

The Geo. T. Smith Middlings Purifier Co.

TORONTO, April 27th, 1889.

THE GEO. T. SMITH PURIFIER CO., Stratford, Ont.

GENTLEMEN: Replying to yours of the 18th inst., I have always been pleased with the result of the changes you made in my mill at Lambton Mills, and which has now been running about six months. From the time you first tinned wheat on the mill, the flour has been good and the finish close. The machinery, millwright work and material of all kinds are entirely satisfactory, and our business relations agreeable. I was influenced, by these facts to place my contract with you in preference to other mill furnishers from whom I had favorable offers for changing my Thorold mill to 300 bbls. capacity, using your full centrifugal system, which I think superior to any other system which has come to my notice.

I have another mill built by E. P. Allis & Co., but prefer your system to theirs.

Yours truly,

W. P. HOWLAND.

THE WELAND MILLS.

Sir Wm. P. Howland, Proprietor.

THOROLD, ONT., Dec. 20, 1889.

S. S. HEYWOOD, Esq., Manager G. T. SMITH M. P. CO.,
Stratford, Ont.

DEAR SIR: Replying to your favor of the 7th inst., enquiring as to how we are pleased with our mill that you built for us this summer, I am happy to say we are very highly pleased with the mill throughout, and I believe we have the best mill in Canada to-day. I may say that until now I have been in favor of the long system, but our mill, which is on the short system, is such a complete success and so far exceeds our expectations in every way, that I am now perfectly satisfied that the short system is the true and proper system when properly put in.

You are already aware that we can with perfect ease turn out 400 barrels of flour every twenty-four hours. We can do this and not crowd a roll or machine in the mill, although your guarantee was for a 300 barrel mill only. For quality of flour and cleanliness of finish I have yet to see anything to equal us. The machinery is the best that can be made, the workmanship and general get up of the machinery cannot be excelled, and it runs and works to perfection. The whole plan of the mill is so simple and perfect that it is impossible to speak too highly of anything in connection with it from beginning to end. Wishing you success and prosperity, I am,

Respectfully yours,

R. B. ROUNTREE,
Manager Welland Mills.

St. CATHARINES, July 23rd, 1889.

GEO. T. SMITH PURIFIER CO., Stratford, Ont.

DEAR SIR: Your esteemed favor of the 17th inst. came duly to hand requesting to know how we were pleased with the mill you built for us last winter. In reply would say that the mill has proved in every way a great success. Your contract with me was for a 300 barrel per day capacity. The mill will exceed this 50 bbls. per day at least. The workmanship is all done in a first class manner, and the quality of the flour produced by it, in our opinion, is not excelled by any mill yet built. It has been running night and day for some time, and so far it has given us entire satisfaction.

Yours truly,

JAMES NORRIS.

NORVAL, ONT., 23rd July, 1889.

THE GEO. T. SMITH M. P. CO., Stratford, Ont.

DEAR SIR: On the 28th of November last I contracted with your agent for a four break full roller mill of 300 barrels capacity. Work was commenced on the 1st of February, 1889, and now I am happy to say that I have a mill that can make in 24 hours 400 barrels of as good flour as any in Canada, and this with a very low yield and clean offal. My mill is built so that one-half can be run alone, or full wheat can be run on one half and spring wheat on the other.

For the nice arrangement of these two mills in one, much credit is due to your draughtsman. Of the millwright work I cannot speak too highly. Your foreman is a practical man, and does things right. In fact, every man on the job did his part with credit to himself and satisfaction to all concerned.

Your special machines, which comprise eleven belted double Roller Mills, six No. 3 Purifiers, twenty No. 6 Inter-Elevator Bolts, two No. 6 Centrifugals, Bran and Shorts Dusters, Packers, &c., are got up in good style. They run light, are stable and handsome. Nor does the work they do fall short of their outward appearance. Each handles its stock with ease, and separations are made which bring the best results at the finish. The belting you supplied is simply first-class, and reflects great credit on our Canadian manufacturers, as well as yourselves for using such stock.

I cannot close this letter without a word of recommendation for your agent, whose courtesy and business-like manner in dealing with the public should gain for you the patronage which you deserve.

Yours truly,

ROBERT NOBLE.

PEAREN BROS. ROLLER FLOUR MILLS,
BRAMPTON, ONT., Dec. 21, 1889.

MESSRS. GEO. T. SMITH M. P. CO., Stratford, Ont.

DEAR SIR: We take pleasure in informing you that the short system flour mill of 100 barrels capacity built by yourselves for us last season is very satisfactory. We did not ask for tenders from any other mill furnishers, believing at the time we placed contract, that you would build us a good and complete mill, and since we have been running it we have not regretted doing so. The Brown engine with cylinder 13 x 36 built by you at your works in Stratford, is a fine piece of workmanship, and for economy in fuel and easy working we do not think it can be surpassed. In regard to the mill, the planning and arrangement of the machinery is excellent. The machinery and millwright work is first-class in every respect, and we feel satisfied that no expense was spared on your part to give us satisfaction.

Yours truly,

PEAREN BROS.

PRESTON & MCKAY, Merchant Millers,
BOISSEVAIN, MAN., Dec. 13, 1889.

S. S. HEYWOOD, Esq., General Manager
GEO. T. SMITH M. P. CO., Stratford, Ont.

DEAR SIR: As you will doubtless be interested in knowing how our mill is running, we write you to say that since starting everything has run like clock-work, and we have been running night and day. We are turning out work equal to anything manufactured in this country. Our flour is giving general satisfaction and we have been so busy since starting we have hardly been able to take care of all the work offered. All the machines are models of fine workmanship and smoothness of running, while the mill has been planned by your clever draughtsman to facilitate the operations of the miller and convenience of all concerned. So far as our experience goes we do not know of any one mill furnishing house in America that manufactures as fine and complete lines of mill machinery as you do, as you seem to have secured all the latest and best lines produced by any single house. Your milling expert deserves great credit for the results we are obtaining as regards flour and yield. We shall take pleasure in showing any one our property here.

Yours very truly,

PRESTON & MCKAY.

We are the Canadian manufacturers of the genuine Brown Engine. Our drawings and patterns came direct from the Brown Engine Co., of Fitchburg, Mass. Many of the so-called Brown Engines manufactured by other Canadian manufacturers are comparatively worthless, and should not be confounded with the genuine Brown.

SECOND-HAND MACHINERY FOR SALE.

1 No. 2 Smutter, manufactured by W. & J. G. Greey, -	\$ 50	2 Jones Iron Rolls for breaks, each	30
1 No. 2 Smutter, manufactured by Howes & Babcock, -	70	1 Run Chop Stones, 3 in. x 6 in., with sun,	100
1 Run Chop Stones, against sun, four feet six inches, -	60	1 Single 12 x 24 Roller Mill, Gear Drive, manufactured	
1 Four Break Machine, 16 in. x 20 in., Goldie &		by Goldie & McCulloch,	100
McCulloch, -	250	1 Double 9 x 18 Roller Mill, Gear Drive, Barter,	200
7 Garden City Purifiers, each	50	1 Double 9 x 18 Roller Mill, Gear Drive, Goldie &	
6 Barter Purifiers, each	100	McCulloch,	175
8 9 x 14 Porcelain Rolls (new), each	30	1 4-break Machine, rolls 6 in. x 16 in., Goldie & Mc-	
3 Jones Stone Rolls for middlings, each	40	Culloch,	200

We have for sale a full line of special machines of our own manufacture, which includes a full line of Upright and Horizontal Cleaning Machinery, and Upright and Horizontal Bran Dusters.

We are Canadian Agents for the Knickerbocker Co., of Jackson, Mich., for the manufacture and sale of the Celebrated

Cyclone Dust Collector.

THE GEO. T. SMITH MIDDINGS PURIFIER CO.
STRATFORD, ONT.

NOTICE TO MILLERS.

We take pleasure in informing the millers of Canada that we have succeeded in making arrangements to manufacture and sell the

COCHRANE TRAIN OF ROLLS

FOR THE DOMINION OF CANADA.

At a large outlay of money, we have fitted up our works with SPECIAL MACHINERY for manufacturing these rolls, and are now prepared to fill all orders with promptness and satisfaction.

READ A FEW OF THE CLAIMS WE MAKE FOR THESE ROLLS:

SAVING IN POWER OF 20 TO 33 PER CENT.

MORE EVENLY GRANULATED PRODUCT

HIGHER PERCENTAGE OF MIDLINGS

REQUIRES LESS ATTENTION

MORE DURABLE, CHEAPER AND BETTER IN EVERY WAY.

For proof that the Cochrane Rolls do all we claim for them, write any of the twelve Canadian millers who have already adopted them, and whose addresses will be furnished on application.

If you wish **A NEW FLOUR MILL COMPLETE,**

If you wish **YOUR PRESENT MILL REMODELLED,**

If you wish **THE BEST ROLLS AND THE BEST MILL IN THE WORLD,**

Write us for plans and estimates.

Address,

Hercules Manufacturing Co.

PETROLEA,

- - - ONTARIO.

THE ELECTRICAL MECHANICAL AND MILLING NEWS

VOL. XIV.—NO. III.

TORONTO, CANADA, MAY, 1890.

{ Price, 10 Cents
\$1.00 PER YEAR

ELECTRICAL, Mechanical and Milling News,

PUBLISHED ON THE FIRST OF EACH MONTH BY

CHAS. H. MORTIMER,

Office, 14 King Street West,

TORONTO, - - CANADA.

ADVERTISEMENTS.

Advertising rates sent promptly on 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.

Subscriptions from all foreign countries, embraced in the General Postal Union will be accepted at \$1.25 per annum.

Subscribers may have the mailing address changed as often as desired. When ordering change, always give the old as well as the new address. 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.

OWING to a rise amounting to about 20 per cent. in the price of crude rubber, the rubber goods manufacturers of the United States met in New York recently and decided to advance prices in a proportionate degree.

WE have been asked by Mr. D. H. Ranck, Secretary, to extend to Canadian millers, on behalf of the Indiana Millers' Association, a cordial invitation to attend an important meeting of winter wheat millers to be held at Fort Wayne, Ind., on May 13th.

IT gives us pleasure to be able to state that the sanction of Parliament has been given to the bills authorizing the Commissioner of Patents to extend the patents of the Geo. T. Smith Co., of Stratford, Ont., and Mr. Samuel May, of Toronto, which, through inadvertence were allowed to lapse, as stated in our April number.

WE read that twenty men had a narrow escape from being killed by an explosion of mill dust in a Chicago brewery the other day. The danger of explosions occurring from the contact of fine particles of dust with the flame of a lighted candle or lamp is not as fully appreciated as it should be by workmen employed in mills and factories, nor indeed by the owners thereof. The introduction of the electric light would remove all danger from this cause, and the day is coming when its use in manufacturing establishments will be universal.

THE municipal authorities of New York state their intention of returning to the use of gas for public lighting. Our opinion is that they are indulging in a little game of "bluff" in the hope of getting a further reduction of prices from the electric light companies. The latter would be doing an extremely foolish thing were they to agree to do the work at an unprofitable figure, as the people of New York will never tolerate the

use of gas for street lighting again. Progress, not retrogression, is the watchword of mankind to-day.

NEW York detectives are said to have spent a couple of months in the city of Hamilton recently with the object of securing evidence which would have enabled an American electrical concern to bring suit against the Hamilton Electric Lamp Company for infringement of patents. The manager of the Hamilton Company is reported to have said to a reporter that one of his employees was offered \$4,000 to sign a paper implicating the Edison Co. in a breach of the patent regulations. The New Yorkers returned home, however, without accomplishing their purpose.

A NUMBER of Montreal wheat speculators are said to have made small fortunes during the last month as a result of a sharp advance in wheat prices, due to unfavorable reports concerning the European crop. As usual under such circumstances, several firms are said to be carrying large stocks in the belief that still larger profits will be obtained. The lesson learned by the purchasers of Manitoba wheat at fancy prices a year or two ago, has apparently been forgotten. The saying that "a bird in the hand is worth two in the bush," is nowhere deserving of more attention than in wheat speculation.

DOES it pay to advertise? Certainly it does, provided your advertisement is properly worded, attractively displayed and inserted in a journal which circulates widely amongst the class of persons you wish to do business with. The latest testimony to the value of the E. M. & M. NEWS as an advertising medium for manufacturers comes from the Geo. T. Smith Company, of Stratford. They inform us that they recently sold a quantity of machinery to Mr. Howse, of Nicola Lake, B. C., solely as the result of their advertisement in this journal. Prior to seeing the firm's advertisement Mr. Howse was unaware of their existence, and immediately opened communication with them with the result stated. It is frequently from remote points like this, unvisited by travelling representatives, that the properly planted advertisement secures business for the advertiser.

IT is daily becoming more evident that electricity is destined to play an important part in the manufacturing industries. The electric light has made possible the performance of more and better work in machine shops and factories. The electric motor has solved the problem of economical power, and is coming largely into use as its capabilities become better understood. The electric welding machine performs in a perfect manner the work heretofore done by hand, and with a rapidity that is marvellous and highly suggestive of increased profits when compared with the method hitherto employed, and so on, *ad infinitum*. The growth of the electrical industries in Canada has been very rapid of late, and at the present time the demands of the country in many directions can be fully met by Canadian manufacturers. A wide field undoubtedly exists for the electric welding machine, and we should be pleased to see arrangements made for its manufacture within the Dominion.

THE *American Machinist* refers to the example set by the late M. Chanteloup, brass founder, of Montreal, in leaving his fortune of half a million to be divided among his former employees, and adds: "We don't know how it may be in Canada, but if such a thing should be done in this country, it is perfectly safe to say that relatives would turn up who would succeed in proving that the testator was insane, and, if they did not prevent a division of the money entirely, would delay it

so long that most of the employees would be dead or independently wealthy themselves, and the lawyers would have the five hundred thousand." We may remark that the disposition of heirs on this side the line closely corresponds to our contemporary's description of the United States species. It may be taken for granted that the heirs Chanteloup will be emphatically heard from in due course.

THE danger to life and property resulting from the operations of electricity has been the theme of endless comment by writers on the daily press. A vast amount of rubbish has appeared on the subject, and the new agency through which has come so much comfort and convenience to mankind, is made to bear a great deal of unmerited blame. Scarcely a fire of any magnitude has occurred recently in the large cities of the United States that has not been attributed to the electric current. So far have these exaggerations been carried, that they have become by-words among the writers of the electrical press. Our English contemporary, the *Electrical Review*, for instance, ironically remarks: "The burning of Toronto University was caused by the falling of an oil lamp. An hour later 2,000 guests would have been in the building attending the *fete*. What an opportunity missed for electricity!"

DR. WILSON, M. P. for Elgin, is moving in the House of Commons to have grain testers enlarged from one-sixteenth bushel to one peck. The wheat buyers have no objection to this in principle, but would have good reason to complain of such a change, on the ground that they have invested thousands of dollars in the testers at present in use, and further have paid one dollar on every tester for Government inspection. Every tester in use has been inspected by a Government official and has been declared to be strictly correct. Further than this, the millers have in some cases taken their testers to farmers' meetings and placed them in the hands of farmers alongside the half bushel measure, and in every such instance the farmers themselves have declared them to be correct. The Secretary of the D. M. A. has written the Government calling attention to these facts, and has also informed Dr. Wilson that it devolves upon him to prove the existence of a grievance before asking Parliament for a remedy.

THERE has within the last few weeks been a turn in the tide of the Canadian miller's affairs. For several years past he has been in decidedly hard luck—in fact, well nigh squeezed out of existence. As the result of a determined effort on the part of the Dominion Millers' Association, he again finds his feet on *terra firma*, and the dejected, hopeless expression which so long served as a mark of recognition, is no longer to be seen on his countenance. A peep into the meeting held in Toronto a month ago, and which is reported in the present number, revealed the fact that the recent action of the Government has put new life and encouragement into the great Canadian milling industry. It has likewise given a new stimulus to the D. M. A., and ensured its continued existence for the purpose of bringing about in other directions much-needed reforms affecting the prosperity of the millers. As a member of the Association truly said at the late meeting, the work of the Association has only commenced. Let it go forward, encouraged by the success which has already crowned its efforts, and guard and promote the interests of its members in every way possible. We are pleased to learn that the Association has taken immediate action with regard to some of the matters requiring its attention. The committee appointed at the recent meeting have succeeded in making an arrangement with the G. T. R. to grind American wheat in transit for export

to Europe and Newfoundland whereby Ontario millers will be placed in nearly the same position for grinding American wheat for export as the American millers themselves, and should there be a good harvest in Manitoba, it is expected the new arrangement will apply to grinding Manitoba wheat in transit. This will serve to keep our millers busy. Altogether things in the milling line in Ontario are looking better than for some time past. The Secretary of the Association, who has travelled considerably through the Province, reports winter wheat prospects as good. Although some clay and low lands are badly killed out, yet on all other soils, especially in southern and western Ontario, wheat looks so good that the deficiency in other districts will probably be made good and an average crop ensured, while the acreage of spring wheat sown is considerably larger than last year.

WITH the view of testing the possibilities of a profitable trade with the West Indies, a number of prominent Toronto merchants and manufacturers have decided to send a representative there in the person of a gentleman who was formerly a resident of the country, and is consequently familiar with the people and their methods. We hope to hear of the success of the experiment.

FIVE times since its establishment in 1882 the Ball Electric Light Co. found it necessary to enlarge its premises. During the last month the offices and factory have been removed from 67 Adelaide street west, to Nos. 70, 72, 74 and 76 Pearl street, Toronto. The new factory will afford the Company four times the amount of floor space which it has hitherto had at its disposal. A quantity of new tools have been added; also a moulding shop, where in future all castings entering into the Company's manufactures will be made. We are pleased to notice these evidences of prosperity on the part of one of our oldest electrical concerns.

COMPLAINTS are already heard from those engaged in lumbering and other branches of industry as a result of the strike which at present prevails in the building trades in Toronto. The time has certainly arrived when the laws should be readjusted so as to compel the reference of disputes between employers and workmen to arbitration. The strike is a cruel and barbarous method, and recourse to it should be followed by severe punishment. It is absurd that a few discontented workmen should be permitted to block the wheels of industry and entail hardship upon an entire community in order that their employers may be forced to grant them a few cents more wages per hour. The subject is one that calls for immediate Governmental attention.

THESE are the days of syndicates and colossal business enterprises. A vast amount of British capital has found investment in the United States during the last year or two, and now there are indications that British gold is finding its way into Canada. One or two of our leading manufacturing concerns have passed under control of British syndicates, and others are considering the overtures made to them. British and American capital is being largely invested in Canadian mining property. We hear of syndicates and companies composed of Canadians and Americans being formed for the accomplishment of various objects in the industrial world. And in not a few instances, so rapid of late years has been the accumulation of money by our people, we witness the formation of purely Canadian companies of great financial strength for the development of the country's resources in one direction and another. There is abundant evidence to show that the Dominion has passed the experimental stage in its history, and attained to the point from which its future progress will proceed on a broader and more rapid scale. There is a discouraging task ahead of the few pessimistic croakers among us who profess to see nothing but disaster ahead. Ten years hence they will appear in a still more ridiculous light than they do at present.

MILLERS and milling journals in the United States are highly amused at the latest vagary of that back number periodical, the *American Miller*, in offering to make a life subscriber of any one who is innocent enough to send the publishers \$15 in hard cash. The scheme is thus referred to by the *Millstone and Corn Miller*: "In the April issue is an announcement to the effect that the *American Miller* will be sent to subscribers for life for the sum of fifteen dollars. This is a new phase of the insurance business that requires more than passing notice. Whether it is expected that five or six years reading of this paper will kill the subscriber, which is

reasonably conclusive, or whether the offer is a tacit acknowledgment of such extreme depression in the milling business that no miller will be found who could spare fifteen dollars at one time for such a paper, will ever remain buried in the archives at 184 Dearborn street, Chicago. When the grave gives up its dead, but not before, the secrets of this place will be rendered in judgment." The *Northwestern Miller* adds: "For genuine brilliancy of conception this project surpasses anything which Tigg Montague, Esq., ever dreamed of in the palmy of the Anglo-Bengalee Insurance Company. It is as ingenious as the slickest freight bill dodge of the Broadway sharper and appeals for success to the same class. What in the world a sane man could want of a life subscription to the *American Miller* passes comprehension. If the "certificate" were transferable after death it might be utilized to some extent and possibly be worth two-and-a-half or even three dollars. One could then leave it to his enemy and thus blight the unfortunate recipient's future."

THE "BROWN" ENGINE.

EDITORIAL, ELECTRICAL, MECHANICAL AND MILLING NEWS.

DEAR SIR, In your April number you publish a letter signed "W. F. Walker, General Travelling Agent, Goldie & McCulloch," which seems to have been called out by mine which you were kind enough to publish in your March edition.

The only statement I made in my letter about Goldie & McCulloch or their engines was, "The Brown Engine in Doherty's organ factory was manufactured by Goldie & McCulloch themselves." Mr. Walker says this is a "fling" at Goldie & McCulloch, and an assertion that the engine is comparatively worthless. I do not know much about the merits of Goldie & McCulloch's engines. Mr. Walker no doubt knows much better than I do, but I did not imagine they were so bad that the announcement of the manufacturers' name would condemn the engine as worthless or be a "fling" at them.

Mr. Walker's statement regarding the number of Wheelock engines built and where sold, relating as it does exclusively to Goldie & McCulloch's business, is no concern of mine. Mr. Walker has been selling engines for many years, and perhaps has not always found it necessary to substantiate his statements by cold, hard facts.

He stated the Doherty engine is being replaced by a Wheelock because the business required a larger engine. Doherty & Co. say the reason for changing is, they heat with exhaust steam, and the engine broke down under the back pressure. Does Mr. Walker know better than Doherty & Co. why they are making the exchange?

Mr. Walker will, I am sure, be pleased to have his attention called to his statement regarding the replacing with a Wheelock a Brown engine manufactured at the company's shops in Stratford. Mr. Walker was unfortunate in his selection of language for this statement, and it has been understood by your readers to mean that the engine referred to was manufactured by this Company. Mr. Walker knows this is false, and will be pleased to have the fact known that the engine in question was not manufactured by The Geo. T. Smith M. P. Co., and there was no more propriety in introducing it in this discussion than there would have been had it been a Corliss.

Yours truly,

THE GEO. T. SMITH M. P. CO., OF CANADA, (LTD.),
S. S. Heywood, Manager.



Mr. Thos. Robins, Barrie, Ont., is refitting his shingle mill.

Mr. Allan McPherson, of Longford, is building an addition to his mill.

Messrs. Hay & Patton, of New Lowell, Ont., are fitting up their saw mill.

A dispatch from Digby, N. S., says Jacob Bingay's steam saw mill at Porter's Lake, was burned to the ground a few days ago. It is supposed to have been set on fire. Loss about \$9,000.

Mr. John Wilson, of Ottawa, representing Booth's Lumber Company, has been visiting British Columbia with a view to selecting a suitable location for a saw mill and lumber framing factory.

Mr. D. Peterman, of Collingwood, Ont., has been making extensive additions in the way of improved machinery to his mill. The machinery for Ackerman Bros.' new saw mill at New Westminster, B. C., is being put into position.

Messrs. Frank Dudley, of Portland, Me., Rufus Henry Pope and W. W. Buley, of Cookshire, P. Q., and Wm. Bullock Ives and Henry B. Brown, of Sherbrooke, P. Q., have been incorporated as "The Scotstown Lumber Company," with \$50,000 capital.



Campbell, Ruthford & Sinclair, Blenheim, are placing in position one of The Geo. T. Smith M. P. Co.'s three roll mills for chop.

The attention of millers and mill machinery makers is called to the challenge appearing in Messrs. James Jones & Son's advertisement in this issue.

Campbell, Stevens & Co., of Chatham, Ont., have recently added a three roll chopper, manufactured by The Geo. T. Smith M. P. Co., to their mill.

A. E. Howse, of Nicola, B. C., has made a contract with The Geo. T. Smith M. P. Co. for the complete outfit for a mill at that place, including building plans.

Campbell, Stevens & Co., are changing their Chatham mill to the three break system, using The Geo. T. Smith M. P. Co.'s system of breaks, centrifugals, etc.

W. J. McCartney, of Thorold, Ont., has bought the grist mill at Port Robinson, and has made contract with The Geo. T. Smith M. P. Co. for one of their three break full roller and centrifugal mills.

Alexander Kelly & Co., Brandon, Man., are increasing the capacity of their mill. James Pyc, of Minneapolis, has the contract. The Geo. T. Smith M. P. Co. furnish the necessary machinery.

A. Watts & Co., of Brantford, Ont., are building a flour mill at Manton, Man. The Geo. T. Smith M. P. Co. are furnishing one of their 4 break machines and other machinery for the mill, which will be full roller process.

We are informed that Pepper Bros., Milverton, are changing their mill to the short system, replacing the Barter and Goldie & McCulloch rolls with modern machines of the Allis pattern, manufactured by The Geo. T. Smith M. P. Co.

Stevens & Sinclair, of Ylmer, Ont., have removed one run of their chop stones and put in place of it one of The Geo. T. Smith M. P. Co.'s chop rolls, and now, with both stones and rolls on chop, have the most complete outfit for chop in Ontario.

Messrs. Maguire & Dryden, for many years past foremen respectively of the iron and wood-working departments of the Toronto Millfurnishing Works, have recently started on their own behalf in the same line of business at No. 22 Bay St., Toronto. Their long practical experience should go far towards ensuring them success.

J. M. McFarlane, Dunblane, is moving his machinery to Arden, Manitoba, where he has formed a partnership with David Moore, and they are building a 100 barrel mill at that place. The Geo. T. Smith M. P. Co., of Stratford, furnished building plans, diagram and specifications, new Brown engine and boiler, rolls and other necessary machinery. It will be a short system mill.



A syndicate is in process of formation to establish steel works at Kingston, Ont.

A new company is being formed to take over and operate the Vancouver foundry.

D. Findly & Sons, founders, Carleton Place, Ont., have dissolved. The business will be continued by Davis Bros.

Mr. R. Ward, of Claremont, Ont., has rented his foundry and planing mill to Messrs. Dobble & Saunders, of Toronto.

An incendiary attempt was made on April 20th to burn Mr. Algie's foundry at Simcoe. The fire was, however, extinguished with slight loss.

The name of the Osborne-Killey Manufacturing Company, of Hamilton, has been changed to the Osborne-Worswick Company, of Hamilton, limited.

The town of Berlin has undertaken to loan to Messrs. Cochrane and Jackson, the sum of \$10,000 for ten years without interest, as an inducement to establish a foundry there.

The Canadian Locomotive and Engine Company, of Kingston, has issued a circular denying the assertion made in a recent Parliamentary debate that mining machinery could not be made in Canada. They submit a large list of articles which they are prepared to manufacture, and which includes nearly every article required for mining purposes. They deny that the acquiring of the necessary patents would be so costly as to handicap any Canadian builder, and state that there are no valid patents to prevent Canadian makers adopting the most approved type without any payment of royalty.

We have repeatedly cautioned boiler hands and engineers against opening or closing valves quickly, says the *Locomotive*. How often do we go into a boiler house, or an engine room, and see an attendant hurry to a valve and spin the wheel round as though it were a top! Now, if such men would consider matters a little, and read up the histories of boiler explosions and other such accidents, they would, we think, be more careful in their operations. How often do we read—"The works had been shut down during the noon hour, and at at one o'clock the engineer went to the throttle to start up; as soon as he had touched the valve there was a deafening report . . ."—or something of that general nature! When any structure is under a strain it should be treated with the utmost consideration, and no sudden variation of this strain should be allowed to take place. This is carefully looked after in railroad bridges and such structures, and the same principles that teach the locomotive engineer to go across the bridges slowly should teach the stationary engineer to open and close his valves slowly.

NEW WORKS OF THE DODGE WOOD SPLIT PULLEY CO.

LARGE factories built and equipped specially for the manufacture of pulleys have only been known in the United States within the past ten years. There is no longer any question, however, but that the pulley factory is now recognized as a great convenience to power users, and the very extensive buildings and plant of the Dodge Manufacturing Co. in Indiana is an indication of how that company has been patronized. The following shows the works of our Canadian Dodge pulley works at West Toronto Junction, and judging from the number of pulleys turned out and shipped by this company daily, we should say that the Dodge Wood Pulley Co. had filled a long felt want. We give the following partial description of the company's new works:

The site selected is on the north side of the C. P. R. track, covering an area of some 4 1/4 acres, and gives every facility for the shipping and receiving of stock, having special sidings for that purpose. The works consist of main building, 250 x 54, three stories, with annex 80 x 60, large store house, machine and blacksmith shops, &c., all of solid brick, having been erected especially for the manufacture of the Wood Split Pulley, and completely equipped in the most modern and substantial manner.

Entering the annex we find the engine room, a model of completeness in itself, and are at once attracted by a beautiful and practical transmission of power by manilla ropes, a system now very popular in the United States and Great Britain, and being largely adopted in this country through the efforts of this company, who make it their specialty. The power is taken from the 13 ft. grooved fly wheel of a handsome 100 h. p. compound engine, and conveyed to the 50 feet of main line shafting by means of 1/2" wraps of 5/8" rope running on to a 1/2" grooved pulley, which with the tightener pulley on travelling carriages and necessary idler and winder, constitute the main drive which runs the shaft at 300 revolutions per minute and drives all the machinery in the factory. In addition to the main drive there is a second transmission from engine shaft upright to counter shaft, from which is driven the mammoth Sturtevant fan. This fan, with the heater attachment, supplies all the hot air necessary for the heating and ventilation of the whole factory and dry kilns. It discharges 52,000 cubic feet of air per minute at 250 revolutions per minute, and requires 18 h. p. to drive it. The boiler is a "Field Stirling" water tube safety boiler, having a working pressure of 165 lbs. and 125 h. p. capacity.

In this building we also find the dry house, which holds 60 M. feet of lumber, all on trucks of 4 M. feet each, and arranged so that as soon as a truck is passed out for use, a fresh one is pushed in from the other end, thereby keeping the kiln constantly full. The loaded truck of dried lumber is carried on an auxiliary car into west end of main building and deposited close to the large endless bed surface planer and planed, then passed to the cutting up saws.

We have now passed from annex into main building and are shown the direction in which the lumber travels after leaving the planer. We find that all arm and bushing stock courses down one side of the large ground floor, while the rim stock goes down the other side. In this way the work is systematically classified, each man and machine having his special portion of the pulley work to do. The pulley as it now appears, has reached the last end of first floor, and is taken on elevator to next floor, where it commences to travel westward. Passing through the different stages, it arrives at west end of second floor, when we find it a "Dodge Wood Split Pulley," ready for the paint shop. It is now taken in on elevator (at that end for the purpose) to paint shop on third floor, where it is thoroughly filled with a patent specially prepared filler, painted and varnished, and afterwards wrapped with special wood wrappers, size marked on end and is ready for shipment.

The machine shop is completely equipped for all iron work necessary in the making of iron centre grooved pulleys for rope transmissions, turning, shafting, bolt and nut cutting, tapping, smithing, etc.

The dust arrester and shaving service, which works most effectually, depositing into the vault in boiler room, is also worked with a Sturtevant fan.

The works throughout have been constructed with a view to being considered "Standard" by the Fire Insurance companies, all elevators and stairways being

backed in from ground to roof, and all doors iron covered. Each flat is provided with two fire plugs and 100 feet of 2 in. hose, also 3 bbls. and 20 pails kept constantly filled with salt water.

The company holds eleven Canadian patents, and the factory has a capacity of about two hundred pulleys per day without working overtime.

The entire construction and fitting up of this model establishment has been under the direct supervision of Mr. Samuel May, the President and Manager, to whom too much praise cannot be given for his untiring zeal in placing his company in a position to supply the power users of Canada with an article which has long been so universally popular on the other side of the line.

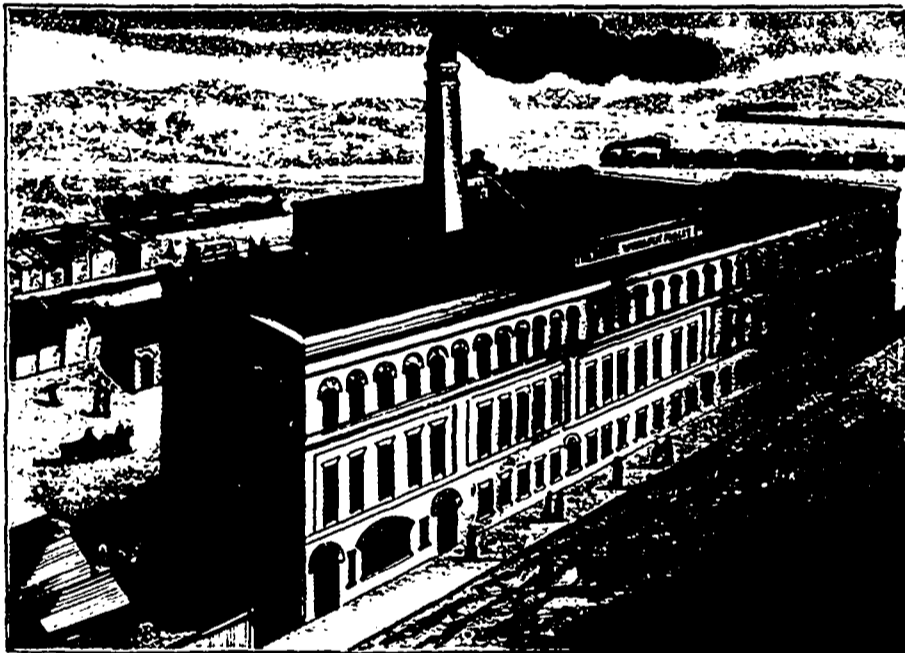
Correspondence should be directed to the office of the Dodge Wood Split Pulley Co., Toronto.

SOME DATA COVERING THE COMPARATIVE COST OF INCANDESCENT LIGHTING.

FROM the carefully kept records covering the period of two years from Jan. 1, 1888, to Dec. 31, 1889, of the large isolated incandescent electric lighting plant in the basement of a well known office building, the following data have been gathered in the hope that they may be of service to some of our readers.

The total dynamo capacity of the plant is 2,100 16 c. p. lamps; but 2,900 lamps have been wired in circuit, though a greater number than 2,000 lamps have been in actual use at one time only on two or three occasions.

The plant has been in constant operation during every hour of the 24 months, with two exceptions, the first of less than two minutes, and the second of several hours, while some changes in the position of the shafting



NEW WORKS OF THE DODGE WOOD SPLIT PULLEY CO. AT WEST TORONTO JUNCTION.

was being made. Only two armatures were injured during the 24 months, necessitating a total expenditure of \$160 to repair same.

The total number of lamp hours for 1889 was 8,831,435, and for 1888, 8,353,080 hours, making a total of 17,185,515 hours.

The comparative life of the lamps used during 1888 was found to be 3,250 hours, while this average had increased during 1889 to 4,464 hours. As the lamps used were all furnished by one company, the natural inference is that a higher grade of lamp is now being supplied, more especially as during the month of November, 1889, the comparative average life of the lamp has reached the high figure of 5,629 hours.

The total amount of coal consumed during 1888 was 1,337 tons, and during 1889, 1,406 tons, and for each pound of coal consumed a lamp was maintained for an average period of 2 hours, 48 minutes.

The average cost of maintaining a 16 c. p. lamp for 24 hours during the period mentioned was 6.82 cents. The cost during the first month of the period, January, 1888, was 8.96 cents per each day of 24 hours, but careful management had reduced that cost by November, 1889, to 5.80 cents per lamp for 24 hours.

A careful study of the above abstract should convince every owner of an office building that it will be to his interest to have an electric light plant installed, with a view of furnishing electric light free to his patrons as an inducement to occupy his offices, as the total yearly average cost per lamp in a modern office building should not exceed *four dollars per year per light*, including every possible expense, aside from electric or combination fixtures, owing to the limited necessity for artificial light during the greater portion of the time the tenants are in their offices.—*Electrical World*.

THE WHEAT MARKET.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

SIR, One of the most important questions of the day among millers is, "How can we avoid paying an unfair price for our raw material without forming a combine?"

There is not a doubt in the mind of anyone in the trade that an immense amount of harm and loss results from these sudden and often unwarranted booms on the market. Take to-day's prices as an example. The dealers on 'Change in Toronto are asking \$1.17 for No. 1 h. wheat, when it can be bought in Duluth and laid down here, duty paid, for \$1.11.

Now I think it would be quite in order to inquire as to the cause of this apparent discrepancy. Some of the outside millers have been led to think that the local millers are to blame for this, but that such is not the case is amply proven by the fact that they have been conspicuously "off the market," and have been taking little or none of the wheat offered. This false idea has on more occasions than one done serious harm, as its tendency is to hide the real cause of the trouble and direct the attention away from it. The first and principal cause is the lack of reliable information as to comparative values of grain here and elsewhere. The grain dealers and speculators who hold wheat in large quantities, take quick advantage of an outside rise and rush the market up here to a point much beyond the figure at which it is either safe or wise to buy, and the millers, panic stricken, rush to buy, and at the same time blame each other for "bulling" the market. Then the millers who have been fortunate enough to have a stock of flour and wheat on hand, go deliberately to work to "squeeze" the unfortunates who have not

for a moment dreamt of taking their profits out of the rise; or if the larger mills should follow up the rise of wheat by raising the price of flour, it is the most common thing in the trade to find a half dozen or so of the smaller fry dodging around their customers and offering cut rates, a course the folly of which it would seem that an experience of a hundred years could not teach them. They must surely know that they cannot sell goods on an open market without their prices and methods being found out, and a fair measure of retributive justice dealt out to them afterwards.

The second source of trouble lies in the fact, that as soon as there seems to be a possibility of a shortage in the crop, the large mills in the Northwest proceed to buy up or corner all the wheat at speculative prices, having in view no doubt the possible but very dubious result of closing out the Eastern buyers. This, however, they cannot now do, for as soon as the Manitoba wheat goes above a certain figure, it becomes not only possible but quite easy to obtain Duluth or other American wheat for our mills.

It has been a matter of common report that a certain large milling firm in the Northwest have recently made an offer of \$1.15 for all the hard wheat in the Northwest, and many ascribe the unreasonably high price of to-day to the extent of that offer as used by the dealers.

Another cause is the bad practice of making offers for stuff, which the dealers almost invariably use as a means of extorting more money from your neighbor, and eventually from you. Let the dealer submit his offer, and then accept or refuse it on its merits.

It is therefore quite reasonable to think, sir, that if the millers of this province would simply look at this matter and examine its causes and effects, then honestly and manfully proceed to put the thing right, each man acting on his own account, there never would arise the necessity of even thinking of a combine or any other solution of the question.

Yours truly,
JOHN BROWN.

PERSONAL.

The E. M. & M. NEWS was recently favored with a call from Mr. Clark, superintendent of Messrs. A. W. Ogilvie & Co.'s Montreal mills.

On the 9th of April, Mr. Hugh McCulloch, Jr., of Galt, was united in marriage to Miss Agnes H., youngest daughter of the late H. R. Symmes, of Riviere du Loup, Que. The office staff of Messrs. Goldie & McCulloch took advantage of the occasion to show their appreciation of Mr. McCulloch's many good qualities by presenting him with an address and an elegant silver water pitcher. The NEWS joins its congratulations to those which the happy couple have already received from numerous friends.

MILLERS' MASS MEETING.

PURSUANT to call of the Secretary of the Dominion Millers' Association, a well attended meeting of millers was held in the Board of Trade rotunda, Toronto, on April 1st and 2nd. Those present were: J. D. Sanby, London; C. Macdonell, Collingwood; Thos. Bell, Elm and Cataract; James Hamilton, Glen Huron; Simon Plewes, Creemore; R. A. Thompson, Lynden; John Plewes, Salmonville; W. H. Finemore, Burlington; P. R. McDonald, Oxford Mills; Thomas Eagon, Tottenham; John Galbraith, Allandale; Henry Bracken, Boston Mills; D. Plewes, Brantford; J. C. Vanstone, Bowmanville; J. Spindloe, Cookstown, Ont.; R. Noble, Norval, Ont.; Fred Rollins, Madoc; H. B. Schmidt, Thornhill; W. Galbraith, Toronto; James Wilkinson, Barrie; James Todd, Stratford; Irvine Lake, Hamilton; J. Goldie, Guelph; R. Rayburn, Deseronto; J. R. Defoe, Napanee; G. S. Baldwin, Aurora; T. M. Syer, Thamesville; G. Carveth, Laskard; R. B. Cooper, Belleville; F. W. Fowlds, Hastings; J. W. Hay, Listowel; Alex. Dobson, Beaverton; John Hull, Lakeland; J. T. Flavell, Lindsay; M. McLaughlin, Toronto; R. Marshall, Plattsville; W. H. Meldrum, Peterboro; E. S. Edmonson, Oshawa; W. J. Howson, Wroxeter; W. B. Robson, Hamilton; John Brown, Toronto; E. Peplow, Peterboro.

The Secretary presented his report, which reads as follows:

"After you appointed me to the position of secretary I applied myself to remedy two evils.

1. The custom of buying wheat without some regular kind of inspection, whereby the farmer with shrunken or dirty wheat oft times got nearly as good a price as the farmer with good wheat.

2. To agitate Ontario and Manitoba to petition the Government to remedy the differential duty evil under which we suffered. With respect to the first evil (buying wheat without some kind of inspection) I held and addressed in different parts of the province nineteen millers' meetings, organizing the province into seven local Millers' Associations. At those meetings the millers almost unanimously adopted the plan and are now known as buying by tester. In a few localities I found the plan had been adopted for some years past, and on the whole was working satisfactorily to millers and all the best farmers who were growing standard wheat. Of course I found that men whose wheat was poor and unclean were opposed to inspection, and always will be. However, the most vigorous protest I have met was that we made too much difference between standard wheat and 56 and 57 lb. wheat, being five cents reduction on 57 lb. wheat and eight cents reduction on 56 lb. wheat, but lately I have got several illustrations that where farmers become buyers of flour they voluntarily make a greater reduction in buying flour from light or heavy wheat than our scale introduced. One illustration on this point I now give out of several, viz.—A miller in London, Ont., does not exchange, but does a larger trade in selling farmers' roller flour at wholesale prices instead of exchanging grists. He keeps three kinds of 95 per cent. flour—1st, one from Ontario wheat, averaging 59 lbs. This flour he charges \$1.90 per 100 for. Another from standard wheat, price of this flour, \$2.15 per 100. Another flour from two-thirds standard Ontario wheat and one-third Manitoba, this he charges them \$2.25 for; and nineteen out of every twenty farmers always take the two best grades, refusing to take the flour from 59 lb. wheat when equal to ten cents reduction per bushel is offered them. Moral—The difference we make is not as large as the farmer makes when he becomes buyer instead of seller. With respect to duty agitation, besides making this a prominent feature in my addresses at millers' meetings, I also addressed fifteen farmers' meetings and was represented by other millers at five farmers' meetings besides, where two meetings would come on the same day, and while the Farmers' Institutes differed in their application of a remedy to our differential duty grievance they nearly all by resolution said we had a grievance. I also addressed two Boards of Trade and wrote letters to four other Boards of Trade. The result of one letter to the Winnipeg Board of Trade was a regular agitation all through Manitoba to petition the Government to remedy the same, and Manitoba sent an influential deputation to Ottawa to press the matter on the attention of the Government. Two deputations have been to Ottawa from Ontario on the same errand, one on the 6th of January being composed of only the President and Secretary, some others were to go then, but failed for some cause to go. Later a much larger deputation went on the same errand, and you have the result of all this agitation in the budget speech and it is now for this meeting to take action on the same as they may elect. On account of the great expense in agitating the duty grievance, the *Bulletin* for want of means to pay for the same, was discontinued after the 14th of January last, after consulting with the President and Executive Committee. They concluded it was best to do that till such time as this meeting was called, then the meeting could devise ways and means for continuing the same or otherwise, as may be determined. From numerous letters received there is a strong desire to have bulletins issued regularly. The introduction of the tester has caused considerable opposition on the part of some of the farmers, for while they generally consent that the principle of buying by some kind of test is right, nevertheless complain that the small tester is not correct, and that if a test is to be applied the tester must not be smaller than a half bushel measure. To show the fallacy of this complaint the Association members caused large samples of wheat, also half bushel measures, and the two quart testers to be taken to a meeting of farmers at Brantford and another at Listowel, and then asked for a farmer to be selected by the meeting and to test the samples of wheat in both half bushel and quarter bushel measure and also to test some samples in the two quart tester and, at Brantford, in the quart tester, and all the tests,

whether in the one quart, two quart or half bushel measure were alike, thus proving in the hands of the farmers themselves the testers were correct and reliable, and the secretary would advise the members of the association whenever there is a Farmers' Institute meeting to apply the same test, so that the present prejudice born of ignorance may be entirely removed.

Passing from recording the past and venturing to forecast something for the future I think it would be in the interest of the members of the Association (supposing there should be a large crop in Manitoba next harvest) some arrangement could be made with the railways, suitable to railways and millers whereby some of the crop in the west could be ground in transit to the seaboard, going full employment to our mills without making the car loads to be carried to the seaboard any less for the railroads. In conclusion, if there are any matters on which members require information not mentioned in the report the secretary will be happy to answer any questions that may be put to him.

Mr. Hamilton referred to dissatisfaction on the part of some of the farmers with the present exchange system. He suggested the appointment of a commission composed of a farmer, a miller and the Ontario Minister of Agriculture to provide a remedy. After several had spoken, the President remarked that the only effectual way of removing the difficulty was by substituting for the present system, buying the wheat and selling the flour.

A committee, consisting of Messrs. Spink, Myers, Syer, Stewart and Noble, was appointed to report on the matter. At a later stage in the meeting the committee reported, recommending the system of buying and selling as being the most equitable between the farmer and the miller, and that millers endeavor to explain to the farmer the advantages of this system by selling flour to farmers at wholesale. But where the exchange system is still in use the committee recommend the Local Millers' Association as the proper parties to frame the exchange table for their various localities, that the tester be used in determining the value for exchange purposes, that due regard be given for the parts of a pound, and that a cash value be the only basis for determining the value for exchange purposes.

Mr. Spink moved, "That this Association heartily endorses the action of the Government in increasing the duty on flour to 75 cents per barrel, thereby placing Canadian millers on equal footing so far as duties are concerned, with American millers in competing for the Canadian trade."

In moving this resolution Mr. Spink said he had never supported the present Government, but nevertheless thought their action on the millers' behalf deserving of recognition.

Mr. Finemore seconded the resolution, and in doing so said that the increase of duty should be satisfactory to the millers. They now only required to get wheat down to export prices in order to make money. Even a dollar per barrel duty would be no advantage unless common sense was exercised in buying. No other commodity was bought in the same way as wheat. In the case of wheat no allowance was ever made for a drop in prices.

Mr. Thos. Goldie suggested that approval be signified of the Government's action in equalizing the duties on wheat and flour. As a dollar per barrel duty was impossible of attainment, they should back up the proposed increase to 75 cents, especially in view of the hostile action of the Halifax and St. John Boards of Trade.

Mr. Spink consented to the motion being amended in the direction suggested by Mr. Goldie, which was accordingly done.

Mr. McLaughlin said that Messrs. Goldie and Macdonnell had been talking like men out of humor. After such a hard fought contest, everybody ought to feel in good humor, and sweep the resolution through with a cheer.

Mr. Macdonnell replied that he had been and was still favorable to an assimilation of duties with the United States, but was prepared to yield gracefully to the wish of the majority.

The resolution was amidst applause unanimously adopted.

The President said that there had been some reports that the system of grinding in bond was being abused, and the Executive thought an investigation should be had.

Mr. Warcup said in view of the fact that the privilege of grinding in bond might be abused, he would move the following resolution:

"That the Government ascertain whether any violation of the existing regulation is taking place, and take action to bring the guilty parties to punishment."

Messrs. Brown and Macdonnell, while repudiating the charges, supported the resolution.

Mr. Peplow thought the adoption of the resolution would look like a vote of want of confidence in the Government and their officials.

Mr. Warcup replied that there was no such intention, but rather to show that the Dominion Millers' Association counted the fullest enquiry.

The President called attention to the fact that years ago this privilege was abused, and the Government collected a large amount of money in consequence. He pointed out that some wonderfully cheap flour had been sold in the Eastern provinces, which had perhaps given rise to these rumors.

The resolution, seconded by Mr. John Plewes, was adopted.

The auditors presented their report showing a deficit of \$600, and the President pointed out that steps would have to be taken to make this good.

Some one suggested that an assessment should be levied upon the members to cover the amount.

Secretary Plewes was reluctantly compelled to state that there were some members who would stand by and not pay a cent. If an assessment was made, it would not be paid. The deficit should be provided for at the present meeting. He would by resigning his office save to the Association the amount of his salary.

Mr. Warcup moved that the members be called upon to pay their annual dues forthwith for the purpose of wiping out this deficit.

Mr. Edmonson enquired whether the annual fees would be sufficient to wipe out the deficit and pay the running expenses of the Association. He thought the Association should be continued.

Mr. Saunders was in favor of a special assessment to wipe off the deficit, and allow the fees to go towards defraying the expenses of the Association. The Secretary stated that with the deficit out of the way, the annual fees would be sufficient for all requirements.

Mr. Peplow thought there would be no difficulty in raising the amount of the deficit by special assessment. He suggested that the assessment should be on the basis of \$5 for each hundred barrels capacity.

The President favored an assessment, and believed enough money would be forthcoming. He pointed out that in future the Association would not require to pay a secretary \$1,500 per year to give his whole time to the work. For the amount of work required to be done in future, a salary of \$500 or \$600 would be sufficient remuneration.

Mr. Robson pointed out that if every member would pay 5 cents per barrel on a single day's capacity, it would foot up the required amount.

Mr. Peplow moved that an assessment of \$5 per 100 barrels be imposed.

The Secretary thought an appeal should be made to millers outside the Association to contribute towards the extraordinary expenses of the recent agitation. He returned thanks to those millers who subscribed money to pay his expenses while attending meetings of local associations.

The resolution was adopted.

EVENING SESSION.

At the evening session Mr. John Brown read the following paper on the relative treatment of American and Canadian millers by American railroads:

The question of the relative treatment of American and Canadian millers by the railroads built and supported by Canadian industry and energy offers a very wide field of enquiry, and is well worthy of the utmost attention of this association, for there is not a miller in Canada who makes ten barrels of flour for the market but is more or less affected by the railway policy of the country.

There has never been a time in the history of the trade when greater evils existed than at the present, and in order to arrive at a just appreciation of the extent of these evils and their results we must make a comparison between the condition of the American shipper and that of our home manufacturer. The freight on flour in car lots to-day from Minneapolis to Toronto is 20 cents per cwt., or 40 cents per barrel; from New Richmond, Wisconsin, 15 cents per cwt., or 30 cents per barrel; from Winona, on the Mississippi river, 15 cents per cwt., or 30 cents per barrel; while the freight on flour for an equal weight of wheat from Manitoba averages 47 cents per cwt., or 94 cents per barrel.

Thus we see that the shipper in Winona can send his product to Toronto for 64 cents per barrel less than his opponent in Manitoba shipping over the same road, while for rating purposes the distance would practically be the same, and he therefore saves enough on his freight discrimination to pay the duty even at 75 cents, all but 11 cents per barrel, and he does not have to pay freight on his offal as the Canadian miller would have to do, and he has a much better market for it than here. Thus having stated the facts let us enquire how such a condition of affairs has come about.

In the first place, the declared policy of the great trunk lines is to encourage importation of foreign goods at what they themselves declare unremunerative rates and against the interests of the home manufacturers. In order to impress this fact clearly upon the minds of my friends who are prepared to combat this idea, let me give some railroad opinion which was given under oath at Montreal, evidence taken before the Royal Commission on Railways, Friday, December 16th, 1887.

Mr. L. J. Seargeant, on being examined as to the general policy of the Grand Trunk Railway, declares that: "As regards these shipments the fiscal policy of this continent is protectionist, both

...the American States and Canada; it is therefore... importations to the extent of the duties imposed on the... goods, and we find it necessary to adjust our tariffs to... possible point to enable commercial men on the other... Atlantic to deal with connections on this side."

Mr. Seargeant here, in the fewest words possible, lays down the... policy of the railways in regard to freights on all imported... goods: "That in order to encourage importation the great... are prepared to make freights so low for the outsiders, ... at home, as to practically annul the effectiveness of our... Now, we cannot pass this over as an incautious and... declaration spoken hastily and without consideration, ... Mr. Seargeant was speaking under oath, and was there as one... representative of his road, and, therefore, in his official... We can therefore form some idea of the power of these... and terrible force of our bondage to them, when they... publicly make such a declaration—when they can almost with... of opposition, and almost without comment from the... down and carry out such a line of policy. This declar... places the position squarely before us, and we are compelled... whether we will continue to pay high local and through... order that these companies may carry our opponents'... for next to nothing, or, on the other hand, take measures... the evil. Some may object that that policy as stated... refers to freight from across the Atlantic, but Mr. Sear... on the same page, declares:—"What I have said on that... applies to all kinds of freight." Now, there are no class... the industrial community who are more anxious for the finan... cess of the railways than the millers, for they fully appreci... the value to the commonwealth, but it is just as certainly true... that they have every reason to be dissatisfied with the policy under... which they now conduct their trade. If the contentions of Messrs. ... Van Horne, Olds, Hickson and Seargeant be correct, and we may... also assume they are, that they are losing money on the impor... traffic, then they certainly are making up the deficiency at... the expense of the home shippers, and we are paying exorbitant... rates. If, as they claim, there is not a sufficiency of home traffic... to meet, would those gentlemen kindly explain why Canadian... lumber, grain, flour and lime shippers cannot fill their orders for... of cars to ship their stuff? Will they offer some reasonable... explanation of the fact that they are expeditiously handling Ameri... brought at rates that do not pay them, while home shippers... cannot get cars? Only last fall, while the railway authorities in... Toronto were announcing the suspension of the American carrying... trade through their paid provocators, the milling journals of the... American North West were noting the fact that thousands of cars... were being shipped via Canadian trunk lines. Now it is very evi... dent that the more the deficiency which these gentlemen have to... make up just that much more will the long-suffering Canadian... shippers have to put up. Thus we see that while his business may... be ruined while he waits for the alien to be served, he is also... called upon to pay a large proportion of the cost of transportation... of goods imported to spoil his own market.

Then Mr. Olds tells us in his evidence that the railways exercise... a benevolent supervision over the necessities of our several busi... nesses and fix the rates accordingly. Let me quote his sworn... testimony. Said he:—"We are governed by what shippers can... afford to pay. It is a matter of agreement between the large... shipper or the small one and the railway agent." Thus we see... that not only does the railway agent arrogate to himself the posi... tion of judge as to the necessities of our trade, but he lays down... the rule that this power may be exercised to the extent of issuing... not only special public rates but also "very special private rates."... Now our American cousins do not tolerate such a method at all, ... and all companies doing business in the U. S. A. are compelled... to post their rates and publish them, in order that the public may... know and take full advantage of them. From this you will see... that the largest miller in Minnesota has no advantage over his 25... local competitors, but on the other hand they have the best facili... ties in the world for bringing their goods to market. This is well... illustrated by the rates noted at the beginning of this paper, where... the mills from which the stuff was actually imported varied from... 100 down to 200 barrels per diem. While a 200 barrel mill in... New Richmond, Wisconsin, sends flour to Toronto, a distance of... nearly 1,000 miles, and the cars are unloaded and loaded again in... transit, for 30c per barrel, the same company charges a mill of the... same capacity in Toronto 25 to 30c per barrel to Montreal, just... one third the distance. Gentlemen of the Dominion Millers'... Association will no doubt, in view of these facts, appreciate to its... fullest extent the benevolent providence in the shape of railway... control which sitting very much aloft, overlooks and cares for... the necessities of our trade. The railway companies claim that... they have to compete against the lake routes, and have in conse... quence to make their rates correspondingly low. That this is not... the true reason is amply proved by the fact that the rates I have... noted are winter rates, and we all know what a wonderful effect... a few degrees of frost seems to have upon the powers that be in... the Toronto railway offices; but these magic influences do not... seem to work their charm to the same extent in Minneapolis, Mil...waukee, or Duluth. As a matter of fact, these companies are... entirely to blame for the present low rates, both to the seaboard and... to interior points, for a reference to the American press will dispel... the idea to the contrary. Indeed to such an extent have the... Canadian lines carried this ruinous competition that the American... people have more than once threatened to stop their traffic by... depriving them of the bonding privilege and charging duty upon... their rolling stock. I am very sure that there is no one here who... does not know that the companies who thus prate about lake com... petition are slowly, but not the less surely, killing that trade, so... that for their own selfish ends, and very shortsighted ones at that, ... they are destroying the hope of commercial advancement of the... people to whom they owe their very existence. They have made... themselves a disturbing element among a people with whom our... very interest teaches us we should live at peace. It is a very... important matter for the common every-day business man to under... stand how this policy is going to pay, even in the far-distant... future. How a policy which is closing mills and factories at home, ... and dependent upon them, will advance their interests abroad, is

a conundrum which, I fancy, even that uncrowned autocrat, Presi... dent Van Horne, would find it difficult to solve. Perhaps he has... got an idea into his head that too much prosperity is not good for... the sound development of the country, and, as a benevolent man... and patriot, has figured out a system by which a strong aggressive... and vigorous race of business men, trained in the great railway... school of adversity, may fill the future teeming marts of trade and... the coffers of the railways. Of course the youngest of us is not... expected to live to see such a happy result, nor yet are we expect... ed to fully consent to such a mode of treatment, but we must take... it purely on faith that Messieurs Van Horne and Hickson know... better than we do what is best for the future. We cannot blame... the railroad companies nearly as much as ourselves for the existing... state of affairs, for they exist only because of our own neglect or... apathy. The American people are fully alive to the necessity of... guarding their commercial interests from the dangers arising from... the great corporations getting control of the business interests of... the country. They have shown very plainly that they will not... submit to the tyranny of railroad control, and in consequence they... have the advantage which we can only look at with envy. In the... United States of America the larger millers and dealers, recogniz... ing the fact that the acceptance of special or private rates only... served to make their bonds the tighter, very wisely united with the... rest of the trade in obtaining legislation abolishing the giving of... special advantages to individual shippers. How things are in this... respect most of you are pretty well aware. Nothing can show... this better than a quotation from Mr. Olds' evidence:—"We have... special grain tariffs which are printed and made public. Then... there are other specials brought about by special circumstances. ... They are simply advised through the agents to those shippers who... are interested in the trade." Now, while I am sure we do not... like to think it, there are a number of business men in our trade... who obtain these special specials, and while as a business transac... tion on their part we cannot wholly characterize it as dishonest, ... we must admit that this is a means used by the railways to perpe... tuate the present system of purchasing these men and their... influence. Then another and by far the largest class of contribu... tors are the men who, sheep-like, suffer extortion and justify... their position by the statement that they are at the mercy of the... railways; and so they are, but only by their volition. The re... maining class are the so-called "chronic kickers" who have the... courage to have opinions and to make them public, who fearlessly... use the lash of the press and the platform upon those who would... impose on us the rule of monopoly. This class varies in number... from time to time, according to the aggressiveness of the monopo... lists. Now, it is mainly due to the "kicking" hump among our... cousins across the line that is daily rendering their commercial... enterprises more free, and contributes to so great an extent to the... expansion of their trade and commerce. Had the millers of Can... ada been content to grumble in the privacy of their offices, would... the Government at Ottawa have ever granted them the half-meas... ure of justice which they seem to have got? Now, if this associa... tion is powerful enough to wring justice from the Government of... the whole country, is it to be said that they cannot obtain legisla... tion to prevent them becoming the slaves of the monopolies. It... was the intention of the writer to have touched upon some of the... methods which are employed in the United States to check unfair... discrimination; but until we are fully satisfied that something... must be done to that end, until we can show a united front to the... common enemy, it would be useless to go into Committee of... Ways and Means. And before concluding this imperfect brief of... the case let me urge upon you all, the paramount necessity of be... ginning at once a vigorous campaign against railway aggression. ... The writer might have cited many statistical tables and quoted... many writers and speakers on this subject, but he feels persuaded... that it is not the facts that are in doubt to you, but that the issue... should be squarely stated and your unanimous co-operation by... voice and pen, on the platform, in the press, and in the office, ... should be solicited and granted to stop the greatest evil that has... yet overshadowed our commercial hopes.

After some discussion the subject was referred to a... committee to draft a suitable resolution.

This closed the first day's proceedings.
SECOND DAY.

Mr. Macdonnel asked for an independent commission, ... which would do away with the friction between the rail... ways and the public and greatly expedite the investiga... tion of complaints.

The committee appointed the previous evening re... ported as follows:

"That a memorial be presented to the Government and also... forwarded to the various Boards of Trade throughout the Domi... nion, asking their co-operation, and also that a copy be sent to... each member of the association with the request that he obtain as... many signatures as possible to the memorial, and then return the... same to the secretary not later than the first of July."

On motion of Mr. Saunby, seconded by Mr. Meldrum... the report was adopted unanimously.

The President suggested that a copy should be sent... to the Government, and to Messrs. McCarthy, Mulock... and Laurier, M.P.'s, who have been promoting this idea... before Parliament, also to all the Boards of Trade and... Manufacturing Associations.

Mr. Brown said the millers themselves had more in... fluence than any other organizations. If the matter was... pushed with the same vigor as the duty business had... been, a year would not pass before a change would be... effected. The trouble with the millers was that they... hadn't half big enough ideas of their own importance.

Mr. Macdonnel moved that copies of the memorial... be sent to each member of the Association, to Boards... of Trade, etc., with a request to get it as largely signed... as possible, and return to the Secretary before July 1st.

The resolution carried.

Mr. Brown suggested that Mr. D'Alton McCarthy and... Mr. Mulock, M.P.'s, be asked to represent Parlia... ment the millers' views on the subject of a Railway Com... mission.

Mr. Brown moved, seconded by Mr. Edmonson, ... "That the Toronto Board of Trade be asked to call a... convention of all the industrial associations with a view... to considering and arriving at an equitable solution of... the freight question."

The President asked if it would not be better to ask... co-operation with the millers on their line of action.

Mr. Brown replied that the millers only expressed in... the memorial their own opinion. It was most desirable... that all the industries should work shoulder to shoulder... with the object of reforming these abuses.

Mr. Edmonson enquired as to who had the most... influence, the millers or the Board of Trade. If the... millers, then they should take the initiative.

Mr. Macdonnel thought it would be rather discourte... ous for the millers to ask the Board of Trade to take... such action.

Mr. Brown differed from this opinion. There were a... large number of other associations, and their combined... efforts would accomplish what might not be achieved in... any other way.

Mr. McLaughlin assured the millers that there was... no fear that the Board of Trade would take umbrage or... refuse to work with them.

The resolution was unanimously adopted.

Mr. Peplow moved that the President be asked to call... a special meeting of the Association in September, and... gave notice of motion to change the date of the annual... meeting accordingly.

Mr. Saunders thought September too busy a season... and suggested July.

The Secretary said if the meeting was held in Sep... tember the result of the Manitoba crop would be known.

Mr. Spink thought Exhibition week, when the railways... issue single fare tickets, would be a most favorable time.

Mr. Brown was afraid that the attractions at the Fair... would prevent a large attendance.

Mr. Hamilton said that many millers would attend at... Fair time who otherwise could not be got to come.

Mr. Saunders moved an amendment that the meeting... be held on or about the first of August.

The original motion carried.

The President announced the next business to be the... election of a secretary.

On motion the resignations of the Secretary and... Treasurer were accepted.

On motion of Mr. Macdonnel, seconded by Mr. Ed... monson, a standing vote of thanks was tendered to... these retiring officers for their faithful service.

Mr. Edmonson moved the reappointment of Mr. ... Plewes as Secretary at a salary of \$600 per annum.

Mr. Peplow thought the Secretary's services should... be defined.

The President read a letter from Mr. Plewes... offering to serve for a salary of \$600 per year, to keep... an office in Toronto, and be in attendance thereat two... days in each week for the purpose of issuing *Bulletin*, ... attend committee meetings, address meetings, interview... railways, etc. He would expect his travelling expenses... to be paid in addition to his salary.

Mr. Meldrum thought Mr. Plewes was offering to give... too much for the money.

Mr. Edmonson's resolution was adopted.

The Secretary read a letter from Mr. Chas. Smith, ... Campbellford, regretting his inability to be present, and... offering to condescend with whatever was done.

On motion of Mr. McLaughlin, seconded by Mr. ... Steward, Mr. Galbraith, of Toronto, was elected Treas... urer.

The Secretary intimated that the manufacturers of... testers refused to give them to him at the reduced price... in future unless he purchased in quantities of 50. He... feared to take the responsibility of doing this in view of... the fact that a large proportion of the millers were... already supplied. Millers requiring testers were conse... quently advised to deal direct with the manufacturers.

Votes of thanks were passed to the Toronto Board of... Trade for the use of its rooms and to the Railway Com... panies for granting reduced fares.

Mr. Brown moved the appointment of a committee to... request the Grand Trunk railway to grant grinding in... transit privileges.

The President said he had spoken to the Grand Trunk... officials on the subject, and was led to believe that if the... C. P. R. west gave these privileges the Grand Trunk... would come into line. He moved that a committee be... appointed to wait on the G. T. R. authorities and sound... them on the matter, said committee to consist of Messrs. ... Hunt, Saunby, the Secretary and the mover.

Messrs. Edmonson and Meldrum, in amendment

moved that the matter be left in the hands of the Executive.

The original motion was adopted, after which came the final adjournment.

SOME TESTS ON THE EFFICIENCY OF ALTERNATING CURRENT APPARATUS.*

By DR. LOUIS DUNCAN AND W. F. C. HANSON.

SEVERAL papers have appeared lately on the efficiency of alternating current transformers, some of which have been of a more or less theoretical nature, while others have given the results of actual tests. I have never, however, seen any tests on alternating current dynamos, excepting the experiments made by Dr. Hopkinson and Professor Adams on a de Meutens machine used for lighthouse work. Even the converter tests have given such various results that one can hardly be certain as to the real efficiency.

The introduction of the alternating system has been so rapid and is so rapidly increasing that people are apparently well enough pleased with the results not to bother about the smaller question of the reason for them. But whatever the results may be it is of value to know just where the losses in any system may come in, so that we may seek how to avoid them; if we are succeeding it may enable us to increase the profits if we are losing it may help us to avoid further loss.

The apparatus, the measurement of which is the main subject of this paper, consisted of a Westinghouse 750 light No. 1 dynamo, with a No. 2 exciter and an outfit of 40 light converters. This apparatus had been presented to the John Hopkins University, and was tested a couple of months ago. The workmanship of the machines is excellent.

The plant consisted of a 75 horse-power Armington & Sims' engine, driving the dynamo and exciter through a Tatham transmission dynamometer. Engine, dynamometer and dynamos were firmly secured to heavy parallel timbers which served as a foundation. The converters were banked on a wooden frame work at a distance of some 30 yards from the dynamo, and their primaries were permanently secured to the dynamo circuit, a switch in the latter serving to cut them off when desired. The ammeter belonging to the plant was put in this circuit and was read when efficiency measurements were being taken. The secondaries of the converters were taken to a switchboard, and then to incandescent lamps mounted on racks.

Power measurements. The Armington & Sims' engine, supplying the power, worked regularly and satisfactorily, and the governor could be adjusted to give the speed required at the dynamo. The Tatham dynamometer was the one used for power measurements at the Intercolonial Electrical Exhibition, held in Philadelphia, in 1884, where its accuracy was checked by making with it a determination of the mechanical equivalent of heat. The result obtained in the latter measurement was 772.8 foot pounds per degree Fah., and show that the dynamometer is practically accurate. A description of the experiments and of the instruments may be found in the report of the test made in the Franklin Institute, but it will not be out of place to briefly describe the apparatus here.

An endless belt, as shown in Fig. 1, passes over the driven pulley, *c*, to the shaft of which the engine is belted, round the pulleys, *s* and *b*, to the driving pulley, *a*, and back over *b* and *s* to *c* again. The bearings of the pulleys *b* and *s* are in cradles pivoted on knife edges, *e*, at their outer ends, and at the inner ends are connected by links at equal distances on the two sides of a knife edge which supports the scale beam, *w*. The outer side belt passes through the line of the knife edges, *e*, and therefore has no effect on the scale beam, but the tensions of the inner parts of the belt act directly on the scale beam, and as they are on opposite sides of the fulcrum they act against one another. The beam is so graduated that this difference of tension is read off directly in pounds, and this quantity the difference of tension of the belt on the two sides of *a* multiplied by its circumference and speed, give the horse-power delivered. A weight travels on the beam, *w*, and readings can be taken with great accuracy.

Electrical measurements. The energy in the secondary circuit was measured by means of a Cardew voltmeter and a Thomson ampere balance. As it is not the custom to put a number of secondaries in parallel, each converter had its separate lamp circuit.

Before making an efficiency test, the potential difference in the primary was regulated, there being a Cardew voltmeter in that circuit and a separate measurement of the potential difference and current in each secondary circuit was made. When the test was actually in progress the voltmeter and ampere balance were used in one of the circuits and the currents and P. D.'s in the others were calculated from the readings in this circuit, together with the previous measurements. Both the voltmeter and ampere balance were accurately calibrated, the former being checked after each test, while the latter had its constant determined with both continuous and alternating currents. The P. D. at the terminals of a non inductive German silver resistance in circuit with the balance was observed, when a continuous current was flowing, and also with an alternating current of the same period as that employed in the test. The current in each case was calculated from the resistance and P. D., and the results gave no appreciable difference in the constant for continuous and alternating currents.

The following tables show at once the order in which the tests were carried out and the results:

HORSE-POWER ABSORBED AT VARYING E. M. F.'S

Horse-power for exciter, field not made.	E. M. F.		H. P.
	Dynamo.	Exciter.	
0	0	0	.34
" " field made.....	0	110	.75
" " for dynamo alone.....	0	0	2.73
" " and exciter.....	0	0	3.04
" " " " " "	0	107	3.41
" " " " " "	1376	124	12.5
" " " " " "	1166	104	10.1
" " " " " "	1066	105	9.60
" " " " " "	1040	105	9.0
" " for primaries of converters on.	1216	105	12.0
" " " " " "	1171	104	11.8
" " " " " "	1107	104	11.12
" " " " " "	1048	104	10.64

TABLE OF EFFICIENCY OF VARYING LOADS.

Approximate load.	Exciter		Dynamo Primary		Converters		H. P. in lamp circuit.	Mechanical horse-power.	Loss in horse-power.	Efficiency, Per Cent.
	E. M. F.	Current.	E. M. F.	Current.	E. M. F.	Current.				
1/2	105	9.4	1107	10.	49.5	153	6.10	21.83	11.62	46.8
3/4	104	10.3	1107	18.9	49.7	138.4	22.50	34.4	11.60	65.4
1	101	11.	1113	28.6	50.0	120.7	34.9	48.0	13.1	72.7
Full	112	11.5	1123	38.1	50.0	730.8	50.48	74.44	13.66	78.5

EFFICIENCY OF CONVERTERS.

No. 3. 40-Light Converter.

No. of lamps.	Volts.	Watts in secondary.	Loss in watts.	Loss in iron.	Efficiency.
40	50.0	2001	109	84	94.8
0	50.9	0	84	84	

No. 4. 20-Light Converter.

No. of lamps.	Volts.	Watts in secondary.	Loss in watts in secondary.	Loss in iron watts.	Efficiency.
20	48.8	952	106	952	99.9
15	52.2	817	114.3	108.9	87.6
10	53.3	506	101.7	99.2	83.3
5	51.44	264	109.4	108.7	70.7
0	52.3	0	110.5	110.5	0

The efficiency of the converters was measured by placing them in a metal calorimeter, between the double walls of which water was allowed to flow. The temperatures of exit and entrance were observed, as well as the weight of water which passed through; at the same time the current and P. D. in the secondary circuit of the converter were measured. A separate observation gave the radiation which was, of course, allowed for, although it was made as small as possible. A number of converters were experimented upon but I give but two of them; a 40-lighter, such as was used in the tests, and a 20-light converter which was very carefully tested by two of my students, Messrs. Bliss and McKeen. In the latter case the observations were made at slightly different P. D.'s, and the results show that the loss in the iron varies as we would expect it to vary, that is, very nearly as the square of the voltage. The variation will not be exact, as the losses due to the reversal of magnetism do not vary quite as fast as the square of the induction.

I would like here to call attention to the fact that in an excellent paper read before this Institute, Prof. Ryan, of Cornell, found that the losses in the iron of a ten-light converter decreased greatly as the load increased. This was accounted for by the fact that there was a jar (evidenced by the singing of the converter) at the higher loads, due to the attractions of the secondary and primary coils. While it is true that the losses in the cores of very small converters are not exactly constant, yet they are nearly so, and a large part of the decrease found by Prof. Ryan is due to the voltage being greater at the low than at the high loads.

Looking now at the figures given in the tables we are struck by two things; the very large amount of power

absorbed in the core of the armature, and the very small loss in the converters on open circuit. The dynamo losses due to reversals of magnetism and eddy currents, at the E. M. F. used in the test, are no less than six horse-power, while the energy due to reversal of magnetism and eddy currents in the 16 converters is only 1.6 horse-power. Another rather striking thing is the almost constant ratio of primary and secondary currents over a considerable range. The maximum efficiency is about 78 per cent. It would seem that the losses could be divided into a constant part, and only varying with the current, but this is not true with the older style and smaller converters of the Westinghouse Company.

Suppose we have a plant, such as is described above, and use it for commercial lighting. Taking data from one of the local lighting companies employed in supplying incandescent lights on this system, we have, for two 2,500-light dynamos, the following outfit of converters:

Size of Converters.	Capacity.	Number in use.	Total Lamps.
No. 1.	5 16 c. P. Lamps.	44	220
No. 2.	10 " " "	61	610
No. 4.	20 " " "	43	860
No. 6.	30 " " "	49	1,470
No. 8.	40 " " "	61	2,460

Total lamp capacity.....5,720
Number of lamps supplied.....4,557

I understand that the converters being added are of the larger sizes.

The efficiency of the 50-light converters does not differ greatly from that of the 40-lighters. The following is a load diagram of this plant, selected from a number of diagrams, as giving a fair average curve. If we have our dynamo working to its full capacity, then from the above data we would have a converter capacity of 23 40-light converters:

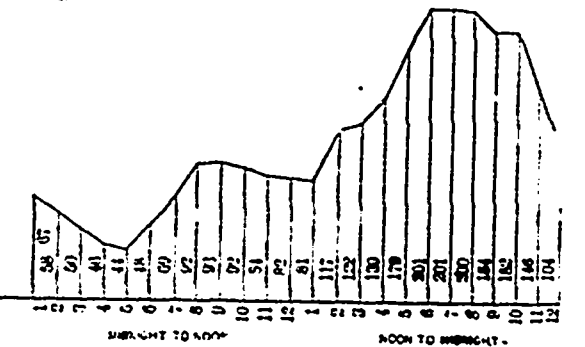


FIG. 2.

If, as in our test plant, these converters are 40-lighters or 30-lighters—for the efficiency of these two sizes is about the same—we would have a mean loss in our plant of, say, 10 horse-power in our dynamos (9.6 + C² K), and in the converters about 3 horse-power (2.3 + C² K); or altogether about 13 horse-power. From the above table we will have 750 lamps supplied, and taking the data from the load curve the average load would be in the neighborhood of 1,500. This corresponds to about 20 horse-power, and the efficiency of the plant for 24 hours would be $\frac{20}{750} = 61$ per cent., minus the percentage of loss on the lines. This, in a properly installed system, should not average two per cent., so that the final efficiency would be 59 per cent.

A continuous current dynamo supplying the same outfit of lamps, with a maximum loss in the mains of, say, 15 per cent., would have a greater average efficiency.

But I wish to point out that the maximum efficiency of the two plants would be about the same, so that they would require the same capacity of station outfit, boilers, engines and dynamos, etc. When more than one dynamo is provided the efficiency is increased by using only one of them during the times of minimum supply, and always working, as far as possible, only a little below the maximum capacity of the machines.

Let us consider these results in view of the present condition of incandescent light distribution in the United States. I take it that what may be called domestic electric lighting is largely a matter of the future—it is certainly not a matter of the present. The majority—the great majority—of the lights in use are in shops, saloons, and theatres, offices, etc. Most of the lights wired are in use at one time or another during the 24 hours, and the proportion of energy supplied to the total capacity of the lamps connected is much greater than it would be in the case of house lighting, where, on the average, only a small fraction of the possible lamp hours are actually in use. Under these circumstances the scheme of alternate current distribution is very different from what it will be when the attempt is made to supply an entire city with light, as they are attempting to supply London at the present time.

If the object of the lighting company is to supply the demand that exists at present, then a system employing a number of small converters is preferable. Such a system is flexible and can be installed with a minimum expense for the more or less scattered demand which is

*Read before the New York Electric Club, March 18, 1890.

presented in even the most closely settled town. I take this as the great difference between the alternating and direct systems as at present installed in this country. The former skims over an extended district, taking advantage of its great flexibility to absorb any business which can be got; while the latter settles itself in a densely built centre, installs a larger plant than is primarily demanded, and works up a business within the limits of economical distribution. Therefore, it is hardly right to compare the present systems of direct and alternating supply, as the latter has not been reduced to a point where entire districts are to be supplied.

To show the disadvantage of the present system for domestic supply, suppose we have an ordinary house such as one of us would live in; it would be necessary to have a converter of at least 20 lights capacity. The constant loss is, say, 100 watts; so, leaving out the C^2R loss, we would have a total loss in 24 hours of $\frac{2400}{750}$, or about three horse-power hours, corresponding to, say, 45 lamp hours. Taking my own experience, the actual number of lamp hours used is about 30 lamp hours during 24 hours, so the efficiency of the converter would be something like $\frac{30}{45}$ - 40 per cent. It is evident that unless the losses in converters can be greatly decreased, a house-to-house distribution with a converter in each house would hardly pay.

It would seem, then, that if gas is to be really displaced, and serious competition with it is to be attempted, a different system of distribution must be worked out. We must replace the numerous small converters with one large converter supplying a comparatively extended district, thus decreasing the converter capacity, so that the law of average can be taken advantage of, and greatly increasing the efficiency. If an extended secondary network is employed, some of the converters may be disconnected from the mains at the turn of minimum demand.

Let us inquire for a moment how the increase in the capacity of converters will modify the designs with which we are familiar. In the first place, if we increase the linear dimensions of any type, since the radiating surface only increases as the square, while the volume increases as the cube of the dimension, then we cannot save the same loss per cubic centimeter of the iron for large as for small sizes. We must decrease the intensity of magnetization or we must decrease the periodicity.

Let us take a typical case. Suppose we have a transformer and double all of its dimensions. If we employ the same induction we will need but one quarter the number of turns in the coils, and as the cross section of the area occupied by the wire is four times as great, the area of the wire may be 16 times as much. As the length is twice as great, the resistance in this case is one-eighth. But the losses in the iron are, roughly, eight times as great; this we cannot allow, since the radiating surface is but four times as great; hence we must diminish the induction. In fact we must so arrange things that the loss in the larger converter is only four times that in the smaller, in order to work at the same temperature. As at the low induction used the loss due to hysteresis varies nearly as the square of the induction, we may take it roughly that the large converter should have an induction of three quarters of the smaller one. This will modify our figures. Instead of one quarter the number of turns we will have one-third, and the resistance of the coils will be one-sixth instead of one-eighth, as we can allow four times the loss that we allowed before, we can have, roughly, five times the output.

As a total result we have five times the output with four times the loss, or, as the C^2R effect is not important compared with the other losses, we can have six times the output with the same fall of potential in the secondary. That is, the efficiency of the larger converter will be greater than the smaller ones of the same design, and working at the same temperature, but the output per pound of metal would be less.

Suppose when we increase the size we decrease the number of reversals. Take a case, for instance, in which the dimensions are doubled while the reversals are halved, the maximum induction remaining the same. We should have half the turns in the coils, and as they are four times the space and are twice as long, the resistance would be one-quarter, and for the same heating effect we would have four times the output.

If we take losses by eddy currents into account, there will be a constant per cubic centimeter, provided the induction and maximum induction are constant, and the thickness of the plates is unchanged, otherwise they vary as the square of the induction, with a constant frequency, or inversely as the square of the period with constant maximum induction. This, in practice, will make the values of the output for the larger cur-

rents, given above, somewhat greater. What I wish to show, however, is that we are limited by heating considerations, and considerations of fall of potential in our secondary, in the output of large converters. If we consider the properties of the materials of which converters are made, we would, I think, find it most economical to make converters that reach the temperature limit, except for the very smallest sizes.

Many of us have, I suppose, read Mr. James Swinburne's paper read before the British Association at Newcastle last year, on the "Design of Converters," and have been struck by the fact that almost all of the converter dimensions given by him are impracticable, either on account of the disproportionate heating of the larger sizes, or the excessive fall of potential in the secondary. In increasing the size of dynamos we usually increase the output per pound weight, but there is the vital distinction between dynamos and converters that losses occur through the entire mass of the latter, and as we increase the volume we increase the losses in the same proportion. In the dynamo, on the contrary, there are practically no losses in the heaviest part of the apparatus, *i.e.*, the field magnets. As a result while we gain in efficiency in the larger sizes, yet we must decrease either our induction or the rate of reversal, and the output per pound is not increased.

Our Western Letter.

SEEDING commenced in Manitoba during the first week in April, or a little more than a month later than last year. A few scattered fields were sown during the first week of April this year. Towards the close of the week, and during the following week seeding became general nearly all over the province. A year ago this spring, more seeding was done in the first week of March than was done in the first week of April this year. Vegetation, however, is likely to be just as early this year as last. When the season is late, the change from winter to summer seems to be more rapid than usual, and this has been the case this year. When the snow began to go, it disappeared very rapidly. Winter seemed to disappear almost in a day, and give place to spring weather. In a few days seeding became general, and has progressed favorably since. By the close of the present month (April), seeding will be nearly completed, except the late crops. Some farmers have already finished sowing their wheat crop, and in the earlier districts wheat has been nearly all sown by the date of writing, April 21.

The land is in fairly good condition for seeding, though on the dry side where the soil is light. The very heavy snow fall of last winter did not leave as much water in the ponds and lakes as was expected. The soil was very dry from last year, and the numerous ponds which dot the prairie were all dried up by the dry seasons of the past few years. Only the larger lakes had any quantity of water. It was expected that the melting of the unusually heavy snow fall of last winter would fill these ponds up with water again, but it appears that the land has been so dry that the water has been absorbed to a great extent, and has not remained on the surface. It would evidently take a prolonged spell of very wet weather to leave as much surface water about the country as was found everywhere a few years ago.

There has been a great run on press drills here this year. Almost every farmer in Manitoba has procured one of these implements. It is surprising that this machine, which was never heard of here until last season, should come into use so generally in such a short time. The belief seems to prevail that the press drill is just the thing for this country, especially in dry seasons. Last year being a very dry year, deep drill sowing gave better returns than the ordinary mode, and this has had the effect of inducing the farmers to go in largely for the press drill. Another advantage claimed for the press drill is that it will prevent the soil from being blown off the sown grain. This is one of the disadvantages which farmers here have to contend with. When the soil is very dry, severe damage is sometimes done by heavy winds blowing the loose soil away, even after the grain has sprouted. The press drill it is claimed will obviate this difficulty by pressing the soil firmly around the grain.

In addition to the proposed new flour mills for Manitoba, mentioned in my last letter, some further enterprises of this nature have been reported. R. Whitelaw, of Woodstock, Ont., has decided to establish a mill at Pilot Mound, Man. Mr. Whitelaw owns an old stone flour and oatmeal mill at St. Leon, and another stone flour mill at Darlingford, both in the Pilot Mound district. These will be moved to the Mound, and new motive power and roller process machinery will be added

for a 75 barrel flour mill and 60 barrel oatmeal mill. A bonus in cash and land to the value of about \$2,000 is to be given for the mill. The contract for the proposed new mill at Neepawa, Man., has been let. This mill will be erected by a number of local men, who have formed themselves into the "Beautiful Plains Milling Company, Limited," with R. C. Ennis as the principal stockholder and manager. The mill has about 75 barrels capacity. Roller flour mills are talked of for Calgary and Macleod, both in Alberta territory. Offers have been made to erect mills at these two points, providing bonuses are granted. Alexander, Kelly & Co., of the Brandon flour and oatmeal mills, have given a contract for the overhauling and improving of their mills. The buildings will be considerably enlarged, and a quantity of new machinery will be placed therein. In addition to these milling enterprises, there is likely to be a good deal of elevator building this year in Manitoba, though not much will be done until the crop is well advanced and the result can be gauged. Still, a poor crop does not seem to make much difference, for a large number of elevators were put up last fall, although it was well known that the crop would be very poor. As fast as new points are opened by railway building, elevators will be put in, and the railway construction which will be done this year will make a large number of new grain markets in the fall, where elevators will certainly be erected. "The Manitoba Elevator Company, Limited," a new organization, is applying for incorporation. This is a farmers' elevator company, and the intention is to erect elevators on the Brandon branch of the Northern Pacific and Manitoba railway.

Flour prices have been on the up grade here for some time, advancing five and ten cents at a time. Wholesale quotations to the local trade, at the time of writing, now stand at \$2.75 for patents, \$2.50 for strong bakers, \$1.30 for XXXX, and \$1.20 for superfine per 100 pounds. These prices will no doubt appear rather steep in comparison with values East. It is no doubt usually supposed that prices for flour would be considerably lower here than is asked for the same grades in the East, but such is not the case. Manitoba millers get as high prices for their flour here as they do in eastern markets, that is, Manitoba millers will ship flour to Toronto or Montreal, pay 45 and 46 cents per hundred on it for freight charges, winter rates, and sell it at the same price as they do here. This, of course, must leave them a good margin of profit on their local trade. Mill stuffs have also been at very high figures here for some time. The demand for bran and shorts has been almost in excess of the supply nearly all the past winter and this spring, and prices have gone up to \$14 per ton for bran and \$16 for shorts, which are very high figures for this market. A few car lots of bran were brought in from Minneapolis and sold here some time ago, but an advance in prices south prevented further supplies from being drawn from that quarter.

There is nothing doing in wheat here, and everything is as quiet as it could be. Quite a little wheat was marketed just before the break-up, owing to an advance in prices due to a little spurt among local millers, during which some pretty high prices were paid, ranging up to between 80 and 85 cents at country points. This spurt likely brought out all the wheat held by farmers in excess of requirements for seed, and after seeding is over it is not expected that there will be any left to market worth speaking of. What there is will go to the local mills. The quantity of wheat in store at our Lake Superior elevators at Port Arthur only amounts to about 370,000 bushels. The big C. P. R. elevators at our lake ports have therefore not had their capacity taxed very heavily this season. The capacity of the three Canadian Pacific elevators which were erected at Lake Superior for the purpose of storing Manitoba wheat until the opening of navigation, aggregate 3,000,000. In addition to the wheat held at Lake Superior, there is considerable held at Keewatin, Winnipeg and in country elevators in Manitoba, nearly all on account of millers for local purposes, probably aggregating in the neighborhood of 1,000,000 bushels altogether.

Since writing the above letter, the condition of the soil has been entirely changed by a two day's rain. This will prevent any damage from heavy winds which at this season of the year sometimes blow the loose, dry earth off the newly sown grain, and are occasionally very destructive. There will be no further complaint for some time at least that the soil is too dry to be favorable for seeding.

A simple method of curing the troublesome creeping of salts on batteries is described by M. Ernest Gerard. The surfaces to be preserved are to be smeared with a thin coating of vasoline. The vasoline is not affected by exposure to the air, is not attacked by most chemicals, is easily applied, keeps well in place and does not cover up from sight the parts to be protected.

ON THE CORROSION OF GAUGE GLASSES.

EVERY engineer knows, says the *Locomotive*, that water-glasses corrode, and that they have to be replaced every little while. Sometimes they will last for six months, sometimes for a year or longer, and sometimes for three months; but in any case it is only a question of time, and sooner or later they give out and have to be renewed. The cause of the corrosion has been studied by many, and several theories have been proposed to account for it. It is evident that there are three possible explanations; namely, 1 that the corrosion is of a purely mechanical nature, the glass being worn away by friction of some sort or another, or 2 that a chemical change goes on, the glass being gradually dissolved by the water in contact with it, or 3 that the two preceding causes work together.

In support of the first theory, it is urged that since the gauge-glass is much more exposed than the boiler, and is correspondingly cooler, the steam in the upper end must be continually condensing, the water so produced running down the sides of the glass and carrying with it small particles of iron rust and other solid matter, thus producing a grinding action similar to that of emery and water, only on a smaller scale. The fact that such condensation does take place continually may be readily seen by watching the glass for a time. Sputs of condensed water will often be seen coming down it, when it is connected directly to the boiler, and drops trickle constantly down the sides. Nor can there be any doubt that particles of solid matter are often carried along too, and deposited as mud in the bottom of the glass. The elements essential to the first theory do, therefore, really exist; but whether they are competent to explain the actual phenomena remains to be considered.

The second theory supposes that water will dissolve glass to some extent, which most of our readers will very likely be inclined to doubt. It is a fact, however, that water will dissolve glass in small quantities under certain conditions. The experiment has repeatedly been tried, of boiling a weighed amount of pulverized glass in water, and in every case it has been found that the glass loses weight by the operation. In fact, we have only to consider the composition of glass to see that this solubility is only what might reasonably be expected. Glass is composed of silica, ZrO_2 , sand, lime, and potash or soda. Lead oxide is also added to some varieties. Now, potash and soda are very readily soluble, particularly when the water is hot; and it is not surprising, therefore, that a portion of these ingredients is dissolved out when the pulverized glass is boiled in water.

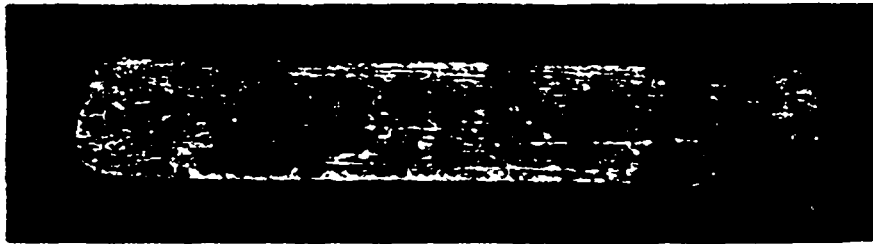
The question naturally arises, why is it necessary to pulverize the glass; and why do not ordinary glasses that are used daily for drinking and other purposes, show the same action? In reply to these questions, we would call attention to the fact that iron may be protected from rust or oxidation by first giving it a thin coating of the black rust known to metallurgists and chemists as the magnetic oxide. This coating acts like a varnish, protecting the iron below it from the air. In a similar way the silica in the glass forms a covering that protects the glass below it from exposure to the water. The potash and soda are dissolved from the surface, the silica being left as a thin skin, and unless this skin is removed by some means, the dissolving action stops. When the glass is pulverized, the surface exposed to the water greatly exceeds that which is exposed when the glass is not pulverized, and a correspondingly greater amount of glass is dissolved before the skin of silica checks the action. Concerning the drinking vessels it may be said that glass is almost insoluble in cold water, and that its solubility increases very rapidly with increased temperature. In fact, by enclosing equal volumes of glass and water in a strong vessel and exposing this to high heat, the water may be made to act on the glass so strongly as to decompose it entirely, leaving nothing in the vessel but crystals of a mineral known as wollastonite.

Returning to a consideration of the actual conditions in a steam boiler gauge-glass, it should be remarked that, in all probability, both of the actions above referred to take place at the same time. The temperature of the steam and water in a boiler carrying 75 pounds pressure is about 320° more than a hundred degrees above the temperature of water boiling freely in the air. At this temperature the glass is far more soluble in water than at 212°, and we should naturally expect to find the corroding action proceeding with correspondingly greater rapidity. A highly important factor in dissolving glass seems to be the *purity of the water*. The condensed steam that runs down the inside of the glass is,

in reality, distilled water; and if there is no foaming or priming in the boiler, it must be in a state of perfect purity. It is, therefore, particularly active at the top of the glass, and rapidly lessens as we approach the water level, on account of the glass already taken up by the water of condensation in its passage over the surface above.

At the same time that the dissolving action is going on, there can be little doubt but that the mechanical scouring mentioned in the beginning of this article is also at work. Particles of iron rust and other solid matter, carried over bodily by the moisture in the steam, are thrown against the inner surface of the glass, and give rise to a scouring action that not only helps to wear away the glass by the direct friction it produces, but also removes the protecting skin of silica referred to in a previous paragraph, and exposes a fresh surface of unprotected glass to the solvent action of the water.

The third theory—that of the combined scouring and dissolving action—appears, therefore, to be the correct one; it remains for us to consider the differences that exist in different waters, in the rapidity with which the corrosion progresses. It appears, in general, that the greatest rapidity is observed where the water is purest; and though exceptions to this rule may be occasionally noted, yet it is reasonable, we think, to believe that in such cases a simple cause for the exception exists, and moreover, this cause may generally be found. For example, one boiler may be using impure water, and yet the water that distills over into the gauge glass may be very pure, provided the boiler gives dry steam and does not prime or foam; while another boiler, using better water, may give wet steam, the moisture in which carries enough foreign matter along with it to materially lessen the capacity of the water in the gauge for dissolving glass. Another important consideration is this: if boiler compounds are used, the engineer may find it difficult to use precisely the amount required to keep his boiler clean, and a portion may be carried over into the glass by the particles of moisture the steam contains,



A CORRODED GAUGE GLASS.

This may cause the water that trickles down to be alkaline, and alkaline solutions, even when not very strong, possess the power of dissolving glass in a much greater degree than pure water does. This hastening action is apt to take place with the purer waters, because when using these the engineer is more likely to introduce an excess of the compound than he is when using water that is very hard. Account should also be taken in investigating anomalous cases of gauge-glass corrosion, of the exposure of the glass to cooling draughts of air; for it is evident that the more exposed the glass is, the more rapid will be the condensation, and consequently the corrosion.

There can be no doubt but that water, at the instant it is condensed from steam, is particularly active in dissolving glass—much more active than after it has stood for a time. We have good evidence of this in our own experience. In fact, at the present moment the writer has before him a glass tube one-third of an inch in diameter internally and twenty-six inches long that was used by this company for condensing steam to supply the laboratory with distilled water. Although it was used only three hours, it is very perceptibly corroded by the hot water of condensation.

Gauge-glass corrosion is observed to be much less rapid when the glass is attached to a water column than when it is attached directly to the boiler; and the reason for this seems to be, that the condensation that takes place in the connections does not pass down through the glass, but is retained in the column. Much less of the iron rust and other solid matter will be taken over into it, too.

L. D. Leary is trying a new experiment in timber raft construction this year. At several points in New Brunswick he has crews of men and teams building cribs on the ice. His plan differs materially from that adopted in the construction of the Jiggins raft, in the fact that his tow will be made up of a number of cribs containing about six pieces of pling each. Each crib has a strong chain-lash lengthwise in the center of the timber, the whole being firmly secured on the outside by bands of heavy wire rigging. When completed a number of these cribs sufficient to make up the tow will be coupled together much the same as a railway train. Powerful tugs will transport them to New York.

USEFUL INFORMATION

A Worcester mechanic gives the following method of hardening any tool, which he has employed for some years. Forge the tool into shape, then melt in a dish, sufficient Babbit metal to cover the end of the tool as far as it is wished to harden it. thrust the tool into the metal and let it cool. This will render any tool much harder than when cooled in oil or tempered by any other process.

To find diameter of exhaust pipe. Multiply the square of diameter of the cylinder in inches by the piston speed in feet per minute and divide by 6,000. The square root of the quotient will be the size of exhaust pipe required in inches.

To find diameter of steam pipe. Multiply the square of diameter of the cylinder in inches by the piston speed in feet per minute and divide by 8,000. The square root of the quotient will be the required diameter of steam pipe in inches.

EMERY WHEELS. The ordinary surface speed of a good emery wheel is about 5,000 feet per minute, or one mile per minute. Some wheels have been run at 10,000 feet per minute, but this speed is too high, and cannot be considered quite safe. It results in great wear of wheel for an increase in rate of cutting. Besides, the heat evolved at such speeds is enormous, and the work rapidly gets red hot.

The following points in regard to water wheels are laid down by T. W. Graham, of Dubuque, Ia.: "The velocity of any body having weight represents power, and water is no exception in rule. This being admitted, we must also admit that if the water on leaving the wheel has a velocity remaining due to one-fourth or one-fifth the head, that per cent. of the power is lost. For a wheel cannot give eighty or ninety per cent. and the water still have twenty-five per cent. of its original velocity. The more a water wheel of a given size discharges, the greater its velocity in passing through the wheel must be, and as it is necessary to quadruple the head to double the velocity of water, the wheel that would discharge double the water through the same area that another would must lose four times as much in the velocity.

The largest Thomson electric welding apparatus yet produced says the *Electrical Review*, welds a copper bar of an inch in diameter, a brass bar of $1\frac{1}{2}$ inches, or an iron bar of three inches, a current of 29,000 amperes, of the low pressure of one or two volts, being necessary. To carry such an enormous current without heating, a solid copper bar $8\frac{1}{2}$ inches in diameter is used as the secondary conductor of the transformer which converts an ordinary dynamo current (passing over a small wire) into one of the great volume and low tension needed. To produce the current by primary battery would require 60,000 telegraphic battery cells for an electro-motive force of one volt, and double that number for two volts. For welding each square inch of a section of iron or steel in 40 seconds,

about 30 indicated horse-power is exerted by the steam engine during the production of the current, though smaller power suffices for less rapid work. Platinum and German silver wires as small as one-fiftieth of an inch in diameter have been united by this system, and work under the microscope might be done if desirable. The smallest currents now used range between 200 and 50 amperes.

A LONG-LIVED ARC LAMP. A rotary arc lamp is soon to be put on the market by a Boston firm. In place of the ordinary pencil carbon, carbon disks are to be used, and as these are examined they revolve, presenting new surfaces to the arc. It is said these lamps will last 40 to 50 hours.

TO PREVENT THE SLIPPING OF BELTS. One good way to prevent belts from slipping is to joint the face of the pulley. This can be done by using hot asphaltum or white lead made thin with turpentine. It will adhere well if allowed to dry thoroughly. A thicker coat of white lead and oil should then be applied and allowed to dry thoroughly before being used. These coatings will not scale off if properly applied.

FUSED JOINTS. Frederick J. Smith writes to the *London Electrical Review* as follows: "May I be allowed to introduce to your notice a method of making electrical joints by fusion. I was anxious to construct a somewhat complicated network of conductors in such a manner that the system might (as far as possible) be free from Peltier effects. When solder is used we know that such effects exist. In order to avoid this source of trouble, I have used joints made by fusing the ends of copper conductors together by means of the oxyhydrogen blow-pipe. As many old joints, on which a current has been acting during the usual hours of house-lighting, have now been tested and found as strong as when first made, I venture to suggest the method to some of your readers to whom, perhaps, it may be of interest. It is as follows: A V-groove is cut in a piece of dry fire brick, or a piece of hard, quick lime, the ends of the wires to be joined are placed side by side in the groove, and then the flame of the blow-pipe is brought down upon them; in the case of a joint made in No. 12 wire, the ends were fused together in 32 seconds. Care must be taken not to prolong the heating after fusion is complete, if the heating is prolonged much after fusion, the copper is suddenly converted into minute spheres, which scatter the metal about and leave a thin place where the joint should be. My first joints were made long before oxygen could be brought at its present price, with oxygen as now supplied, joints can be easily and cheaply made in big wires and leads; no flux was used in making any of the joints, nor were the ends cleaned previous to their being heated.

ROLLS.

By J. MURRAY CASE.

It is not my object in this article to speak of the mechanical construction of rolls, but rather of their mechanical device for delivering the feed to the rolls evenly is one of very great importance. If feed is not distributed perfectly, but is permitted to stream at some points, and very thin at other points, under such circumstances the roll cannot possibly do good work. If we could take this sheet of material passing thus imperfectly to the rolls and have it rather delivered, upon a plane surface precisely as it goes to the rolls, and then magnify this surface a number of thousands of times, we should be able to see what condition the material enters the rolls. The material was passing through in streams, and at some points would appear mountain ranges, and where there were bunches, these would appear like great hills, and the intermediate spaces between we should have deep valleys. Now, the result of the operation of the rolls upon this imperfectly spread material is to crush the mountain ranges, so to speak, down hard upon the grinding surface, and consequently to produce a large amount of material; while intermediately between the spaces, or within the valleys, so to speak, the material is scarcely touched, and consequently passes through without grinding.

These two very serious injuries are the result: First, the streams are ground too hard, so as to produce the caking, and, second, in the valleys, or spaces where the material is thin, we have little or no grinding. Not only these two serious effects follow, but another almost equally serious, and that is, while the rolls are passing over the elevated bunches, or what we denominate the mountain ranges in the magnified condition of the material, the rolls are thrown apart, and then they are instantly forced together again by the stiff spring between them, and in this forcing together we have what may be compared to a thousand strokes of a hammer per second. The effect of this is to cause a jarring of the machine. This is what produces that growling noise which we have often had the question asked, "What makes my rolls growl?" It is done by the separation of the rolls, being forced apart by the uneven feed and the surfaces striking as they fly together again. The uneven grinding and caking of the rolls produced is very detrimental.

The rolls should never be set too close. Sometimes millmen do so, but they are not making a clean finish, and they do so by closer grinding; the result is that the material becomes caked, and the finish is less perfect. The reason for this is, for the reason that caked material will not grind properly.

The length of rolls is also a question to be considered. It is a safe rule to use long rolls in the breaks where the material is set closely together, and especially at the ends of a mill, where but little heat is produced; but from the experience of the writer that in the use of long rolls for middlings and for finishing the material, they will not grind perfectly from end to end of the roll, and that there is a limit to the length of the roll. The reason of this is that in the center of the material there is an unequal expansion of the roll does not radiate its heat as to the end, and consequently it becomes arched in the middle, thus producing a grinding action in the middle of the roll for 20 to 25 inches, beyond which it is found that scarcely any grinding is done.

It is found that to use a smooth roll longer than 30 inches in general to produce no more work than a shorter roll. The best size, according to the experience of the writer, for a smooth roll for large material the greatest capacity is expected to be got from a number of rolls, would be 25 inches long. The length and the feed distributed properly from the rolls, as much grinding will be accomplished as with rolls 40 inches in length. I will advise, that there are places in a mill where close grinding may be used to advantage; that is on the first break there is but little heat produced; and close grinding may also be used for sizing the germ material in the grinding is done with reference to sizing middlings, instead of flour. In these places the heat is much less than where close grinding is done, besides which there is no effort at making

The grinding of rolls may be traced to many causes, one of which is overloading and attempting to do too much work upon a given surface. If a roll is overloaded it will do far less work than where it has its normal load, and there is also much greater liability to wear.

The material in a horizontal roll should be delivered directly into the centre of the roll, for that in so doing it is liable to drift, as it were,

in spots and bunches. The most perfect delivery of material upon rolls is the laying of it upon the surface of one of the rolls in such a manner that it will spread itself.

In horizontal rolls I have often stopped the "growling," so called, by putting in a deflecting board in such a manner that, instead of the feed dropping down into the centre of the roll, it is delivered over onto the side of the roll. This spreads it more perfectly, and instantly the growling noise ceases; and not only that, but the grinding will be found to be very greatly improved, and very much more of a reduction performed. It will also be found that the rolls may be set farther apart and at the same time perform their function, for the reason that, whenever material is passing in bunches, the set must be so as to permit the rolls to spring forward when forced open by passing over the elevated points.

In relation to the perfect delivery of feed upon a roll, there can be little doubt that in a roller mill constructed with one roll above another, whereby the material is delivered substantially at right angles with the roll, the spreading of the material is thereby very greatly assisted, and this advantage will go a great way towards making the 2-high roller mill the standard mill of the future, for the most perfect distribution of the stock over the entire surface is the most neglected yet most important element in roller mills. *London Millers' Gazette.*

MAGNETO TESTING.

By P. B. WARWICK.

A MAGNETO, or current bell as it is termed in this country, is the name applied to a small magneto-electric generator with a Siemens H armature without commutator, revolving at high speed between the poles of a permanent steel magnet. The armature is rotated by hand by means of multiplying gear, and generates alternating currents of very high e. m. f. This machine, in combination with a polarized bell, is very largely used as a telephone call, but unfortunately it is also used as a testing instrument in the majority of electric light stations.

Although various writers have shown from time to time how unreliable an instrument for this purpose the alternating magneto is, it is still being used largely. It has been pointed out numberless times that this magneto will give false alarms under certain conditions, and mislead the person who is testing. For instance, an arc light wire was tested for grounds. The weather was very dry. The whole circuit consisted of well insulated wire (not underwriters) fastened on glass insulators; still the magneto would ring loudly through earth. Convinced something was wrong, I tested with a wheatstone bridge with 30 silver cells, and was surprised to find the insulation measured over 1,000,000 ohms resistance. By means of a string soaked in salt and water, the resistance was lowered to 50,000 ohms, and a test with the magneto then indicated no grounds. The electrostatic action of the well-insulated line caused the false alarm.

In another case related by Mr. F. Badt, the well-known electrician, a station hand was greatly excited and stated that the field wire of a large shunt-wound dynamo was broken, as the magneto would not ring through the field current. Mr. Badt showed him, however, that one galvanic cell would deflect the needle of a galvanometer, and so, of course, the circuit was not broken. It was beyond the man's comprehension that the self-induction of the large electro-magnet was sufficient to choke the alternating current of the magneto.

The reader will naturally ask, "Is the magneto a desirable testing instrument for engineers, dynamotenders, &c.?" Certainly not. But what shall we give them? The testing must be (1) cheap, (2) portable, (3) reliable, (4) it should indicate through at least 20,000 ohms resistance.

There is not on the market at present any galvanic apparatus fulfilling these requirements; we therefore advise the use of the following apparatus for line work: (1) A direct current magneto, and (2) an incandescent ground detector and locator for station work at night.

An alternating current magneto can be very easily made into a direct current magneto by putting a two section commutator on the armature. A high resistance galvanometer or buzzer or bell should also replace the polarized bell on the box. This kit is not only reliable but it is useful on arc light circuits to see whether the lamps are hung the right way, which is handy, and often very desirable. The second piece of apparatus consists of, for say a 25 light circuit, thirteen 50 volt lamps connected in series on the wall of station. One end of a ground wire is connected with one lamp and a flexible cord is connected, so as to be applied to either the lead or the return main wire. To use this at night when running,

the operator simply touches one end of the flexible cord to the lead and the other end to the connection of the thirteenth lamp. If without result he repeats the operation with the others in succession. For instance, should there be a ground between the eleventh and twelfth arc light from the machine on the lead wire, then test lamp No. 11 will light and the other 10 besides; no result will be shown from the lamp, however. Now reverse and connect the flexible cord from the return instead of the lead, and you can light the whole batch of thirteen test lamps. Now, as an arc lamp is usually taking about 45 volts, you know that your trouble is between the thirteenth lamp from one terminal and the eleventh from the other, and your patrol man is then enabled to, with a little practice, go straight to the faulty place. The writer has tried this plan and never found it fail. It can be improved, however, by having an incandescent test lamp for every arc lamp in circuit, and using a sectional switch board of circular form. A fuse should also be placed in center of flexible cord so as to blow out in case of danger to test lamps through carelessness or misadventure.

ELECTRICAL POWER IN FACTORIES.

A CORRESPONDENT of *The Tradesman* has the following to say regarding the use of electrical power in mills and factories: The dynamos should be plain, strong, self-regulating machines, built for honest work by responsible makers. They should be required to run with but little attendance, and, if the distance be not great, low-pressure dynamos of the constant potential type are best. These machines are easily kept in order. They require but little repair and attendance, and will run day after day without a break. The only difficulty in using this class of machines is the great size of the conducting wires necessary. With copper at 21 cents per pound, it is quite an object to use as small conducting wires as possible.

The power-carrying capacity of two currents is the same if one has 110 volts and 1,500 amperes, and the other 1,000 volts and 150 amperes. In either case, the number of watts is about the same, being 145,000 in the first case and 150,000 in the second. As 746 watts equal one horse-power, there is about 190 horse-power in the 110 volt, and 201 horse power in the 1,000 volt current. This is 10 horse-power in favor of the high pressure, and while the 110 volt circuit would need a copper conductor 5-8 inch in diameter, the 1,000 volt circuit can be made of ordinary electric light wire.

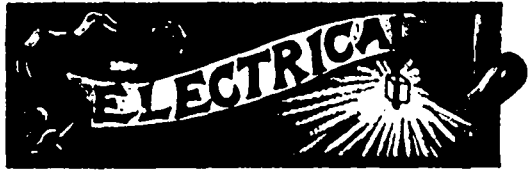
With dynamos and motors, instead of pulleys and shafting, power could be applied to each machine separately, as to each group of machines, and power delivered where needed without losing more than 27 or 28 per cent. of the engine power. It will be hard to find a mill where the shafting and other machinery of transmission consumes less than 28 per cent. of the whole power. No oil or attendance is required for shafting where motors are used; the conductors never get out of line like shafting, and the only disadvantage is the cost of motors. As a method of transmission in mills electricity has a future.

WATER RIGHTS.

IT is frequently claimed that those situated at the head of a fall have certain rights and privileges over those below them. Except in peculiar cases such is not the case. For instance, a party owning all the lands on both sides of a stream, both above and below the fall, may construct a dam and form a pond, and dispose of a certain mill site, and guarantee them certain rights in the use of all the water in the stream, should their necessities require it. He may also sell other sites with the privilege of drawing from the same pond, subject to the rights previously granted, and the party purchasing and accepting those conditions, which must be clearly specified in the deed, is bound to submit to those conditions; but other sites located upon lands below them and owned by other parties are in no way bound by such conditions as to the control of the water, but may demand the free and unrestricted use of the natural flow of the stream at all times; while those above them will be held to only a reasonable control of the water at any time.

The courts, in nearly every case where it is shown that water is used in an unreasonable manner or diverted from its natural source to the damage of mill owners, have promptly awarded damages for the same, and even the state has no legal right to grant the privilege of taking water from such lakes as are under state control, without the consent of the riparian owners of the land situated upon the outlets thereof. — *C. K. Tompkins.*

Mr. D. Miller's shingle mill at Waslago, Ont., was destroyed by fire recently.



Clayton, Ont., will pay \$900 a year for thirteen electric lights.

A Boston man talks of starting an electric street railway in Ottawa.

Cantcook, P. Q., is seriously considering the electric light question.

The Methodist church at Penetanguishene, Ont., will be lighted with electricity.

The Petrolia Electric Light Co. are tubing their incandescent light wires in order to prevent fires.

Mr. Reeves will, at the next meeting of the Windsor Council, introduce a by-law to purchase an electric light plant.

The St. John electric railway bill having passed the legislature, the company will proceed at once to arrange for running cars.

The Grand Trunk Railway Company will purchase an electric plant by which to light the Union depot yard and round houses at Toronto.

"Currants," said the grocer in response to a query "Yes, sir, what kind will you have?" "I think I'll try electric currents this time," replied the woman.

Sound travels about 1,093 feet per second, a rifle ball flies 1,460 feet in the same time, light moves 192,000 miles per second, while electricity makes 288,000 miles per second.

The Fort Wayne Electric Company are making preparations for the establishment of an incandescent light plant in St. Thomas in opposition to the St. Thomas Gas and Electric Light Company.

The New Westminster Electric Light & Supply Company has purchased the business and good will of the Vancouver Electric Company from McPhee Bros., and now controls the business on the mainland.

Hon. J. R. Thibault, President, and a number of the Directors of the Royal Electric Co., of Montreal, were in Boston recently acquainting themselves with the latest developments in electrical science.

The New Westminster Electric Light Company (limited) is asking incorporation, with a capital stock of \$50,000, divided into 1,000 shares. The first trustees are Samuel Woods, P. R. Bell and J. L. Chisholm.

The Hill Electric Light Co. are supplying the necessary plant to light the streets and stores and a number of residences in the town of Hagersville, Ont. Power will be supplied from the engine in Messrs. J. & P. R. Howard's flouring mill.

A British Columbia despatch states that the North Arm and Lorne's Landing Electric Street Railway Company will apply for incorporation under the general joint stock companies act. The capital stock will be \$270,000 in 100 shares.

Professor Curtis E. Brackett, in his opening address at the Lenox Lyceum Exhibition, made use of this expression "Sound is not air, it is air in motion. Electricity is not matter, it is matter doing something. And we are trying to find out just what it is doing."

There are 125 electric railways, with 705 miles of track, mostly in the Western and Northwestern States, and working on ten different systems. 1,683 cars are in use. Great Britain has only 64 miles of electric railway and tramways, but they are working eleven different systems.

The new electric light plant which the Hill Co. have placed in the town of Whitby had just been started in operation by Mr. Hunt, the electrician, when an imperfect pulley on the boiler pump caught the belt, tearing some of the machinery to pieces and turning out the lights. The light station was full of inquisitive people at the time of the accident, but owing to Mr. Hunt's promptness in stopping the engine, no one was hurt.

The Canadian Interior Conduit Co., Limited, is seeking incorporation for the purpose of manufacturing conduits and tubes for containing electric light, telegraph and telephone wires. The chief place of business will be Toronto and the capital stock \$100,000. The names of the applicants are H. P. Dwight, of Toronto, Thomas Leggat and Charles G. Clouston, of Montreal; John H. McLennan and Edward H. Johnson, of New York.

Edison has recently been granted a patent on a commutator and brushes having amalgamated contact surfaces. He claims that the amalgamated surfaces have such an affinity for each other that the resistance of the contact to the passage of the current is low and the spark is very much reduced. As sparking occurs as the commutator bars break circuit with the brushes, the mercury performs the function of carrying off the spark heat by its vapor.

The annual meeting of the shareholders of the Royal Electric Company was held a fortnight ago at their offices in the city of Montreal. The financial report of the year's operations was found to be very satisfactory, and the old board of directors, Hon. J. R. Thibault, and Messrs. W. J. Withall, G. R. Robertson, E. A. Small, I. Alex. Strathly, Wm. C. Caldwell, F. L. Beique were re-elected. At a subsequent meeting of the directors the Hon. J. R. Thibault was re-elected president, and Mr. W. J. Withall, vice-president.

The Peterborough Gas and Electric Light Companies have merged into the Peterborough Light and Power Company, (Limited), for which incorporation is being sought. The new company will have a capital of \$200,000, and has among its principal shareholders Messrs. T. G. Hazlett, Jas. Stevenson, M. P. Dees, Bradburn, Richard Hall, Geo. A. Cox, Wm. Walsh and Wm. Davidson. The new company intend putting in a new incandescent plant for lighting shops, offices, residences, etc. They will also introduce another new feature in the shape of electrical motors for the supply of power at less cost than by present methods.

Mr. Ridger, city electrician of Montreal, has received from the Gamewell Company, of Boston, two beautiful and ingenious electrical apparatus that he is contemplating introducing into his department. Their purpose is to instantaneously announce the crossing of any wires or their contact with any earth connections. The advantage of this apparatus over the present system of testing by the operator periodically is that it announces automatically at frequent stated intervals, and does not depend upon any voluntary action on the part of the operator.

The revised Canadian tariff upon electrical apparatus is as follows: Telephone and telegraph instruments, telegraph, telephone and electric light cables, electric and galvanic batteries, electric motors and apparatus for electric lights, including incandescent light globes and insulators of all kinds, N. E. S., 25 per cent. ad valorem; lamp, gas light and electric light shades, lamps and lamp chimneys, sidelights and headlights, globes for lanterns, lamps, electric lights and gas lights, N. E. S., 30 per cent. ad valorem; electric arc light carbons or carbon points, \$2.50 per 1,000.

The St. John, N. B., Street Railway Company are asking the city to allow them to introduce electricity as a motive power. It is their intention, if permission is given, to run the cars with the Sprague dynamo and the Edison system. The first cost of this change will be between \$50,000 and \$75,000, as an engine house will have to be provided, also all the necessary machinery and car attachments. An overhead conductor will be used. It is estimated that a much more efficient service can be given by this system, and the saving to the company in running expenses will be about 30 per cent. This change will permit of considerable extension of the line, which now only traverses a portion of the city.



The firm of McKeen & Whitman, millers, Guysboro, has been dissolved.

Mr. Jackson has purchased the grist mill at Brechin, Ont., from Mr. Turner.

James Calvert, Theford, Ont., is putting a new stone foundation under his mill.

It is said there are three parties ready to start a grist mill at Wheatley, Ont.

A branch of the G. T. R. will shortly be run to Murton's oatmeal mill at Guelph, Ont.

The machinery for the manufacture of maize is being put in position in Mayor's mill at Sarma.

There are 371,616 bushels of Manitoba wheat stored in the Port Arthur and Fort William elevators.

Alexander Wood, of Smith's Falls, Ont., contemplates the erection of a four storey oatmeal mill.

The death is announced of Mr. T. Hawkshaw, of the milling firm of Fox & Hawkshaw, Lucan, Ont.

T. Charlesworth, of Detroit, has been engaged as miller in Kidd's grist mill at Tilbury Centre, Ont.

Messrs. Hodgins & Hutchins' grain elevator at Lucan, containing a large quantity of oats, collapsed recently.

The projectors of a flour mill for the Macleod, Alberta, district are asking the town of Macleod to give them a bonus.

A probable surplus available for export of about 8,000,000 bushels of wheat is claimed for the Argentine Republic.

Mr. P. Kyle, of Merrickville, Ont., is preparing to put in a full set of rolls in his mill, also a couple of latest improved waterwheels.

Messrs. McClellan & Reid's building at Gananoque, Ont., is being pulled down to make way for the erection of the new flour mill.

S. Nairn, of the Winnipeg oatmeal mills, has imported from Scotland several varieties of grain, which he intends to test thoroughly.

It is reported that a large grist mill will be built at Arlington, Ore., and operated by electric power generated at the falls of the John Day river.

Johnson & Barclay, of the oatmeal mill at Portage la Prairie, Man., have purchased and are fitting up a large building for a pork packing factory.

A meeting of farmers was held recently at Paramount, Ont., to consider the advisability of taking part in the erection of a joint stock grist mill at Hemlock City.

One or more flour mills will undoubtedly be erected at or near Calgary, N. W. T., so soon as the farmers of the district shall prove their ability to supply the necessary wheat.

The Beautiful Plains Milling Co., Limited, has just been organized for the purpose of erecting at once a flour mill at Neepawa, Man. The company will have a capital stock of \$50,000.

The boiler, engine and machinery of the Jackson flour mill, Bleahem, Ont., lately destroyed by fire, has been purchased by Messrs. Watson Bros., who will remove it to Ridgeway to be overhauled and repaired.

Mr. Whitelaw, of Woodstock, Ont., has moved his oatmeal mill from St. Leon, Man., and will shortly move his flour mill from Darlingford to Pilot Mound. The town gives him the site free, and a bonus of \$1,700 payable at intervals to March, 1891.

Mr. William Spink, of the well-known milling firm of Spink Bros., is receiving the congratulations of numerous friends upon the extent of his recovery from an attack of paralysis from the effects of which he has been confined to his home for two years past. Within the last fortnight he has again put in an appearance at his office, and his complete restoration to health is hoped for.

An Ottawa despatch says the Government has decided to place oats in the same category as wheat and other cereals upon which a reduced rate of toll is allowed for passage through the Lawrence and Welland Canals when bound for Montreal or ports east of that city. Foreign oats for export will have to be loaded in passing through Canada.

Mr. George McIntyre leases and operates a grist mill in Hungerford township, Hastings County, Ont., and lives in a farmhouse near by. One night recently after the family had retired to bed, the house was shaken by what proved on investigation to have been the explosion of a dynamite cartridge placed by an unknown enemy under the end of the house. Fortunately no member of the family was injured. An investigation is to be held.

Mr. Cameron, who recently went from Iroquois, Ont., to change of the Carberry Milling Co.'s mill at Carberry, Man., with a shocking accident on April 14th. While brushing the out of the rolls both his hands were caught, and before the machinery could be stopped they were mangled to the wrist. After being released he walked downstairs to the engine room, thence about 500 yards to the hotel, where a couple of doctors amputated both hands above the wrists. The unfortunate man is now in the Winnipeg hospital.

A good system for daily yields is as follows: "Have your feed and feed patters empty at a certain time every day. In this way you will know how much flour you have made and how much feed. By dividing the number of pounds of feed by the number of barrels of flour you will have the amount of feed per barrel, knowing the number of pounds to reach 196 pounds of flour, the total of feed will make the amount of wheat used per barrel, less the waste. The wastage is ascertained after grinding out, and knowing the total amount of wheat used per barrel in pounds, which by dividing by sixty pounds to the bushel, gives the yield per barrel in bushels and pounds. Where screenings are not reduced, of course the weight of the screenings for the day must also be divided by the amount of flour made to get the amount per barrel, and added in the same way as the feed. A mill furnished with the best machinery should not have a wastage over five pounds to the barrel."

The Kingston and Montreal Forwarding Company has made arrangements with the Ogdensburg transit company for a regular service of lake and river vessels with a view of diverting American grain for export by the St. Lawrence route. The Ogdensburg company is building an elevator with a capacity of 1,500,000 bushels at Ogdensburg and its lake vessels will be discharged there and the grain held until the steamships for which it is intended are reported at Montreal. The forwarding company's largest export to be able to transport the grain from Ogdensburg to Montreal three days. It is reported that the Montreal Transit Company, head of this new route, has bought 400,000 bushels of corn on its own account at Chicago, and is having it brought forward at once. Ocean freights have been quite lively as a result of the competition between the forwarding companies, and the full capacity of the regular line steamships up to the middle of May is already contracted for. The Chicago Tribune says it is expected that an unprecedented trade will seek the St. Lawrence route this year.

A case of interest to millers was recently decided in the court at Portage la Prairie, Man., Chief Justice Taylor presiding. The circumstances are as follows: In the fall of 1888 the agent of the Ogilvie Milling Co., Mr. Matheson, signed to purchase some 6,000 bushels of wheat from the defendant James Gibb, at \$1.15 per bushel, but, after some 500 bushels had been delivered owing to change being made in the firm, Mr. Matheson received orders that he was to close out business for the present, and he then transferred some 3,000 bushels of the wheat to the Portage la Prairie Milling Co., and told Mr. Gibb to deliver the rest to them and he would receive the same price. After he delivered about 200 bushels the plaintiff told him that as their elevator was crowded, they could not take any more at present, but as Gibb wanted some money they advanced him \$1,500. Subsequently Gibb started to deliver the balance, but the company refused to accept it, claiming that the wheat did not come up to No. 1 hard, and that the largest with the Ogilvie Co. was that it should all be of that quality, as they brought that action to recover the balance of the advance amounting to some \$1,300. The defence was that Matheson had agreed to take all Gibb's wheat at the figure named, and that of the same quality as the load he had with him when the contract was made, and that, as he was not a party to the agreement between the Ogilvies and the plaintiffs, he was not bound by it, that, owing to the plaintiffs refusing to take the wheat, he had to sell it, at a loss of \$1,218. The jury, after deliberating two hours and a half, returned a verdict for the plaintiff for \$280.22.

DO NOT!

Do not overload your motor. Every motor when installed should be tested with volt-meter and ammeter. If it uses more amperes than indicated on the motor card, put it in a larger machine.

Do not use poor oil or an excess of oil.

Do not allow the commutator to become rough.

Do not allow sparking at the brushes. This is a sign that the motor is overloaded, or that the brushes are on the neutral point.

Do not change pulley or motor shaft. To decrease or increase the speed of the counter or main shaft, use there a larger or smaller pulley.

Do not turn the current on too rapidly.

Do not permit the motor to be covered with dust or dirt.

Do not allow grooves or ridges to be worn on the commutator.

Do not buy a motor because from its low price it seem to be cheap.—Power-Stream.

A Non-Fibrous
Anti-Friction
Box Metal
FOR
Machinery
Journal
Bearings.

FOUNDRY SUPPLIES



The Most Durable Metal Known.

Messrs. F. G. Pratt & Co., Victoria, B. C., J. H. Ashdown, Winnipeg, Man., Honore R. Ridout, 22 St. John St., Montreal, The Chain Hardware Co., Quebec, Messrs. Robb & Son, Amherst, N. S.

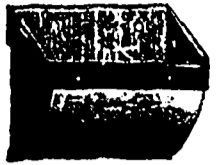
Alonzo W. Spooner,
(Patentee and Manufacturer)

PORT HOPE, ONT.

Hardware
Stores
all
Sell It.

FAVORITE

Mill Buckets



Manufacturer and Dealer

JOHN RADIGAN,

19 and 21 Kelly St.,

HAMILTON, ONT.

SEND FOR PRICES.

TENDERS WANTED

A Weekly Journal of advance information and public works.
The recognized medium for advertisements for "Tenders"

CANADIAN CONTRACT RECORD
TORONTO.



Brough

& Caswell

14, 16, 13 BAY ST.
TORONTO

D. & C. MAKE A SPECIALTY
OF FINE CATALOGUE
PRINTING

Printers

.. SEND FOR PRICES AND SAMPLES ..

Please mention the ELECTRICAL MECHANICAL AND MILLING NEWS when corresponding with advertisers.

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.

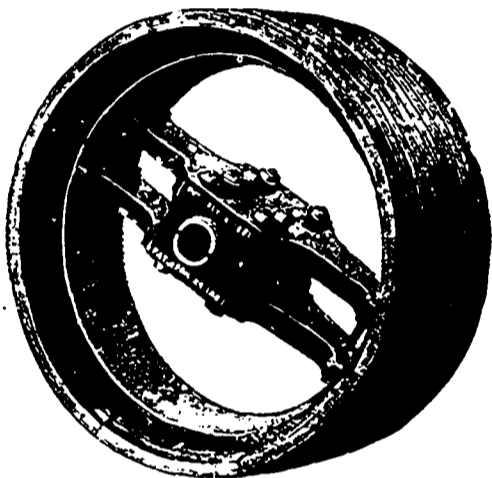
In comparing prices of pulleys, please note carefully the following:

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-five 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 Dodge Patent System. Estimates furnished for main drives and transmissions of any required power on application.



BOX 333

Address,

THE DODGE WOOD SPLIT PULLEY CO.,

TORONTO.

TELEPHONE 206

BAGS

For Flour, Oats, Bran, Feed, etc.

Every size and quality in stock.

The Largest and Best Equipped Bag Factory in Canada

BAG PRINTING IN COLOURS A SPECIALTY.

Designs furnished free, and the best work guaranteed.

Printing capacity—15,000 bags daily.

HESSIANS OR BURLAPS

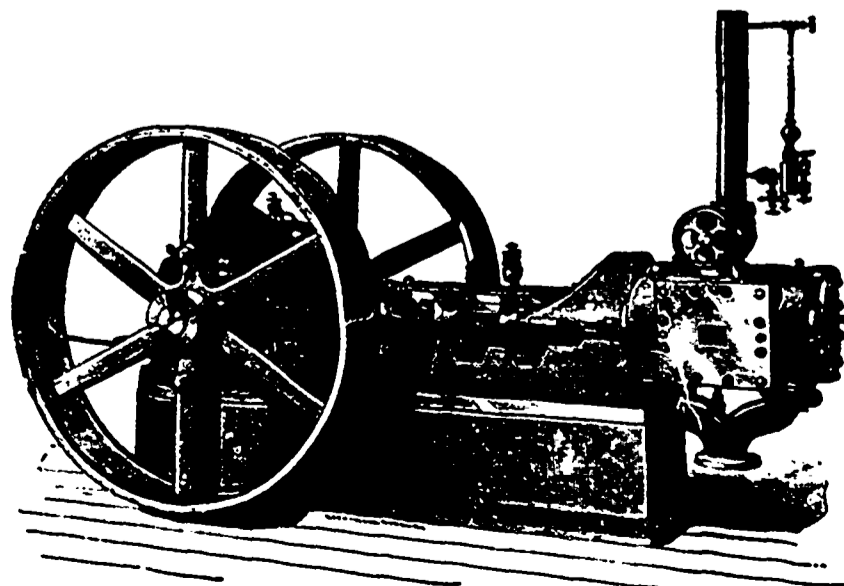
WE CARRY THE LARGEST AND BEST ASSORTED STOCK IN THE DOMINION.

THE CANADA JUTE COMPANY, Limited,

TORONTO AGENT: FRANK F. BARR,
45 Wellington St. East, TORONTO.

15, 17, 19 and 21 St. Martin St.

MONTREAL



ARMINGTON & SIMS' HIGH SPEED ENGINE FOR ELECTRIC LIGHT PLANT, &C.

THE CANADIAN LOCOMOTIVE & ENGINE CO.

(LIMITED)

KINGSTON,

ONTARIO

MANUFACTURERS OF

LOCOMOTIVE, MARINE

STATIONARY ENGINE

Boilers of all Descriptions.

SOLE LICENSEES AND MANUFACTURERS FOR CANADA OF

ARMINGTON & SIMS' HIGH SPEED ENGINES, THE "CYCLE" GAS ENGINE, ATKINSON'S PATENT, THE "HAZLETON" BOILER.

Descriptive Catalogues of the above on application.

NOTICE.

The Canadian Locomotive & Engine Co., Limited, of Kingston, Ontario, have the Exclusive License for building our Improved Patent High Speed Engine for the Dominion of Canada and furnished by us with drawings of our latest improvements.

(Signed)

ARMINGTON & SIMS

PROVIDENCE, R. I., Nov. 18th 1889.

Cochrane Roller Mills Co.,

- CHILL ROLL MAKERS,



ESCANABA, - MICH.

OUR GRAIN CHILL ROLLS,

IN FINISH; IN TRUENESS, IN UNIFORMITY AND IN HARDNESS

Are admitted by all users to

HAVE NO EQUAL

Using Lake Superior Charcoal Iron specially mixed for us at the "Furnaces," we are enabled to produce a Chill Roll which cannot be equalled.

THE TRADE OF CANADA SUPPLIED.

CHILLED WHEELS

FOR

ORE, COAL MINES AND LUMBERMEN.

We make Chilled Wheels of from 10 inches to 24 inches in diameter, from Lake Superior Charcoal Iron. Our Chilled Wheels are outselling all wheels in the iron mines of Michigan and Wisconsin. They are

LIGHT, DURABLE and STRONG,

And will outwear five ordinary wheels. We guarantee them as specified.

Lake Superior Charcoal Iron is admitted to produce a more perfect Chill than any iron in the United States or Canada.

ADDRESS :

Cochrane - Roller - Mills - Co.,

ESCANABA, - - MICH., U. S.

PATENTS

Obtained in Canada, United States, Great Britain and all Foreign Countries.
TRADE MARKS, DESIGNS AND COPYRIGHTS REGISTERED.
 Examinations and Reports as to validity. Searches made. Infringements investigated. Assignments and Agreements drawn. Advice on Patent Laws, etc.

FETHERSTONHAUGH & CO.,

CANADIAN BANK OF COMMERCE BLDG. (Second Floor) **Solicitors of Patents and Experts in Patent Causes.**

GOLDIE & McCULLOCH Galt, - Ontario,

Have the following Second-hand Machinery, which they offer cheap and on reasonable terms.


- Iron Turning Lathe, 18 feet bed, 32 inch swing.
 - 80 H. P. Automatic Cut-off Engine, can be seen at Hamilton Electric Light Co.'s Station, Hamilton.
 - 80 H. P. Inghs & Hunter Engine.
 - 80 H. P. Dickey, Neill & Co. engine, splendid for Saw Mill, recently replaced by a Wheelock Engine.
 - 50 H. P. Slide Valve Engine, our own make.
 - 35 H. P. Kelley & Co. Engine.
 - 40 H. P. Corliss Engine and 50 H. P. Boiler, only a short time in use, made by Cowan & Co.
 - 30 H. P. Slide Valve Engine, our own make.
 - 25 H. P. Kelley & Co. Engine.
 - 30 H. P. Brown Engine.
 - 20 H. P. Beckett Engine.
 - 25 H. P. Westinghouse Engine.
 - 20 H. P. Slide Valve Engine, at D. Morton & Sons, Hamilton, being replaced by a Wheelock Engine.
- A great many second hand Boilers, all thoroughly tested, and complete with all mountings, from 20 H. P. down, also second-hand Planer and Matcher, Moulding Machine and other Wood-working Machines. For particulars address

GOLDIE & McCULLOCH, Galt, Ont.

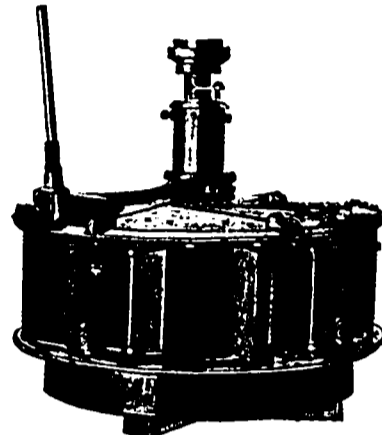
SUBSCRIBED CAPITAL, \$100,000.
 AMOUNT ON DEPOSIT WITH THE GOVERNMENT OF CANADA, \$54,724.

SIR ALEX. CAMPBELL, K.C.M.G. Pres.
 Lieut. Gov. of Ontario
 JOHN L. BLAIR, Esq. Vice Pres.

THE BOILER INSPECTION and Insurance Company of Canada



CONSULTING ENGINEERS. G.C. ROBB, Chief Engineer. A. FRASER, Secy. Treas.
 HEAD OFFICE, 2 TORONTO ST. TORONTO
 Prevention of Accident our chief aim. Economy of Fuel Secured.



GEORGIAN FOUNDRY, MEAFORD, ONT.
 C. Barber, Proprietor.
 MANUFACTURER OF
IMPROVED CANADIAN TURBINES,
The Best and Cheapest, Most Reliable and Economical Water Wheel in the Market.
 Agents for Maritime Provinces: MESSRS. A. ROSS & SONS, Amherst, Nova Scotia.
 Also complete Saw Mill Outfits and Supplies.
SAW CARRIAGES A SPECIALTY.
 Shafting, Hangers, Pulleys and Gearing.
 A large list of General Patterns.
 CORRESPONDENCE SOLICITED.

F. SCHOLLS, Managing Director.

A. ALLAN, President.

J. O. GRAVEL, Secretary-Treasurer.

THE CANADIAN RUBBER CO. OF MONTREAL

CAPITAL, \$2,000,000.

MANUFACTURERS OF

Rubber Shoes and Felt Boots.

OUR PATENT PRESSED DOUBLE STRIP

RUBBER BELTING

Is specially adapted for heavy work, such as Saw Mills, Elevators, etc.

Sole Agents and Manufacturers of the FORSYTH PATENT SEAMLESS BELTING for the Dominion of Canada.

Rubber, Engine, Hydrant, Suction, Steam Brewers' and Fire Hose.

Wringer Rolls, Carriage Cloths, Blankets, Stopples, etc., etc.

MOULD GOODS OF EVERY DESCRIPTION.

OUR RUBBER GARDEN HOSE IS THE BEST IN THE MARKET.

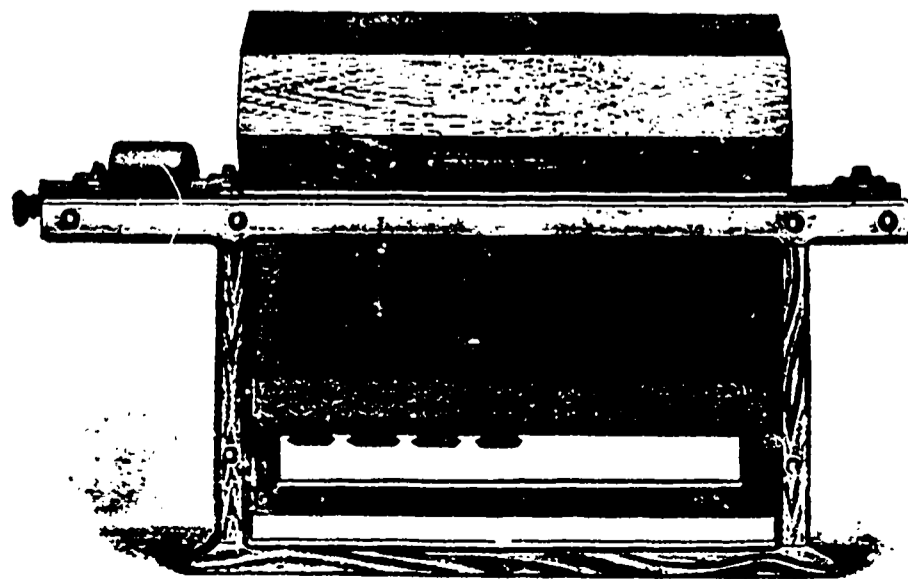
Office and Warerooms:
 333-335 ST. PAUL STREET,
MONTREAL,

Factory:
 PAPINEAU SQUARE,
QUEBEC.

J. J. MCGILL, Manager.

Western Branch:
 Cor. Front and Yonge Streets, **TORONTO, ONT.**
 J. H. WALKER, Manager.

HORIZONTAL BRAN DUSTER



Simple in Construction.

Very Light Running.

Perfect in Operation.

Manufactured to suit Mills of any Capacity

BY

A. LAIDLAW & CO.,

1123 Queen St. W., - PARKDALE, TORONTO

SEND FOR PARTICULARS.