failed to notice—the disturbing influence exercised in his office by the reflection of *light. Now in these cases the foreman had after all* been right, because he had examined the flour under a skylight at the top of the mill where reflection was all but impossible. When testing two, three, four or six samples of flour on a board by the Pekar test he had noticed a very peculiar phenomenon, for in turning the board in various positions the color or brightness of the various flours changed, so that flour appeared best in one position, while it looked the reverse in another.

The chairman remarked that in testing flour in his office he obtained light from the south, west and north, and he had found so much variation of color in testing samples that at times he was not sure when the test was finished whether he was right or wrong, so difficult was it to get the correct light. He should like a little information respecting the best light, as he had just made arrangements for removing the testing room to the top of his mill in order to get a better light. Now that he had heard this paper he thought it might be possible to save the expense by considering the valuable points in Mr. Ashby's paper.

Mr. Peter Mumford quite agreed with the remarks made by Mr. Daw as to the variation of colors, and he went still further by asserting that a slight change of position in a single sample of flour would bring a perceptible variation in color. The physical condition of the flour had also to be considered, for he had noticed that as the moisture dried out the flour took a whiter color. Let any one take two pure flours, and he would perceive that in a correct light the finer ground appeared the whitest, whereas flour with the largest granules made the whitest bread.

Mr. J. Murray Case (of Columbus, Ohio, U. S. A.) was very pleased to have had an opportunity of becoming acquainted with this paper, which was most exhaustive. It touched on all points except one, and that was the degree of granulation in the different flours being compared. Fine ground flours reflect light better than flours of large granulation. To become fully alive to this fact a person had only to take from a sample of middlings a small portion and to somewhat reduce it. He would then see a great difference between the original sample and the finer sample. A sample of flour might appear white in one comparison and yet dough very dark as compared with another sample.

Mr. Daw doubted whether absolute reliance could be placed on a standard sample when regard was had to the fact that such sample would necessarily in time undergo a certain amount of bleaching. He would like to hear something further on this point from Mr. Ashby.

Mr. Ashby observed that with regard to heating of wheat to which Mr. Hibbard had taken exception he meant that the heat generated in grinding wheat should not exceed 112 degs. In reply to Mr. Evans, hot air currents in purifying, would, in his opinion, act as a kind of harvesting of the skin particle. Someone had referred to the bleaching of floor. He considered that bleaching was due to the withering of the branny or fibrous particles in the flour, and as a standard sample might change its character it was impossible to place much value on the comparison of that sample with any *other. The amount of moisture in flour so depended* upon the character and condition of the sample and the temperature and quantity of moisture in the atmosphere that in practice it would furnish no deduction of value Mr. Case had referred to a difference in granulation among various flours and it should be understood that in examining the color of flour. notice must be taken of reflected and transmitted light. The rays of pigments are black ; the rays of reflected light are white. Iron to a certain point is transparent, and a glass window in transmitting a number of rays of light will absorb and kill a small percentage. Then if the granulation was very fine there was the additional question of transparency. The question of granulation of different flours was really only to be satisfactorily tested by the operation of baking, and then it would become apparent what degree of granulation in flour was most favorable for the production of white bread.

Mr. Hibbard asked Mr. Ashby if he could give millers any idea as to the value of the tintometer. It was evident that he had had something to do with that instrument in the preparation of his paper.

Mr. William Whitmore (Wickham Market), after expressing the interest and obligation which he, as a milling engineer, felt with respect to the valuable paper read by Mr. Ashby, and alluding more especially to the idea or proposal raised by the reader, viz., that of artificially harvesting the middlings supplied to the purifiers, or drying the material over heated rollers, said it would be interesting to learn from Mr. Ashby his ideas or experiences of the degree of temperature necessary or advisable to effect this.

In reply to Mr. Hibbard, Mr. Ashby said that he had used the tintometer, and found it a great help. There was one thing about it that troubled him, and that was you were asked to look at a pigment through a transmitted light. He had tested liquids with the instrument and for that purpose he thought it perfect ; and he had also dissolved gluten in nitric acid and tested it for color. But no time must be lost in putting the liquid into the tank of the instrument, as the tint of the liquid was liable to continual change, so that a little delay might expose the operator to error. However, the instrument was a very useful one, although it was liable to tire the eye when used for any length of time. In answer to Mr. Whitmore, the temperature of the rolls really depended upon the length of time that the material was allowed to be in contact with them. In any case the material should not be allowed to exceed 112 degs. of temperature. With reference to Mr. Appleton's query, he would suggest the use of a mirror in testing flour for color, the mirror being placed in various positions round the flour. The sample which came the best out of this trial would be the best in color.

The grist mill at Selkirk, Man., has been lately overhauled.

A 50,000 bushel elevator is being erected at Orangeville, Ont.

Hunt's mill at London, Ont., was slightly damaged by fire a fortnight ago.

The first elevator on the N. P. & M. line is in course of erection at Portage la Prairie.

Mr. Clark, superintendent of the Ogilvie mill, Montreal, is at present visiting the Northwest.

The M. & N. W. Ry. expect to handle a million bushels of No. 1 hard this season from another line.

The mills belonging to A. H. Lance, at Perth, N. B., were recently destroyed by fire. No insurance.

The Portage Milling Co. purchased the first 30,000 bushels of wheat offered this season on the Portage la Prairie market.

The machinery in the new roller mill at Omemee, Ont., has been set in motion, and found to work very satisfactorily.

The Martin Elevator Co., is erecting elevators at West Lynne, Portage La Prairie and Miami, Man., and purpose building one also at Cragielea.

The partnership between Messrs. Cook & Cole, flour millers, Wolseley, N. W. T., has been dissolved. Mr. W. D. Cook continues the business.

The Pilot Mound, Man., mill has been purchased by Messrs. Chalmers Bros. & Bethune, who will put it in good working condition and operate it.

There is great scarcity of old oats in Manitoba, and prices have advanced 3 cents per bushel. Manitoba oatmeal millers are unable to replenish stocks.

The Winnipeg Grain Exchange has appointed a committee to make arrangements which will ensure the expeditious shipment of grain by the Duluth route.

Jas. Mitchell, a well known Winnipeg grain buyer, has gone into partnership with Wm. Martin in the Northern Pacific & Manitoba elevator system in Manitoba. The firm is known as Martin, Mitchell & Co.

France is said to be the largest consumer of wheaten bread in the world, her consumption of wheat per head being about 8 bush. against 5¾ to 5¾ bush. per head in Great Britain. Thus although the population of France is only about three millions more than that of Great Britain, the consumption of wheat in the former country is about 42,000,000 quarters per annum, and in the latter country only about 26,000,000 quarters.

Mr. Thos. Dickson, of the Patterson Mills, Avonan, Ont., who is about to remove to Manitoba, was made the recipient of a highly complimentary address, accompanied by two very handsome bibles, one each for Mrs. Dickson and himself, as slight tokens of the high esteem in which they were held by the Presbyterian congregation with which they have so long connected. Mr. Dickson made a suitable reply, after which several of his friends bore their tribute to his ability, and to the valuable services rendered by him to the congregation and community.

A meeting of the shareholders of the Lake of the Woods Milling Co. was held in Montreal recently, when the following directors were elected: Robert Meighen, president; John Mather, vice-president; E. B. Angus, William Cassils, and John Turnbull. The statement was made that owing to the speculatively high price of wheat last year, and the quantity of American flour which under the present unfair operation of the tariff is allowed to come into competition with the home product, the result of the mill's operations had thus far not proved satisfactory.

After a thorough investigation as to the cause of rust in wheat and other grains, the Guelph, Ont., Agricultural College has arrived at the following conclusions: 1. Seasons are the chief cause of rust; sudden changes of temperature and rain, accompanied by close, still weather, are favorable to its increase. 2. Low-lying, rich soils are most subject to attack. 3. An excessive use of manures rich in nitrogen encourages the disease. 4. Late sown grain is most subject to attacks. 5. Thinly sown crops seem mostly liable to injury. 6. Red wheats are less affected than white varieties. 7. Rust is more common in the vicinity of barberry hedges than it is at a great distance.

A terrific explosion attributed to want of sufficient water in the boiler, occurred in Merner's flouring mills at New Hamburg, Ont., on the morning of Sept. 14th. The brick engine house was blown into fragments. The air was filled with timbers, bricks and castings, which penetrated the houses in the neighborhood, doing considerable damage and endangering the lives of the occupants. A large piece of the boiler crashed through the roof of a barn 200 yards distant. Mr. James Hamilton, lessee of the mills, was in the engine house when the accident occurred. He was rescued from among the *debris* in an unconscious condition, being very severely bruised and scalded. His medical attendants hope for his recovery. The mills are owned by Mr. F. Merner, whose loss is placed at $5,000.

The quantity of grain, flour and meal received at Montreal is shown by the following table, compiled from the *Gazette's* official figures from January 1st to September 4th, in comparison with former years:

	1889.	1888.	1887.	1886.
Wheat, bush.	1,037,579	1,644,784	6,925,892	4,531,369
Corn, "	4,623,839	1,358,905	592,767	3,544,862
Peas, "	637,592	353,439	1,618,218	1,587,102
Oats, "	62,583		502,108	1,742,754
Barley, "	4,072		7,318	7,841
Rye, "			109,124	16,037
Flour, barrels	423,015	221,691	513,764	416,967
Meal, "	41,919	4,045	31,833	39,597

C. Anderson, sawmill operator at Little Current, is offering to sell out.

Ludlaw & Anslie, planing mill operators at Combe, Ont., were burned out recently; partially insured.

The Vancouver, B. C., saw mill, is undergoing improvements with the view of doing an export lumber business.

The proposed new C. P. R. line into the Parry Sound district, would afford an outlet for one of the largest lumber producing sections of Canada.

A. Christie, of Brandon, has purchased the whole season's cut of H. Bulmer's mill at Rat Portage, consisting of about 4,000,000 feet of pine lumber.

The tug "W. A. Booth," having in tow 2,000,000 feet of logs, was seized at Amherstburgh for non-payment of export duty, amounting to $4,000 and fined $400.

A leading lumberman in Ottawa, states that during the coming winter there will be a scarcity of work for log makers, as there will be more square timber made.

A fire originating in the boiler house, destroyed Hillman's mills, near Ottawa on the 11th of Sept., together with half the season's cut of timber. The loss is placed at $30,000.

In view of the large export of logs from British Columbia by Mr. Leary, of loggins raft notoriety, the Government are said to be considering the duty to be assessed on Douglas pine.

The saw mill property and timber limits belonging to the Hastings Saw Mill Co., New Westminster, B. C., were recently purchased by the Royal City Planing Mills Co., by whom the capacity of the mills will be largely increased, and new machinery introduced.

A number of the Chaudiere lumbermen have sent a communication to the city council agreeing to furnish fuel to a company undertaking the manufacture of charcoal, iron and steel, in event of the city aiding such an industry by giving ground suitable for the location of such works.

The quantity of timber measured and culled at Quebec, up to August 14, as compared with 1888, shows an increase of 104 per cent. in waney white pine, 302 per cent. in white pine, 102 per cent. in red pine, 16 per cent. in oak, 335 per cent. in elm, 101 per cent. in ash and 149 per cent. in birch and maple.

"I notice one thing," says an observant manufacturer, "and that is that hardwood logs, especially oak, that have been placed in the water immediately after cutting and allowed to thoroughly soak, make brighter lumber, with less tendency to sap stain than that from logs that are left on the ground for several months. I find also, that in green logs, if sawed immediately after cutting, and the lumber is thoroughly steamed preparatory to placing it in the dry-kiln, the same results will be obtained, greatly enhancing the value of the lumber for fine finishing purposes."

The lumbermen of the Ottawa district met recently and decided to send a formal protest to the Quebec Government against its action in claiming the exclusive right to appoint bush rangers for protection against fires, while the lumbermen have to bear half the expense of maintaining the service. The new law was passed last session, and provides that one-half the expense is to be raised by an assessment at the rate of 10 cents a mile upon the limits under license. In Ontario the lumbermen who are also assessed for this service are allowed a voice in the nomination of the officers.

The following is the last published statement of the Dominion government showing the ratio of timber taken out in each of the several provinces, to every 10,000 acres of area.

	CUBIC FEET.					FEET.
	WHITE PINE.	RED PINE.	OAK.	TAMARACK.	BIRCH AND MAPLE.	PINE LOGS.
Prince Edward's Island	11.1	2.5	1.3	82.5	689.5	38.5
Nova Scotia	92.9	26.7	17.0	7.2	430.5	378.9
New Brunswick	75.2	18.3	1.9	147.3	208.3	377.9
Quebec	400.8	54.2	4.9	224.2	230.5	447.1
Ontario	1883.3	284.3	83.7	232.7	63.1	2293.4
Manitoba	0.2		17.6	4.1	..	1.8
British Columbia	84.0	0.8	..	..	1.1	36.5
Northwest Territory	0.1	..	..	0.1	..	..
The Dominion	87.0	11.7	25.5	20.9	19.8	1107.1

An item is floating around to the effect that the Port Blakely, Washington, sawmill is probably the largest sawmill in the world and that it has a capacity of about 100,000,000 feet annually. This is a mistake says the *Lumberman*. There is a mill located at a small place in Ontario, at the mouth of the Trent river, near the head of the Bay of Quinte, which has a much larger capacity than the one alluded to in Washington, but which has rarely been run to its full speed, the stock not being obtainable. The Trenton mill, when erected, was simply enormous in size and capacity, a large number of gangs and circulars comprising the lumber producing machinery; but it was hyperbolic, a sort of exaggeration, so to speak, like the steamship Great Eastern, there being "no use for it," or in the case of the mill no use for over half of it, as it would have required nearly all the logs harvested on the Trenton river to have furnished feed for its capacious maw of saws. In fact, at the time the mill was erected it had sufficient capacity to have produced all the lumber being cut on the Saginaw river, if not in all Michigan. It was a perfect cormorant in its power to consume pine saw-logs, and could undoubtedly have cut one-quarter of the present out-put of all the Saginaw and Bay City mills. It was known, when erected, as "the big mill," from one end of Canada to the other, and approximately retains its name to this day. But from its inception to its consumption it was a sort of abnormity, and its enormous capacity was rarely utilized.

ELECTRICAL SPARKS.

The city of Kingston will buy the electric light works and run it.

Notre Dame Cathedral, Montreal, will be lighted by electricity.

We are informed that a model electric light station is under construction in Brockville.

The Barrie Electric Light Company, are putting in an additional incandescent system at a cost of $20,000.

The Picton Town Council will put in an $18,000 electric light plant to be owned and operated by the town.

Application has been made for the incorporation of the Windsor Electric Stroke Bell Co., the proposed incorporators all being Ontario men.

Midland is to have electric light. The corporation will take eight lights which are to be kept burning till 11 o'clock each night, at a cost of $300.

Mr. W. J. Clarke, consulting electrical engineer, is at Midland with his staff of assistants reinstalling and refitting the old lighting plant in the mills there.

Messrs. Goldie & McCulloch's tender for an engine and boiler to run the dynamos of the electric light plant, has been accepted by the Mitchell town council.

The street railways in St. John and Halifax are sending experts to the United States to secure the necessary data to enable them to supersede horse power on their lines by electricity.

The Intercolonial Railway now has its own complete system of incandescent lighting, with dynamos and other appliances of a well-equipped electric light station at Moncton and Levis for the storage of its own batteries.

It is reported that Mr. F. A. Ritchie, Director of the Holmes' Electric Protective Company, of Toronto., has caused to be issued a mandamus against Alex. McKay, Secretary-Treasurer of the Company, to compel access to the books.

The Board of Works of the City of Toronto will ask the City Council to sanction a by-law confirming a by-law passed by the county of York authorizing the Metropolitan Street Railway Company to operate an electric railway on Yonge street from the C. P. R. tracks north to the city limits, a distance of 1,500 feet.

The Toronto Electric Light Company is starting 100 new street arcs and building the plant for 300 more. The company, of which Mr. J. J. Wright is superintendent, have 560 city lights under contract, and run nearly 900 in all. They have put in a new 250 horse power engine and two 100 horse power boilers.

By the application of electricity a saving of three tons of coal per day, has been effected at the Barber paper mills, at Georgetown, Ont. A large dam has been built across the Credit river, below the mills, by means of which power is obtained to drive a 60 h.p., dynamo, the electricity thereby generated being conveyed to the mills over two ¾ inch copper wires.

One of the most conspicuous and attractive of the many exhibits of electric lighting appliances at the recent Toronto Industrial Exhibition was that of the Fort Wayne Electric Light Co., of Fort Wayne, Ind. The dynamo, and many of the other appliances exhibited had been sold to the Town of Port Hope, whence they were shipped direct from the Exhibition grounds. The exhibit was in charge of Mr. W. J. Morrison, general agent for the company for Canada and the State of New York. The attention of our readers is directed to the advertisement of this enterprising company, appearing on the front page of this paper. They invite correspondence.

At the last monthly meeting of the Canadian Electrical Society, of Montreal, Mr. Ness exhibited a fan driven by a Fuller battery, adapted for sick-rooms or dining rooms. The President, Dr. Lapham Smith, showed a small modification of the Leclanche cell, in which the fluid is a mixture of equal parts of saturated solutions of muriate of ammonia and bichromate of potash, the carbons being pencils such as are used for electric light. He tested several of these in ringing bells and so on, showing that they were equal to the Leclanche cells in proportion to the amount of zinc exposed, and their cost was from one-half to one-third of the former. One of the most interesting features of the evening was the paper read by Mr. A. Morrison on electrotyping.

The time for receiving tenders for the construction and operation of the Assiniboine water power at Winnipeg has been extended to January 15.

The Kingston foundry, established half a century ago by Mr. Caldwell, and which has since proved a paying concern, has just been purchased for $27,500 by Mr. W. Craig.

It is stated in the *Metallarbeiter* that iron can be coppered by dipping it into melted copper, the surface of which is protected by a melted layer of cryolite and phosphoric acid, the articles to be thus treated being heated at the same temperature as the melted copper. Another process consists in dipping the articles into a melted mixture of one part of chloride of fluorine of copper, five or six parts of cryolite, and a little chloride of barium. If the article, when immersed, is connected with the negative pole of a battery, the process is hastened. A third method consists in dipping the articles in a solution of oxalate of copper and bi-carbonate of soda, dissolved in 10 or 15 parts of water, acidified with organic gas.

To protect metal from oxidation, polished iron or steel for instance, it is requisite to exclude air and moisture from the actual metallic surface, therefore polished tools are usually kept in wrappings of oil-cloth and brown paper, and thus protected they will preserve a spotless face for an unlimited time. When these metals come to be of necessity exposed, in being converted to use, it is necessary to protect them by means of some permanent dressing, and boiled linseed oil, which forms a lasting covering as it dries on, is one of the best preservatives, if not the best. But in order to give it body, it should be thickened by the addition of some pigments, and the very best, because the most congenial of pigments, is the ground oxide of the same metal, or in plain words, rusted iron, reduced to an impalpable powder, for the dressing of iron or steel, which thus forms the pigment of oxide paint.

EXTENSION OF THE AMERICAN ELECTRICAL WORKS A NEW FACTORY IN MONTREAL.

ONE of the most striking proofs of the great demand for all kinds of electrical wire and conductors generally, as well as an instance of the success which a painstaking firm can achieve, is shown in the fact that the American Electrical Works, of Providence, R. I., have been compelled to extend their facilities again and again in the past, and have once more added by locating an entirely new and independent offshoot in Canada. The F. E. Phillips Electrical Works, limited, was organized this month in Montreal with a capital of $60,000, and starts out with the following corps: E. F. Phillips, of Providence, President; F. A. Smith, of Providence, Vice-President; James Cooper, of Montreal, Secretary and Treasurer, and Frank S. Mead, electrican and general manager.

Mr. Mead has been assistant to Mr. Sawyer, of the Parent Works, for ten years past, and is thoroughly fitted for handling the reins. He has been in Montreal since last April, and has fitted up a new factory with machinery and tools sent from the Providence works. The new factory is 100 feet by 45 feet four stories high, brand new, and one of the best in Montreal. It is practically the branching out into Canada of an old established works, and no experimental stage is to be gone through; hence, right from the start, the new works should and will turn out just as good work as the parent works in Providence. The new concern has our best wishes. —*Electrical Review.*

THE MILLING SITUATION.

PETERBOROUGH, Sept. 6th 1889.

EDITOR ELECTRICAL, MECHANICAL AND MILLING NEWS.

SIR, I am too busy a man to be able to give the time necessary to hunt up statistics, &c., necessary to deal fully with the questions affecting the milling industry at the present time. I may however refer briefly to a few things as they meet me in transacting our business. Straight roller St. Louis flour sold in Montreal this week for $3.90 per barrel in bond. How do our inactive Government propose to remedy this? How are they going to settle this matter with the farmers who placed the Government where they are? To remedy just such a question as this the manufacturers assisted to place the present Government in power. It meant extinction to a large number of them if our country was to be made a dumping ground for America's surplus goods, yet such is being done by the American millers to-day. The duty upon American flour is almost entirely wiped out by the low rates of freight given to millers in St. Louis and Minneapolis on flour to the seaboard—either Montreal, St. John, or Halifax—as the difference between the freight paid by St. Louis millers and that paid by our own millers is about five cents per barrel. Yet in the face of this, the Government stands idly by and sees our millers and farmers robbed of their rights by people who pay no taxes and do nothing to build up our country.

I am a supporter of the National Policy, and cannot understand the present inaction of the Government in this matter.

The millers have had this injustice brought home to them through reduced bank accounts and curtailed markets. The farmers are having it brought home to them now, and the millers, especially those of our different associations, are missionaries in disseminating knowledge amongst our farmers, and there is no question as to the result. The farmers are sharp enough to see that if our Government allows American flour to come in it displaces so much of their wheat in our market, and depreciates the price of same to them as well as to the millers. They are awakening to the injustice done to the largest tax-paying industry in Canada, *agriculture*, and if the millers are only united the remedy must come.

It is certainly cheering to see the number of successful local associations that have been organized by our indefatigable Secretary, Mr. David Plewes, of Brantford. Although the majority of our large millers have come in, a number of small mills, principally those depending on grinding and local trade, have not as yet done so, notwithstanding they are complaining of the larger mills cutting off their market. This is the very reason why they should come out and join our associations and help to remedy the real grievance. If the larger mills had the markets which the Americans have taken, they would leave the smaller millers their home market at their door undisturbed.

The different associations have settled on a table of exchange and buying and are determined to carry out the buying of wheat, both street and especially car wheat, by tester. It is to be hoped that all members will carry this out to the letter. Thanking you for assistance to our cause, I am,

Yours truly,

W. H. MELDRUM.

MILLERS, MANUFACTURERS AND WATER-POWERS.

VERY curious and interesting disputes are constantly coming before the courts, relative to the rights of millers and manufacturers on the streams which afford them power. Any one who has taken the pains to note the tenor of the decisions in these cases will see that they conform to certain established principles of law, with which every mill-owner would do well to be conversant.

The word "riparian" (from the Latin *ripa*—meaning the bank of a river) is a term used in law to refer to the rights and privileges of persons who own lands lying upon or bounded by streams or rivers. It is fixed in law and confirmed by court decisions that every riparian proprietor has an equal right to the free use of the water which passes his land. He has, however, no exclusive property in the water itself, but the simple use of it as it passes. He cannot appropriate it to his exclusive use nor divert it permanently from its natural channel without the consent of the adjoining proprietors. If he does divert it on his own premises, he must return it to its ordinary course when it leaves his estate.

These are the broad principles upon which the general and state laws are based. Of course the minor details of water rights, etc., are subject to local state enactments, forms and restrictions, otherwise streams of running water could rarely be properly applied to agricultural or manufacturing purposes. In all instances it may be taken for granted that nothing but positive surrender of rights or contract to the contrary, can deprive the riparian proprietor of the use of the stream passing him until he has had use of it, or he wishes to employ it legitimately.

If the water is insufficient for the mill-owner's purposes, but can be made by a reasonable detention, available for power, the courts have decided that he can so retain it until he has enough to use profitably. The mill-owners further down must do the best they can, being, of course, entitled to their share of the water when it gets to them in regular course. Again, as to protecting himself from damage by freshet or overflow, he can erect such protection as may be necessary in the way of embankments, etc., even though such protective measures may back the water upon adjoining land. The land-owner in the latter case has no legal cause for action.

Of course no mill-owner would be justified in the malicious detention or wastage of water, or in the unwarrantable release of water so as to destroy neighboring property. He has, however, the inalienable rights of proper use of the water and of protecting himself from its ravages, let others do what they will.

In this same connection, though not directly in the line of the foregoing, there comes the report of an interesting decision rendered in the supreme court of New York. The defendant had on his land a spring surrounded by an embankment. The plaintiff had a well which was dependent upon the defendant's spring for supply. The defendant cut through the embankment, thereby lowering the water in the well of the plaintiff. The court held that the plaintiff had no course for action, no matter what was the defendant's motive. The laws and courts throughout seem to decide that the elements air and water are the untrammeled property, for the time being, of those brought into natural contact with them.—*Mechanical News.*

TRADE NOTES.

Messrs. Wm. Kennedy & Sons have supplied during the last month, one 36 inch water wheel to A. R. Moore, Port Elgin, N. B., one 42 inch wheel to Rufus St. Fillemore, Moncton, N. B. one 50 inch wheel to Rupert Gardner, Halifax; one 42 inch wheel to R. B. Powers, Salt Springs, N. S., one 30 inch wheel for Meaford Electric Light Co., one 50 inch wheel to A. Sydney Smith, Port Sydney, (rebuilt). They have orders for one 60 inch wheel for the "Soo" Electric Light Co., and have in sight a good many others besides orders for saw mill and other machinery.

Messrs. Wm. Kennedy & Sons, of Owen Sound, write us as follows: We send you our advertisement under separate cover. As an item of news, we may say that we supplied two horizontal 25 inch "New American" wheels to drive Barber Bros. electric motors at Georgetown. One of these wheels develop 75 h. p., and the other 100 h. p. We also furnished the corporation of Joliette, Que., with a New American wheel to drive their electric plant, which it is doing satisfactorily, while two or three wheels of other kinds failed. We are now under contract with the Corporation of Niagara Falls, Ont., for the construction and placing of a 3 million gallon pumping plant working against a pressure of 250 lbs. per square inch at the pumps; the water power will be constructed by making an excavation in the rock above the Falls of sufficient size to admit of two iron penstocks for the water wheels, and of depth sufficient to secure 27 feet working head of water. The tail race will be a tunnel running from the penstocks to a point beneath what is known as the Table rock; the head water will be brought from the lower end of Cedar Island to the pump-house through a pipe laid in an excavation made in the rock. The water wheels are 250 h. p. each, and are so arranged that either or both wheels can be made to do the work. The pumps are in two sets, each set consisting of three 12 inch outside measurement plunger pumps. Provision is also made for a wheel to drive electric lighting plant. The whole work is intended to be first-class throughout, and to be completed in the early part of next year."

The cut at the Ottawa lumber mills this season amounts to 400,000,000 feet.

MACHINERY MFG.

The machinery for Mr. E. B. Eddy's new pulp factory in Hull is commencing to arrive in that city.

The well known firm of Miller Bros. & Mitchell, Montreal, has been succeeded by that of Miller Bros & Toms.

The Alpha Iron Works Co., and the Canada Iron Furnace Co., Limited, both of Montreal, are seeking incorporation.

The foundry by-law, granting $2,500 bonus to Mr. Thompson, of Qu'Appelle, to establish a foundry at Fort William, has been carried.

The town of Galt is indebted to Messrs. Goldie & McCulloch, the well known manufacturers, for a valuable site for a public hospital.

Mr. J. H. Killey, of the Osborne-Killey Mfg. Co., Hamilton, has severed connection with that firm, and formed a partnership with Mr. F. G. Beckett, under the style of the Beckett-Killey Pumping Engine and General Machinery Co.

A machinery house lately sent out men to test the consumption of power by various manufacturing concerns, and it was found that nearly all were wasting one-half their engine power, or one-half the fuel consumed. The percentage of loss ran as high as 73. This is an important point, surely, and when such manufacturers find it hard work to make any money at their business, they could cause a material saving by looking after the power question.

A company is being formed at Orillia to manufacture special machines which are the inventions of Mr. Robert Lloyd, of that town. These comprise two improved shingle machines; two other machines designed to utilize the waste of large mills by converting it into shingles, headings and box stuff; an improved saw carriage for lumber mills with a steam feed for same; a new automatic cut-off steam engine, and another engine designed for either stationary or portable use.

The reports of the inspectors of the Hartford Steam Boiler Inspection and Insurance Company, show that during June 9302 *boilers were inspected. The whole number of defects reported* reached 8332, of which 700 were considered dangerous and 26 boilers regarded as unsafe for further use. There were reported in this month 2199 cases of defective riveting, the next largest defect being serious leakage at tube ends, of which there were 1457 cases. Forty-five safety valves were found over-loaded and defective in construction; 116 burned plates were found, and 214 blistered plates.

A new machine which is at work in a Brussels mill, and which is said to thoroughly reduce the wheat to middlings, with a minimum amount of break flour in two breaks, the bran being left very large, and only requiring to be put through bran rolls to be finished. There is a certain amount of secrecy observed about this machine, which has, however, been examined by a number of English millers lately, who agree that the work done is marvellously good, but that the capacity is too small. The machine we are told consists of a roll of large diameter specially fluted, working against a fixed segment also specially grooved.

In the shops of Geo. Richards & Co., Broadheath, England, says the *American Machinist*, the holes for centers in the spindles of lathes of a certain class are all made standard size, so that centers are interchangeable, all the lathes being grouped in as few classes as is practicable. When a center in use is sufficiently worn, or is broke, instead of repairing it the lathesman takes it to the tool room, and gets another. The dilapidated centers are put in shape in the tool room, being held in a standard hole in a piece that can be attached absolutely true to the face plate of a grinding machine. It is the work of a boy to grind the centers, and a stock of each size is kept on hand.

Modern Light and Heat informs us that some tests have recently been made of the downward draught boiler, a principle by no means new, yet one which has not had an extended application, which have showed an economy over the ordinary type of boiler. While much progress has been made in steam engineering, it seems to us that the boiler, essentially the vital part of steam producing apparatus, has been a trifle neglected, and whatever is being done to improve it will certainly be watched with interest by all engaged in electric lighting, as anything which will cheapen the production of power is of great value to them, as additions to new and present plants for the generation of electricity for the vast number of purposes for which it will be and is now used, will certainly be required.

The *Woodworker* points out the fact that many planer knives, as they come from the factory, are not perfectly true on the face and will not rest firmly upon all parts of the face of the cylinder even after all the bolts are screwed down. Such knives are unsafe to use until these imperfections are removed. In order to secure a perfect bearing upon the cylinder, especially upon that part near the edge, the face of the knife should not only be perfectly true and straight lengthwise, but from the edge to the back it should be ground sufficiently concave so that when it is put upon the cylinder and screwed down, the pressure on the front and back edges should be greater than in the center. This not only insures it against slivers driving under it, but will also compensate for any fullness of the cylinder in the center that may be caused by the strain upon the bolt heads.

STEEL-WIRE TIRED FLY-WHEELS.—MM. Mannesmann, of Remscheid, Westphalia, Germany, are manufactering fly-wheels capable of double and even treble the speed of fly-wheels made of cast-iron, the resistance of which is generally limited to a speed of 40 meters, or about 129 feet, per second for the rim of the wheel. They have succeeded in obtaining fly-wheels which are capable of acquiring three times the speed of ordinary fly-wheels, by constructing the nave and the spokes of iron or steel and making a rim entirely of steel wire wound round and round itself a great many times.

THE DODGE PATENT WOOD SEPARABLE OR SPLIT PULLEYS.

Best Belt Surface, Best Balanced, Strongest, Lightest and Most Convenient Pulley in the World.

WITH OUR PATENT BUSHING SYSTEM

Every pulley will fit twenty-two or more different sizes of shafting. Two hundred of our pulleys and an assortment of bushings represent as many as four thousand iron pulleys, a great advantage to dealers carrying stock.

In comparing prices of pulleys, please note carefully the following:

Our list is lower than most others. Every pulley is a split pulley. Every pulley is guaranteed to transmit from twenty-five to sixty per cent. more power than any iron or steel pulley with same tension of belt. Our pulleys are seventy per cent. lighter than cast iron pulleys. The fastening does not mar the shaft. They are perfect in balance. They are the most thoroughly made wooden pulley in the world. And the handsomest pulley on the shaft. Every pulley as represented or no sale.

Order a sample pulley, after which you will have no other.

We make all sizes, from 9 inches to 16 feet diameter, and all strong enough for double belts.

We also manufacture **GROOVED HARD-WOOD PULLEYS** *for the transmission of power by ropes—under the Dodge Patent System. Estimates furnished for main drives and transmissions of any required power on application.*

POST OFFICE Address, **THE DODGE WOOD SPLIT PULLEY CO., - TORONTO.** TELEPHONE 2080.

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W. C. BONNELL, Manager.
- *Telephone 475.*

Halifax Branch:
BREMNER & HART'S WHARF.
F. LEDDEN, Manager.

Winnipeg Branch:
MERRICK, ANDERSON & CO.
AGENTS.

MANUFACTURERS OF

Cordage, Red Cap Binder Twine,

JUTE AND COTTON BAGS, CALCINED AND LAND PLASTER.

Factories at Montreal, Que., and Port Hope, Ont.

HEAD OFFICE, - MONTREAL.

Sample orders will always receive the greatest care.

BAGS

BRANDS, ELECTROTYPES
— AND —
NOVEL DESIGNS
FOR
PRINTING
SUPPLIED GRATIS.

OUR Bags Works have only been in operation a few months, but nevertheless we are pleased to be able to state that our daily sales exceed those of any similar concern in the country. This is accounted for by the fact that our plant and facilities are vastly ahead of what are ordinarily in operation, and the goods turned off cannot help but be superior in workmanship, appearance, and general uniformity. The Finest Bag Printing Press on the American Continent is running in our works.

Full stock of our Manufactures at all branches.

A. W. MORRIS & BRO., - MONTREAL, QUE.

LONDON MACHINE TOOL CO.,

LONDON, - ONTARIO.

MANUFACTURERS OF

Machinist-:-and-:-Brass-:-Finishers'-:-Tools.

L. A. MORRISON, with A. R. WILLIAMS, General Agents, TORONTO, ONT.

IMPORTANT TO STEAM USERS.

THE PREVENTION OF **BOILER EXPLOSIONS**

AND OTHER ACCIDENTS TO STEAM BOILERS.

When were your Boilers last inspected? Are they in safe working order? Are they giving the greatest power at the least cost?

The Boiler Inspection & Insurance Company of Canada.

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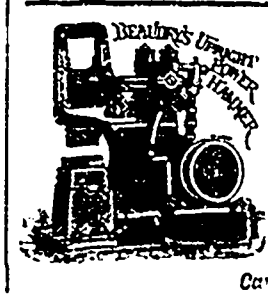

Beaudry's Upright Cushioned

POWER - HAMMER

Simple, Practical, Low-priced, Entirely New Design.

—SEND FOR PRICES—

MILLER - BROS. - & - TOMS,
(Successors to Miller Bros. & Mitchell.)
(Sole Makers for Canada) - *MONTREAL.*
Can be seen at Permanent Exhibition, Toronto.

Mr. E. O. Champagne of Montreal, was appointed Vice-President of the Boiler Inspector's Association, at its recent meeting in Chicago.

The report that the C. P. R. would build elevators at Duluth is contradicted. The Company propose to increase the capacity at Ft. William 1,500,000 bushels by building an annex to elevator A, which will bring the total storage capacity owned by the C. P. R. at the head of lake navigation to nearly 5,000,000 bushels.

A St. John, N. B., despatch states that flour importers are making complaint that the Canadian Pacific people are giving no better rates from the Ontario mills than the Intercolonial gave before the Short line was opened, and that the rates to St. John are the same as to Halifax, nearly three hundred miles farther. About all the flour brought here comes by the Intercolonial, all the way round by the north shore. The dealers decline to change their methods while the rates are the same both ways.

Says the London *Millers' Gazette*: The imports of oatmeal into the United Kingdom have very much increased compared with last year, indeed this trade seems to be extending rather rapidly especially from Canada. During July we imported 10,358 hundredweights from Canada and 10,504 hundredweights from America, against 580 hundredweights from Canada and 1,128 hundredweights from America last year. In the seven months ended July 31 America has sent us 104,060 hundredweights, and Canada 62,727 hundredweights out of a total import of 158,115 hundredweights, while last year we imported in these seven months only 17,407 hundredweights, nearly all from America. The present imports are of course but trifling compared with the Scotch and Irish manufacture, and neither American nor Canadian oatmeal millers, although they have largely improved their methods of manufacture, can ever hope to reach the quality of our leading Irish and Scotch makers, lacking as they do the necessary quality of oats.

We would like to enquire whether it is the intention of any of our Canadian Colleges or Universities to recognize the important part which electricity is destined to play in the world's affairs by providing a course of electrical training for those of our young men who may desire to qualify themselves to apply to practical purposes this useful and mysterious force.

LUMBER PRICES.

LUMBER.

CAR OR CARGO LOTS.

1¾ and thicker clear picks, Am. ins	$50 00@	52 00
1¾ and thicker, three uppers, Am ins.		37 00
1¾ and thicker, pickings, Am ins		27 00
1 x 10 and 12 dressing and better	20 00	22 00
1 x 10 and 12 mill run	14 00	15 00
1 x 10 and 12 dressing	15 00	16 00
1 x 10 and 12 common	12 00	13 00
1 x 10 and 12 spruce culls	10 00	11 00
1 x 10 and 12 maple culls		7 00
1 inch clear and picks	24 00	25 00
1 inch dressing and better	18 00	20 00
1 inch siding, mill run	13 00	15 00
1 inch siding, common	12 00	14 00
1 inch siding, slap culls	10 00	11 00
1 inch siding, mill culls	8 00	9 00
Cull scantling	8 00	9 00
1¼ and thicker cutting up plank	22 00	25 00
1 inch strips, 4 in. to 5 in. mill run	14 00	15 00
1 inch strips, common	11 00	12 00
1¼ inch flooring		35 00
1¼ inch flooring		31 00
XXX shingles, sawn	$2 25@	2 30
XX shingles, sawn	1 20	1 25
Eastlake galvanized steel shingles, 24 W. G., per square		5 25
Eastlake galvanized steel shingles, 26 W. G., per square		5 00
Eastlake painted steel shingles, per sq.		4 00
Eastlake painted steel siding, per sq.		5 00
Manitoba galvanized, steel siding, per square		4 50
Manitoba painted steel siding, per sq.		5 00
Special galvanized steel siding, per sq.		4 50
Special painted steel siding, per sq.		5 00
Imitation brick siding, per square		4 00

YARD QUOTATIONS.

Mill cull boards and scantling		10 00
Shipping cull boards, promiscuous widths		13 00
Shipping cull boards, stocks		14 00
Hemlock scantling and joist up to 16 ft.	11 00	12 00
" " " 18 "	12 00	13 00
" " " 20 "	13 00	14 00
Scantling and joist, up to 16 ft		14 00
" " 18 ft		15 00
" " 20 ft		16 00
" " 22 ft		17 00
" " 24 ft		19 00
" " 26 ft		20 00
" " 28 ft		22 00
" " 30 ft		24 00
" " 32 ft		26 00
" " 34 ft		28 50
" " 36 ft		30 00
" " 38 ft		32 00
" " 40 to 44 ft		35 00
Cutting up planks, 1¼ and thicker, dry	25 00	26 00
" " board,	18 00	22 00
Dressing stocks	16 00	22 00
Picks, American inspection		40 00
Three uppers, American inspection		50 00
Cedar for block paving, per cord		5 00
Cedar for Kerbing, 4 x 14, per M		14 00

B. M.

1½ inch flooring, dressed, F. M.	18 00	19 00
1½ inch flooring, rough, B. M.	18 00	22 00
1¼ " dressed, F. M.	25 00	28 00
" undressed, B. M.	18 00	19 00
" dressed	18 00	22 00
" undressed	12 00	15 00
Beaded sheeting, dressed	22 00	25 00
Clapboarding, dressed		32 00
XXX sawn shingles, per M, 16 in	2 65	2 75
Sawn lath	1 00	1 20
Red oak	30 00	40 00
White	35 00	45 00
Basswood, No. 1 and 2	18 00	20 00
Cherry, No. 1 and 2	70 00	70 00
White ash, No 1 and 2	25 00	25 00
Black ash, No. 1 and 2	20 00	30 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M	$11 00@	18 00
Birch, 1 to 4 inch, M	16 00	25 00
Basswood	14 00	20 00
Walnut, per M	50 00	100 00
Butternut, per M	22 00	40 00
Cedar, flat	00 00	00 00
Cherry, per M	65 00	80 00
Elm, Soft, 1st	15 00	17 00
Elm, Rock	25 00	30 00
Maple, hard, M	20 00	21 00
Maple, Soft	16 00	20 00
Oak, M	40 00	95 00
Pine, select, M	35 00	40 00
Pine, 2nd quality, M	20 00	25 00
Shipping Culls	14 00	16 00
Mill Culls	8 00	10 00
Lath, M	1 75	1 95
Spruce, 1 to 2 inch, M	10 00	12 00
Spruce Culls	4 50	6 00
Shingles, 1st quality	2 00	3 25
" 2nd "	1 25	2 00

Cement, etc.

Portland Cement, per barrel	$ 2 50@	2 87
Roman " "	2 50	2 87
Fire Bricks, per M	18 70	24 00

NEW YORK PRICES

WHITE PINE.

Uppers	$46 00@	62 00
Selects	40 00	53 00
Fine common	35 00	45 00
Cutting up	21 00	30 00
Common	17 00	25 00
Norway	19 50	26 50
Pickets	14 00	21 00
Shippers, according to quality, for different ports	17 50	52 00
Coffin boards	21 00	21 00
Box	15 50	17 00
Ceiling	24 00	42 00
Shelving	25 00	42 00
Moulding	34 00	37 00
Bevel siding	30 00	35 00
Bridge timber	28 00	30 00

EASTERN SPRUCE.

9 to 12 in	16 50	17 00
8 to 12 in	16 00	16 50
7 to 12 in	15 00	16 00
6 to 9 in	14 50	15 00
Special lengths	16 50	18 00
Lath	2 35	2 20
Piling, per lineal feet	5	5½

SHINGLES.

Pine, 16 in., extra	$ 3 10@	3 25
18 in. extra	4 35	4 50
18 in. clear butts	3 15	3 25
16 & 18 in. stocks	4 50	5 30
Cedar	8 75	10 00
Cypress	6 00	10 00
Redwood, per bunch	1 25	1 50
Various widths		1 00

HEMLOCK.

Timber	12 00	13 50
Joists	11 00	12 00
Boards	12 00	13 00
Lath		2 00

DRESSED LUMBER, CAR LOAD LOTS.

No 1 flooring, ⅞in	23 00	24 00
No 1 ceiling, ⅞in	25 00	26 00
No. 1 ceiling, ⅜in	18 00	19 00
Timber	14 00	15 00

ALBANY, N. Y PRICES

SHINGLES AND LATH.

Shingles, shaved pine		6 50
2d quality		5 00
Sawed, extra	4 30	4 40
Sawed clear butts	3 00	3 30
Cedar, xxx	4 00	4 20
Shingles, cedar mixed	2 75	4 00
Hemlock		2 25
Lath, pine	2 25	2 35
spruce	2 00	2 25
Hemlock	1 75	2 00

HEMLOCK.

Boards, 10 in., each		13½
Joist, 4x6		34
Joist, 2½x4, each		13
Wall strips, 2x4		10

PINE.

2½ in. and up, good	55 00	60 00
4ths	53 00	55 00
Selects	48 00	50 00
Pickings	43 00	45 00
1¼ to 2 in., good	50 00	55 00
4ths	45 00	52 00
Selects	40 00	45 00
Pickings	35 00	40 00
1 in., good	50 00	55 00
4ths	45 00	48 00
Select	40 00	43 00
Pickings	35 00	38 00
Cutting up, 1 to 2 in	30 00	35 00
Bracket plank	32 00	36 00
Shelving boards, 12 in. and up	28 00	32 00
Dressing bds., narrow	20 00	22 00
Shipping boards	16 00	18 00
Box boards	13 00	15 00
10 in. boards and better	30 00	34 00
Common	16 00	22 00
12 in. boards dressing and better	32 00	36 00
Common	16 00	24 00
1¼ in. siding selected 13 ft	43 00	45 00
Common	16 00	21 00
1½ in. siding selected	43 00	46 00
Common	14 00	19 00
Norway, selected	24 00	26 00
Common	12 00	16 00
10 in. p. k. 13 ft. dressing and better, each	45	50
Culls	23	25
10 in. boards, 13 ft., dress. and better each	28	33
Culls	17	22

BUFFALO AND TONAWANDA PRICES.

NORWAY PINE - ROUGH

No. 1, 1 and 1¼ in	20 00	22 00
No. 2, 1 and 1¼ in	15 00	15 50
No. 3, 1 and 1¼ in	11 50	12 00
Stocks No. 1, 1 and 1¼ in		22 00
No. 2, 1 and 1¼ in		17 00

WHITE PINE ROUGH

Uppers 1 and 1¼ in	42 00	44 00
1½ and 2 in	43 00	45 00
2½, 3 and 4 in	52 00	55 00
Selects, 1 inch	36 00	37 00
1¼, 1½ and 2 in	24 00	35 00
2½, 3 and 4 inch	44 00	46 00
Cuts, No. 1, 1 inch	27 00	29 00
1¼, 1½ and 2 inch	30 00	32 00
2½, 3 and 4 inch	37 00	40 00
No 2, 1 inch	16 00	17 00
1¼, 1½ and 2 inch	20 00	22 00
Moulding, 1 inch	30 00	33 00