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ELECTRICAL,

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EDITOR'S ANNOUNCEMENTS.

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

THE Government has decided to spend $30,000 in procuring a supply of the best seed wheat for gratuitous distribution throughout the Northwest territories. The work of distribution will be entrusted to Mr. A. McKay, superintendent of the Brandon Experimental Farm, preference being given to those whose crops failed last year.

MR. Alderman Hewitt, of Toronto, thinks he has solved the vexed problem of how to dispose of electric wires. He would substitute hollow iron for stone street kerbs, and through them he would run the wires. Several electricians and engineers of note are said to have signified their approval of the scheme, and the suggestion will receive further consideration.

THE suspension of Messrs. A. W. Morris & Bro., proprietors of the Canada Cordage Works, Montreal, a few months ago, called forth expressions of regret and sympathy on every hand. It is not surprising, therefore, that the news that they have effected a satisfactory adjustment of their difficulties and will immediately resume business, is received with pleasure by the business community.

THE importance to Canada of developing commercial relations with the West Indies was recently the subject of comment in these columns. We learn that the people of Jamaica purpose holding an exhibition in their city of Kingston next year, and this event should be taken advantage of by Canadians, specially manufacturers of articles for which a market exists, to bring the merits of Canadian productions prominently to the notice of the islanders.

A BILL introduced by the Hon. C. H. Tupper in the Dominion Parliament provides, that twelve months after it becomes law, sawdust or other mill refuse cannot be thrown into any navigable rivers or streams in the Dominion. This will make still more difficult the problem of the mill-owners as to how they may dispose of their refuse. It may, however, prove to be a blessing in disguise, by stimulating the mind of some one to invent a method of turning this refuse material to profitable account.

OUR Winnipeg contemporary, *The Commercial*, urges the formation of an association of Manitoba millers. Associations are capable, as our contemporary says, of being made instruments of advantage to their members. We may add to this the opinion, that as sometimes managed, they are worse than useless. To be of service, officers and members must be alive to their own interests, and must be willing to devote some of their time to meeting and discussing with their brother members, matters affecting their welfare as a body and as individuals. A half-hearted meeting two or three times a year will not suffice to maintain an active, efficient organization. A majority of the members must attend the meetings, and all must be prepared to contribute their share towards making them interesting and profitable. It won't do to throw all the work upon two or three pairs of shoulders, or they will soon tire, and the organization will go to pieces. We have known instances wherein members of an association were in the town where a few hours later an important meeting was to be held, but nevertheless refused to wait and take part, but went away home and left others to do the work and look after their interests. Moreover these men lived but a few miles distant. This is the kind of conduct that tends to paralyze an association and ultimately to wreck it. The millers of Manitoba are, as a rule, separated from one another by a considerable distance, which would render it difficult for them to meet together, and though we should like very much to see them form themselves into an association, we should not feel hopeful of the success of the movement unless a greater amount of interest and determination was thrown into it than has characterized some of the undertakings of the kind in the East.

THE Dominion Parliament has at present under consideration the petitions of two Canadian manufacturing firms whose names are familiar to our readers Messrs. Samuel May & Co., of Toronto, and the G. T. Smith Middlings Purifier Co., of Stratford for the renewal of patents on the Dodge wood split pulley and the Geo. T. Smith middlings purifier respectively, which, through inadvertance, have been allowed to lapse. In the case of Messrs. May & Co., the request for renewal, accompanied by the necessary fee of $20, should have been forwarded to Ottawa in March 1889, but by an oversight was not so forwarded until October. In the Smith Company's case, a clerk in sending the fee for the extension of the patent had enclosed only $10 instead of $20, and before the requisite sum reached the department the patent had expired. These informalities render necessary the passage of Bills through Parliament restoring the patents. In both instances, the patents are very valuable, hundreds of thousands of dollars being involved. Great hardship will result to both firms should their petitions be refused. Parliament appears to appreciate this fact, but some of the members are averse to opening the door for future petitions by interfering with the provisions of the Patent Act. The matter is receiving the attention of the Minister of Justice, and we trust that some way may be provided out of the difficulty which these firms have got into through no fault of their own, but by carelessness on the part of their agents. Their case will no doubt serve to put the owners of valuable patents on their guard against possible failure to comply with the requirements of the Patent Act.

SHORTLY after the loss of life and property by the flood at Alton, Ont., a few months ago, we pointed out that there were other Canadian towns and villages so situated as to be liable to destruction from a similar cause, and that the Government would do well to make provision for the proper inspection of dams and reservoirs. Our attention has again been called to this matter by action taken recently by the citizens of Port Hope. A mile north of that town is what is known as the Electric Light Pond, a body of water covering more than seventy acres of land. The embankment confining this pond is by some of the townspeople considered to be unsafe. The volume of water is immense, and should the embankment give way, the loss of life and property in the town would be very great. The danger which it is believed threatens the town from this cause, was the subject of consideration at a recent meeting of the council. In view of the spring freshets which may be expected in the near future, the councillors thought some legal action should be taken to prevent a deluge of the town in case the light company's dam breaks away. The opinion was expressed that some action should be taken by the Local Legislature to provide a means of inspection of dams, and a resolution to that effect was passed and forwarded to T. W. Craig, M. P. P., with the request that he propose such legislation being effected. We trust the legislation asked for will be forthcoming, so that nothing approaching to the terrible Johnstown disaster may ever occur in Canada. In the meantime we would suggest to the town council of Port Hope and of any other town or village which believes itself to be in danger from this cause, that they should take immediate steps to ascertain for a certainty whether or not their fears are well-founded. Unless such action be taken, disaster may come before the desired legislation goes into operation.

THE farmers in some localities are still expressing dissatisfaction with the grain tester and the exchange system. At a meeting of farmers held recently at Calamachie, Ont., a committee was appointed to canvas for subscriptions with which to build a farmers' roller mill. This action—the foolishness of which will in due course be revealed—was followed by the adoption of a resolution so long that we cannot find space to print it. In substance it is to the effect that the "millers combination" is discriminating against the farmers by exacting "enormous tolls;" that while the toll is kept out of the best wheat, the farmer never gets any of the higher grades of flour but is generally sent away with a second or inferior grade; that Government should protect the farmer by legislation, declaring him to be entitled to 52 pounds of flour, bran and shorts, and that from good wheat weighing 58 lbs. and upward the farmer shall be entitled to the proper proportion of high grade, and that inasmuch as farmers cannot under the roller system get back the flour from their own grist, it be enacted that they be not allowed to take in for gristing dirty or musty wheat; that all parties wishing to have such wheat gristed must do so by special arrangement." This is the burthen of the farmers' complaint. We might suggest to them a shorter and quicker method of relief than the slow Governmental process under which many of the millers have been waiting so long that they have grown grey-headed. It is to abandon the system of exchange entirely as unbecoming the business age in which we live, and adopt the system of selling their wheat for cash and purchasing their flour for cash at wholesale prices. This is the common sense, business-like method which already prevails in many localities, and which in time will doubtless supersede almost entirely the old-fashioned method adopted to meet the requirements of early Canadian civilization. A prominent milling firm in a west-

ern Ontario town have sent us a copy of a hand-bill which they have issued announcing their intention of doing away with the exchange system after the 1st of April, and adopting instead the plan of buying the wheat and selling the flour, bran and shorts. They point out that under the proposed new system the purchaser will receive a much superior quality of flour; all purchasers of 500 lbs. and over will obtain their flour at lowest wholesale prices, and the value in flour at wholesale prices for whatever quantity of wheat they may bring to the mill. We can conceive of nothing fairer than this to the farmer, and would urge every miller to make an effort to establish such a system. We are not disposed to deny that the exchange system sometimes works to the disadvantage of the farmer; we also believe that quite as frequently the miller also suffers under it, while it has ever been, and so long as it exists must continue to be, a source of unprofitable wrangling and hard feeling between farmers and millers. To that portion of the resolution which aims to prevent the marketing of dirty or musty wheat, we are sure every miller will say "amen." This is one of the prime objects for which the much abused grain tester was brought into use, and we are a trifle surprised therefore that among those who find fault with it, are these farmers who desire to keep dirty wheat away from the mills. The tester, tending so greatly to encourage thorough wheat cleaning on the part of the farmer, should be regarded as a friend by every farmer whose practice it has been to bring to market nothing but clean wheat.

WE desire to point out a fact that is perhaps not so well known as it should be, viz., that the ELECTRICAL MECHANICAL AND MILLING NEWS reaches regularly the officials of four hundred Canadian towns and villages. Manufacturers desiring to do business with these corporations will find in this journal the most direct medium through which to make their announcements.

THE Secretary of the Dominion Millers' Association has issued a call for a mass meeting of millers to be held in the Board of Trade rooms, Toronto, April 1st and 2nd. The annual reports of the officers of the D. M. A. will be presented, and the work of the Association since its organization reviewed; the tariff on flour and freights on American flour will be discussed. Officers for the ensuing year will be elected.

WE notice that the Great North Western Telegraph Co. of Canada have taken a decided step to protect its wires from crosses with electric light wires. The company has issued general orders to its linemen to string a dead wire above all their other wires at all points where the same are crossed by electric light conductors of any kind, so that if these conductors should slacken or fall they will strike the dead insulated wire and not come in contact with any of the telegraph wires. We think this is a step in the right direction, and the example might well be followed by other companies.

THE city of Toronto's contract with the Toronto Electric Light Co. expires at the end of the present year. In view of this, a committee of aldermen has been appointed to secure information on the following points: "What is the best system of electric lighting now in use. What would be the cost of a plant, etc., required to furnish 1000 arc lights on the overhead system. The cost of the underground system. Whether the same machinery can be used for a combined underground and overhead system. What success has attended the underground system." The city proposes to be seriously considering the advisability of purchasing and operating its own electric light plant. If economy is the object sought, it will do well to act upon the advice given by a well known philosopher to the young man about to marry, "Don't."

TWO very important subjects, to some extent related to each other, have during the last fortnight been pressed upon the attention of the Dominion Government. One is the necessity of enlarging the St. Lawrence canal to a capacity corresponding to that of the Welland canal; the other the adoption of a more vigorous immigration policy with a view to the early settlement of the Northwest. The carrying out of these projects would doubtless result in largely increasing the prosperity of the Dominion. It was claimed by the delegation representing the leading Boards of Trade which recently interviewed the Government, that the enlargement of the St. Lawrence canal would reduce the cost of carrying grain from Port Arthur to Montreal from 8 to 5 cents a bushel and add a tremendous sum yearly to the income of the farmers and the general community, who would thus be enabled to bear any extra burden of taxation which might be involved in the obtaining of money for the enterprise; that it would also tend to draw a large share of the import trade from Baltimore, New York, Boston and other American sea ports to Montreal and Quebec, as merchandise of all descriptions could be more cheaply laid down in Kingston, Toronto, Hamilton, Port Arthur, Winnipeg and Vancouver, as well as in Buffalo, Cleveland, Detroit, Milwaukee, Chicago, Duluth, St. Paul and Minneapolis, than by any other route, either rail, or lake and rail, that our interprovincial trade could be largely increased, because steamships could be loaded with Manitoba flour to be shipped direct from Port Arthur to the Maritime provinces, and with return cargoes could bring coal to Ontario points for $1 per ton and compete successfully with the Pennsylvania product, and that our shipping industry, which is on the decline, would be greatly stimulated. In view of these and other advantages which are likely to accrue from the early completion of our canal system, it is gratifying to have the assurance of the Premier that the government expect that the work will be carried out within the next three years.

With regard to the subject of immigration, we feel that one of the surest and speediest ways of peopling our great Northwest territory is by providing easy means of interprovincial communication by railways and water ways. Let the northwest settler be given the means of getting his produce to the world's markets as rapidly and as cheaply as possible; then make known to the best class of intending immigrants in Europe the advantages which we have to offer. There has been a considerable amount of money spent to very poor advantage for immigration purposes in past years. Immigration agents have been paid large salaries to live lives of ease in England. The amount of service which they have performed may be judged of by the fact that when the Minister of Agriculture for Ontario was asked in the Legislature the other day, what one of these agents was doing for his salary of $1,600 per annum, he replied that he really didn't know. This state of affairs requires to be changed. This country needs increased population, and care must be exercised to see that the right class of immigrants are induced to come here. We can afford to spend money for this purpose, but such improved methods should be adopted as will insure that every dollar is spent to the best advantage. We hope the Government will see its way to granting the request of the Northwest members of Parliament for a vigorous immigration policy.

RELIEF FOR CANADIAN MILLERS.

AS we go to press the gratifying news reaches us that the Government will increase the import duty on American flour from 50 to 75 cents per barrel. In making the announcement, the Finance Minister said:

"It has been felt that this disparity between the flour and the wheat duty should be remedied, and it has been decided to give an advance of 25 cents per barrel upon flour, and thus equalize that duty with the wheat duty. For a country which produces surplus wheat, and which has a milling capacity to mill all the flour that is necessary for the consumption of this country and to supply outside markets to a large extent as well, it is not reasonable to believe that this will do more than keep the market for the Canadians."

Although the millers felt that the duty should be increased to $1 per barrel, we believe, considering all the circumstances, that the measure of relief which the Government proposes to give, will be accepted as satisfactory.

While the justice of the millers' demand for tariff readjustment was always beyond question, we felt, as did also the millers themselves, that the Government was placed in a most difficult position by conflicting interests of producers and consumers, as well as by the varied requirements of different localities. The changes in the tariff appear to have been wisely made with a view to the improvement of the general situation, and this fact should make them acceptable to all parties concerned.

We congratulate the millers upon the result of the agitation which was continued intermittently for a number of years, but of late more determinedly and steadily, for justice under the tariff. An additional duty of even 25 cents per barrel should be sufficient to dispel to a considerable extent the clouds which have so long darkened the millers' sky, and cause them to feel that the millions of dollars invested in milling property will in future not be entirely unproductive.

THE "BROWN" ENGINE.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

DEAR SIR, I noticed a letter in your last issue from Mr. S. S. Heywood, manager of the Geo. T. Smith M. P. Co., of Stratford, in which he takes exception to the statement published in your Feb. issue, as an item of news, that Goldie & McCulloch, Galt, were building one of their patent "Wheelock" engines for Messrs. W. Doherty & Co., Clinton, to replace a "Brown" engine; he lets the public know that the said "Brown" engine was manufactured by Messrs. Goldie & McCulloch themselves; also that some engine builders in Canada, attracted by the superiority of the "Brown" engine, had in times past attempted to copy it, and placed on the market a comparatively worthless imitation, and by implication gives us to understand that the "Brown" engine referred to above belongs to this class.

Now, in so far as this last assertion is concerned, I beg to give the same a flat denial. The so-called "Brown" engine at Clinton was manufactured by Goldie & McCulloch, and is as good an article as any ever turned out of the headquarters of the "Brown" engine at Stratford: and I may add, more correctly made, and with much better workmanship than any his company ever built; and is being replaced by the Wheelock because the business requires a larger engine. I would like to ask Mr. Heywood how it has come to pass that notwithstanding the great "reputation" which the "Brown" engine is said to have achieved, his company have not made more than about half-a-dozen, and that Goldie & McCulloch build more Wheelock engines every month than his company have built during their business career? If I am not greatly mistaken, the Galt firm have placed more Wheelock engines in his own city of Stratford than his company have of their celebrated "Brown" engines.

Mr. Heywood closes his somewhat petulant letter with the assertion that "no Brown engine built by us was ever displaced by a Wheelock or any other engine." In answer to this it might be said, that so few of his company's engines have been in use throughout the country, but little opportunity has been afforded for this displacement. I beg to state, however, that the Galt firm have replaced with a "Wheelock" at least one of the "genuine Brown engines" nay, the very "Brown" engine that was constructed under the direct supervision of Mr. Brown himself, in the company's shops at Stratford, and which has been running till within a short period. This is a hard fact which even Mr. Heywood will hardly attempt to deny.

It would seem as if Mr. Heywood's letter was prompted by a desire to have a fling at Goldie & McCulloch, but I doubt whether that firm will notice it. In matters like this, nothing succeeds like success, and I am satisfied that they will willingly leave to the decision of an intelligent public the settlement of this and all other questions in regard to the merits or demerits of their products.

Yours very truly,

W. T. WALKER,
General travelling agent, Goldie & McCulloch.

PUBLICATIONS.

WE have been favored by "The Electrician" Printing and Publishing Company, Salisbury Court, Fleet street, London, with a copy of their Electrical Trades' Directory and Hand-Book for 1890. The book embraces nearly one thousand pages, and contains a vast amount of reference material of the greatest value to persons engaged in the electrical trades and profession. The book may be obtained from the publishers at the above address—price five shillings, postage extra.

PERSONAL.

Mr. Featherstonhaugh, on the occasion of resigning the position of chief draughtsman with Messrs. D. C. Ridout & Co. to engage in business for himself as a patent solicitor was presented by Mr. Ridout with an inkstand of hammered and burnished brass, and by his fellow employees with a handsome clock.

Mr. Wm. G. Colville, who was manager five years for Messrs. J. L. Fenn & Co., Bracebridge, and previous to that served six years with Messrs. Adam Hope & Co., of Hamilton, has now accepted the position of travelling salesman for the Dominion for Spooner's Copperine. He is a Scotchman by birth, a young man of good address, and well up in hardware and machinery, and we wish him every success.

It is proposed to incorporate the Therapeutic Magnet Company of Canada, with headquarters at Windsor. The capital stock is placed at half a million.

At Douglas, Man., a meeting was recently held to consider the advisability of forming a joint stock company to build a flour mill. A letter from Mr. Plewes, of Brantford, Ont., was read offering to take $5,000 interest in the mill providing the company could raise another $5,000. The majority were unwilling to take any stock in a company. A number of farmers expressed their willingness to give a reasonable quantity of wheat per year for two or three years gratis, to some competent man who would build a mill at his own expense.

The owners of the Perth Bolt and Nut Works have shipped part of the machinery to Toronto.

A movement is on foot among the stationary engineers of London to form an association with a constitution similar to that of the Toronto, Hamilton and Stratford organizations.

The Thomson Electric Welding Company has made a successful experiment in welding steel pipes to brass in such a way that the steel will split longitudinally without affecting the welding.

A young Englishman named Alex. Shaw, who for three years past has held the position of book-keeper and confidential clerk, of the Canada Jute Company, Montreal, has been arrested, charged with being short in his accounts several thousands of dollars.

The Bill introduced in the Legislature of Quebec by Mr. David to amend the law respecting the protection of employees in factories provides that all steam boilers shall be provided with a low water alarm attached to the boiler independently of the glass gauge and try cocks.

Application has been made under the Companies Act for letters patent to incorporate Benjamin Westwood and others of Toronto, as the Eno Steam Generator Co., of Canada, with a capital of $100,000. The objects of the company are the manufacture and sale of steam appliances.

A company with a proposed capital of $500,000 is said to be in process of organization, to be known as The Light Heat and Power Corporation of Canada, Limited, to introduce and operate in Canada a new patent oil gas, which is said to possess exceptionally valuable qualities. The first plant will be put in at Gananoque.

Over 4,000 tons of nickel is now the annual output of the Copper Cliff mine near Sudbury, Ont. This is a larger production than that of all other nickel mines combined. The *Engineering News* expresses the hope that the increased production may result in a decrease in the price, now about 80 cents per pound, since the metal is now so largely used in plating the best class of mechanical work.

Colonel Potto, an Italian engineer, recently made some interesting experiments, respecting the employment of sugar as an agent to obviate the incrustation of steam boilers. The experiments were made in a boiler of 20 horse-power, and containing 120 tubes, and the *St. James Gazette* learns that the results proved entirely satisfactory. Two kilos. of sugar were introduced into the water every week. Formerly the same boiler used to become incrusted in a period of about six weeks; but at the end of a like period after the sugar had been employed it was found to be but slightly coated. After the boiler had been working continually for a period of four months, with sugar introduced into the water, a thin film of incrustation was found to be formed, but this was easily removed by washing.

Among the remarkable examples of bold engineering in the great sugar refinery of Claus Spreckles, at Philadelphia, Pa., one of the most unique is the hanging or aerial steam engine foundations. The engines used in this establishment are distributed practically all over the buildings, a large proportion of them being on upper floors. Some of these engines are bolted to iron beams or girders on second and third storeys of the building, and are consequently innocent of all foundation. Some of these engines run noiselessly and satisfactorily, while others produced more or less vibration and rattle. To correct the latter, the engineers simply suspended foundations from the bottoms of the engines, so that in looking at them from the lower floors, they were literally hanging in the air. A foundation does service to an engine, or to machinery, it seems, by its weight alone; hence, it makes no difference whether the foundation be firmly embedded in the earth or in the air.

ELECTRIC POWER FOR SMALL PLANTS.

It has been proved by actual working that the cost of operating an electric motor is considerably less than that of an isolated steam plant, including interest on the original investment, depreciation and repairs. The following figures were obtained from an owner of a printing establishment in Boston, where a three-horse power motor has replaced a four-horse power steam engine, and serve to indicate the comparative expense of operating electric motors and small steam plants:

Horse power of steam plant	4
Boiler capacity	4
Average cost of attendance per month	$14.73
Average cost of fuel per month	6.00
Average cost for storing and transporting fuel	2.00
Average cost for repairs per month	2.10
Total cost of operating steam plant	$24.83
Cost of electric power per month	$15.19
Average cost for repairs per month	.85
Total cost for operating motor	$16.04

This estimate neglects interest and depreciation, which would add to the economy of the motor, on which depreciation is much less than a steam engine and boiler. The expense of operating by electricity in this case is 65 per cent. of that of steam power. Naturally, prices for electric power are subject to wide variation since so much depends upon the power-generating plant and its favorable situation for obtaining fuel and water and the cost of labor. Where water can be obtained the cost of power is not so great, but where steam is used in the generating station, prices per year will average as follows:

1 Horse-power	$125
2 "	200
3 "	285
5 "	450
10 "	800

The rates are based upon continuous service 300 days per year, ten hours per day. As a general thing a contract can be made when motors are required for shop use upon the estimated power used, and not upon the rated horse-power of the motor.

Some electric companies are selling current for motors by meter, which in some cases gives better satisfaction than by contract.—H. B. Prindle in *Building*.

Our Western Letter.

MATTERS are pretty flat at present in grain and milling circles in Manitoba. There is very little grain movement and until after seeding there is not likely to be any increase in the movement. At present only a couple of train loads of wheat per week pass through Winnipeg eastward. Of course there is more wheat than this marketing, but it is being taken by millers at country points. After seeding has been finished, whatever wheat is remaining in farmers' hands will be marketed. The quantity so held is not easily even approximately estimated, but some grain men claim that there is a good deal more wheat still held by farmers than there is generally supposed to be. They say that a good many farmers have held on to their wheat while laboring under the belief that there would be a large demand for wheat for seed in the spring, and that they would get higher prices on this account. If such is the case, those who have held are likely to be disappointed. Since the somewhat erratic boom in Manitoba wheat markets has flattened out, prices have gradually been on the decline, and for some time back the price has been about 65 to 70 cents per bushel to farmers in country markets, for choicest samples. During the boom in prices here in January and early in February, prices were run up to ten and fifteen cents above legitimate values on a basis of Minneapolis and Duluth markets. That was evidently the time the farmers should have sold all the wheat they could spare. Farmers, as a rule, however, have little or no knowledge of the conditions which govern the markets, and very often when prices are advancing, that is the time they will hold for still higher prices. It is said that in some parts of Manitoba the farmers were quite firm in the belief that their wheat would be worth $1 per bushel before spring. The high prices paid here a while ago it was well known were caused by local competition among millers, who bought for a short time quite regardless of legitimate shipping values. Such a condition of affairs, however, could only last for a short time, and had the farmers understood the situation, they would have hurried in their wheat as fast as possible. However, the quantity of wheat which will be marketed after seeding will determine whether or not there has been much holding for higher prices.

One year ago this week I wrote to the ELECTRICAL MECHANICAL AND MILLING NEWS: "Here in western Canada we are now in the midst of seeding. Seeding commenced on the first of March, on the second day of March a ten acre field of wheat was sown on the experimental farm at Brandon." This year the outlook is quite different. It is now pretty well on toward the close of March, and there is no appearance of any seeding being done yet awhile. The season is fully a month later than last year, so far as seeding is concerned. The prairie is still covered with snow to a considerable depth on the level. It has been thawing some through the day usually for some time past, but freezing hard at night. The snow has gone down some, but it is disappearing very slowly. However, this is not considered a bad sign, on the contrary, the general belief here is that very early springs make poor crops. It certainly was the case last year. In fact farmers are more hopeful than usual this spring. The snow fall during the past winter has been one of the heaviest on record in Manitoba. Since 1881 and 1882 the fall of snow has been very light each winter. There was considerable snow in 1882, which was the year of the spring floods. This winter the snow has been even heavier than in the winter of 1881-82. This is looked upon as a splendid sign for a favorable crop year. The melting of the snow will thoroughly moisten the land and make it in good condition for starting the crops to grow. The numerous ponds and little lakes all over the country, which have been dry during the past few dry years will also be filled up with water, the evaporation from which will send forth much moisture. The fact that the snow is remaining on the ground well into the spring, is also considered a favorable feature. It must be remembered that a season favorable to early seeding does not mean that the crops are any earlier. The snow may go off early and seeding may commence, but the weather may continue too cold for growth for long time. As a rule vegetation will be just as far ahead by the middle of May, with seeding done in April, as it will with seeding done in March. When the snow remains on the ground until late the moisture does not dry out before the weather is warm enough to start the crops growing, and in the end it is claimed to be better than when seeding starts very early. The very heavy snow fall and the fact that the snow has remained so long on the ground, are claimed by old settlers to be very favorable features, and they all predict a good crop year. May they be right.

It is believed that the area to be sown this spring will show an increase over other years fully up to the average. I was talking the other day with a miller from one of the largest wheat districts in Manitoba, and he informed me that in his district the increase in the area of crop this year would be fully one-third An increase of about twenty per cent. is looked for for the whole country, which would bring the wheat acreage of Manitoba up to about 1,000,000 acres.

It is early to prognosticate as to what may be done in the direction of building new mills in Manitoba and the territories this year. Several mill enterprises, however, are under consideration. It is likely that the mill burned down a short time ago at McGregor Station, Man., will be rebuilt this year. An understanding to this end is said to have been arrived at with the proprietor, R. Whitlaw, of Woodstock, Ont. A mill will also most likely be built at Austin, Man., where a large bonus is offered for such an enterprise. A bonus has just been voted for a new mill at Neepawa, Man. R. C. Ennis has this enterprise on hand and he is likely to push it through. Neepawa is one of the best points in Manitoba for a good mill. There is an old style mill at the place, but it does not meet the requirements of the district. Russell, Man., is another point which offers a bonus for a mill. D. Moore has undertaken to build a mill at Arden, where bonus assistance has also been granted. At Gladstone and Douglas, two other Manitoba points, some figuring is being done upon a mill. At Manitou, Man., an old style mill is being remodeled.

These are the principal milling enterprises under consideration at present. Others will develop no doubt later. A good many of the smaller country mills in Manitoba have been erected with the aid of bonuses. This, however, is likely to be stopped. A Bill is now before the Manitoba Legislature, which will prevent all bonusing. The Bill has passed its second reading, and will very likely become law. If it does, it will lessen the number of smaller mills being erected through the country. On general principles the bonusing business is considered bad, and it will perhaps be a good thing to have the privilege of granting bonuses taken from the municipalities. Where bonuses have already been granted, but the mill not yet erected, the projectors will be more likely to go on with the work for if the bonuses lapse, they will be unable to have them re-enacted again under the new law.

The Winnipeg Board of Trade has just secured an important concession from the Dominion Government, regarding disputes in grading grain. Heretofore any difference between inspectors as to the quality of grain, was referred to the Toronto board of grain examiners for settlement. It has now been decided that any such cases arising concerning the grading of western grain, shall be referred to the Winnipeg board. S. Spink, S. Nairn, Geo. J. Maulson, A. Atkinson and F. W. Thompson have been appointed a board of examiners and arbitrators to settle any such differences.

The Manitoba Legislature will prepare a memorial to the Dominion Government setting forth the disadvantages which the National Policy brings upon this part of the Dominion, owing to its geographical position. This may have some influence upon the Ottawa authorities in considering the question of the flour duties.

A model of the Forth bridge, on the scale of ¼ inch to the foot, has been proposed for the Edinburgh electrical exhibition. The model would be 300 feet long and the headway under the center of the spans twelve feet.

A machine for feeding grain to the rolls of roller flour mills has been patented in Canada by Mr. Henry R. Shaw, of St. Catharines, Ont. This device consists of an adjustable tube feed regulator, through which the grain is fed and falls on a distributing doweled bottom board and corrugated boards, and by means of a tumbling board is conducted evenly between the rolls.

THE USES OF FRICTION CLUTCHES.

FRICTION clutches are especially designed to be used in connection with machinery where it is desirable to be able to stop or cut off one part for any reason, while the other parts continue to run, or when it is necessary by reason of accident or otherwise to instantly disconnect machinery or shafting from the motive power.

A clutch pulley is a better means of starting and stopping large or heavy machinery than a shifting belt or tight and loose pulley arrangement. Shifting belts cannot well be applied to heavy machinery; they are moreover subject to rapid wear, resulting from the fact that they are constantly in motion, whether the machine is running or standing still. The friction clutch, on the other hand, is more easily manipulated, and the amount of power it may be adapted to transmit is unlimited. Its great economy of belting becomes apparent when compared with a shifting belt, since by its means the belting is only in motion when actually driving the machine.

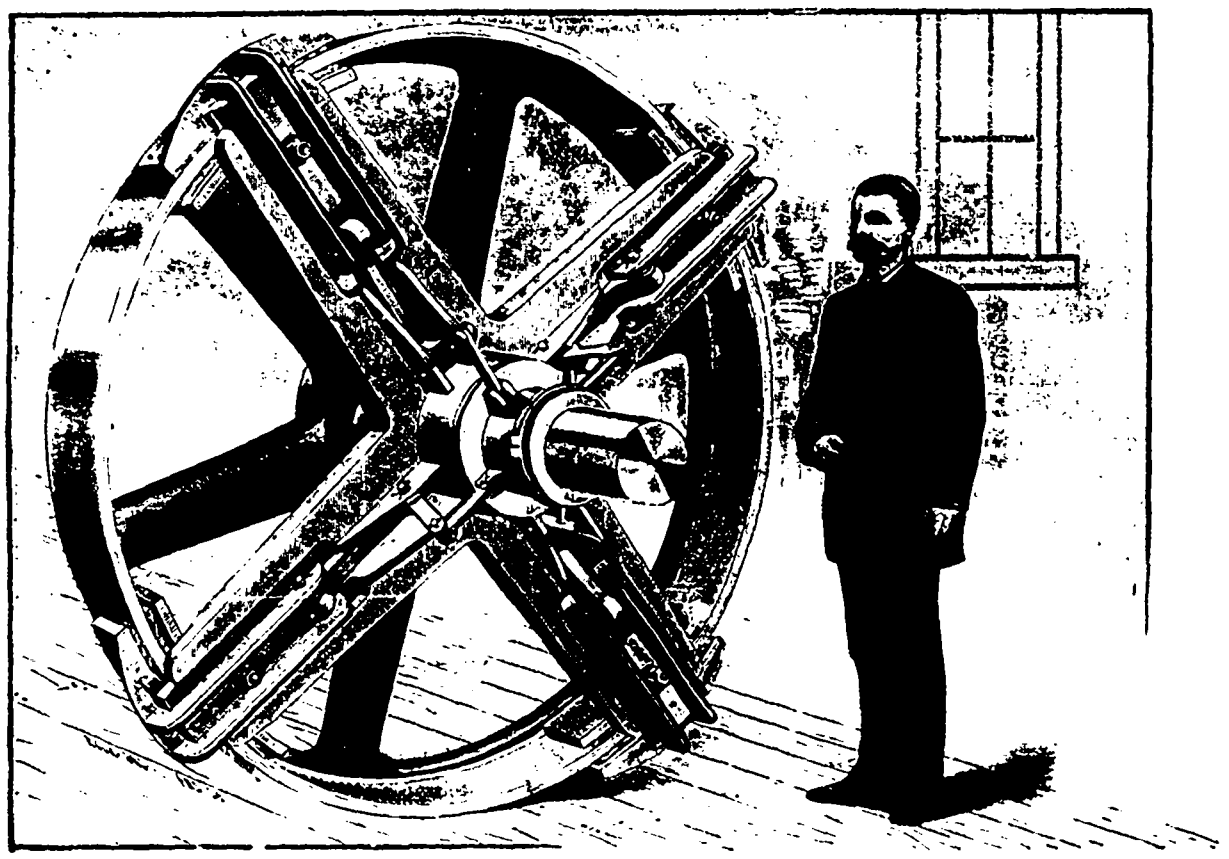
Clutches are advantageously used on line shafting as cut-off couplings, to enable the operator to disconnect while in motion one line of shafting from another, so that it may stand still while not required to run, thus saving wear of shafting, belts, etc., and avoiding much useless loss of power. Danger to life and property is reduced to a minimum by the use of friction clutches in connection with running machinery of all kinds; in case of accident as of a person being caught in the machinery, or something dropping into or becoming entangled with the moving belts the ability of instantly arresting the motion of the machinery by the use of friction clutches may frequently be the means of averting serious consequences that might otherwise result in damages to the amount of hundreds, or even thousands of dollars.

The Hill Patent Friction Clutch is specially remarkable for its compactness, rigidity and simplicity, and is adapted to run the lightest as well as the heaviest machine, and at any rate of speed.

The present illustration shows it adapted to a cut off coupling. The rim when applied to a pulley being bolted to the arms, is grasped by the four clutch members, which are shod with thoroughly seasoned maple. The end of the grain being the wearing surface, it will wear many years, and requires no oil. The radial motion of the four jaws or clutch members is produced by the cone being pushed towards the clutch or pulley, forcing in opposite directions the outer ends of the two curved levers whose ends are resting on the shaft. These acting upon two angle levers, force the upper or outer jaws inwardly and the inward jaws outwardly, until they grip firmly both sides of the rim. Moving the cone away from the clutch disengages the jaws or frictional surfaces, and the pulley is instantly and entirely loose on the shaft. A remarkable feature of this clutch, and one that will be appreciated by all practical mill men, is that it is disengaged or released without the aid of any spring whatever; this being done entirely and positively by centrifugal action, there is absolutely no contact of frictional surfaces when the clutch is disengaged. The operation of engaging or clutching the pulleys is performed with so much ease that the cone before alluded to can be pushed against the clutch or in its clutching position with the hand without the use of the ordinary lever.

We would call special attention to the patent split sleeve or removable hub with which the Hill Friction Clutch Pulleys are fitted. The sleeve is made in two parts, is babbitted with the best babbit, and turned outside to exactly fit the hub of the pulley, held in its proper position by means of two set screws in the pulley hub. When the eye or bore of the pulley becomes much worn, which must be the case with all loose pulleys, sooner or later, it is very desirable that suitable means for renewing the eye or bore quickly and cheaply be at hand. We are informed that the Hill Patent Friction Clutch Pulley is the only one in the market provided with such means. The split sleeve, being in two parts, is easily taken out of the hub of the pulley, the old or worn babbit knocked out, the sleeve replaced on its shaft between the two halves of the split set collar, which hold the two parts of the sleeve firmly together and central to the shaft in position to be rebabbitted. When this is done the sleeve is placed back in the hub of the pulley, and the result is an entirely new pulley-bearing or bore. The whole operation need not take more than thirty minutes, and is done without disturbing either the shafting or the pulley. The arrangement and construction of the parts are so simple that there is no liability of disarrangement.

Miller Bros. & Toms, successors to Miller Bros. & Mitchell, Montreal, Que., are the owners of the Canadian patent, and will be glad to afford any further information.



HILL PATENT CUT-OFF COUPLING.

ZINC AS A PREVENTATIVE OF BOILER CORROSION.

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

On account of the action we have outlined above, it is generally believed that zinc is always a good thing to prevent corrosion, and that it cannot be harmful to the boiler or tank under any circumstances. Some of our experiences go to disprove this belief, and we have met with numerous cases in which zinc has not only been of no use, but has even been harmful. In one peculiarly marked case a 100 horse power horizontal tubular boiler had been troubled with a deposit of scale consisting chiefly of organic matter and lime, and zinc was recommended as a preventative, some few weeks previous to our annual internal inspection. When the inspection was made, large amounts of detached scale from the shell and tubes were found in the bottom of the boiler, and the iron surfaces from which they had been detached showed markedly the action of the zinc, the crystals of which, deposited upon the iron, gave it the appearance of frosted silver work. On the rear portion of the tubes, the scale, being much heavier and more obstinate to remove, partially remained; but it was easily loosened and detached, and when it was removed the same frosted appearance of the iron was observed. The beneficial action of the zinc was so obvious that its continued use was advised, with frequent opening of the boiler and cleaning out of detached scale until all the old scale should be removed and the boiler become clean. Eight or ten months later the water supply was changed, it being now obtained from another stream supposed to be free from lime, and to contain only organic matter. This change of feed water was unknown to the inspector, who two or three months after its introduction opened the boiler for inspection, and was greatly surprised at its condition. The tubes and shell were coated with an obstinate adhesive scale, clinging tenaciously to the iron, and composed of zinc oxide and the organic matter or sediment of the water used. The deposit had become so heavy in places as to cause overheating and bulging of the plates over the fire. It was with difficulty that these patches were separated and removed by the use of long chisels made specially for the purpose. This action of zinc when the water supply is changed has been noted by us in many cases, but in no other case that we have yet met with has the contrast between its beneficial action at first and its injurious action afterward, in the same boiler, been so marked.

Another very interesting instance of the peculiar action of zinc under certain conditions came to our notice not long ago. This time the trouble was with a tank used for heating water, and containing coils of brass pipe through which exhaust steam was passed. The shell of the tank corroded rapidly, and one day a large crack opened in one of the plates, and the hot water (which was under a pressure of 75 lbs.) was discharged into the room. An entirely new 5-16 inch shell, 42 inches in diameter, and 8 feet high, was then constructed, and when it was placed in position, a 30-pound pig of zinc was hung between the tubes to prevent the continuance of the corrosion. The zinc certainly did prevent the species of corrosion that had given so much trouble before, but it gave rise to a very peculiar alteration of the iron of which the new shell was made. After the lapse of two years, the handhole plates were renewed, and it was found that although the old ones had preserved their form, they were softened on their inner surfaces, so that a penknife point could be easily thrust into them about 3-16 of an inch. The metal on these surfaces was black and lusterless, and had every appearance of being graphite or black lead. So soft was it that the strengthening ribs on one of the plates was entirely cut away by an ordinary pocket knife. The interior surface of the tank presented the same appearance, but as the tank showed no signs of distress, it was continued in use, and for six years it has proved serviceable and satisfactory, no leaks or other symptoms of weakness having been observed. The old handhole plates were kept for subsequent examination, but in a short time they hardened up so that a cold-chisel would make scarcely any impression on them. The zinc pig that had been used was removed, and its character was found to be entirely changed. It had preserved its former shape and general outward appearance, but its fracture was no longer bright and metallic, resembling wood from which all the sap had been expelled. By carefully melting it in a clean black lead crucible, it was found that only 15 per cent. of it remained in the metallic state. The remaining 85 per cent. was probably zinc oxide, though no analysis of it was made.

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

DEMONSTRATED AND DISPUTED POINTS IN MILLING.

By J. Murray Case.

IN my last article I dwelt exclusively upon the "first-break," or wheat-splitting machine, as I regard that portion as strictly belonging to the wheat cleaning in all cases where more than four breaks are used.

The only object of a successive number of breaks is to produce as large a quantity as possible of semolina and middlings, whereby the separation of bran may be effected before the flour producing part of the berry is reduced to flour. By this means we obtain a flour substantially free from the coloring matter produced by the particles of bran and germ. It is therefore apparent that the first object to be attained is to so reduce the wheat as to produce the greatest quantity possible of this semolina and middlings, and of the best quality to be operated upon by the process of purification. All efforts to produce a large quantity of flour by the breaks, and thus reduce the labor to be performed by the smooth roll reductions, I regard as a movement in the wrong direction, although it has been supported by some vigorous advocates in America. It cannot be denied that white flour can be made on the soft break system, and that 60 per cent. of the flour may be made in the wheat breaks, using fine corrugations and rounded teeth; but quality sharpness of granulation, and for merchant milling it has been clearly proved to be a failure.

In the earlier history of roller milling three and four break mills were erected. The profitable operation of these mills stimulated the miller to grind more than the legitimate capacity of the rolls, and the results were not so good. This led to the addition of another break, instead of doubling the roll surface on existing breaks; and as the output was increased still another break was added, and then another, until by a sort of common consent the milling engineers got into the habit of using six breaks, and did not know why they used that number, only that Jones and Smith had six breaks in their mills.

As a result of this mutual consent, all the small mill men were led to believe that six breaks were essential absolutely necessary for successful milling; and consequently for a number of years scarcely any small mills, either in America or Europe changed to rolls. The system was so elaborate in all its details that small mills could not afford the outlay, and in time (especially is this the case in the States) they became unprofitable, and many were comparatively idle, and those which did run generally did so at a loss.

Thus stimulated the American engineers to undertake to provide a system for small mills less elaborate, but which would enable them to compete with the larger mills, and thus hold their local trade. In doing this they reduced the number of breaks to *three*, and eliminated much of the paraphernalia commonly used in larger mills. These small mills, thus built, proved successful, and in many cases produced results superior to some of the larger ones. Then arose the dispute between the advocates of the "short break system" and the "long break system," which has deluged the American milling journals for the last four years, and has only been answered by the stern fact that the short break mills, built with special reference to making a large percentage of middlings, have been the most successful; and that instead of the large long break system mills running out the little "shorties," as it was prophesied, it has become a serious question as to whether or not the little mills will not ultimately supply all local demands, and thus make the large ones unprofitable.

So I may say that it is clearly demonstrated that a short break mill is a success, and the question presents itself as to how short they should be.

I may answer this question in one sentence, viz., they should never be so short as to injure the quality, or reduce the quantity, of middlings and semolina, and never so long as to produce an unnecessary quantity of bran powder.

If too short the quality of the middlings are injured; if too long the flour is darkened in colour. These two important facts are based upon well-grounded reasons. To shorten the system so much that the middlings removed from the bran cannot find sufficient space in the corrugation to hide away, so to speak, they must, in that case, be crushed, softened and injured, and consequently not in suitable condition for perfect purification. If too long there is an unnecessary amount of abrasion of the bran, and between these two extremes we must look for the true system.

In six-break mills we not unfrequently find that the miller simply splits the wheat on the first break, mangles it somewhat on the second, and only produces a trifling quantity of middlings on the third. The flour, therefore, from the first, second and third breaks is of a very dark colour. On the fourth break he performs a good deal of work a work that might better have been done on the first operation, and thus saved the production of so much very dark flour, made dark by the sharp corrugations scraping upon the whole and half-grains of the wheat. It is hard for some millers to comprehend that this bran powder is a production of the rolls, and not an element that exists in the wheat; and that, as many will say, "if I don't get it out that way it will get into the flour in the next breaks." The facts are, you are producing it, and the harder and less broken the wheat berry, the more you will produce, because in that condition there is no yielding action, and consequently the corrugations scrape hard upon the bran coating. It is therefore important that in the first operation after the "splitter," if used, all the work should be done that it is possible to do, and at the same time preserve the quantity and quality of the middlings. This may be set down as a fundamental rule applicable to every kind and quality of wheat, because it is based upon absolutely correct principles.

Following out this rule, the question arises, how much work can be done on the first main break without damage to the material?

This will depend upon two conditions; first, the quality of wheat used; second, the style of corrugation employed.

Assuming a six-break mill as a standard of comparison, I would say that with suitable corrugations the wheat should be broken on this first main break, when soft wheat is used, down to the ordinary third break, and on hard wheat down to the ordinary fourth break. This leaves the two or three succeeding breaks to perform precisely the same function that they perform in a six-break mill, but you will have the decided advantage that the average break flour will be of a better colour, and worth more money. The bran will also be broader, and less "bran chips," or cuttings to contend with on the smooth rolls, and consequently a more perfect finish and increased yield.

After my experience in the programming and erecting of a very large number of mills operating upon all kinds of wheat, and conditions of climate, I am fully persuaded that four breaks for the very soft wheats, and three breaks for the hard varieties, is the correct number for the most successful milling. In this I do not count the "wheat splitter," which, when used, can only be regarded as a wheat cleaner.

In the use of the standard corrugations I have found on a four-break mill that 12, 16, 20, 24 are the suitable numbers. The first break should run back to back, and the tooth made as deep as possible. The other three may be front cut. In a three-break mill the cuts would be the same, simply skipping the 16.

I have found, however, that in either a three or four break mill, where a large amount of work is to be done on the first main break, that a "special corrugation" may be used on the first break to advantage; a corrugation of my own design, which is provided with alternate teeth, and blank smooth spaces in the slow roll. These blank spaces form recesses to hold the middlings, and consequently but a small amount of flour is made and a broader bran insured.

I do not offer any suggestions as to the number or kind of corrugations to be used in a six-break mill, for I am persuaded that the time has passed when six-break mills will be built, except in such cases where men are governed by the precedent of old usage, rather than by reason and investigation; and they will always find milling engineers ready to furnish them with all the *useless paraphernalia* that their perverted fancy may demand.

In relation to the spiral used on corrugated rolls, few can tell the reason why they are used, or what function they perform, and consequently they are often made so as to produce more injury than good. In my own mind I am fully persuaded that they do no good whatever, except to prevent the points of the teeth coming in contact with each other, and one half-inch spiral in the length of a roll would perform this as well as six inches. An excessive spiral, when made so that they cross each other at the point of contact, thus forming a hear's action, will do more injury than good. The line of one is upon an angle of elevation, that of the other an angle of depression, precisely like the crossing of shears; the result is the wheat berry is caused to slide endwise of the roll—towards one end only—and in this sliding action there is a tendency to shave off long splinters of bran, upon which clings a quantity of middlings. These "splinters" pass the meshes of the scalpers, and find their way to the germ rolls, where they are crushed, but not one-half the flour is removed from them, and they go the pollard rich with flour, thus helping to drag down the yield. Sometimes these "bran chips" are sent to the fifth break, where they are chopped up so that they will nearly all pass the scalper, and thus get *intermingled* with the middlings, when a part of them go to the rolls for making patent flour, and a part to the germ rolls, when they ultimately appear in a flour of a muddy color and reduced value.

THE BREAK SCALPER.

The subject of the proper scalping of the break and other coarse material in the mill, whereby the germ and bran are first separated from the starch and gluten of the wheat berry, is one of more importance than millers generally suppose. In fact it is the key that opens the door to successful and economic milling. I say it is the key, because it is the first important process after breaking the wheat, and in view of the fact that the prime object of the successive breaks is to remove the bran and germ from the middlings, it follows that the more perfectly this germ and bran can be removed *before an* effort is made to make flour, the more efficient will be the general results. The prime thought to be borne in mind should be to get rid of all the bran and germ possible at the head of the mill. Do not let it tag along through every successive step, every roll, every purifier, every bolt, but get all of it to the bran or pollard as soon as possible. If millers will bear this one thought *in mind and study their separations with special* reference to it, great improvements may be made in many mills. The loss to millers from permitting large quantities of bran to become intermingled with granular stock and an attempt thus to grind it together is simply fabulous. I believe I am not overstating the importance of this question when I say that I believe that not less than one-fourth of the entire profits in roller milling have, up to this time, been absorbed by the imperfect separation of the bran and germ from the middlings. This will seem to many a wild statement, but I can take the samples of pollard and a large percentage of inferior flour made at the tail of the mills in some of our largest plants and demonstrate this statement to be mathematically correct.

I do not make this charge as applied to English or European mills only, but it is applicable to all countries. There has not been sufficient attention given to the proper sub-division of the material and programming to study scientifically the relative effect that one number of cloth may have upon a succeeding reduction or separation; but the question has been, "What numbers of cloth will let the material through"? without reference to what kind of a conglomeration it may form with other material when it gets through; and consequently we not unfrequently have middlings and bran and germ united in brotherly love at the very tail of the mill, the middlings, like young chickens, hiding beneath the feathered wing of the bran and the golden plumage of the broad-leafed germ. This is certainly a Christian idea of divine love and protection, but it is not practical applied to milling; it does not protect the miller's pocket-book.

The first effort, therefore, should be to separate the middlings from the bran and germ, and never allow them to become intermingled again. How can this best be done? There is such a variety of ways for handling the break-chop, all of which are successful, and each of which has its especial advantage for especially designed mills of varying capacities, that it would be impracticable to undertake to explain these various systems without special programmes and very elaborate *articles. I will therefore only touch upon the leading* points as applicable to all mills. One common fault in scalping is to have scalpers of too excessive capacity. The material that should pass the scalper is not unfrequently all bolted out before it reaches half the length of the scalper, and what passes through from there on consists of broken pieces of wheat, much of which is made by the scalper. These broken pieces of wheat find their way to the germ-rolls, where they are flattened, and a majority of that which should be flour is crushed on to the bran instead of being removed. Further attempts are then made by more smooth-roll reductions to get this flour off, and some of it is thus obtained, but always of a very soft, "greasy" quality, which materially injures the general results.

How to make as little as possible of these "stubtails" or broken pieces of wheat, and what to do with them is an important problem. My experience has been that in all mills larger than four-sack plants, where wheat of different qualities are used, the best scalping arrangement is a system of inter-elevator bolts provided with double conveyors, a thing which English engineers have never yet fully appreciated the importance of, so arranged that the millers can "cut off" and send with the tailings of the scalper to the next reduction, all that branny material which finds its way into the break-chop at the

tail of these reels. At the next reduction these bran chips will be reduced so that the middlings will pass the meshes and the bran tail over. And if an aspiration, or assorting system, is applied to these tailings, this last bran will be removed. It will then be found, when the break chop has been gathered and sent to the separating reel or scalper, that a very much reduced per cent. of bran-chips will be found in it. The remaining bran-chips that tail over the separating reel may be sent to an aspirating leg or purifier, and than, in large mills, be reduced on a special roll, 24 cut, and scalped on about 30 wire, which will make a product good enough to go with the break chop, in which case it is a special reduction and not a return.

The next process would be to purify and roll the germ middlings. They will be found substantially free from bran, and consequently but light tailings will pass the scalper, which may be sent to the final roll, and the product from its scalper either dressed separately or, which in most cases is preferable, sent into the break-chop reel, as such a system simplifies the operations, and the stock, being of a very high order, it brings up the break flour to a much higher standard. We thus have all the products in the mill, except that from the bran-rolls, centralized and substantially free from bran and germ; consequently the subsequent operations are not so difficult. It is true, however, that there will still remain a quantity of fine bran which the purifiers will not wholly remove, and the separations should be so made as to tail off this bran and pollard at every point possible, and under no circumstances let it again become intermingled with the second middlings, which is a common fault. By following this process the flour will be granular and free from that woody, wooly substance which we find sometimes in the very middle of the mill, and which increases as we go down. There is no reason why the flour from the last reel preceding the low-grade reel should not maintain its granular qualities and comparatively high commercial standard, and it will, when these perfect separations are carried out.

In relation to the best class of machines to be used for scalping, every miller will be his own judge. There is a great variety of machines for that purpose. The "rotary scalper" is very prominent just now. It has the advantage of being a cheap machine to make, and has a large capacity, but I fear that the rubbing action on the middlings is too severe and the mechanical motion faulty. The whirling of the stock around and rubbing on the sieve forms a sort of automatic cleaner, but not a perfect one; consequently it is liable to fill up and to tail over rich product. It is not a new device, for it has been used in America for a century or more for sifting corn-meal, for which purpose it is well adapted. The reciprocating riddle, with long stroke to cause the stock to turn over, is, perhaps, a preferable device, as there is less wear on the material, but it should have a cleaner for the cloth, as the tumbling action is not sufficient to keep the meshes open. The vertical shaking riddle accomplishes the work fairly well and does not wear the stock so much, but it bolts through more long bran-cuttings, as by the tossing action more of them come endwise to the cloth. It also must have a cleaner, or tail over rich material sometimes. The common round reel scalper is limited in capacity, because the material rolls in a sort of hoof fashion and the centre of the mass does not reach the surface, consequently it is liable to tail over rich unless of excessive length. The ordinary hexagon reel has held its ground well, and probably would continue to do so against any of the machines above mentioned, except in small mills, where one shaking riddle may be made to do the work of all the breaks by simply dividing it into sections. The hexagon has the disadvantage of lifting and dropping the stock through a considerable space, which operates to produce and force through the meshes broken pieces of wheat.

The inter-elevator bolt, in my opinion, embodies the nearest approach to a perfect scalper on all classes of stock that has been thus far developed. It is somewhat more expensive than either of the above described machines, but the difference in cost in a large mill, in my opinion, would soon be saved. The special advantage of this machine is that the material is delivered upon the cloth in a thin spray on both sides of the machine, and consequently has no weight behind it or over it, as in a rotary scalper, to increase the pressure and consequent flouring of the stock. It has double the capacity of the hexagon reel, and thus may be made very much shorter, holding the stock for a less time and consequently less wear upon it. It has the same advantage for dusting middlings. I may say further for it, that, being a slow, rotary motioned reel, and also provided with a brush cleaner, it therefore requires no attention. In all machines where a given result can be accomplished as well by a revolving motion as by any other, the true mechanic will seek that motion, as the mechanical forces are thus balanced. When the Lord set the universe to whirling, he spun this world upon an axle, and while he did give to each a compound rotary action, he so balanced the centrifugal forces that there is no "giggle" among the stars. And so in mechanics; we will find those machines most serviceable and giving the least trouble which approach nearest to perfect balance of action. London *Millers' Gazette.*

TABLES OF DIAMETERS IN INCHES AND AREA IN SQUARE FEET.

IT is often desirable as for instance in calculating the diameters of circular grates, etc., where a certain area in square feet is desired to have a table which will give the square feet or fraction thereof for a given even diameter in inches corresponding to various even areas in square feet.

To get the first, it is only necessary to multiply the square of diameter in inches by $\frac{0.7854}{144} = .005454$; and to get the second, to multiply the area in square feet by $\frac{144}{0.7854} = 183.09$ and take the square root of the product. Thus a grate 20 inches diameter has an area of $20 \times 20 \times .005454 = 2.2816$ square feet, while to get exactly 4 square feet of surface the diameter would have to be $\sqrt{4 \times 183.09} = \sqrt{732.36}$ equals practically 27.4 inches.

Diam. inches.	Sq. of dia. inches.	Area sq. inch.	Area sq. foot.	Diam. feet.
12	144	113.10	.785	1.
12½	156.25	122.72	.852	1.04
13	169	132.73	.921	1.08
13½	182.25	143.14	.994	1.13
14	196	153.94	1.069	1.17
14½	210.25	165.13	1.146	1.21
15	225	176.71	1.227	1.25
15½	240.25	188.69	1.310	1.29
16	256	201.06	1.396	1.33
16½	272.25	213.82	1.470	1.37
17	289	226.98	1.576	1.41
17½	306.25	240.53	1.670	1.45
18	324	254.47	1.767	1.50
18½	342.25	268.80	1.866	1.54
19	361	283.53	1.969	1.58
19½	380.25	298.65	2.073	1.62
20	400	314.16	2.181	1.66
21	441	346.36	2.40	1.75
22	484	380.13	2.64	1.83
23	529	415.48	2.88	1.91
24	576	452.39	3.14	2.00
25	625	490.87	3.40	2.08
26	676	536.23	3.72	2.16
27	729	572.56	3.97	2.25
28	784	615.75	4.27	2.33
29	841	660.52	4.58	2.416
30	900	706.86	4.90	2.449
31	961	754.77	5.24	2.582
32	1024	804.25	5.58	2.665
33	1089	855.30	5.93	2.748
34	1156	907.92	6.30	2.831
35	1225	962.11	6.68	2.914
36	1296	1017.9	7.06	2.997
37	1369	1075.2	7.46	3.08
38	1444	1134.1	7.87	3.16

Power and Transmission.

TRADE NOTES

Messrs. E. E. Dixon & Co., of Toronto, have recently supplied the Toronto Electric Light Co. with a driving belt 30 inches wide, double thickness, and 126 feet long, and to the Picton Electric Light Co. a 20 inch double belt, 67 feet long.

The Canadian Rubber Co., of Montreal, are sending out to their customers a valuable little treatise containing suggestions for the transmission of power by rubber belting, by James Bennett Forsyth. The ability of the company to manufacture a good article in rubber belting is attested by the fact that they have been appointed by the Boston Belting Co. sole agents and manufacturers of the Forsyth patent seamless belting for the Dominion of Canada.

It is simply astonishing, says the Bobcaygeon *Independent*, the effect that Spooner's Copperine has. Mr. Gildey, of the Little Bob Mills opened a box of this anti-friction metal on Tuesday, and the thermometer has been fooling around zero ever since. With stove wood at $3 a cord, if Mr. Spooner should happen into this village just now, he would get hustled out so quick that he would require to be boxed in his own metal for a time to get cooled off. Mr Gildey says, though, that this metal is wonderfull stuff for journal bearings, no matter what the weight or speed may be there is no disturbing its equanimity. Belts may break, fly wheels burst, and lubricators burn out, but this metal remains as cool as a clam or a professional widow at her fifth wedding. The sales of copperine are said to be increasing rapidly. There are still a number of old McGintys around some of the machine shops and factories who think they can make Babbitt, but what kind of fly plaster is it. Why if you look at it with a warm glance, it blushes like a girl in her teens. It may be a few cents cheaper, but it costs as many dollars the first time it heats. Spooner's Copperine appears to be the material. We have this week sent out a stack of subscription accounts and if they don't come back next week, Mr. Spooner will receive an order, if he will chalk it up of course, for several boxes of his finest copperine, for this journal will be at a white heat.

ELECTRICAL

Attempts are being made to secure electric light for Wycbridge, Ont.

The electric railway at Victoria, B. C., will be extended to Beacon Hill

The boiler and remainder of plant have been received by the Nanaimo, B. C., Electric Light Works.

The Bell Electric Light Company are making preparations for the erection of a seventy light circuit in Sarnia.

A company to run an electric street railway in Moncton is asking incorporation in the New Brunswick legislature.

The power consumed by an arc light is determined by the formula $C^2 \times R$, or current squared, multiplied by the resistance

The details of the plant of the Kingston Electric Light Company have been placed in the hands of arbitrators with a view to amalgamation with the gas company.

Mr St. John, Government Inspector of steam boilers, delivered an address on boiler joints at a recent meeting of the Canadian Association of Marine Engineers.

Hon. Gilbert McMicken, of Winnipeg, claims to have patented an automatic word recorder in 1847 at Montreal, and denies Thomas Edison's recent claim of being the inventor.

The Bell Electric Light plant at Arnprior has been sold to Dr. McEwen of Carleton Place and Mr. Menzies, of Arnprior. The latter, who is a practical electrician, will manage the business.

At a public meeting held in Saanich, B. C., a resolution was passed petitioning the Provincial Government to assist the National Electric Tramway Company of Victoria to build an extension to Saanich.

The amount of penalty imposed at Victoria, B. C., upon the California Electric Company, for an infraction of the customs laws, has been set at $2,885 which had to be paid before March 29th, or the whole apparatus would have been confiscated.

Mr A. A. Knudson, who was recently at St. John, says that the prospects of electricity being adopted for the street railway are excellent. It is probable the work will be commenced in the spring.

The Windsor Electric Light and Power Co., of Windsor, N. S., has been organized with the following board of directors: A. Forsyth, president; J. Doran, P. J. Mosher, H. V. Hind, J. B. Black, M. D., Rufus Curry.

A number of new residences erected last year in the city of St. John, N. B., have been wired throughout for the incandescent light, and it is believed that its introduction will become quite general during the coming summer

The Massachusetts Charitable Mechanic Association of Boston will hold its "Seventeenth Triennial Exhibition of Industry, Skill and Art," the next autumn. An important feature will be an exhibit of the latest devices in electrical science. The Secretary is Mr. Alfred Bicknell, Mechanics Building, Boston.

In a recent issue, mention was made of an accident by which Mr. G. W. Hunt, electrician of the Bell E. L. Co. had his leg broken. We learn that Mr. Hunt is now able to resume his duties, and that before leaving London for Paris a number of his friends presented him with a handsome gold ring.

A very successful test was recently made of the Victoria, B. C., electric street railway. Mr. A. S. Winslow, superintendent, manipulated the electrical currents, and the car travelled at from 8 to 12 miles an hour. The cars are of the most approved pattern, capable of seating 26 persons, and weighing in all about six tons.

The Mayor and a delegation of prominent citizens of West Toronto Junction recently paid a visit to Howland & Elliot's flouring mill at Lambton Mills, for the purpose of ascertaining the feasibility of obtaining power to drive the electric light plant which the town propose to purchase. The scheme is believed to be practicable.

We have received the prospectus of the Brooks Manufacturing Co., of Peterboro, Ont. The company is the first that has been organized in Canada for the manufacture of electric light carbons. They announce that they will manufacture nothing but the very best quality of goods, and that they will be ready to fill orders promptly.

Bids for lighting the city of Detroit for periods of one, two and three years have just been entered, and the prices range from 39 cents to 75 cents a light per night. In Philadelphia, on the new bids, the prices range from 45 to 55 cents a light per night burning from sunset to sunrise every night in the year. In Cincinnati, the contract for street lighting has just been awarded to the Brush company at 40 cents per night.

The Edison Electric Company are taking steps to extend their business in Canada. The company have bought out the business of Messrs. M. D. Barr & Co., Montreal, their Canadian selling agents, and placed the Canadian business under the jurisdiction of the New York head office, Mr. Barr having been appointed manager for Canada. The Company's Canadian business will be removed to Ontario, with headquarters in Toronto.

A novel circumstance, believed to be the first of the kind on record, is reported from Hamilton. The location of the wires that were originally put into the basement walls of the new city hall, connecting with the switchboard in the upper hall, has been lost, through somebody's carelessness during the building operations, and cannot now be found without ripping up the marble pavement and mutilating the walls in what might, after all, prove a fruitless search

A bill is before the British Columbia Legislature to incorporate the Vancouver Street Railway Company and the Vancouver Electric Illuminating Company as one company to carry on the business

each company was incorporated to carry on separately. Another bill is for the incorporation of Thomas R. McInnes, [illegible] and Arthur M. Herring, chemist, as the New Westminster Electric Light and Motor Power Company, capital stock $100,000.

It is to be regretted that many contractors for all kinds of electrical work are continually cutting prices and putting in a poor class of apparatus which is continually giving their customers trouble and in this way putting extra money in the contractors pockets for repairs, etc. Now if these same contractors would but consider for a moment, they would see that by the system of work they have adopted they are simply educating the public generally to lose all confidence in electrical appliances, whereas if they used good material, did their work well, and charged an honest price, they would find the demand for electric bell work constantly would increase to an enormous extent, and their business would thereby be not only directly but permanently benefitted.

A new and very important use has been discovered for paper. The electric companies of New York city have recently adopted a new conduit system for supplying interior lights. By it electric wires in buildings instead of being strung with no other protection than insulating material, are run through tubes made of sheathing paper that has been subjected to a process making it impervious to fire or water. The tests made were thorough, and showed that wires within the tubes could be burned out without the slightest danger of setting a building on fire. Mayor Hart, of Boston, and a party of other New England officials visited New York city recently to inspect the new system, and they declared after the examination, that the use of such conduits would have saved Boston from its last great fire.

Some remarks having been made about some of the leading electricians not being satisfied with the organization of the Canada Electrical Society, the president at a recent meeting said that more than one hundred electricians were invited to participate in its formation, and if they were dissatisfied it was their own fault through not being present at the meetings. The society had been organized after due reflection and after notice had been given in what was thought to be the best manner for ensuring its success, and those who were not satisfied with its organization could easily change it by becoming active members and attending the meetings when every opportunity would be given them of expressing their views. At the next meeting a paper will be read by Mr. W. K. Kendall on "Electricity as a Motive Power."

A New York despatch reports that at last there is a perfected plan backed by money already subscribed, to utilize the power of Niagara—not of Niagara Falls, but of the waterhead of the river above the falls. Within a month the Niagara River Hydraulic Power & Sewer Co. will begin the digging and blasting necessary for the building of its main tunnel, which will be about two and one-half miles long. The ground above Niagara where the factories of the company are to stand has already been bought by the company. The estimate of cost for tunnel, 24 cross tunnels, [illegible] gateways and bulkheads, and necessary masonry, timber, etc., etc., is $2,250,000. It is thought to be practicable by the parties who are undertaking it to convey this power as far as Buffalo [illegible] for lighting that city with electricity, and new ways of using and conveying the inexhaustible force of the Niagara river [illegible] light will be discovered in the future. One of the best known banking houses in Wall street is said to be deeply interested in this undertaking.

It is a well recognized fact amongst Canadian electric light men generally, that the fire underwriters of Canada and their inspectors have very little knowledge of the particular class of electrical work which they undertake to regulate. For instance, they will condemn the use of underwriters' wire for inside work, when put up in the most perfect manner, and will allow the use of wire which has a slightly better insulation, but this same insulation will carry fire with rapidity, whereas the insulation of underwriters' wire will not. We always favour first-class work in every case, but we contend that underwriters' wire strung on good insulation on the inside of buildings, and protected by rubber tubes where it passes through floors or partitions, is (for the above mentioned reason) far safer than nine tenths of the wiring which the underwriters inspector passes as correct.

Throughout Ontario there are numbers of lighthouses which are maintained by the Government at an expense of between three and four hundred dollars a year each. A large number of these lighthouses are situated within a short distance of towns in which the electric light plant is being operated. Now we would suggest that the Dept. of Public Works consider the advisability of connecting these lighthouses with the electric light circuit, which can be done by a suitable submarine cable at comparatively little expense. They could then contract with the local lighting company for the supply of light, and we think that in most cases the price asked would not exceed $30 per annum for an incandescent light that would far outstrip the ordinary oil lamps in brilliancy. In case of the lamp burning out, an apparatus can easily be arranged to put in a new lamp and thus maintain the light without interruption.

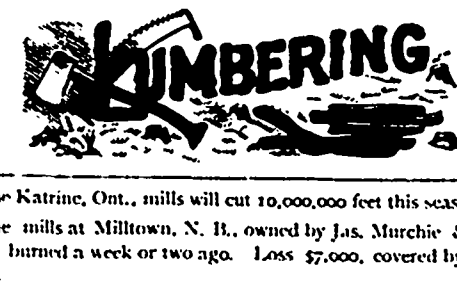
Two Canadian gentlemen are said to have made the important discovery that telephone trunk lines may be duplexed the same as telegraph wires. This has hitherto been considered impossible on account of the great dissimilarity between telegraph and telephone currents. It is on this account chiefly that long-distance telephony is more expensive than telegraphy, as only two persons can use the wires at the same time. By means of the new invention it is said that four persons can use the same wires simultaneously without the least interference. Advantage is taken of the metallic wire system now in general use on the interurban trunk lines. Transmitters and receivers are used with double coils, and the apparatus is connected with both branches of the double-wire circuit. One set of transmitters generates electrical impulses in the two wires in opposite directions, while the other set generates impulses in the two wires in the same direction. By means of differential reversing coils one set of apparatus will actuate and be actuated by a set similarly connected, while, on the other hand, it will not affect or be affected by apparatus with coils dissimilarly connected. In the one case the electrical impulses move only in the metallic circuit formed by the two wires of the trunk line; in the other case the circuit is completed through the subscriber's ground wires. If this invention is found to work as satisfactorily in actual practice as it is claimed to work experimentally, it will necessarily very materially reduce the working expenses of long distance telephone lines.

When Professor Henry showed the remarkable distance at which electric inductive action could be indicated by the effect of one coil upon another situated in different parts of a house, and the inductive effect of a lightning discharge, he little dreamed that the same principle would some day be employed for the purpose of maintaining communication with a rapidly moving train. Yet such is the case, and the demonstration which we recently witnessed ourselves, and which we will describe at a future time, can leave no doubt that the system has been reduced to a practical basis. The operator on board the train was "rushed," perhaps harder than one in any stationary telegraph office, and the remarkably few repetitions required, demonstrated fully the volume and clearness of the sound received in the telephone both at the terminal station and on the car. With success demonstrated, the question will naturally be asked whether the system will find extensive application. We believe that, in the matter of its introduction, it will follow very much the course of the speaking telephone. When first brought out, the mere possibility of its functions was doubted. When finally demonstrated as an actual fact, it was looked upon much as a toy which might be used for certain purposes. After that, with very little delay, came the education of the public to the convenience which it afforded, making it the very great success it is to-day. So, we believe, it will be with the train telegraph. Its practicability is proved beyond question, and when the public, in which we include the railroad managers, become educated to its advantages, it will take a prominent place among the methods of communication. It certainly affords advantages which cannot be obtained so cheaply in any other way, so far as the movement of trains is concerned, and as a convenience to the travelling public, it stands unique.

A decided change may be perceived in the speculations which have within recent times been made on the possibilities and methods of producing artificial illumination. From the old tallow dip to the incandescent and arc lamp is recognized as a great advance. But we are now more than ever forcibly reminded of the fact by prominent writers, that, scientifically considered, even our most improved methods of lighting are barbarous in their wastefulness of energy. The light of the little glow worm is pointed out as exhibiting the small amount of energy actually required to produce a given amount of illumination, when that energy is in proper form to act upon the retina of the eye. Why, we are asked, should we effect ten million of vibrations per second to produce a luminous effect, by working up through the lower scales of vibrating energy as presented in the production of heat? The question evidently resolves itself into devising means for producing billions of vibrations per second, in order that matter may be put into a state of luminosity without the intervention of other forms of vibrating energy. It may have occurred to many that such a high rate of vibration, or change of state, might be obtained by electrical means of a comparatively simple kind, such as by the impulses produced in the coils of a rapidly revolving armature; but a moment's thought will show that probably little can be expected from that source with any machine running at a practicable speed. The recent investigation in this line tends to show that the oscillation produced in electro-static discharges approached more nearly to this rate of vibration required to effect luminosity, and in this direction we may hope to obtain some success, though we have everything to learn with regard to this subject. We know pretty nearly the conditions to be fulfilled in the solution of this problem, but the means of carrying them out are still to be devised.

The electric lighting station in the city of Hamilton, Ontario, is situated on the corner of King and Catherine street. It is a three storey building solidly built of brick, with a frontage of 73 feet on King street, and a depth of 169 feet on Catherine street. The front of the building is occupied by the business office and testing room, the latter being fitted up for the accurate testing of arc and incandescent lamps. The dynamo room is immediately in rear of the office, and is fitted with 79 feet of line shafting, to which is belted five 50 light, two 35 light, two 25 light, and two 12 light Thomson-Houston dynamos of the latest design. There is also one Westinghouse alternating current incandescent dynamo having a capacity of 1,500 lights of 16 candle power, also a smaller one having a capacity of 500 lights. The engine room and boiler room are situated back of the testing room and to the east of the dynamo room. The boilers are seven in number of the following dimensions:—*two 68 inch x 14 feet, 96 3 inch tubes in each; two* 60 inch x 11 feet, 74 3 inch tubes in each; three 60 inch x 14 feet, 74 3 inch tubes in each. The smoke from all the fires is carried into an immense brick stack in the rear of the premises, 130 feet high, which affords such an excellent draft that coal screenings are easily used without the aid of a blower. There are two very fine new engines of three hundred horse power each. These engines were made by Messrs. Goldie & McCulloch, of Galt, Ont., and have 20 inch cylinders, with a stroke of 48 inches, the revolutions per minute being 82. There is also a Westinghouse automatic high speed engine of 65 horse power, which is used exclusively for driving the 500 light Westinghouse dynamo. The two large engines each carry a large belt of 38 inch face, from which an extra heavy 36 inch belt transmits the power to the line shaft in the dynamo room, friction clutches being so arranged that either engine can be thrown in or out of use at a moment's notice. The linework comprises about 90 miles of insulated wire, about 1,500 long, heavy, well set poles, and 250 outrigger or patent arms for suspending arc lamps from. The company supply the city with 252 arc lamps of 2,000 candle power each, and also 34 incandescent lights. The merchants and other private consumers use about 100 arc lights, and 500 incandescent lights, while contracts are already signed and the wiring is under way for an increase of 1,500 incandescent lights.

It is claimed by many that the use of incandescent lights on arc light circuits has proved a failure when used to any large extent. There seems to be a mistake here, as we know of many places where large numbers of incandescent lights are so used, and what is more, they burn perfectly steady and give an excellent average of life. The first essential to perfect working of these lights is perfect regulation of the dynamo current. This can be obtained firstly by having fairly steady power, and secondly by having a proper automatic regulator on the dynamo that will compensate for any change in the load. Of course there is no trouble about obtaining the steady power, as any first-class make of engine working under steady steam pressure will answer the purpose perfectly, and we know that there are several makers of dynamos that control their current so perfectly that a variation of more than one tenth of an ampere hardly ever occurs. Where then does *the trouble lie?* It is evidently caused by two circumstances, namely, the impossibility of obtaining a reliable cut-out when the lamps are run in groups, and the prohibitive price asked for about the only reliable cut-out on the market, that can be used when the lamps are run in series. The principal cause of the high price is the complicated arrangement of the socket and the heavy import duty imposed. Only for the matter of price the series lamp would answer the purpose perfectly, and would greatly increase the burning capacity of all lighting companies whose field is too small to permit of their installing a separate incandescent plant. We learn with pleasure that it is the intention of the Canadian Edison Lamp Co., at Hamilton (the only manufacturers of the incandescent lamps in Canada) to place upon the market at an early date, a line of lamps that will be especially adapted to working in series with arc lights. These lamps have an automatic cut-out contained in the lamp itself, so that nothing is required but the lamp and ordinary socket, and we understand that the price will be such that there will no longer be any reasonable excuse on the part of lighting companies for not adopting the series lamp.



The Katrine, Ont., mills will cut 10,000,000 feet this season.

The mills at Milltown, N. B., owned by Jas. Murchie & Sons were burned a week or two ago. Loss $7,000, covered by insurance.

Some saw mill owners say they will be obliged to discontinue operations if better rates are not afforded by the Intercolonial railway.

Mr. D. Miller's shingle mill at Severn Bridge, Ont., was destroyed by fire on the morning of March 25th. Loss, about $1,200; insurance $300.

The saw and shingle mills belonging to Olds Bros., Greenbush, near Brockville, Ont., were totally destroyed recently by fire. Loss, $2,000; no insurance.

On the night of the 8th of March Jerrett's large planing mill at Alliston, Ont., was destroyed by fire. Cause of fire unknown; loss heavy; insurance $1,000.

Messrs McLachlin Bros.' mills at Arnprior, Ont., are being thoroughly overhauled and refitted with every improvement, previous to starting the season's cut.

Messrs. W. R. Thistle & Co. have sold their saw mill at Pembroke, Ont., to a joint stock company composed of Messrs. Thos. Hall, Dunlop & Chapman, A. & P. White and John Bromley.

Mr. N. E. Cormier, lumber merchant of Aylmer, P. Q., ex-M. P. P. for Ottawa County, has assigned at the demand of the Ontario Government. His liabilities will amount to over $100,000.

Knight & Co., of the Popcum mills, Chilliwack, B. C., are putting in a new Wheelock automatic cut-off engine, 75 horse power, and intend going extensively into the manufacture of "Excelsior," a preparation of wood for upholstering purposes.

A member of the Red River Lumber Co., of Minnesota, recently visited Winnipeg to look into the question of erecting a very large saw mill there for the purpose of manufacturing the large product of the company's timber limits along Red River in Minnesota.

The extensive remodelling of the Hastings saw mill at Vancouver, B. C., contemplated for some time, will now be carried into effect. Nearly all the present machinery will be replaced by new machinery, and the capacity increased to about 150,000 feet per day.

G. F. Slater, of the Vancouver shingle mill, Vancouver, B. C., has given his mill a thorough overhauling, preparatory to *commencing the season's operations. The mill* can now turn out 75,000 dimension shingles per day, of any width from four to twelve inches.

Eight million, two hundred and eighty-five thousand cubic feet is the estimated square timber cut by the Upper Ottawa lumbermen for the season of 1888-90. The selling value of this at the average current rate of 26 cents per cubic foot is $2,154,100. This amount also represents in trees cut down, counting fifty cubic feet to a tree, 165,700. This is in excess of the cut of any previous year.

Two Michigan lumber men, Messrs McIntyre and Hewont, have bought out the entire interests of Mr. Sutton in the Cowichan, B. C., saw mill, including the mill, timber, leases and goodwill. A new mill will be erected on the old site with a capacity of 150,000 feet per day; the river will also be improved for navigation, and between $150,000 and $200,000 will be spent before the firm commences the manufacture of timber.

Mr. T. Carr has purchased the Walker foundry at Belleville, Ont., for the sum of $14,500.

The Walkerville Malleable Iron Company, Walkerville, Ont., heretofore alluded to in these pages, has been incorporated with a capital stock of $100,000.

L. M. Palmer's stave mill at Dawn, Ont., was burned recently. Loss, over $13,000; insured. The fire was caused by the explosion of a lamp in the engine room.

CONVENTION SPARKS.

UNDER this heading our esteemed Boston contemporary, *Modern Light and Heat*, has summarized in the following paragraphs, the most valuable opinions expressed at the recent convention in Kansas City of the National Electric Light Association of the United States:

An arc light wire should never be concealed. *M. D. Law.*

A boiler which is under frequent repairs is dear at any price. *George H. Babcock.*

The mechanical part of electrical construction is substantially all of it. *Mr. Torrey.*

The modern arc light carbon of commerce is hardly ten years old. *E. F. Peck.*

No one furnace is best for all fuels, and rarely for more than one. *George H. Babcock.*

My orders are to drop all work that is not absolutely necessary to clear grounds. *M. D. Law.*

It pays to have men of brains as well as brawn and muscle even for firing fuel and watching water. *George H. Babcock.*

It is important that the switch board should be made of soapstone or other incombustible material. *C. J. H. Woodbury.*

It is to the furnace we must look largely for the ability to meet the sudden fluctuations in demand for steam. *George H. Babcock.*

I want to put myself on record as indorsing the plan for a mutual insurance company for central stations. *Marsden J. Perry.*

It is well to understand that there is no such thing as "burning smoke," but furnaces can be made to produce a minimum quantity. *George H. Babcock.*

No more inviting field is offered for either investing capital or good engineering than a central station for lighting, power and railway work. *C. J. Field.*

Switches, fuses, bad joints, ruptured wires, are much less liable to arc and incur risk of fire with alternating than with continuous currents. *Prof. Elihu Thomson.*

Every central station should send a competent man to every fire with the fire department. That has been done in Philadelphia now for nearly nine years. *M. D. Law.*

I think there is infinitely more danger in the electric lighting stations from the boilers, engines and heating apparatus, than from the electric lighting wires. *T. Carpenter Smith.*

To work under the most advantageous operative and economical conditions, we *must* convey electrical energy by moderately high electrical pressures. *Prof. Elihu Thomson.*

I believe that those few companies who are doing business in insuring electric lighting stations to-day, even in their deplorable condition, are making money. *S. E. Barton.*

I look forward to the time when many existing, well-constructed and well-drained cable conduits will become electrical conduits, and electricity will then score another victory. *Frank J. Sprague.*

There can be no doubt that electricity, as an agent, in itself is not to be charged with bringing about the results for which recklessness in its use is sufficient to account. *Prof. Elihu Thomson.*

From my standpoint as an insurance man, I wish every other kind of illumination was driven out, and that electric lighting was exclusive. We would have a great many less fires. *S. E. Barton.*

There is no mystery about the carrying capacity of a wire. For one cent you can buy a set of tables which any mechanical engineer will indorse as being perfectly safe to follow. *Marsden J. Perry.*

We use coal which costs us a dollar a ton more than some others we could get, and count it the cheapest, because the item of hauling away the ashes with us is very heavy. *T. Carpenter Smith.*

That system of distribution will surely survive, which, while involving economy of first cost and maintenance, at the same time secures the greater safety and embodies the greatest flexibility. *Prof. Elihu Thomson.*

Set down all claims to the evaporation of over twelve pounds water per pound of combustible unless it be oil, gas or hydrogen, under any conditions, as made ignorantly or with an intention to deceive. *George H. Babcock.*

We should keep a record of our knowledge of the grounds and their causes; and after a short time in studying those causes, I think it will be found where we can improve upon our method of construction. *J. E. Lockwood.*

I look upon the omission, in these days of progress, of any possible safeguard against danger to property or person, as criminal, as contrary to the principles of true economy, and extremely impolitic. *C. C. Haskins.*

The first line which was established in the United States for actual commercial service was a suburban line of two miles in length, built by Mr. Daft just outside of Baltimore, in the latter part of 1885. *Frank J. Sprague.*

It should be the aim and policy of all electrical corporations to constantly improve the condition of poles and lines, giving as much attention to their strength and beauty as to their perfection electrically. *H. W. Pope.*

I believe it is possible with care to operate a storage battery on grades not exceeding, say 4 per cent., and with limited speed and daily mileage at an expense about equal to that of horses or a little less. *Frank J. Sprague.*

The insurance inspector who steps into a building, and is competent to inspect everything in it, except electric wires, should make himself competent to inspect that risk, and accept or reject it for cause. *Marsden J. Perry.*

Many of the central stations are built with hollow frame walls and thin roof, forming a structure which is hot in summer, cold in winter, and combustible all the year round which disadvantages diminish dividends. *C. J. H. Woodbury.*

If the boiler-house is placed at the end of the central station, the division wall should be made of brick and extend through the roof, entirely cutting off all wood communication between the station and the boiler-room. *C. J. H. Woodbury.*

I hope, as cordially as any other man can, that the storage battery for street railway work is going to be a success; but there is no question but that its limitations are pretty clearly fixed, and that it can never compete with direct sources of supply. *Frank J. Sprague.*

It is certain that to attempt to bury the electric light wires in a hasty, ill-considered fashion, merely for the sake of getting rid of overhead lines, would be productive of no good results, either in avoiding risks or bettering the service. *Prof. Elihu Thomson.*

An incompetent fireman is a very expensive luxury, a careless lineman is a drain which saps the profit account of its treasure, while a dynamo man or an engineer who watches the clock more closely than he does the guages or the brushes, is sure to be a heavy brake on the wheels of progress. *C. C. Haskins.*

The Thomson-Houston and Sprague Street Railway Companies will agree hereafter to use a standard potential of 500 volts upon all electric street railway equipments that do not require any special apparatus for their successful operation. *Report of Committee on Standardization of Potentials.*

The waste in the use of carbons is a very important feature. These should be dealt out and every stump returned. The amount saved in laying by the four and five inch stumps, to be used in the summer months, will make a saving of at least ten thousand carbons per year for a one thousand light station. *M. D. Law.*

An electric light station must always be on hand ready for work. It cannot take a vacation at the pleasure of its proprietor, the whim of its operator, or even for attention to repairs. A break down not only stops its own work, but that of many others, and jeopardizes often great and grave interests. *George H. Babcock.*

I agree with Mr. Law that the cleanliness of the station is a very vital thing. In fact, I go farther, and say it is the most vital thing as affecting the fire risk of the generating station to-day. I believe that more than three-fourths of the fires that have occurred in stations have been due to carelessness and want of cleanliness. *S. E. Barton.*

The strong point I wish to bring out is the providing of ample space or ground for the central station. Buy it and own it. It is what you want for future growth and development. That is certainly a pertinent lesson that has been taught us by the universal experience of all men engaged in central station construction. *Marsden J. Perry.*

I believe that the next large incandescent station will not only include compound or triple expansion engines of 300 or 400 horse power, but will also have multipolar dynamos, one or two being directly connected to the engine. By this, I do not mean belted, but direct shaft connection through a flexible "coupling." *C. J. Field.*

It was a sharp trader who exhibited a cotton covered, painted wire to the insurance people and demonstrated that it did not really burn. "Just the thing," said the Actuary, and the President, and the Inspector, and they all smiled at the honor conferred when the cunning merchant baptized it for its godfathers, and called it "The Underwriters' Wire." *C. C. Haskins.*

The protection against fire in a central station consists principally in keeping the establishment in a clean and orderly condition, the use of good lubricating oil, and careful attention to the bearings; and beyond that, numerous fire pails kept filled with water, and hose connected to hydrants ready for instant use, form the means for protection against fire. *C. J. H. Woodbury.*

I think that a large source of economy will be found in central stations by putting in a forced draft apparatus, more than increasing the capacity. I know there is strong prejudice against forcing boilers, on the score of danger from it, but I do not think that any electric light station should be run by any man that cannot be trusted to force a boiler without endangering it. *T. Carpenter Smith.*

There can be no question that a shock obtained from certain characters of current, such as an alternating current, is much less safe than in the case of continuous currents of equivalent pressures. Nevertheless, I am just as firmly convinced that the fire risk is very much less with alternating than with continuous currents of equivalent potential, assuming the work of installation equally good. *Prof. Elihu Thomson.*

When we consider that in constant running a boiler, to speak figuratively, eats its head off every three or four months, it is plain that a reasonable additional cost for an economical boiler is a first-rate business investment. In other words, a boiler which would save 10 per cent. of the coal would pay 30 to 40 per cent. on its cost annually and would be cheap at a round price as against another as a gift. *George H. Babcock.*

The watchwords of the future are certainly economy of fuel and perfect insulation, and while there may be improvements in designs for apparatus, and in methods and means of distribution, and while we still hope for the direct conversion of the energy of coal, the advance of the immediate future should be in the direction of economizing present waste, rather than in the discovery of new facts or principles. *E. E. Weeks.*

It is true that electric lighting and power have made wonderful and monstrous strides in popularity, considering the youth of their existence; and they will continue, despite every opposition, to grow in grace and strength, till they have relegated to the rear ranks every other form of illumination, and crowded the present clumsy, hot, ungainly engines from their vantage ground, as the circus elephant clears the tan-bark ring for the riders. *C. C. Haskins.*

The one great important point in cental station construction is to determine how large to build the station, that it may permanently serve its purpose for not less than twenty-five years in the development of this business. One of the ideas that suggested itself to me was, in solving this problem, to take the local gas output of the city, and, on the basis of 16-candle lamps, reduce it to steam power, and provide for from two to three times the total gas output. *Marsden J. Perry.*

As illustrating the progress of electric railways, I may state that there are about 130 towns in the United States with one or more electric railways in operation, construction, or under contract, and that these roads comprise about 1,500 miles of track, equipped with about 1,700 motor cars, requiring 3,000 motors of an aggregate capacity of 45,000 horse-power, and steam and electrical generators of 25,000 horse-power. The roads in operation are making about 100,000 miles per day, and within three months the mileage will be doubled. *Frank J. Sprague.*

Every new industry is compelled to fight for an existence. If like the electrical enterprise, it must elbow its way into notice, taking the place of a competitor in the front rank, it must make enemies and of a necessity antagonize those whom it discomforts and crowds to the background. It is not an attribute of the descendants of Adam to submit tamely to rebuffs and usurpation, and no opportunity is ever lost of disfiguring the countenance of the new comer. To give occasion for and encourage these opportunities by our own acts seems to me to be short-sighted and illogical. *C. C. Haskins.*

Now the gas companies have got to a certain condition after forty or fifty years of hard experience. They did not get their experience from having somebody sit down and figure it out for them. They started just as we have by piping peoples' buildings and doing everything of that kind. Gradually they began to cut off these little luxuries, and now they have got down to delivering gas at the customer's premises; they put their meter in and are responsible for it, and beyond that they are not responsible; and the electric lighting company must get there too, just as quickly as possible. *T. Carpenter Smith.*

DECIDING UPON A BOILER.

In a lecture before the National Electric Light Association, George H. Babcock gave the following general rules to be observed in selecting a boiler:

"(a) Set down all claims to the evaporation of over nine pounds water per pound of combustible (unless hydrogen gas or hydrogen) under any conditions as ignorantly or with an intention to deceive, and such boilers as are claimed to do this, as either fabulous or soda water factories. (b) See if the boiler has the elements which are necessary to economy, such as rapid and thorough circulation of water, thin heating surface, a well distributed flow of the hot gases, of sufficient duration to secure thorough absorption of the heat, and ample disengaging surface to permit the steam to be driven off free from entrained water.

"In this matter of circulation of water, a caution needs to be given, also, as against many unfounded ideas and claims. To secure an effective circulation of water, the currents must not only be separated from each other, but they must combine to form a continuous circuit without interfering eddies or material enlargements, and the steam is ready to be separated from the water. Thus a series of horizontal or slightly inclined tubes open only at one end have many interfering currents and but a very slight circulation. Return bends connecting two or more inclined tubes cause such a collision of currents going in opposite directions as to effectually destroy the circulation, and when tubes open into an intake wide enough to admit a downward current within them the most efficient factor of circulation is taken away.

"(c) Observe the record of the boiler for a term of years. Single tests may be made to show superior results with a boiler which is anything but desirable for actual use. Tests made in regular work are best, if honestly made by competent engineers, but even here one needs to be on guard, as not infrequently tests grossly distorted are put forth as correct.

"In considering the choice of a boiler for electric lighting purposes, economy of evaporation is not the only necessary element. There are three others of as great importance, if not greater. One of these is the ability to be forced for a short time while the maximum load is on. This is very important, otherwise it is necessary to put in a plant large enough for the maximum, and run at great disadvantage except for the two or three hours a day when the demand is at the greatest. But the boiler, while adapted to the economical generation of the average amount of steam required, can be forced enough to meet the greatest demand, even if it should be at reduced economy for the time being, the average economy will be better and the interest account will also be less.

"Another point of importance is safety from explosions. Now the light plant, as a rule, must be erected in the midst of thickly populated communities, and therefore this is one important, possibly, to secure safety from explosions in them than in most other steam plants. Now while a common boiler may not be liable to explode under good care, yet one of the most difficult things to secure under all conditions is this good care. The best of men become careless and forgetful at times, and hence good boilers sometimes explode when least expected. It is far better economy, even at a great cost, to put in a boiler safe from destructive explosions than to run the risk of a blow-up, with loss of time, of capital, not to mention human life. Instance the Edison company, at Chester, Pa., where the explosion of a new and well made return tubular boiler killed seven and wounded eight persons, besides demolishing the building. Even at a much higher first cost a safe boiler would have been good economy. But it is necessary in this matter also to employ a coefficient of common sense because so many claim safety for their boilers when they violate every element of security from explosion. As a rule, a water-tube boiler properly constructed should be a safety boiler, but the mere presence of water tubes may be no surety whatever. In applying the coefficient of common sense to this question of safety, one needs to remember that a large surface exposed to the direct action of the fire and all flat surfaces, stayed or unstayed, are elements of danger, and that this danger is greatly augmented by insufficient circulation of water, whereby unequal expansions are liable to occur with consequent straining of the parts.

"The third important question to consider in selecting a boiler, for economy, is its liability to repairs. A boiler that is under frequent repairs is dear at any price, and repairs which repairs are not quickly and cheaply made, are in the same category. This point is best determined by long and extensive experience. Nothing else can be relied on with any certainty. While tubular boilers may last for years in favorable circumstances, their average life is usually stated to be not over ten or twelve years, and their average repairs are usually estimated at 10 per cent. per annum on their cost.

Many go years without repairs, and I do not vouch for this estimate, only giving it as one accepted in ordinary calculation. As for water-tube boilers, the makers of the best known example publish the results of experience with an aggregate 100,000 horse power which has run from two to 20 years, and on which repairs to the boiler proper had been about one-half per cent. per annum. They claim, moreover, and it cannot be successfully disputed, that in over twenty years' experience not a single boiler of that kind has been worn out in use, and that of all which have ever been sold in twenty-three years, not less than ninety-eight per cent. are in use to-day. It is unfortunate, however, that the same cannot be said of water-tube boilers in general.

Last, but not least, we come to the element of brains. No matter how good or cheap the fuel, how perfect the furnace, or how exceptional the boiler, unless brains are placed in charge, the preparation goes for naught. It is not difficult to find a difference of twenty-five and even more per cent. in economy between the extremes of fireman with the same plant, to say nothing of repairs and stoppages caused by a little carelessness. It pays to have men of brains as well as brawn and muscle, even for firing fuel and watching water.

To review the necessary conditions of economy in generating steam for electric lighting plants, we have:

First—The use of the fuel which gives the best results for the least money. This varies with the locality.

Second—A furnace which will burn the said fuel to the best advantage, and at the same time permit of the rate of combustion to be quickly changed to meet the greatly varying demands without serious loss of economy between the highest and the lowest.

Third—A boiler which will utilize the heat to best advantage; which will give dry steam; which will permit of being forced much above its average rating for short times, without serious loss of economy; which is safe against destructive explosions, and which is not liable to frequent, difficult, or costly repairs.

Fourth—Foreman and fireman with brains enough to employ all these things to the best advantage, and keep the apparatus at a point of maximum efficiency.

In selecting these elements of an economical plant it is urged that the coefficient of common sense should be fully employed, and that facts gained from long experience are a far safer reliance than mere assertions not backed by years of practical results.

FOUNDATIONS FOR DROP PRESSES.

THE new works of the Gorham Manufacturing Co., at Providence, R. I., cover nearly four acres of ground. The buildings are founded upon a firm bed of gravel. The works in full operation will employ from 1,500 to 2,000 men.

The drop-press department has demanded and received especial attention in this matter of foundations, and a short account of the methods pursued is now given. The work has been done under the direct supervision of Mr. John M. Bogle, the master mechanic of the Gorham Co, and the long experience gained in his connection with the old works has been utilized in setting up the new presses.

This experience taught Mr. Bogle that the foundations under these presses must be very solid and so bound together that no one foundation can yield under the forces applied to it. The drops themselves vary from 250 lbs. to 3,000 lbs. in weight, and the fall varies from 2 feet to 6 feet, according to the work required.

For this foundation a pit was first excavated 81 feet by 16 feet and 12 feet deep. Large foundation stone were used, resting on a firm gravel foundation. Over the bottom of the pit a 10 inch bed of Portland cement concrete was laid, made in the proportions of one part cement, two parts sand and four parts stone chips. The presses are set upon three courses of granite blocks of the dimensions given. The 102 blocks contain 4,872 cu. feet of granite, supplied by the Smithfield Granite Co. It is an unusually strong stone, weighing 176 lbs. per cubic foot. The blocks were set in Portland cement, and the entire mass of masonry was imbedded in concrete.

The upper courses of the foundations are separated from each other and carry the iron bases of the presses, each weighing from 4 to 11 tons; on these the beds of the presses rest. The entire work is one of remarkable solidity, and no expense was spared to make the first the sole cost. We are indebted to Mr. Oscar H. Briggs, the inspector in charge, for these details.

The wheat product of the Portage Plains, Manitoba, this year, is estimated at 1,291,000 bushels.

USEFUL INFORMATION

If the foundation of your engine is of stone, paint it with two or three coats and dry it well before starting the engine, and there will be no trouble in keeping it clean.

An English locomotive has earned 10s. 8d. per mile run. It is a model of Webb's compound, the Dreadnaught and is set in motion by pennies, the receipts going for charitable purposes.

A simple way of removing rust from finely polished steel without injury to the surface consists in cleaning the article with a mixture of ten parts of tin putty, eight of prepared buck's horn and twenty-five of alcohol, and then rubbing with soft blotting paper.

Geo. M. Whitney, Hickory, N. C., says: "I have recently made a discovery which I regard as of value to the mechanical world. It pertains to belt lacing. I find the most useful material I have ever employed for lacing belts is nothing more or less than ordinary bed ticking. I want all users of high speed belting to give this a trial. Tear the lace with the warp about 1½ inches wide. It will outlast any leather lace that I ever used."

FRENCH AND ENGLISH EQUIVALENT OF MEASURES OF LENGTHS.—LINEAL MEASURE.

1 millimetre (1-1000 metre)	equal to	0.03937 in. (about 1-25 in.)
1 centimeter (1-100 ")	"	0·3937 "
1 decimetre (1-10 ")	"	3·937 "
1 metre	"	39·37 " or 3·28 ft.
1 kilometre (1000 metres)	"	0·621 mile.
1 inch	"	25·4 millimetres.
1 foot	"	0·304 metre.
1 yard	"	0·9144 "
1 mile	"	1·609 kilometres.

A correspondent of the *Stationary Engineer* has for more than twelve years found great advantage in feeding shavings, etc., from wood surfacing machines into the furnace by an air blast, moving twelve feet per second through a pipe twelve inches in diameter. He seems, by the way, to have a fondness for this number. The shavings are injected in a sort of spray, and blaze up at once, the air forced in with them giving full support to the combustion. Only half as many shavings were used as when they were fed with the shovel, as in that case the air cannot get in while it is needed, and a great part of the fuel passes off in smoke. In another experiment (at Schulenberg & Boekeler's planing mill, at St. Louis), where the shavings were blown in from both sides of the furnace into a battery of three boilers, it is claimed that two-thirds of the fuel and the labor of one man is saved.

In his paper read before the French Academy of Science, M. Ch. Tellier claims to be able to produce motive power for .44 pounds of coal per horse power hour. This result is obtained by using a combustible gas, employing the heat generated by its explosion to generate steam, and the use of the vapor of ammonia. When the gas has operated on the piston it escapes at a temperature of about 400 degrees into a generator where steam is produced, which is used to act upon the opposite side of the piston from the gases. There are two advantages claimed for this, the high temperature due to combustion of the gas prevents cylinder condensation and the steam assists in lubrication. The completed machine for which this claim is made will consist of two cylinders, one making its forward stroke under the action by the explosive gases, and its return stroke by the action of steam; the other is operated entirely by vapor of ammonia. Under these conditions, says M. Tellier, there can be no doubt theoretically or practically that .44 pounds of coal per horse power hour is an economy which can be secured.

TREATMENT OF WATER FOR BOILER PURPOSES.—In an article in the *Chemical Trades Journal*, Mr. G. E. Davis recommends that water used for boiler purposes should be so treated before entering the boiler that all formation of scale should be prevented, and deprecates the use of substances which merely prevent the scale from adhering to the boiler. As an example of how various precipitating agents may be used in conjunction with one another, a water which contained 5.2 grs. of calcium carbonate, 25.3 grs. of calcium sulphate, 0.15 grs. of magnesium sulphate, 4.27 grs. of magnesium chloride, 17.27 grs. of magnesium nitrate per gal., was treated with a mixture of 17 grs. of caustic soda—77 per cent.—17 grs. of sodium carbonate, 5 grs. of tribasic phosphate of sodium, with the result that of 12.9 grs. of lime only 0.78 grs., and of 6.6 grs. of magnesia only 3.78 grs. remained to enter the boiler, and this at a cost of 3¾ d. per 1,000 gals. The precipitate amounted to 25 tons semi-dry sludge—or nine tons dry—from 5,000,000 gallons of this water per week.

COMPRESSING COAL DUST.—One-seventh of the coal mined is lost because broken up too finely to be burned with profit. Some method of preventing this waste is, therefore, of the greatest economic importance to mankind, and has long been sought. It is now believed that this desirable result has been accomplished. The Reading Railroad Co. is using a process of compressing the dust, mixed with pitch, into brickets that burn like hard coal, with the advantage that they are entirely consumed to ashes and leave no clinkers. Two presses are employed, which turn out 800 tons of brickets every twenty-four hours. As the brickets take up twenty-five per cent. less space than ordinary coal, an engine can be loaded to go one-fourth farther with them. The Reading Railroad will use this new fuel exclusively, and making a saving over coal of $35,000 to $40,000 per year. It is intended to place this new fuel on the market at a lower price than coal, and it will undoubtedly reduce the price of fuel considerably, thus adding to the prosperity of every industry. Besides the enormous piles of coal dust left around the mines to be worked up into fuel, it will be a great saving to be able to mine coal hereafter without being obliged to throw away as worthless one-seventh of all the product of the miner's labor.

ON BOILER TRIALS.

ALTHOUGH most engineers understand the principles of boiler testing, we have thought that an outline of the methods most commonly used might be of service to such of our readers as have never conducted or been present at such trials. The apparatus that we show in the cuts is simple, and can readily be set up and arranged by any engineer, yet we believe it to be capable of giving very satisfactory results.

The first thing to do, in making the trial, is to set up the pump, *C* Fig. 1, and the cask, *A*, and scales, *B*. In case the boiler to be tested (*D*) is one of a battery, its feed pipe, *F*, may be disconnected from the main feed, F, the opening thus left in the tee on *F* being closed by a screw plug. The boiler feed is then connected to the pump by means of suitable pipes, reducing coupling being used if necessary. The suction of the pump is connected to the cask, *A*, by means of a rubber hose, *H*, and the cask is filled by means of another piece of hose, shown at *K*. The connection at E should be left until the last thing, or otherwise the water in the boiler may run low while the pump and cask are being arranged, and serious damage may result.

When all is in readiness, a small quantity of water is let into the cask, and the pump is started so as to fill the connecting pipes and enable the engineer to detect and stop any leakage there may be. The fire is then hauled, and the water level marked. The mark should be a little above the second try-cock, this being the general level carried by engineers. A new fire is next built on the grates, using kindling material that has been previously weighed.

Meanwhile water is introduced into the cask until the cask and its contents weigh say six hundred pounds. When it becomes necessary to feed, the temperature of the water in *A* is taken by stirring a thermometer around in it, and the valve *P* is opened and the pump allowed to work until the cask and its contents weigh exactly one hundred pounds. We know, then, that five hundred pounds of water have been introduced into the boiler. This fact, together with the time of day, is taken down in a note-book, and the cask is filled once more, ready for the next feed.

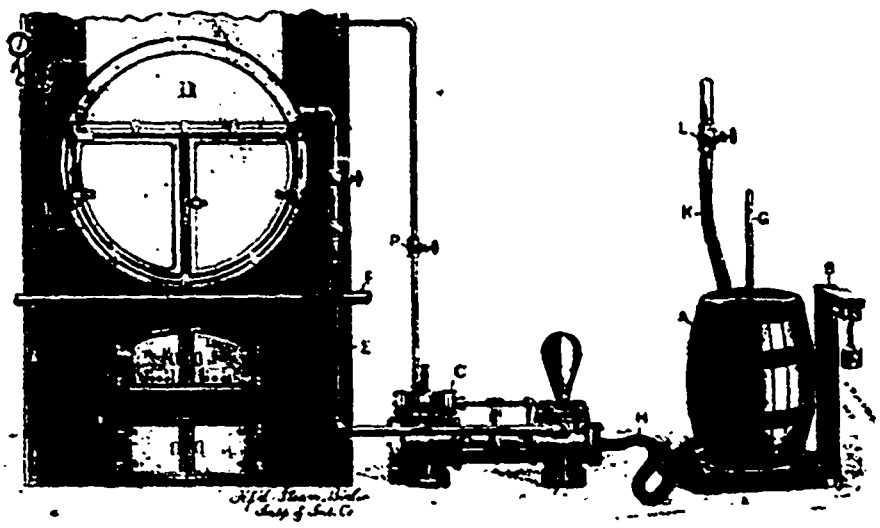


FIG 1.—APPARATUS FOR EVAPORATIVE TEST

In order to avoid errors in getting the weight of the feed water, it is well to proceed as follows: Place a float in the cask, with a rod or stick, *G*, projecting upward from it, and passing through a hole in a piece of board tacked to the top of the cask. Place the sliding weight of the scales at the zero mark, and at the end of the beam hang, say, two two-hundred pound weights, and two one-hundred pound ones. Then open the valve *L* and let the water enter the cask until the scales just balance. If a slight excess of water is introduced, it may be baled out, so as to make the balance exact. Then make a mark on the float-stick, *G*, opposite the top of the board through which it passes. Then take off all the weights at the end of the beam, except one of the one hundred pound ones, and pump down till the scales just balance. Then make another mark on *G*, opposite the top of the board on the cask. After this has been done, the procedure is very simple. To fill the cask, add the weights that have just been removed, and open the valve *L* wide until the high water mark on *G* gets near the top of the board. Then shut it almost off and let the cask fill slowly until the scales just balance. A little practice will enable the engineer to shut off the water so exactly that the beam of the scales will come to rest half way between the stops; but should too much water be accidentally admitted, the sliding weight on the beam is run out till the balance is restored, and the correct weight of the water is noted down in the note book. The sliding weight is then pushed back, and all weights except the hundred-pound one are removed from the beam. When the water is fed the valve *P* may be opened up till the low water mark on *G* approaches the board, the pump being then run slowly until the balance is obtained. If *P* is now closed quickly enough, so that a little too much water is removed from the cask, the hundred pound weight on the beam is removed and the true weight of the cask and contents ascertained by means of the sliding weight. By conducting the feeding operations in this manner, the engineer may obtain very accurate results, without much trouble.

As the trial draws to a close, care should be taken that the water level in the boiler is a trifle below the string on the guage glass, which marks the level of the water when the test began. Then, when the trial is at an end and the fires have been drawn, water is introduced by the pump until the level is brought back to the string, and the weight of the water so introduced is recorded in the note-book. It will then be an easy thing for the engineer to find out, at his leisure, precisely how much water he has fed during the entire trial.

Now as to the fires. When the grates and ash-pit have been carefully cleaned, and the new fire has been started, with a known weight of kindling material, a careful record should be kept of the weight of coal used, and the condition of the coal should be the same as it is under ordinary circumstances, in the every-day practice. Many engineers, in making such trials, dry out a sample of the coal to find out what proportion of it is moisture, and allow for this moisture in the total weight of coal used. This does not seem to us a desirable thing to do, since the object of most tests is to find out, not what the boiler *can* do under assumed conditions, but what it *does* do under actual conditions. The same rule applies to the handling of the fire. We hold that if the trial is intended to show what the boiler is doing in its every-day work, no attempt at expert firing should be made while the trial is in progress, but everything should be done as on ordinary days.

No water should be used in the ash-pit, and as the end of the test draws near it is a good plan to let the coal on the grate burn pretty well out. At the last moment the fire is hauled and deposited in the ash-pit, together with the ashes already there, and allowed to cool, when the coal may be separated from the ash and clinker by hand, if desired. Both are then weighed, and the sum of the two is taken from the total weight of coal fed into the furnace. This gives the quantity of *combustion* used. If the coal found in the ash-pit be subtracted from the total amount of coal used, the result is the total amount of *coal* used. If the weight of ash be divided by the weight of coal used, the result is the per cent. of ash the coal contains.

If the steam that boilers give off was perfectly dry, the weight of water fed would be equal to the weight of steam formed; but since steam ordinarily contains a certain percentage of water, existing in it in the form of fine spray, or mist, we have to take this fact into account in estimating the quantity of water evaporated. The apparatus for determining the moisture present in steam is shown in Fig. 2. It consists of a common steelyards

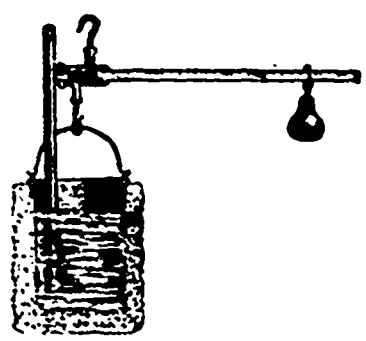


FIG. 2.—

and a large tin pail, about which a layer of cotton wool, an inch and a half or two inches thick, is wound, and secured by means of an outer layer of cloth, around which several turns of string are tightly wound. The empty pail is made to weigh an exact number of pounds by placing one or two nuts or other bits of iron in it. Ten pounds of water are next weighed into it, and the weight on the steelyards is then pushed along one pound. Steam is then blown into the pail until the steelyards once more balance. In this way we know, with considerable precision, just when one pound of steam has been added to the water. The temperature of the water in the pail is taken both immediately before and immediately after the steam has been passed into it, care being taken, especially in measuring the higher temperature, to stir the water well with the thermometer and to leave the thermometer in it long enough for the quicksilver to reach the same temperature as the water in which it is plunged. The rise in temperature so obtained gives us a means of determining the percentage of moisture in the steam, and numerous rules and formulæ for calculating it will be found in the books.

We think, however, that most engineers will find the following table very satisfactory. (The first table of this sort, we believe, was given about 1867 by Dr. Van der Weyde. It has since been republished by Mr. Thomas Pray and others.)

This table is exact when the steam pressure is 75 lbs. and the temperature of the water in the pail, before drawing steam into it, is 60°. It will still be serviceable, however, for pressures and temperatures differing considerably from these. If the rise in temperature is greater than 105°, the steam is superheated.

It will be seen that the thermometer used in this work must be of very good quality, in order to give readings of sufficient accuracy to determine the moisture satisfactorily. It should be graduated to single degrees, and the readings, both before and after drawing the steam, must be taken with great care. The experiment should be repeated frequently during the trial, and the average rise in temperature is to be taken in calculating the moisture from the table given below.

Particular attention should be made, in making boiler trials, to two points. In the first place, the blow-off valve must be perfectly tight. Otherwise a considerable amount of water will pass off through it, and the boiler will appear to be doing better than it really is. Secondly, in drawing steam from the main pipe for use in the calorimeter, care must be taken to let it blow freely through the pipe running to the pail, until this pipe and its connections are well heated; otherwise the steam will appear wetter than it really is. The lower end of this pipe should be fitted with a rose, or at all events with a tee, so that the incoming steam may not blow directly against the bottom of the pail. If this is not attended to, the engineer will find it impossible to tell when he has drawn off precisely one pound of steam. Attention should be paid, also, to the manner in which this pipe enters the main. More or less moisture is always drawn along the interior surface of steam pipes by the steam, so that if the pipe barely enters the main, the steam drawn off through it will be too wet, and will not fairly represent the average quality of that which the boiler is making. Various ways of connecting the pipe have been proposed, in order to secure steam that will be of average quality. We think that the engineer will achieve this by putting a longer thread than ordinary on the end of the pipe, and screwing it until its inner end projects somewhat into the interior of the main.

The percentage of moisture in the steam being known, the quantity of water that went over into the mains as water is easily found. Thus, if the total water apparently evaporated was 15,000 lbs., and there was 5 per cent. of moisture in the steam, the total amount that went over unevaporated would be $15{,}000 \times .05 = 750$ lbs. This being subtracted from the weight of water fed, we have $15{,}000 - 750 = 14{,}250$ lbs. as the quantity of water actually evaporated. If this be divided by the total weight of coal burned (say 1,750 lbs.), the evaporation per pound of coal is $14{,}250 \div 1{,}750 = 8.14$ lbs.

In closing this article it may be well to say, that accurate results cannot be obtained in boiler trials without a good deal of work, and the exercise of patience and care. Various measurements other than those herein described are usually made at the same time, as, for instance, the temperature of the flue, the draft of the chimney, the flow of air into the ash-pit, and particularly the steam pressure.

TABLE FOR FINDING THE PERCENTAGE OF MOISTURE IN STEAM.

Rise in Temperature.	Per Cent. of Water.	Rise in Temperature.	Per Cent. of Water	Rise in Temperature.	Per Cent. of Water
105	0	95	12	77	34
104	1	93	14	76	36
103	2	92	16	74	38
102	3	90	18	72	40
101½	4	88½	20	71	42
101	5	87	22	69	44
100	6	85	24	67	46
99	7	83	26	66	48
98	8	81	28	64	50
97	9	80	30	62½	52
96½	10	79	32	61	54

Wm. M. Halliday's mill at Gananoque, Ont., is offered for sale.

W. W. Coventry, has sold his mill at Burgessville, Ont., and removed to Woodstock.

W. W. Brown will remove his mill from the neighborhood of Dutton, Ont., to the Northwest.

A. M. Williams, mill owner, Dutton, Ont., is reported to have assigned to J. M. Green, owing $8,300.

The Ogilvie Milling Co.'s elevator at Manitou, Man., has been added to the light deliveries of wheat at present.

W. W. Brock, head miller at Seagram's mill, Waterloo, Ont., died a week or two ago from an attack of la grippe followed by pneumonia.

S. S. Law, for several years in the office of the Oshawa Woollen Mills, has secured a lucrative position in the west, and will leave at early date.

M. Fox Hawkshaw, of the firm of Fox & Hawkshaw, millers, Dutton, Ont., is lying very ill at his residence, with chances of recovery somewhat against him.

Mr. Peter Robertson, of Caledonia, Ont., an old millwright, died aged 83rd. His son, Mr. A. M. Robertson, millwright of Ogilvie mills, Winnipeg, was present at the funeral.

Messrs. W. Snider & Co., of Waterloo, Ont., have bought the grain warehouse at Newton which they will enlarge and improve by the addition of machinery for an elevator.

The grain warehouse of Dundas & Flavelle Bros., at Woodville, Ont., gave way under the great strain of the grain stored there. Seventy-five bushels of barley and oats were spilled.

The farmers of Huron are organizing to build a grist mill in Seaforth, for which they are issuing a thousand shares of $10 each, no one being allowed to subscribe for more than ten shares.

Mr. Wm. Mills Morse, who was formerly engaged in the milling business with his brother John, and owned the Tollendale mills, Bracebridge, died at his residence in the city of Toronto a few days ago.

R. Jackson, employed in Hillard & Peplow's flour mill, Portage, had his hand caught in a bolt and severely smashed. Every one of the fingers was pulled out, and several of the fingers broken.

Mr. Edward Plewes Secretary of the D. M. A. advises farmers, in view of Congressional proposals, not to plant barley this spring, but substitute spring wheat on the early land and peas on the late.

Mr. N. Boswell of Wyoming, Ont., has leased his oatmeal and flour mill to Messrs. Campbell & Dennis, his former millers, who will conduct the business in future. Both men are well able to carry on the business successfully.

It is stated that Mr. John McFarlane of the Dunblane, Ont., mills, has decided to move to Arden, Man., in May. He will take the machinery of the old Dunblane mill with him, and expects to have a new mill ready for work by first of September.

During the past year $5,000 have been sent out of Lower Nicola, B.C., for flour. The farmers could not sell their wheat, as there was no mill to purchase it. Mr. A. E. Howson proposes to remedy this state of affairs by erecting a 50 barrel roller mill.

It is said that the well-known Ogilvie Milling Co., of Montreal are building on a site recently purchased on Foundling street, Montreal, a magnificent suite of offices, which it is claimed will be something that has yet been seen in the flour trade of Montreal.

At the request of the Winnipeg Board of Trade, the Dominion Government has appointed a Northwest Board of Arbitrators to settle disputes between grain inspectors as to the proper grading of wheat. This duty has heretofore been performed by the Winnipeg Board of Trade.

The farmers Milling Co., at a recent meeting in Brigden, let the contract of putting up their new mill to Mr. James Whyte. The building is to be completed by the first of August, and will be ready for the placing of the machinery. It is expected to receive a big order early in the fall.

The insurances on the People's Milling Co.'s mill recently burned at Meaford, amount to $16,000, distributed as follows: Liverpool, England, $3,000, Royal Canadian, $4,000; Phœnix, $3,000; Gore District Mutual, $2,000; Western, of Toronto, $2,000; Canadian Millers' Mutual, $2,000.

The following resolution was adopted at a recent meeting of the Toronto Corn Exchange: "That the members of the Corn Exchange Association are satisfied that all grain consigned to Toronto to be placed in store after 48 hours from arrival if not ordered delivered, the storage rates to be half a cent per bushel for the first ten days, and a quarter of a cent per bushel for each succeeding ten days."

In the annual report the secretary of the Port Arthur Board of Trade says: "The failure of the flour mill negotiations (reference is made to the proposal of Hastings Bros. & McGaw to build at Port Arthur) has thrown us back a year, and unless some definite effort be made this winter, we shall be thrown over another year before we realize it. I am still of opinion that the city should liberally bonus a mill.

On the afternoon of March 13th Jackson's flour mill at Blenheim, Ont., was discovered to be on fire in the second floor. The fire-brigade soon at work, but in spite of their efforts the mill and contents were entirely consumed. Insured in the British American for $600; Citizens for $600; Royal $1,450; Waterloo Mutual $1,450. The mill was valued at $8,500, and contained about 3,000 bushels of grain. The fire is supposed to have been caused by a spark from the engine.

A Brandon correspondent writes.—Alexander Kelly & Co., millers, Brandon, contemplate pulling down their present frame mill and erecting on the same lot a large brick mill during the coming spring and summer. J. S. KeKay, millwright, was in the city last week, discussing the plans of the proposed building.

Five leading millers of the Bay of Quinte district have offered prizes of $25, $15 and $10 for the best three fields of spring wheat, not less than five acres, to be grown in West Hastings, East Hastings, Ameliasburg or Sophiasburg, open to members of the Bay of Quinte District Agricultural Society. The wheat is to be judged in the field.

An order of the Courts has been granted quashing by-law No. 3 of the village of Bayfield in the county of Huron, which granted a bonus of $2,000 and a loan of $3,000 to John Kalbfliesch of that village to aid a steam roller flour mill, on the ground that the requirements of the statute had not been fulfilled prior to the vote being taken and for other irregularities.

The lake marine insurance companies met in Chicago last week, and adopted a new style of policies, and also fixed the rates for insurance on vessels for next season. Trip rates on grain from Chicago are: To ports on Lake Superior, 80c, Huron, Sarnia and Detroit river, 65c; Georgian Bay, 75c; Lake Erie, 75c; Lake Ontario, 90c, Ogdensburg, 95c; Montreal, $1.25.

Mr. Cochrane, M. P., has lately received a number of communications from farmers in different parts of the province, asking him to bring in a bill to compel millers to give farmers a standard weight of flour for their wheat. Mr. Cochrane consulted the Minister of Justice about the matter, and learned from him that the subject was entirely under the control of the provincial legislature.

The dirtiest of all dirt released in a mill says the *Millers' Gazette*, is that about the smutter. It should be well taken care of so that it cannot find its way about the mill to contaminate the pure stock. The smutter should be housed separately, else its impalpable gray dirt will float about the mill, perhaps imperceptible to the eye, to find its way into bolts, elevators, and flour bins at every point. The spout from the fan should lead so far away from the mill that none of its dirt can possibly get back into the building. The mill should be clean. In the wheat cleaning is where the extraneous dirt is set free; therefore attention to that part relieves the mill of the greatest dirt creating trouble.

Many millers are becoming alarmed says the *Millstone*, at the growth of farmers' alliances and other societies, and their predilection to engage in milling. We do not see any cause for alarm in this, as a little experience in milling will add to their qualities as farmers. We note a case where a mill owner in Southern Indiana leased his mill to the alliance on a guarantee of 6 per cent. per annum. We commend this as one of the ways for a miller to shift the problem of making losses on a class saturated with ignorance of milling and prejudice against millers. There is nothing like a little 'sperience, and the farmers are bound to have it.

The following resolution has been adopted by the council of the St. John, N. B., Board of Trade: "Resolved, that in the opinion of this council it is objectionable that the duty on flour imported into the Dominion should be increased above what it is at present, but if it should be decided to increase the duty it would be only fair to the people of the Maritime provinces that they should be relieved of duty on other articles largely used here. This council would therefore recommend that molasses imported from the place of growth should be made free; that the duty other than from the place of growth be allowed to remain as it is at present, viz., 20 per cent.; that corn should also be admitted free, in which case the duty on cornmeal should be reduced to twenty cents per barrel."

The inaugural address of the President of the Toronto Board of Trade has the following reference to the milling business: "The milling trade has continued to feel the effect of the competition from the importation of American flour. The duty on wheat imported into Canada is 15 cents per bushel, which, by way of comparison, is equal to 74¼ cents per barrel of flour, whereas the duty on flour is only 50 cents per barrel. It seems to me unfair under our policy of protection to home industries that the millers should not have the same treatment as accorded to other manufacturers, so as to participate in the advantages of our home market. There can be no doubt that this industry is suffering, and, although the farmers, as a class, have not appeared to take much interest, yet whatever affects its welfare must indirectly affect the agricultural interest, with which it is so intimately allied."

Rats, says the London *Miller*, have a known predilection for flour mills, where in spite of the fact that they have no business, they can usually find congenial occupation. To mend rats is a hopeless task, as they are not amenable to "moral suasion," and the first care of him who is unfortunate enough to receive their attentions is to discover how to end them. The following is said to be an unfailing remedy, and it must be admitted to possess a grim humour which is "all its own." Let the miller take a large barrel and fill it three parts, or rather more, full of chaff, but as rats, although very intelligent animals, have but a feeble appreciation of humour, he should carefully "cover up" his "chaff" with a thick layer of maize meal or some other cereal dainty beloved of rodents. Then he will adjust to the tub a piece of board broad enough to allow of plenty of rats having "free access" to the meal. On the first morning after the miller has started in this line of business he will find the bait three parts consumed, which will be a sign that he has succeeded in establishing confidence in the bosoms of his long-tailed customers. Let him beware of stopping the credit he has given, as with a little patience the "reckoning" will soon come. After a few nights he has only (without giving notice) to "discontinue the supply" of bran, and to fill its place by water, on the top of which the bait will form a floating island such as never entered into the heart of the most romantic novelist. Then will the rats return once more, and tumble, but this is not the right word—such are the niceties of the English language—no, they will drop—drop even as they who quit this world by the loop line. In the morning the miller may return to find his barrel half full of rats who have "settled" in the water. And so will his account with these customers balance on the right side.

CONTINUOUS OUTPUTS OF TWO-POLE DYNAMOS AND MOTORS.

By Alfred T. Snell.

THE following equations are intended for the use of engineers in charge of electrical plant, and demand no special electrical knowledge, the measurement being made by a foot rule. They give approximately the safe average output of dynamos and motors *for continuous running*, and are based on observations made during the past few years with machines of nearly all the best manufacturers. They, of course, only average the results, and so will not give a sufficiently high output for machines of abnormal proportions, *i. e.*, with unusually heavy fields, or very deep armature cores. With very light machines the formulæ will give results too high.

With normal machines the outputs given by these equations will generally be about 10 per cent. lower than that given in the price lists. This margin is made to meet contingencies incidental to continuous running.

The outputs are expressed in terms of the armature lengths and diameters and the number of revolutions per minute. The constants are carefully determined from a large number of tests. (They depend on the fact that the average magnetic induction through an armature is determined by the effective area of the iron and the magnetic density per unit area. For a given field excitation the total induction will be sensibly constant through considerable variations of radial depth of armature. This is apparent when we consider that the conductivity of the armature iron bears but a small proportion to the conductivity of the magnetic circuit as a whole, and hence an increase of iron will not largely increase the total induction, but will almost always decrease the induction per unit area.) The outputs of dynamos are given in watts (746 = 1 horse-power). Those of motors are given in brake-horse-power. The linear measurements of the armatures are made in inches. l = the length of the armature parallel to the shaft. In the case of cylinders the length may be taken over all, *i. e.*, from one end of the winding to the other. In drums, only that part of the armature covered by the pole-pieces must be measured for the value of l. The outer diameter d of the armature is measured over the windings. The revolutions per minute can be taken by a speed indicator or counter.

For two-pole dynamos:

l = length of armature in inches.
d = diameter of armature in inches.
r = number of revolutions per minute.

Drum armature: $l d^2 r \cdot 015$ = output in watts (I.)
Cylinder armature $l d^2 r \cdot 01$ = output in watts (II.)

For two-pole motors (Symbols have the same signification.)

Drum armature. $l d^2 r \cdot 000015$ = B. H. P. (III.)
Cylinder armature: $l d^2 r \cdot 00001$ = B. H. P. (IV.)

With a four-pole machine, since for the same magnetic density in the armature double the field excitation required for a two-pole machine is necessary, the *constant* must be multiplied by *two*. Some four pole machines, however, have very light fields, and then the output is given nearly correctly by the formulæ. Generally, with machines of more than two poles the equations will only be useful for determining the safe load for a *first run*. If the heating be very little the output can then be gradually increased until a suitable load be obtained.

The following examples, chosen at random, show the method of applying the formulæ to various machines:—

Edison-Hopkinson Dynamo.—Drum armature, 9¼ in. in length, 10 in. in diameter, 970 revolutions per minute.

Equation (I.)

$9{\cdot}75 \times 10^2 \times 970 \times {\cdot}015 = 14{,}200$ watts.

The output is given at 15,700 watts.

Paterson and Cooper Dynamo.—Cylinder armature, 10 in. in length, 13·5 in. in diameter, 850 revolutions per minute.

Equation (II.)

$10 \times 13{\cdot}5^2 \times 850 \times {\cdot}01 = 15{,}500$ watts.

The actual output is given at 16,200 watts.

Immisch Motor.—Drum armature, 14 in. in length, 7·25 in. in diameter, 1,000 revolutions per minute.

Equation (III.)

$14 \times 7{\cdot}25^2 \times 1000 \times {\cdot}000015 = 11$ B. H. P.

This machine is actually designed to give 10 B. H. P.

Immisch Motor.—Cylinder armature, 16 in. in length, 24 in. in diameter, 450 revolutions per minute.

Equation (IV.)

$16 \times 24{\cdot}5^2 \times 450 \times {\cdot}00001 = 43{\cdot}2$ B. H. P.

The actual horse-power given continuously by this motor is between 44 and 45.

The writer has found these equations of great assistance in selecting the size of armature for a given machine, before making more complete calculations.—*The Electrician.*

Mr. C. A. Rice has sold his flouring mills at Belford, P. Q., to Mr. E. Coslett for $6,100.

Mr. R. P. Harman has leased his planing mill at Uxbridge, Ont., to Messrs. W. Thirsk and James Reid, who will in future carry on the business.

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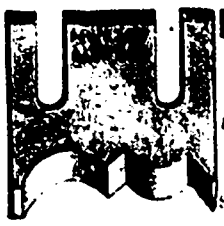

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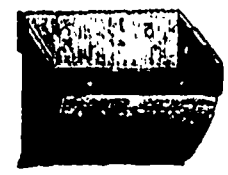

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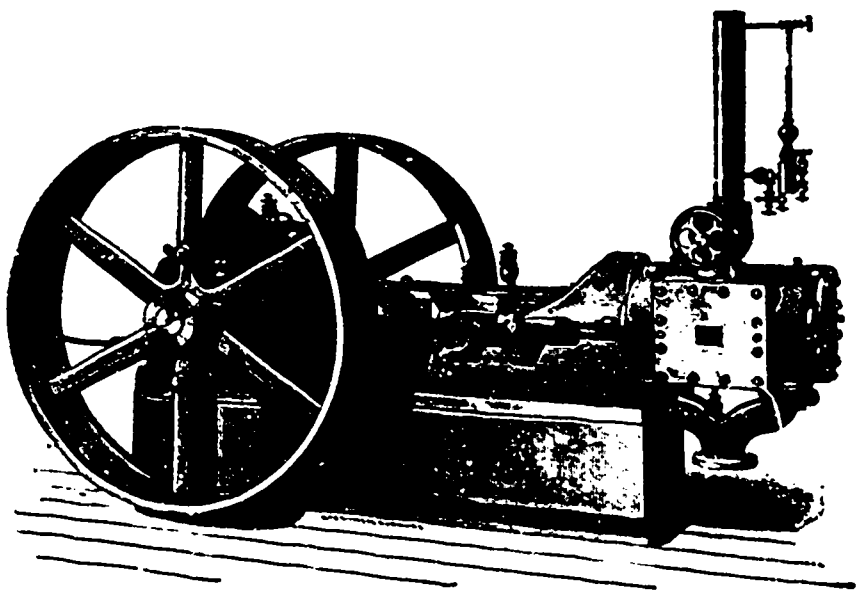

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(Signed) ARMINGTON & SIMS.

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

LUMBER PRICES.

LUMBER.

CAR OR CARGO LOTS.

1¼ and thicker clear picks, Am. ins	$30 00@	32 00
1¼ and thicker, three uppers, Am ins.		37 00
1¼ and thicker, pickings, Am ins.		27 00
1 x 10 and 12 dressing and better	18 00	20 00
1 x 10 and 12 mill run	13 00	14 00
1 x 10 and 12 dressing	14 00	16 00
1 x 10 and 12 common	12 00	13 00
1 x 10 and 12 spruce culls	10 00	11 00
1 x 10 and 12 maple culls		9 00
1 inch clear and picks	28 00	30 00
1 inch dressing and better	18 00	20 00
1 inch siding, mill run	14 00	15 00
1 inch siding, common	11 00	12 00
1 inch siding, ship culls	10 00	11 00
1 inch siding, mill culls	8 00	9 00
Cull scantling	8 00	9 00
1¼ and thicker cutting up plank	22 00	25 00
1 inch strips, 4 in. to 8 in. mill run	14 00	15 00
1 inch strips, common	11 00	12 00
1½ inch flooring	14 00	15 00
1½ inch flooring	14 00	16 00
XXX shingles, sawn	2 30@	2 45
XX shingles, sawn	1 40	1 35
Eastlake galvanized steel shingles, 24 W. G., per square		6 00
Eastlake galvanized steel shingles, 26 W. G., per square		5 50
Eastlake painted steel shingles, per sq.		4 00
Round pointed galvanized steel shingles, per sq.		6 00
Round pointed painted steel shingles,		4 25
Round pointed, unpainted, Terne tin shingles		4 00
Manitoba galvanized, steel siding, per square		5 00
Manitoba painted steel siding, per sq.		3 50
Painted sheet steel pressed brick		3 50
Painted crimped steel sheeting		3 40
Price of Copper shingles according to weight		

YARD QUOTATIONS.

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

B. M.

1¼ inch flooring, dressed, F. M.	28 00	32 00
1¼ inch flooring rough, B. M.	18 00	22 00
1¼ " dressed, F. M.	25 00	28 00
" undressed, B. M.	15 00	19 00
" dressed	18 00	22 00
" undressed	12 00	15 00
Beaded sheeting, dressed	22 00	35 00
Clapboarding, dressed		12 00
XXX sawn shingles, per M, 16 in.	2 65	2 75
Sawn lath	2 00	2 20
Red oak	30 00	40 00
White	35 00	45 00
Basswood, No. 1 and 2	18 00	20 00
Cherry, No. 1 and 2	70 00	70 00
White ash, No. 1 and 2	25 00	25 00
Black ash, No. 1 and 2	20 00	30 00
Dressing stocks	16 00	22 00
Picks, American inspection		40 00
Three uppers, American inspection		50 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M.	$13 00@	18 00
Birch, 1 to 4 inch, M	15 00	25 00
Basswood	12 00	20 00
Walnut, per M	50 00	100 00
Butternut, per M	22 00	40 00
Cedar, flat	00 04	00 06
Cherry, per M	60 00	80 00
Elm, Soft, 1st	15 00	17 00
Elm, Rock	25 00	30 00
Maple, hard, M	20 00	25 00
Maple, Soft	16 00	18 00
Oak, M	40 00	95 00
Pine, select, M	35 00	40 00
Pine, 2nd quality, M	20 00	25 00
Shipping Culls	13 00	16 00
Mill Culls	8 00	10 00
Lath, M	1 50	1 90
Spruce, 1 to 2 inch, M	10 00	12 00
Spruce Culls	4 50	6 00
Shingles, 1st quality	2 00	3 00
" 2nd "	1 25	1 50

Cement, etc.

Portland Cement, per barrel	$ 2 70@	3 00
Roman " "	2 70	3 00
Fire Bricks, per M	20 00	30 00

NEW YORK PRICES.

WHITE PINE.

Uppers	$46 00@	62 00
Selects	40 00	53 00
Fine common	35 00	48 00
Cutting up	21 00	30 00
Common	17 00	25 00
Norway	19 50	26 50
Pickets	14 00	23 00
Shippers, according to quality, for different ports	27 50	52 00
Coffin boards	21 00	23 00
Box	15 50	17 00
Ceiling	24 00	42 00
Shelving	25 00	32 00
Moulding	14 00	37 00
Bevel siding	16 00	23 00
Bridge timber	38 00	80 00

EASTERN SPRUCE.

9 to 12 in.	16 50	17 00
8 to 12 in	16 00	16 50
6 to 12 in	15 00	16 00
6 to 9 in	14 50	15 00
Special lengths	16 50	18 00
Lath	2 15	2 20
Piling, per lineal feet	05	

SHINGLES.

Pine, 16 in., extra	$ 3 10	3 25
18 in., extra	4 35	4 50
18 in., clear butts	3 15	3 25
16 and 18 inch, stocks	4 50	5 30
Cedar	8 75	19 00
Cypress	6 00	16 00
Redwood, per bunch	1 25	1 50
Various widths		1 00

HEMLOCK.

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

DRESSED LUMBER, CAR LOAD LOTS.

No. 1 flooring ⅞ in	23 00	24 00
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Timber	14 00	15 00

ALBANY, N. Y. PRICES.

SHINGLES AND LATH.

Shingles, shaved pine		6 50
2nd quality		5 00
Sawed, extra	4 80	4 90
Sawed, clear butts	3 00	3 75
Cedar XXX	3 50	4 30
Shingles, cedar mixed	2 00	3 00
Hemlock		2 25
Lath, pine	2 25	2 35
Spruce	2 00	2 25
Hemlock	1 75	2 00

HEMLOCK.

Boards, 10 inch, each		13½
Joist 4x6		33
Joist, 2½x4		13
Wall strips, 2x4		10

PINE.

2½ in. and up good	58 00	60 00
4ths	53 00	55 00
Selects	48 00	50 00
Pickings	43 00	45 00
1¼ to 2 in., good	50 00	55 00
4ths	45 00	52 00
Selects	40 00	45 00
1 inch, good	50 00	55 00
4ths	45 00	48 00
Selects	40 00	43 00
Pickings	35 00	38 00
Cutting up, 1 to 2 in	30 00	35 00
Brick, plain	32 00	36 00
Shelving Boards, 12 inch and up	28 00	32 00
Dressing boards, narrow	20 00	22 00
Shipping boards	16 50	18 00
Box boards	13 00	15 00
10 inch boards and better	30 00	34 00
Common	16 00	22 00
12 in boards dressing and better	32 00	36 00
Common	16 00	22 00
1¼ in siding selected 13 ft	43 00	45 00
Common	15 00	20 00
1½ in siding, selected	43 00	46 00
Common	14 00	19 00
Norway, selected	24 00	29 00
Common	12 00	16 00
10 in. p. k. 13 ft. dressing and better, each	45 00	50 00
Culls	23 00	25 00
10 inch boards, 13 ft. dress and better, each	28 00	33 00
Culls	17 00	22 00

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

WHITE PINE—ROUGH.

Uppers, 1 and 1¼ in.	42 00	44 00
1½ and 2 in	43 00	45 00
2½, 3 and 4 in	52 00	55 00
Selects, 1 inch	36 00	37 00
1¼, 1½ and 2 in	34 00	35 00
2½, 3 and 4 inch	44 00	46 00
Cuts, No. 1, 1 inch	27 00	29 00
1¼, 1½ and 2 inch	30 00	32 00
2½, 3 and 4 inch	37 00	40 00
No. 2, 1 inch	16 00	17 00
1¼, 1½ and 2 inch	20 00	22 00
Moulding, 1 inch	30 00	33 00