The Cochrane One Belt Drive ( ) Continuous Train of Rolls

CANNOT BE DOWNED,

BUT

ITS INTRINSIC MERIT BRINGS IT AGAIN TO THE FRONT,

Both in Canada and the United States

AN invention, with less merit, could not have withstood the onslaughts that have been made on it. Notwithstanding the untimely death of its inventor, and, in the United States, its financial supporter, as well as the keenest and most bitter opposition, it is again ready to do service and be a help to the millers in Canada and the United States. In the latter country its merits are being appreciated on all hands, and it is meeting with a rapid sale.

It will save you

- Twenty-five per cent. in power over any other known practical system in the world.
- Attention in its operating.
- Having your rolls out of train.

It will give you

- A more even granulation.
- A higher percentage of Patent Flour.

IT IS PRACTICAL; IT IS ECONOMICAL;

IT IS THE BEST MACHINE EVER PUT ON THE MARKET.

We have much pleasure in announcing to the milling public of Canada that we have granted to THE HERCULES MANUFACTURING CO., of Petrolea, the sole right to manufacture the Cochrane One Belt Drive Continuous Trains of Rolls under the Canadian patents granted to the late W. F. Cochrane, that they have purchased our patterns formerly used at Dundas in its manufacture, and that they are prepared to fill all orders for same.

COCHRANE ROLLER MILLS CO.

(OWNERS)

ESCANABA, - - MICH.

VALENCY E. FULLER, President.

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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 present is an era of great Exhibitions, the greatest and most successful of which has just closed in Paris.

A MEETING of delegates from the various branches of the Canadian Association of Stationary Engineers is shortly to be held to adopt means to assist the passage of a bill through the Legislature for the licensing of engineers.

THERE are a number of articles in the line of electrical supplies at present imported from the United States which we believe could be manufactured at a profit in Canada. Among these might be mentioned carbons and glass globes for arc and incandescent lamps.

DURING the last month, two of our most important and esteemed advertising patrons, leading business men in their respective lines of manufacture in the city of Montreal, have been compelled to ask the indulgence of their creditors. We refer to Messrs. A. W Morris & Bro., manufacturers of bags, cordage, etc., and the Hibbard Electric Manufacturing and Supply Co. The causes leading up to the suspension of these firms have been given in the daily papers. It is our hope and belief, as we believe it to be that of the business world, that these gentlemen will be able to effect such an adjustment of their affairs as will allow them to resume business on a sound basis.

CLOSE observers of events will have noticed that a large amount of American capital has found its way into investments in Canada during the last few years. The purchase by an American syndicate of the celebrated Kakabeka Falls, containing 480 acres, and the water rights to the Kaministiquia river near Port Arthur, for manufacturing purposes, is a reminder of this fact. With the increase of wealth and the filling up of the opportunities of profitable investment in the United States, will come a constantly increasing amount of American capital seeking investment in Canada, and assisting in the development of the Dominion. Following these investments will also come the increase in population which is our principal requirement.

THE placing of electric light and telephone wires under-ground, which has lately been commenced in Toronto, will in time lead to a great deal of trouble in several directions unless a change in methods is decided upon. At present each company puts down its own conduit. A pursuance of this system will result in a network of underground conduits, the putting down and repairing of which will necessitate continual tearing up of the streets and make it impossible for the city to maintain good roadways. There is little doubt that it will also lead to conflicts involving questions of right and authority between the various companies using the streets. The present is a proper time for the authorities of Canadian cities to consider the whole question of the best method of conducting electricity. If it is decided that the proper place for electric wires is underground, then we believe it will be found cheaper and far more satisfactory in the end, to provide underground subways of sufficient dimensions to accommodate all the electric light and telephone wires that may ever be required to be used. The underground problem must ultimately resolve itself into this; therefore by taking a comprehensive grasp of the situation at the present time, endless expense and annoyance will be avoided in the future.

SHORTLY after the frightful disaster at Johnstown, Pa., a few months ago, we made enquiries to learn whether there existed in Canada any system of Governmental inspection of dams and reservoirs. We were informed that no provision had been made for such inspection and no necessity existed for making such provision, as there were no towns in Canada so situated as to be in danger of being destroyed by the breaking away of any existing dams or reservoirs. While not altogether satisfied with this assurance, we refrained from pointing out, as we had intended to do, the necessity for guarding life and property from possible danger from floods. The calamity which followed the breaking away of McClellans flouring mill dam above the village of Alton, early on the morning of Nov. 13th, emphatically proclaims that the necessity *does* exist for the regular inspection of embankments confining large bodies of water. We believe there are other towns and villages similarly situated to Alton, where the lives and property of the citizens depend upon the strength of an embankment. The Government would do well to provide for the competent inspection of such structures at proper intervals. There should likewise be a lesson in the recent disaster for mill owners. It should lead them to so strengthen their dams that they will be capable of resisting the greatest pressure that the swelling of the streams by heavy rainfalls may impose upon them. The safety of their own property and the lives and property of others forbids that they should be negligent in this matter.

THE prosperity of the City of Toronto, depends to a very important degree, as does that of most cities, upon the number and importance of her manufacturing establishments. Such establishments give employment to large numbers of mechanics, the expenditure of whose wages is an important factor in the maintenance of the city's commercial interests. These facts should lead the city to deal liberally with manufacturers, instead of imposing upon them burdens in the shape of excessive taxation which must have the effect of driving them out of the city entirely. We regret to observe that the Toronto municipal authorities appear to be pursuing a course which must to a very large extent have this result. Manufacturers are loudly complaining of the amount of taxes which they are compelled to pay for the privilege of carrying on business in the city. More than one important enterprise has already been removed to outside points, and others are talking of doing likewise. Many manufacturing concerns were attracted to Toronto by its exceptional shipping facilities. The keen competition for business between the Canadian Pacific and Grand Trunk railways has resulted, however, in giving a number of towns shipping facilities equal in every way to those of Toronto. These towns are offering large inducements to secure the removal of Toronto manufacturing concerns. Not only do they offer exemption from taxation for long periods, but supplement the same in some instances with substantial cash bonuses. As we have said, these inducements have been sufficient in several instances to secure the removal from Toronto of important manufacturing enterprises, and there are not wanting indications to show that unless the taxation on manufactories located in Toronto is lightened, the exodus will continue. This is a question of vital interest to the city, and the council should lose no time in adopting such measures as will retain for Toronto the position it has gained as a manufacturing center.

A DESPATCH from Blenheim, Ont., conveys the information that an indignation meeting of farmers has been held there to protest against the system of buying wheat by tester inaugurated by the Dominion Millers' Association. After a good deal of speech-making, the substance of which has not been made public, it was unanimously resolved to form a joint stock company with a capital of $50,000 for the purpose of building and operating a $20,000 mill. In the absence of a full report of the meeting, we have been vainly trying to imagine upon what foundation the farmers in question base their fault finding against the millers' association. Is there any fairer method of buying wheat than by weight? Is there any fairer method of determining the weight than by means of a tester the correctness of which must be certified to by a Government inspector? Is it not an equitable system which provides that the farmer who brings to market the heaviest and the cleanest wheat should receive a higher price than one whose wheat is short in weight and full of extraneous substances. We can only account for the opposition to a system so obviously just by supposing that the farmers present at this meeting are in the habit of bringing to market wheat that is both under weight and under quality. We cannot bring ourselves to regard the $20,000 mill project as other than a game of "bluff" designed to frighten the millers into returning to the old order of things. If such be the object, its failure is a foregone conclusion. On the other hand, if the farmers have really determined to embark in the milling business, they are deserving of sympathy rather than censure. Evidently "they know not what they do," but we can safely promise them that they "shall know hereafter." Meanwhile, we hesitate to resume the responsibility of assuring them that the knowledge will not be purchased at too dear a price. In the face of the fact that men who have been trained to the milling business are at their wits end to learn how they may make any profit from the business, how can these inexperienced farmers hope to make a success of their proposed venture? Considering that the prices at present paid by millers for wheat are from five to ten cents above the export value and the selling prices in St. Louis and other American wheat centres, how do these farmers propose to further increase the price and yet find sale for their flour? Let us candidly tell them

that the scheme is illogical and therefore unworkable, and should they persist in the attempt to carry it into operation, we would advise millers who may be on the look-out for the purchase of a mill at half-price or less, to keep an eye on Blenheim.

SEVERAL fires which have occurred in Toronto recently, are alleged to have been caused by the contact of electric with telephone wires. There no doubt exists an element of danger in the present method of carrying electric and telephone wires on the same poles. The suggestion that electric light wires should either be strung on separate poles or only from the topmost cross-arms of poles carrying telephone wires, is one that if acted upon, would undoubtedly tend to reduce very much the danger from high currents.

THE *Montreal Gazette* says: The Government has been pressed for some time past to do simple justice to the milling interest, and the request cannot well be longer ignored. If the reasonable demand of the millers is not granted, an agitation for the abolition of the duty on wheat will follow as a logical consequence, for the millers can hardly be expected to submit to the double pressure of American competition and exclusion from the cheap wheat of the United States. Either adequate protection should be accorded or the wheat duty should be removed, and between these alternatives a National Policy parliament ought not long to hesitate.

WHAT is electricity? has of late been made the subject of discussion both in this country and abroad, and thinking men are not altogether satisfied with the theory of electricity as it stands to-day. Physicists probably know as much about electricity as most other natural phenomena, yet while everyone seems fairly well satisfied with the theories given for the latter, many seem to demand more light when electricity is defined on similar lines. Indeed, in the absolute sense in which the question is usually asked, it can virtually no more be answered than the question, "what is the attraction of gravity?" Numberless theories have been propounded for the latter, and so it is with regard to electricity. Indeed, it is but natural that with the general advance in knowledge, derived from experiment, ideas formerly accepted as true should be modified or entirely swept away to make room for new ones, and we may almost say that we have arrived at such a transition stage with regard to electricity. The part which the ether will play in the new theory will be prominent, for more than one person who has essayed to answer the question recently has fallen back upon that element as a means of bridging breaks in the chain of the argument.

SO far as we can ascertain, electric cars all over the country were subjected last winter to most severe weather, and still did excellent work. Here and there a little trouble was experienced, but none that could really be attributed to the cars or to the electric system. In New York there has been the spectacle of an electric car tackling heavy grades in the worst of weather with undeniable ease and success, and altogether last winter has done much to demonstrate the efficiency of the electric system. Of course where a company have their tracks so flooded that they have to break through thick ice to find them, it is hardly fair to blame the electric motor. Under such circumstances it might be well to run on top of the snow and ice, and after all, we do not see why light omnibusses or similar vehicles, equipped with electric motors, and taking current from overhead wires, but not depending on any track, could not be run at a good profit. With extensible connection, such busses could wander about the road at will, picking their way like a horse conveyance. It is not impossible that such lines might succeed in small places where it would never pay to lay regular tracks. We throw out the suggestion for what it is worth

THE discussions which have taken place of late on the effects of circuits carrying alternating currents upon neighboring conductors, have left out of consideration to a certain extent the influence of such circuits with respect to the loss entailed by induction between wire and wire. One writer on the subject seems to fear the loss which will ensue by induction between an alternating circuit and a continuous fire alarm wire. The case is in some respects similar to the frequent question of the effect with telephone wires. There is really in both of these cases nothing to fear from induction, and hence no loss, if the outgoing and incoming alternating mains are placed at equal distance from the third wire. Any induction caused by one side of the circuit is neutralized by the induction of the other. But, it may be asked, what is the effect of the induction caused by one branch of an alternating circuit when contiguous to the other, and here is a question which we think will bear investigation. It seems to be plain that, other things being equal, the two branches of an alternating circuit ought to be separated in order to avoid loss by self-induction. Such effects, it is true, become marked when two wires are placed close to each other over a long distance, but there is sufficient here, it seems, to be taken into consideration in the laying out of alternating current system and wiring especially if underground work is attempted.

WHILE on this side of the water the ingenuity of inventors has been employed in the devising of telephone transmitters which shall not operate on the continuous circuit plan, or in other words, shall be of the make and break type, inventors in England have sought to remove existing difficulties by devising transmitters which shall not embody diaphragms or their equivalents, in their construction. This course of action has been brought about by the decision of the English courts in relation to the Edison patent claim for "the combination with a diaphragm or tympan of electric tension regulators, substantially as described." In the course of the inquiry one witness defined a diaphragm to be "anything which separated anything from anything else," and although the courts did not exactly endorse this far-reaching interpretation of the word, yet they have practically construed its meaning as used in Edison's claim, to be any device which receives the vibrations of the voice and transmits them to an electric tension regulator, such as a microphone. Therefore, a telephone transmitter, to be clear of Edison's patent, must be free from the presence of any sounding board, resonator or other appliance conveying the air impulses to the contacts by which the intensity of the electric currents is modulated and controlled. Many inventors have imagined that they have produced instruments fulfilling this condition, but the application of the legal-scientific mind to the apparatus, has demonstrated, in very numerous cases, that the designers have been self-deceived, and that although much disguised, the diaphragm or tympan formed an essential feature of the instruments. The question, therefore, What is a diaphragm? is a very interesting one in English telephonic circles.

AS we are about to go to press the news reaches us that the Royal Electric Company's application before the Supreme Court for cancellation of the patent for the Edison incandescent lamp owned by the Edison Electric Light Co., and originally granted to Thos A. Edison, has been refused. After hearing the case exhaustively argued by eminent counsel on both sides, together with an elaborate report on the whole case by the Minister of Justice, the Minister of Agriculture gives the following decision:—1. "I find that Thomas Alva Edison, the patentee of the patent in the proceedings mentioned, did within two years from the date of such patent commence, and after such commencement did continuously carry on in Canada the construction and manufacture of the invention patented, in such manner that any person desiring to use it might obtain it or cause it to be made for him at a reasonable price at some manufactory or establishment for making or constructing it in Canada. 2. I further find that after the expiration of twelve months from the granting of the said patent, neither the said patentee nor any person claiming or holding under him did import or cause to be imported into Canada the invention for which the said patent was granted. I do, therefore, in pursuance of the statute in in that behalf, declare that the said patent has not become null or void, and I dismiss the application of the petitioners, the Royal Electric Company of Canada." It is estimated that $20,000,000 of capital was staked upon this decision, inasmuch as the United States Supreme Court recently laid down the principle that the quashing of an American patent in a foreign country renders it null and void.

THE Canadian millers' horizon has brightened considerably since the publication of our November number. The cause may be found in the decided stand taken by the farmers of Peel in behalf of the millers' demand for an increase in the flour duty, as reported on another page; and the statement made by Premier Greenway, of Manitoba, to officers of the Dominion Millers' Association, that in the interests of the people of that province who want a market in Eastern Canada for their wheat, he will exert all possible influence to obtain a readjustment of the flour duties. Great significance should be attached to these two events. We believe the decision arrived at by the farmers of Peel is the one which will be reached by farmers in every part of Ontario where a full explanation of the effects of the anomaly in the tariff may be given. This has been the opinion which we have expressed during the last few months Indeed, we fail to understand how the result can be different. It is beyond dispute that the millers of Ontario have been paying the farmers for their wheat an average price ten cents above export values. If American flour is allowed to displace Canadian flour in the Canadian market, the millers will not require Canadian wheat. The Canadian farmer will then have no other alternative than to sell his wheat for export at a loss of ten cents per bushel as compared with past and present prices. This would aggregate on the present year's crop, as shown by Mr. Brown at Brampton, $1,800,000. With such a large amount as this at stake, the millers should find little difficulty in securing the assistance of the farmers of Ontario towards the accomplishment of the purpose in view It is the duty of the Dominion and Local Millers' Associations to fully explain the question to the farmers and secure their signatures to petitions to Parliament urging an increase of duty. Resolutions should also be passed, as at the meeting in Brampton, calling upon the representative of each constituency in the Dominion House, to give this agitation his support. Proceeding on this line, and with the powerful influence which will be brought to bear by the people of the Northwest, we feel convinced the millers will succeed at the approaching session of Parliament in securing the removal of the injustice which of late has been pressing so heavily upon them. A great deal of credit is due to the officers of the Dominion Millers' Association for the efforts they have put forth for this object. Especially would we mention Mr. John Brown, Vice-President of the Association, who with tireless energy has pushed forward in every way possible the present agitation These gentlemen are deserving of the thanks and sympathy of every miller and farmer in Canada. They have succeeded in bringing the agitation to a point which we believe ensures its future growth and ultimate success. Let this be encouragement to them to continue to push forward the fight until victory shall have been attained.

THE FLOUR DUTIES.

THE FIRST OF A SERIES OF MEETINGS OF MILLERS AND FARMERS DEMANDS TARIFF READJUSTMENT.

A WELL ATTENDED meeting of farmers and millers was held at Brampton, Ont., on Nov. 23rd, to consider the effect of the present tariff upon the two great industries of agriculture and milling.

Mr W A. McCulla, the member for Peel in the Dominion Parliament, presided, and took occasion to remark that the interests of the farmers and millers were identical in this matter, and he hoped the farmers present would listen attentively to the arguments advanced.

Mr. Plewes, General Secretary of the Dominion Millers Association, in a speech occupying half an hour, the substance of which we have previously published, fully explained the situation.

Mr. John Brown, Vice-President of the Association, pointed out that either the farmers would have to help, or the milling business in Canada would cease. If the mills were compelled to stop, if the millers were taken off the market, the farmers would have to accept ten cents less for all the wheat sold, as it would have to go for export, and that was the difference in the price. That sum would pay the taxes of the Ontario farmers, for on the wheat crop of the Province it would amount to $1,800,000. In addition to this, the farmers of this province had to contribute more than a half a million dollars in the form of a coal tax for the benefit of the very people who were opposing the millers' claims; in fact the people of Ontario paid $688,145.99 last year for the benefit of the Nova Scotia coal miners, the relative percentage of taxation being 53 per cent. on coal, and 13 per cent. upon breadstuffs.

The following resolution addressed to Mr. W. A. McCulla, was moved by Mr. E. Crawford and seconded by Mr. R. Lewis:—

"Whereas the present tariff on wheat and flour is so arranged as to give the American miller a bonus of 21¼ cents per barrel on flour and thereby causes the importation of a very large quantity of American flour made from American wheat to the exclusion of the home-grown product, thus destroying the home market for Canadian wheat;

And whereas such tariff has caused a very severe depression in the milling industry of this country and threatens still more serious consequences to the agricultural interests of Canada;

Be it resolved that we, the farmers of Peel County, do hereby petition you to forward, in every way at your

...mmend, the demands of the millers of Canada for a fair ...justment of the tariff and endorse their request that ...e duty upon flour be made equal to that imposed upon Canadian flour entering the United States of Am...a by placing a specific duty of one dollar upon each barrel of flour imported into Canada, and we would respectfully ask you as the representative of Peel County to d...ne your position upon this question which is of such vital importance."

Mr Pickering offered, as an amendment, a resolution in favor of Commercial Union as a remedy for the evil complained of, but this motion was ruled out by the chairman on account of its political character. The latter gentleman then briefly addressed the meeting, expressing his approval of the millers' claims, and stating that already he had done something to advance them.

Mr Chisholm, from the point of view of a grain merchant, expressed his sympathy with the millers. The statements of Mr. Brown and Mr. Plewes he believed to be practically correct, and, if the farmers of Canada had been compelled to export their wheat, they would have got from five to ten cents per bushel less for it. At the same time, he considered that if we had a Reciprocity Treaty with the United States it would be better for all parties, the millers included. But that question was not up for discussion, and though he prefered freedom of trade to Protection, still, as it could not be got and as the millers were in a difficult position, they should help them out. The present conditions of affairs would ultimately prove to be against the interests of the farmers as well as of the millers. At the proper time if a Reciprocity Treaty could be got, then let it be made. At the present time the keenness of competition forced the members to hurt themselves in two ways. The competition for wheat to grind forced them to give high prices, and in the sale markets competition forced them to accept cheap rates for their flour. In favor of the amendment though he was, still, viewing the circumstances, he would support the motion.

The original resolution was then put to the meeting, and adopted by a large majority.

After an explanation by Mr. Plewes of the method of buying wheat by tester, the meeting adjourned.

THE MILLERS' AGITATION.

Editor Electrical, Mechanical and Milling News.

Sirs, There are a number of millers in this province who are content to reap the advantage of the work of others, but who will not raise a hand to assist. Now sir, while a local miller might easily see the Member for the riding in which he resides without trouble or much loss of time, yet he will leave this duty to the executive officers at Toronto, who, after travelling a hundred and fifty miles, could not so effectually bring influence to bear; and then our drone in the hive will calmly ask: "What has the Association done as yet towards putting the trade on a sound footing?" Just the other day I was asked this question by a miller who has considerable influence in his district. I said to him, "Sir, are you a member of the D. M. Association?" On his replying "No," I asked him "Why?" Said he, "I am waiting to see what they are going to do." "Very good," said I, "let us all sit down and wait for each other to move." He has since joined the D. M. A., and I believe he is now rendering material assistance.

While officers of the central organization are straining every nerve to win, while they are not missing a single chance for success, they cannot possibly hope for a successful issue without the active support and co-operation of the whole trade; and those gentlemen who are sitting on the fence criticizing the few who are drawing the wagon, will have to get down and pull, if they expect to share in the returns. The wagon is not by any means "stuck," but with twice as many pushing, it would doubtless travel twice as fast.

The heather is afire in Manitoba, and we will have behind us by your next issue a whole province, from Premier Greenway to the last arrived farmer, irrespective of political feeling or creed. In an interview with the Premier of Manitoba, he expressed himself as being entirely with the farmers and millers on the tariff question, and said that it was his intention to introduce the question at the next session of the House, and have a committee appointed to report on the best means of obtaining that measure of justice to which the people of this province are entitled.

The farmers of this province are rapidly falling into line, and notwithstanding the opposition of political hacks of all shades and creeds, our meetings have been uniformly successful. Invitations to hold meetings are pouring in upon us, and there is not a doubt that a combined effort now would be crowned with success.

One of the greatest difficulties yet met with in the minds of the farmers, is the idea which has been circulated by designing opponents, that the D. M. A. is a "combine." Now the best way to combat this, is by a simple denial and a reference to any respectable newspaper, or a personal enquiry into the acts of the D. M. A, which are open for public inspection.

There is just now among the millers a great deal of dissatisfaction with the manner in which they are treated with regard to freight rates, especially on the G. T. R. west of Toronto. Any one so dissatisfied would confer a favor by sending a statement of his case to the Secretary of the D. M. A., or to the writer of this letter.

Yours truly,

JOHN BROWN.

AN ENTERPRISING TOWN.

Editor Electrical, Mechanical and Milling News.

WE read a great deal nowadays in the daily papers concerning the uselessness and inactivity of city corporations.

Much that is written against these august bodies is true and well-deserved, but in a great many cases the councillers who show any attempt at progress or advancement are cried down by the local press, and these gentlemen give up their own valuable time to the advancement of their community's interest.

Your correspondent had the pleasure last week of paying a visit to the town of Joliette, P. Q., and was very much surprised to see such a thriving and prosperous town, and also the enterprise exhibited by the people. It has been frequently stated that the towns inhabited by French Canadians are so much behind the times, but if anyone holding the opinion that our French Canadian neighbours are not a progressive race would visit Joliette, they would see for themselves a town with a population at the beginning of this year of only 3,000 with a first-class system of water works, splendid fire brigade and apparatus, electric light everywhere, all furnished by the corporation, a magnificent Hotel de Ville or City Hall, large colleges, markets and factories, well laid out streets, as well as one of the ablest and most progressive city councils in Canada, made up of the representative men of the town, who are the largest real estate holders, manufacturers or merchants. The best evidence, however, of their progression is their electric light plant, which is the most complete and thorough of any plant in Canada, or in the world, proportionately to their population. We arrived at Joliette at 7 p. m., and were met at the station by the vociferations of the hotel runners and cabmen, making us think by their deafening calls that we had landed in some great metropolis. We boarded the hotel buss and passed through some well graded streets, brilliantly illuminated with the arc lights; arriving at the Joliette Hotel, we were met by the genial host, who conducted us to our several rooms, each of which was brilliantly lighted with incandescent lights.

After a good supper we strolled over to the Hotel de Ville or City Hall where a meeting of the Council was in progress, and had the pleasure of listening to some very eloquent speeches, all in French, delivered by several of the aldermen. The meeting being shortly afterwards adjourned, we had the pleasure of being introduced to, and heartily welcomed by Mr. Ed. Guilbault ex-M.P., the present Mayor of Joliette, and Messrs. J. H. Renaud, Adolphe Fontaine, L. Chaput, G. Lafortune and O. Chevalier, aldermen, and Mr. C. G. H. Beaudoin, Secretary and Treasurer.

After complimenting these gentlemen on the happy results of their enterprise in going so extensively into electric lighting as well as other modern improvements, we accepted their kind invitation to visit the electric light works, and drove to the station, which is situated about two miles from the city. There we found a most complete installation equipped by the Royal Electric Company of Montreal. The water wheel is a new "American Turbine" made by W. Kennedy & Sons, of Owen Sound, and is capable of producing over 400 horse power. The head of water is about 14 feet, and the dam extends across the Assomption River, thus damming the whole river. There is an opening, or penstock on each side of the river, the present power being taken only from one side. There is probably over 1,000 horse power in this dam.

Re-entering the building, we find an arc dynamo of the Thomson Houston system, with a capacity of 30 arc lights of 1,200 c. p. or their equivalent. This machine is used exclusively for street lighting, and is running 22 arc lamps and 32 incandescent lamps of 32 candle power each. The incandescents are used in the by-lanes and the arc lights on the principal thoroughfares.

From another pulley on the same countershaft was running an incandescent dynamo of the alternating type, with a rated capacity of 1,000 incandescent lamps of 16 c. p. This dynamo was running over this number, and was operating lights in nearly every private residence, hotel, store or factory in the town. There was also another dynamo of the same type as the last, but with a capacity of 500 lights. This machine is started up every night at about ten o'clock, when the lights get below 500, and this gives both dynamos a good rest and divides the work between them. These machines are a credit to any electric light manufacturer. The Seminary or College at Joliette has some 250 lights wired up, but only runs 130 at one time, two transformers of 50 light capacity each being used.

The corporation have invested something over $30,000, and are the owners of several more water privileges on the same river.

These water powers are good all the year round, and run from 500 h. p. and larger. The City Council expect to induce some large manufacturing concerns to move to Joliette, and they offer great inducements in the way of unlimited water power and good liberal bonuses. Here are some splendid openings for capital. The railway facilities are good, the C. P. R. having a branch from their main line running in from Lanoraie, a station on the trunk line between Montreal and Quebec. Labor is abundant and cheap, and in the City Council will be met courteous gentlemen, who are business men, and open to any business-like proposition.

Returning to the electric light plant, the corporation owning their own water power, and being in a position to do cheap lighting, have made their charges to consumers very low, as they have only running expenses and the interest on their capital to make up. Owing to the high efficiency of their entire plant, the cost of running is reduced to a minimum, consequently they provide cheap and good light for the consumers, and have their streets lighted for nothing, as well as being able to lay by a sinking fund, which will eventually wipe out the capital invested.

The charges are so reasonable, that coal oil, the only other illuminant, is entirely superseded. The town of Joliette has without doubt, in proportion to its population, the largest number of electric lights in operation, of any town in the world, which with their capacity of 1500 lights for 3000 inhabitants, means one light for every two persons. This is a good record, which we think cannot be beaten in the world, and speaks volumes for the enterprise and progress of the corporation of Joliette. The council were strenuously opposed when this scheme was first mooted but with wonderful foresight fought the matter through to a finish, and brought it to a successful issue, winning the confidence of their constituents, who a year ago wanted to throw them out of power.

To-day they find their taxes decreased, the town in a prosperous condition, and with splendid prospects ahead of them.

We wish the Council every success in their endeavors to build up their town, and hope their enterprises will always meet with such well-merited success, and that soon we shall have the pleasure of seeing the fertile valley of the River Assomption dotted with fine factories and the population of Joliette increased tenfold.

TRAVELLER.

Mr. P. Christie of Severn Bridge, will run his shingle mill all winter.

Miscampbell's big mill at Midland has cut 15,000,000 feet this season.

Mr. John Knight, Medonte, Ont., will remodel his saw mill this winter.

Henry Livingstone, planing mill operator, Ridgetown, Ont., has assigned.

Mr. Evans, Bradford, Ont., is building a sash, door, and framing mill factory.

Beck's big mill at Penetanguishene, has closed down after a very successful season's cut.

The cut in the Hull and Chuadiere mills during the past season will run over 400,000,000 feet.

Arrangements are said to have been made for the erection of a large saw mill on Burrard Inlet, B. C.

Mr. James Andrew's saw and shingle mill near Hourey's rapids, Ont., was destroyed by fire recently. Loss about $300.

Brook's saw and shingle mills in the township of Ryde, Ont., were recently destroyed by fire. Loss, $3,000; no insurance.

Messrs. Maitland and Rixon will erect a saw mill at Owen Sound, using the machinery now in their mill at Tobermoray Harbor.

Our Western Letter.

NOTWITHSTANDING the low prices which ruled for wheat this year, and the predictions that farmers would not sell at the price offered, there has been a pretty fair movement of wheat from Manitoba eastward since the season opened. Up to the close of navigation, about two million bushels of wheat have been shipped eastward from Manitoba. About all of this has gone by the lakes to Owen Sound, Collingwood, Sarnia and other ports. A few cars have been shipped all rail to Montreal or other points, but only very little grain went by the rail route so long as navigation remained open, and this consisted mostly of rejected stuff which shippers did not care to have go into the elevators at our Lake Superior ports. The movement has kept up pretty steady since the new grain commenced to move, and as many as 100 cars of wheat have passed through Winnipeg in a day. Over half a million bushels were in store at Port Arthur and Fort William elevators at the close of navigation, but nearly equal to this amount of old wheat was in store when the new grain commenced to move, so that practically all the grain marketed here up to the close of navigation is now east of the lakes. A limited quantity has also been shipped by our new summer outlet via Duluth, and when the Northern Pacific company has its railway system in Manitoba completed and in working order, it will handle a good deal of grain by its Duluth line and connections here.

The movement of wheat eastward has now fallen off considerably. As long as the grain could be shipped out by the lake route, dealers forwarded it as fast as marketed, so that the quantity held in store here at the time of writing is very light. The 2,000,000 bushels already shipped out represents practically all the wheat marketed to the close of the lake route. Now, however, that the lower freight rates by the lake route cannot longer be taken advantage of, dealers will allow receipts to accummulate in country elevators here. The principal grain men here own elevators all over the country, and they might as well carry the wheat in store in their own elevators as ship eastward to Port Arthur or by the all rail route to further eastern points and pay storage to railway companies. Country elevators here, however, only run from 30,000 to 40,000 bushels capacity, and a brisk run of deliveries by farmers would soon fill these elevators up, so that shipments eastward for storage would have to be resumed more actively. Of course it all depends upon the quantity of wheat left in farmers' hands here. What this quantity may be is one of the questions which is agitating grain men here. The total amount marketed to date does not exceed 2,500,000 bushels, including the quantity previously noted as having been shipped east. Some dealers claim that the amount already marketed represents fully two-thirds of of the surplus crop of Manitoba this year. If this is the case, there will only be from one and a quarter to one and a half million bushels yet to come. However, it is really a very difficult thing to estimate closely the quantity of grain remaining in farmers' hands. Indications, however, point to a smaller quantity yet to be marketed than had previously been estimated. It was expected that as soon as the frost came to stop plowing, deliveries would show a considerable increase, but on the contrary, the quantity of wheat being marketed by farmers shows a falling off. This is a strong argument in favor of those holding the minimum views as to the quantity of wheat remaining in farmers' hands. Then it must be taken into consideration that the harvest was early this year, the weather was very favorable to threshing, and with the very light straw, threshing was finished months earlier than in some years. There has also been nothing in the weather conditions to retard delivering grain, so that all these things together seem to indicate that a larger proportion than usual of the wheat has been moved out before the close of navigation.

About 1,000 cars of wheat have been inspected at Winnipeg since the crop movement commenced. This of course is a small portion of the total shipments through here. The bulk of the grain shipped during open navigation is inspected at Port Arthur. This accounts for small inspection figures here. All rail shipments, however, will be mostly inspected at Winnipeg.

Nearly all the oatmeal in this market is now coming from Ontario. The very poor crop of oats here this year has just about closed up the oatmeal mills, and local millers cannot compete with eastern men. Prices of oatmeal have dropped about 30 cents per sack since this season's oats came into the market. Jobbing prices here are: Standard oatmeal, $2.40, granulated $2.50 per 100 pounds, rolled, $2.40 per sack of 80 pounds. Prices of oats are very high, ranging from 40 to 45 cents per bushel to farmers, and the samples too poor to be fit for milling. Ontario and Minnesota oats are selling in this market. The latter, though subject to a duty of 10 cents, can be laid down here to compete with Ontario oats, cars on track here costing 40 to 42 cents per bushel to importers.

Prices for wheat to farmers have ruled lower, and by sample do not now average much over 60 cents per bushel for best samples, in country markets, against an average of about 65 cents a month ago. These lower prices may have to some extent caused the falling off in deliveries. There has been a great deal of "kicking," on the part of farmers on account of low prices, especially as they were led to believe by the country papers that prices would be high this year. Some country papers have championed the cause of the farmers, and published articles to the effect that the grain men were not paying fair prices for wheat. Most of the country editors, however, are now taking a common-sense view of the question, and are showing that with an average cost of about 28 cents per bushel to deliver Manitoba wheat in Montreal or Toronto by the lake route, the average price of 65 cents per bushel ruling here until recently was a big figure, and left the grain men very little margin. Now that the lake route is closed, the cost of sending wheat to Toronto or Montreal will be about 4 cents per bushel greater, or say about an average of 32 cents per bushel, including an allowance for cost of purchasing. The low prices for wheat have revived the agitation for the construction of the proposed railway from Winnipeg to Hudson's Bay, and writers upon this subject are now busy showing how much more cheaply wheat could be exported to Liverpool via Hudson's Bay, than by the present routes.

Three new roller mills have been added to the milling capacity of Manitoba this year. The Arrow Milling Company have their mill at Birtle now completed. This is one of the finest little mills in Manitoba, with a capacity of about 150 barrels. The mill building is very substantially built of stone, with heavy walls. The company is now buying wheat and commencing to grind. New mills have also been erected at Boissevain and Gretna, and are both now completed. These are the only completed new mills erected in Manitoba this year. At Crystal City a new mill building has been erected at the railway station, and the machinery of the Crystal City roller mill, which formerly occupied a site a mile from the railway has been moved to it. A good deal of new machinery has been put in, including a new 60 horse power engine, so that the mill is about as good as a new one. At Russell, Man., a local stock company is being formed to build a mill. A bonus was voted some time ago for the erection of a mill at Russel', but as no person would take hold of the enterprise, the local company is being formed. Another important milling item is the sale of the Minnedosa roller mill, owned by Jas. Jermyn, to P. & E. Pearson, for $16,000. The new proprietors have now taken possessior. The Minnedosa mill has a capacity of about 100 barrels, and was built in 1877.

The fall has been a grand one for plowing, and farmers have had every facility for getting in all the fall plowing they wanted done. Harvest work was over unusually early, and plowing has been uninterrupted up to about the middle of November, when it was stopped by frost. The acreage plowed has been the largest in the history of the country, and a big crop will be put in next spring. The fall has been very dry, and this is not regarded as a good feature for next year's crops, but the crops will be put in with the hope that the harvest may turn out better than it has this year.

COMPUTING THE MEAN PRESSURE OF EXPANDING STEAM.

IN estimating the power of a steam engine at different points of cut-off, it is customary to use a table of hyperbolic logarithms, the process being well-known to engineers. The table given below will be found to greatly simplify the operation as compared with the use of the table of logarithms. It is taken, by permission from *The Tabor Indicator*, by John Musgrave & Sons, Bolton, England. To use the table, multiply the *constant* opposite the point of cut-off selected, by the total pressure of steam (that is, the pressure above vacuum), and the product will be the *total* average pressure of steam for the whole stroke. From this must be subtracted the back pressure, say 16 lbs. for a non-condensing engine, and 5 lbs. for a condensing engine.

The following example will make the operation plain to those not accustomed to such calculations; Suppose we are to use steam of 75 lbs. boiler pressure, and wish to cut off at 20 per cent. or 1-5 of the stroke of the piston. To get the *total* steam pressure add 15 (which is near enough the pressure of the atmosphere for this purpose) to 75, making 90. Opposite 20 in the table is found the decimal .5219; this multiplied by 90 gives 46.97+. For a non-condensing engine subtract 16, which leaves 30.97 lbs. as the mean effective pressure on the piston. If the engine is condensing, subtract 5 lbs. which leaves the mean effective pressure 41.97 lbs.

CONSTANTS FOR FINDING THE AVERAGE PRESSURE IN THE CYLINDER WITH ANY PRESSURE OF STEAM.

Percentage of the stroke at which steam is cut off.	Constant.	Percentage of the stroke at which steam is cut off.	Constant.
1	.0500	41	.7738
2	.0982	42	.7811
3	.1321	43	.79[illegible]
4	.1688	44	.8011
5	.1698	45	.80[illegible]8
6	.2288	46	.8164
7	.2593	47	.8235
8	.2821	48	.8308
9	.3067	49	.83[illegible]
10	.3362	50	.8466
11	.3527	51	.8530
12	.3743	52	.8592
13	.3952	53	.8696
14	.4152	54	.8722
15	.4345	55	.8770
16	.4532	56	.8846
17	.4712	57	.8914
18	.4885	58	.8962
19	.5055	59	.9002
20	.5219	60	.9062
21	.5377	61	.9114
22	.5529	62	.9162
23	.5671	63	.9200
24	.5823	64	.9264
25	.5967	65	.9298
26	.6102	66	.9340
27	.6237	67	.9385
28	.6365	68	.9427
29	.6484	69	.9461
30	.6612	70	.9496
31	.6726	71	.9531
32	.6842	72	.9588
33	.6958	73	.9595
34	.7066	74	.9620
35	.7172	75	.9638
36	.7276	80	.9784
37	.7378	85	.9878
38	.7477	90	.9945
39	.7567	95	.9960
40	.7665	100	1.0000

American Machinist.

STORAGE BATTERIES AS POWER ACCUMULATORS.

A STEAM engine under a given set of conditions finds its maximum efficiency under a certain load. If the load which it is required to carry is that for which it is adapted it will do its work with the least expenditure of fuel. An increase in the expense per horse-power per hour will accompany any wide departure from this rule in either direction.

With a little skill upon the part of the engineer who installs the plant, therefore, a very economical arrangement may be effected where an engine is running under a fairly constant load. In practice, however, it is often the case that an engine is called upon at different times to do widely varying amounts of work. Perhaps the maximum load lasts but a short portion of the time, but the engine has to be large enough to handle it when it comes, and meanwhile runs the greater portion of the time at a disadvantage underloaded.

The engines which run the cable for the Brooklyn Bridge, for example, are subjected to variations ranging from 303 horse-power as a maximum to nearly 13 horse-power less than nothing as a minimum; that is to say, that at times when loaded trains happened to be on the down grade with none on the other side to balance them, they would not only not require any power from the engines to run them, but would actually of themselves propel the engines with the steam shut off. Other less exaggerated instances are abundant, as in foundries where the load is temporarily greatly increased during melting hours, etc.

If in a plant of this kind, an engine of a size sufficient to economically carry the average load could be used, running at a constant load and speed, which would have developed at the end of the day the number of foot pounds necessary for the varying work, and if the power so generated could be stored up and used as required, the engine gaining when the load was less than the average sufficient to have a surplus in the accumulator when the load exceeded the engine capacity, many apparent advantages would accrue.

It is doubtful if any purely mechanical method of storing power would be practicable in this application on account of cumbersomeness, but may we not hope for something in the electrical storage and redistribution of power which will effect a solution of the problem? Accumulators are now in use for an analogous purpose on purely electrical plants, and with the constant development in efficiency and reliability of the storage battery we may not unreasonably look to it for an ultimate solution of the question of varying loads through the method above outlined.—*Power-Steam.*

THE SLATTERY INDUCTION SYSTEM.

The illustration which we herewith publish represents the latest type of alternate current machine of the Fort Wayne Electric Company, as used in their Slattery Induction System. It is a 60,000 watt machine, similar to those employed in the magnificent station of the Manhattan Electric Light Company in New York City, and is capable of delivering some 50 amperes at 1,000 volts and over at a distance of from 4 to 5 miles from the station.

The large new factory of the Fort Wayne Electric Company is now entirely devoted to the manufacture of these machines and the other factors of the system, such as converters, etc., with central station appliances, instruments, meters, switches, and the like.

These machines are doing splendid work, keeping cool under excessive loads, and developing no troubles under very long runs. Many of them are running 24 hours a day 7 days in the week, with an hour's rest on Sunday occasionally.

It will be noticed that the exciter is mounted on the same case as the alternator, and is driven by a short belt operated by a pulley on the end of the shaft of the alternator. This arrangement ensures compactness, and at the same time avoids the troubles incident to self-exciting alternators.

At a future day we hope to be able to give more detailed particulars and units of this machine.

The Canadian office of the company is at 38 York Street, Toronto, under the charge of Mr. W. J. Morrison, General Agent, and Mr. T. Cooper, Special Agent for Canada.

CANADIAN STATIONARY ENGINEERS AT TABLE.

A LARGE attendance and an unusual amount of enjoyment were the characteristic features of the annual dinner of the Toronto branch of the Canadian Association of Stationary Engineers, which took place at the Richardson House, Toronto, on the evening of Nov. 6th. In addition to the members of the Toronto society, there were present representatives from the branches of Hamilton and other western cities. The Association was also honored with the presence of the Hon. G. W. Ross, Minister of Education, His Worship the Mayor, Prof. Galbraith, School of Practical Science, of Toronto; Messrs. John Galt, C.E., M.E., and O. P. St. John, Government Steamboat Inspector.

Several letters of apology for non-attendance were read.

The *menu* was of a character to tempt the most fastidious appetite, and the discussion of it resulted in making everyone feel perfectly satisfied with himself and the world at large.

The dinner bye-and-bye gave place to toast, song and sentiment, under the ensuing influence of which the hours flew swiftly by.

The toast to the Queen having been honored by the enthusiastic singing of the National Anthem, Mr. J. A. Wi[illegible] Chief Engineer Dominion Government Buildings, made a happy response to the toast "Canada our Home," setting forth the honors achieved by Canada in the mechanical world. "The Educational and Technical Interests of Our Country," was coupled with the names of the Minister of Education and Prof. Galbraith. The former thanked the Association for its active interest and assistance in regard to the movement to establish technical schools. He outlined the [illegible] of instruction proposed to be given, and spoke of the growing necessity for free evening classes for mechanics. The proposed technical college would be provided with apparatus for testing the strength of materials. There was necessity also for a School of Mines, where, by a thorough instruction in metallurgy, our youth could qualify as mining engineers, and assist to develop the vast mineral resources of the country. Stationary Engineers also needed theoretical instruction to qualify them for the proper discharge of their duties. Prof. Galbraith went into details concerning the nature of the apparatus to be used.

"The World's Motive Power" brought responses from Messrs John Galt and Wm. Sutton. "Kindred Societies," from Mr. O. P. St. John, and "Our Visitors" from Messrs. John Colgan, on behalf of the Locomotive Engineers; Andrews and Ogle of branch No. 4, Brantford; Mackey of Branch No. 2, Hamilton; Hay, of Branch No. 3, Stratford.

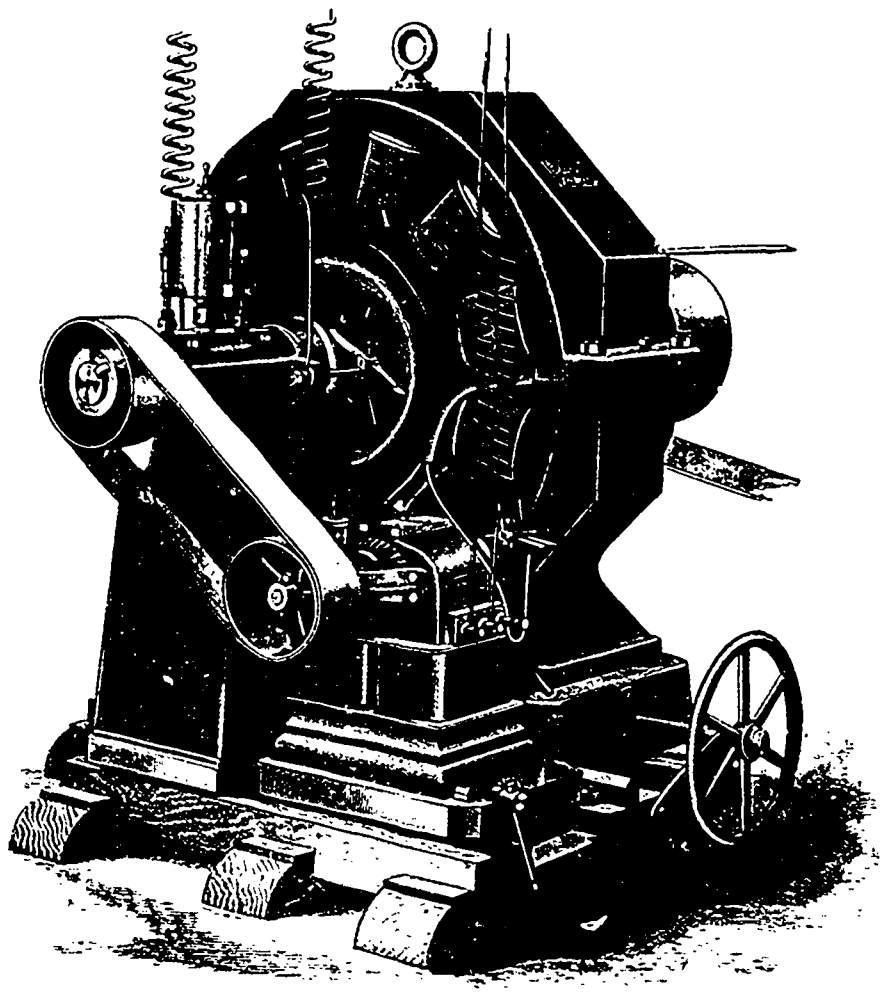
In response to the toast "Toronto No. 1," President Wickens gave a short history of the starting and growth of the Canadian Association of Stationary Engineers; also a few illustrations of the good work being done by this society, showing how members had become more proficient in their callings. Some of the members present had been enabled by the information gained in the meetings to save nearly one half of the amount of fuel formerly used. He referred to the part taken by the society in the advancement of the engineers socially, morally and scientifically, and closed by stating the universal desire of the members for a license law.

Songs were sung at intervals during the evening by Messrs. G. W. Grant, C. H. Kinsey and A. E. Edkins. A most enjoyable occasion closed with the singing of Auld Lang Syne and the National Anthem.

WHO WAS THE "MISCREANT"?

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

I NOTICE a paragraph in the papers from Hamilton, stating that some miscreant during the night had let the water out of the Stone Crushing Company's boilers, and that the engineer in the morning lit the fires and did not discover he had no water until he had badly burned one of the boilers. Now it appears to me that in this case they have called the wrong man a miscreant.



THE SLATTERY ALTERNATING CURRENT DYNAMO.

Any man who will fire up a boiler without first finding out whether he has water or not, should be called a harder name than "miscreant." Men are going around this country calling themselves "engineers" who do not know enough to run a wheel barrow. They get into trouble through ignorance or carelessness, and then try to throw the blame on someone else.

Yours truly,

AUTOMATIC CUT-OFF.

PERSONALS.

Mr. John Dick sailed by the S. S. Allen from New York, on 6th Nov. We understand he is going to Dundee to purchase a Calender and other machinery of the latest designs for the Toronto Bag Works.

Mr. William G. Strathdee has been appointed engineer of the new Bank of Commerce building, Toronto. He has recently been visiting the large office buildings of Chicago, seeking information of service in his new position.

The Canadian Electrical Society propose to hold an invitation conversazione during the winter, at which several interesting exhibits will be displayed and explained to visitors, such as the telegraph, telephone, fire alarm, electric light, phonograph, medical electrical apparatus, etc.

Mr. Roderick Macrae, electrician of the National Electric Motor and Manufacturing Company, of Baltimore, has invented an apparatus designed to regulate the supply of power in electric motors to the demands of the work which they may be called upon to perform. The current is controlled by variations in the rotative speed of the armature. The device is automatic.

USEFUL INFORMATION

It is estimated that in the factories of Pittsburg, Pa., from 25 to 30 per cent of the natural gas which is used in them is wasted by reason of the employment of defective apparatus, and thus though the more economic utilization of fuel has become a question of prime importance.

A NEW FORM OF FUEL.—An Indiana man grinds corn-stalks and coarse prairie grass, moistens them with water, reduces them to a coarse pulp and then subjects the mass to a heavy pressure, compressing them into blocks 12 x 4 and 4 inches thick. These, when thoroughly dry, furnish more heat than ordinary bituminous coal.

An English inventor, desiring better lubrication of indicator pistons has an internal reservoir formed in the body of the piston, so that the steam pressure acting on the surface of the lubricant forces it through small outlets into a groove cut on the outer surface of the piston. The piston is thus continuously lubricated and the oil under pressure in the grooves forms a packing. One piston full of oil will last while taking twenty-four diagrams.

RIDDING MILLS OF RATS.—A German milling paper recommends a very simple means of getting rid of rats in mills, warehouses, etc. By pouring liquid tar into all the holes that can be detected, the rats will either be suffocated, or, being besmeared with tar, they will come forth, and perish in a very short time. It is best to let them run off when coming out, because in running into another hole they will besmear and thus force away their companions too. *In localities which one wishes* particularly to protect from the vermin, old boards besmeared with fresh tar may be placed; the rats will never cross them. As soon as the tar is drying up and losing its odor, it must be renewed. This done for several successive days, those of the troublesome vermin which have not been killed with the medicine will speedily remove to other quarters.

SILVERING IRON.—A new Austrian patented process for silvering articles of iron is thus described: The article is first plunged in a pickle of hot dilute hydrochloric acid, whence it is removed to a solution of mercury nitrate and connected with the zinc pole of a Bunsen element, gas carbon or platinum serving as the other pole. It is rapidly covered with a layer of quicksilver, when it is removed, washed and transferred to a silver bath and silvered. By heating to 300° C (572° F.) the mercury is driven off and the silver firmly fixed on the iron. To save silver the wire can be first covered with a layer of tin; 1 part of cream of tartar is dissolved in 8 parts of boiling water, and one or more tin anodes are joined with the carbon pole of a Bunsen element. The zinc pole communicates with a well cleaned piece of copper, and the battery is made to act till enough tin has deposited on the copper, when this is taken out and the iron ware put in its place. The wire thus covered with tin chemically *pure and silvered is much cheaper than any* other silvered metals.

A BOILER THAT CAN NOT EXPLODE.—Additional tests have been made of the new French steam boiler which, it is claimed, is proof against explosion. The boiler consists simply of a solid drawn steel tube which has, with the exception of its two ends, been rolled out flat, so as to leave in it a channel only 0.1 to 0.3 millimeters wide; the tube is then coiled spirally, and its inner end bent up vertically to receive the steam pipe, while the feed pipe is screwed into the outer end of the spiral. This spiral tube boiler is placed in a furnace which may be of the slow-combustion type, and there is claimed to be no need for either stop-valve, blow-off cocks, gauge-glass or safety-valve. The feed-water upon entering the narrow channel within the tube is instantly converted into steam and issues perfectly dry. Thus, it is asserted, there is no possibility of scale accumulating, owing to the great velocity with which water and steam pass through the boiler, and the calcareous salts held in solution in the water, instead of being detrimental to the proper working of the boiler, are reduced to an impalpable powder and really act as a lubricant.

Manufactures of wooden articles will appreciate any method or process of drying lumber that will not warp the lumber. T. H. Sampson, a New Orleans, La., furniture manufacture, has applied for a patent on a process of treating gum and other woods which have a tendency to warp badly, that he will at once put in operation in that city. He has a plant capable of preparing 30,000 ft. of lumber daily, which he guarantees will not warp. Evaporation by heat, vacuum and steam-pressure are the means employed. A long wharf has been built, and a crane and elevated carriers are used for hauling logs from the water. They are drawn inside a factory building by a steam windlass, and run into an iron cylinder 120 feet long and 72 inches in diameter, that is supplied with numerous tubes connected with a steam boiler. The carriage fits snugly in the cylinder, and after the charge is inside the head is closed and bolted, and steam is turned in. Heat to the temperature of 500 degrees F. can thus be generated, and after a thorough drying the air is exhausted by pumps, and a vacuum pressure of 22 pounds to the square inch is produced, which exhausts the remaining moisture. The claim is made that all the sap is extracted by the process, and that the lumber so treated not only can not warp, but retains all its natural color, red gum, especially, coming out in fine shape.

THE INJECTOR.*

By Albert E. Edkins.

SINCE the injector was invented by Giffard, and brought into practice, it has generally done its work satisfactorily, and at a fairly small cost for feeding steam boilers. It was a great novelty when first introduced, and soon became a favorite among engineers whether locomotive, marine or stationary. The cause of its popularity is not far to seek, as it acts entirely independent of the engine, and can therefore be put on or off at any time.

Before the injector came into use, it was not an unfrequent occurrence for locomotive engineers to draw their fires, when side tracked, or delayed by an accident in front, and thus save their furnace sheets. To do such a thing in these days would be to degenerate to the old style This applies also to a stationary boiler. It is not in these days at all creditable for a stationary engineer to draw his fires for low water, when for a comparatively small sum an injector can be attached to any boiler.

Probably no invention was ever placed in the hands of engineers, that has been accorded such a small amount of thought and investigation, and which, nevertheless, we have been able to work so efficiently. Very few of us have taken the pains to investigate and find out the cause or action by which this instrument can deliver water into the same boiler from which it is supplied with steam.

Of course, if an injector will not work, we take it down and dissect it, and look for the objectionable bit of dirt, etc. Should it fail again, we test our suction pipe to see that it is perfectly tight, examine our feed water to see that it is not hot, and then if it won't work well, we can't do any more.

The action of the injector or inspirator is entirely due to the concentration of the steam issuing from the steam cone, which can be taken as representing the power of the instrument. Here the steam is condensed, and is concentrated by means of the water coming in from the water inlet. The united streams of water and steam are passed on into the receiving cone, and here it is that the resistance to the entry of the water into the boiler is experienced. The sectional areas of these cones differ as a matter of course. The areas of the steam and water cones are about as 2.0106 is to 0.7854 at their smallest diameters. The injector takes advantage of the superior velocity with which steam issues from a boiler as compared with water, and may be regarded as an instrument for producing a combined jet of steam and water, flowing through a nozzle at a higher velocity than that at which a corresponding stream of water would issue from the same boiler that supplies the steam.

When the water comes within the scope of the current of steam, it is carried along by the concentrated steam acting upon it. The water, which is incompressible, is projected forward into the delivery pipe, and thence into the boiler by the impulsion force of the steam, the velocity of the steam being due to its elastic pressure. It can be likened to a rifle or gun, inasmuch as the expansive force of gunpowder is confined by the lead to the powder chamber, where the force is concentrated that ultimately sends the ball hissing through the air. So with the action of injectors, the force is concentrated by the water at the cone, and instead of there being one effect, as with a charge of powder for one shot, the injector, while steam is on, is always charged, and there is a continuous discharge of water.

The reason why an injector will not work with feed water of a greater temperature than 130 to 150 is that it requires so large a quantity of water to condense and concentrate the steam issuing from the steam cone, that the necessary speed of water to overcome the resistance to entrance of boilers can't be obtained, and the consequence is, the machine will "kick." The ratio of the quantity of water entering the boiler to that of steam used is as about 18 to 1—that is to say, roughly speaking, for every 18 lbs. of water injected into the boiler, 1 lb. of steam is used to operate the injector. The temperature of the feed water after passing through the injector is raised from 75 to 100 when the pressure on boiler is about 70 lbs. per sq. inch.

Now we will assume that, after an injector has been at work for some time it throws off stops working. There are at least three causes by which a stoppage may be produced.

1st. The injector will throw off when the feed water exceeds a certain heat, for the reasons before mentioned; but it may be argued, that as the injector took the water and worked for a short time at first, why not continue to do so? The answer is: because the injector itself may have been cool when first put on, and thus cool the steam to a greater or less degree, until itself became heated.

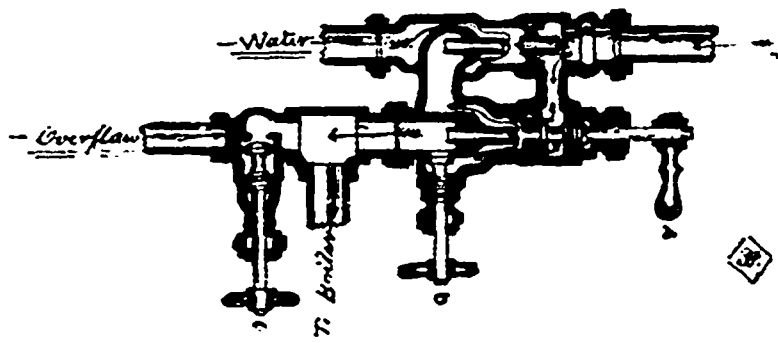
2nd. The water in the tank may not have had the same temperature throughout, and as the hotter water entered the injector, it failed to condense and concentrate the steam.

3rd. The injector will throw off, when the volume of issuing steam from boilers is insufficient to give the required speed to the water, so as to overcome the resisting pressure of the water and steam in the boiler. Here again it may be said: "But the injector worked at first!" yes! but the water that has been put into the boiler has reduced the temperature of the steam, and consequently its velocity is reduced in proportion, while the volume of water entering the injector remains the same as when it was first put on; therefore the steam is condensed, and still there is not sufficient force given the water to overcome the pressure of steam and weight of water within the boiler.

There are many injectors bearing different names but they all work on the one principle. The Hancock Inspirator is an American invention. It is a double apparatus, as will be seen by the sketch, one half operating as a lifter, and the other half as a forcer, consisting of a forcing jet and forcing nozzle or injector—the lifter drawing the water and delivering it to the forcer, which in its turn delivers it to the boiler.

Although both the lifting and force nozzles are fixed, their proportion one to the other is such that the inspirator does not require any adjustment for changes in steam or water supply. By means of the inspirator, water can be lifted 25 feet, and delivered into a tank or boiler, as required, with a steam pressure of 30 lbs. per sq. inch.

The temperature of the feed water may be as high as



from 90° to 100° Fahr. for a lift of 25 feet; or it may be as high as 125° Fahr. for a lift of 3 or 4 feet. The inspirator for stationary boilers as shown in section, has three valves. By means of the valve A, the admission of steam to the forcing jet is controlled. By the middle valve B is regulated the flow of water delivered by the lifting jet into the forcing tube. By the lower valve C, the overflow is opened or closed. There is a Hancock inspirator manufactured, which can be operated by one lever, thus doing away with the opening and closing of so many valves. It is the same in principle as the machine which we have shown on the sketch, and is self-contained. It operates in this manner: By a slight movement of the starting lever, steam is admitted to the lifting jet. When water issues from the overflow, by a further movement of the lever one of the valves is closed (thus turning the supply water through the force nozzle) steam is admitted to the forcing jet. Then the waste valve is closed. Then (everything being in order) the instrument is at work.

An elaborate series of trials of the Hancock inspirator was conducted at Boston by Mr. R. H. Bush. According to a table of some of the results of these trials, with a No. 30 instrument, in which the smallest diameters of the force nozzle was 0.30, or nearly 5-16 of an inch, when the lift was from 2 to to 3 feet, and the temperature of the water was 70° Fahr. while the pressure of steam supplying the instrument as well as the pressure against which water was delivered, varied from 15 lbs. to 150 lbs. per sq. inch, the maximum rate of delivery when the steam valve was wide open and supply throttled, was from 60½ cub. ft. to 78 cub. ft. with steam of 140 lbs. The temperature of the water at maximum delivery, varied from 103° to 193° Fahr. At maximum delivery, when the steam valve was open wide, and supply throttled, the temperature varied from 184° to 230° Fahr., under pressures of from 40 to 150 lbs. per sq. inch; and at minimum delivery, with steam valve throttled, and supply valve opened wide, the temperature varied from 134° to 168° Fahr., under pressures varying from 80 to 150 lbs. per sq. inch. The vacuum in supply pipe varied from 4 inches to 23½ inches, between the extreme pressures of from 15 to 150 lbs. The lowest pressure of steam with which the inspirator delivered water against these extreme pressures, varied from 11 lbs. to 90 lbs. per sq. inch. Some inspirators will work with 150 Fahr.

In conclusion I would say, that in my estimation an injector is a necessity in any boiler room, as it is a friend in need, but for a steady, reliable, every day boiler feed, a good pump, either power or steam, can't be beat. The time when an injector proves a friend, is when the pump goes back on us.

* Paper read before the Toronto Branch of the Canadian Association of Stationary Engineers, Nov. 8, 1889.

THE LIMIT OF IMPROVEMENT IN MILLING.

HAVE we reached it? This is the question which, above all others, is engaging the attention of the progressive miller, and to this question varying and contradictory replies are given. Of course the inventor of every new system very naturally believes that he has put the cap-sheaf on improvement, and that the milling progress is, excepting embellishments, practically ended. Others, of the pessimistic order of thought, see nothing ahead but one continued line of changes and improvements, each following its predecessor and consigning all previous systems of milling to oblivion. And it must be said that a good many millers are exactly in this frame of mind. Some of them, having changed their machinery, are fearful lest some gigantic genius discover processes and machinery still better, rendering their present machinery useless, or at least antiquated.

We would not by any means put a limit to inventive genius, but we see no reason to give the picture of the future so dark a coloring. However radical future changes may be in the case of individual mills, we believe that no such wholesale changes will be made in the mills that have adopted a good system, as we made a few years ago. We believe that the principles of nearly perfect milling are embodied in the machines of the present day. Modifications will, no doubt, be made both in machines and in processes; but we think that the machine we now have will form the material out of which future systems are to be erected. This puts no limit on improvement, for we believe there is none. We simply believe that few or no radical changes will be made in machines as we now possess them. In fact, we believe that the implements for almost perfect milling are already in our hands.—*Millers' Review.*

MACHINERY MFG.

A Whitby firm of implement manufacturers want some inducement to locate at Orangeville.

The Vancouver City Foundry and Machine Works Co., Ltd., have doubled their stock, thus making their capital $100,000.

An international exhibition of electrical engineering general inventions and industries will be opened in Edinburgh in May next, to celebrate the opening of the Forth bridge.

The moulding shop in connection with Doldge & Stuart's foundry at Thorold, Ont., was destroyed on Nov. 22, together with a lot of patterns. Loss about $1,000, no insurance.

A young man named Robert Bones, employed as timekeeper by Messrs. Wm. & J. G. Greey, Toronto, is before the courts charged with having set fire to the firm's works. The fire was fortunately discovered soon after its inception and extinguished, although not before considerable damage had been done to the premises.

Messrs. Wm. Kennedy & Sons' foundry at Owen Sound had a narrow escape from destruction by fire recently. The excessive heat caused by some very heavy forging is supposed to have ignited a beam which runs along the wall near the furnaces. Fortunately the fire was discovered in time to have it extinguished before much damage had been done.

The designers of steam-engines for driving dynamos do not always appreciate says the *Stationary Engineer*, the effect which the weight of a fly-wheel has upon close regulation, and in many cases otherwise well-built engines are rendered nearly useless because of insufficient weight in the fly-wheel. As a case in point, a 30 x 54 Corliss engine running 52 revolutions per minute was provided with a fly-wheel 18 feet in diameter weighing 28,000 pounds. A calculation based on the generally accepted formula for fly-wheels gives the proper weight at 42,000 pounds. Using the formula upon which the practice of some of the best engine building firms is based, the weight required would be 50,000 pounds. As a result of the insufficient weight in the fly-wheel a great deal of trouble with the dynamos has been experienced. An extra ton in the rim of the fly-wheel is worth more for purposes of close regulation than the money it would cost put into fine finish on the regulator.

THE MILLER WHO KNOWS IT ALL.

His mill is a model mill;
It never needs repairs.
There is nothing new
That he can't see through,
And improvements are costly snares.

His brands are always best,
And they find a ready sale,
At a price so high
That it makes you sigh
When you hear him tell the tale.

He always sells for cash;
He never consigns a sack,
His buyers all pay,
He is pleased to say,
And his orders are never slack.

His flour is never off;
His mill is never down,
His shipments delay
Not a single day
On their way to the seaport town.

An association join?
Ah, no! He does not need
Any outside aid.
He is not afraid
Of the patent attorney's greed.

Such things are not for him;
They may do for the miller small.
They are quite too slow
For our friend, you know,
The miller who knows it all.

—"Lusty Lyre," in *Northwestern Miller.*

[illegible] is being erected at Creemore, Ont.

[illegible] Stein, a miller at Wellesley, Ont., has assigned.

Mr. Anderson, of Brantford, will build a new flour mill at [illegible]

The [illegible] full-process roller mill at Ailsa Craig, Ont., has commenced operations.

[illegible] & Crawford will establish a grist mill in the Lake Dau[illegible] Man.

Mr. James Craig, of Napanee, has recently patented a sieve [illegible] flouring mills.

The Woodward elevator at Deloraine, Man., is said to be in the hands of the sheriff.

[illegible] h. p. engine and boiler has been placed in the Cry[illegible] Man., roller mill.

The Arrow Milling Company's new mill at Birtle, Man., is [illegible] commence operations.

[illegible] Featen Bros. have erected a grain elevator adjoining [illegible] mill at Brampton, Ont.

[illegible] Hutton & Carr's mill at Wingham, Ont., has recently [illegible] thoroughly fitted up with the roller process.

[illegible] Nov. 7th, fire destroyed Bryden's grist, saw, shingle and [illegible] mills at Flinton, Ont. Loss $4,[illegible], no insurance.

[illegible] Mathews, of Toronto, has leased the Arthur elevator for [illegible] years, and has engaged Mr. W. F. Johnston to buy.

[illegible] Hastings, who has for some time back represented the [illegible], on the Pacific coast, has tendered his resignation.

[illegible] of the Columbia Milling Company, of British [illegible], have received 42½ cents on the dollar on their claims.

A [illegible] farmer is reported as recommending the use of dry [illegible] of damp grain to remove the moisture by absorption.

[illegible] Taylor & Bryden, of Flinton, Ont., whose mills where [illegible] by fire on Thanksgiving Day, have commenced to [illegible]

[illegible] Caselman Lumber Co., organized with a capital of $250,[illegible] among other things propose to do a grain and milling [illegible] at Casselman, Ont.

[illegible] Thompson, proprietor of oatmeal mills at Seaforth, [illegible] and Mitchell, finds it too much to look after them all, and [illegible] to close down the one at Seaforth.

[illegible] I. D. Lilbold & Co., and H. W. Hansell have formed [illegible] west Milling and Elevator Co., for the purpose of [illegible] the Regina, N. W. T. mill and elevator.

[illegible] of Hilborn, Hambly & Co., lessees of the Salem Roll[illegible] has been dissolved, Mr. Amos Hilborn having taken [illegible] the Ayton Roller Mills, owned and run by Messrs. N. [illegible] Bros.

[illegible] flour mill has been formally handed over to Mr. [illegible] Stephenson, the proprietor, by the contractor, Wm. Bates [illegible]. The mill is four stories high with 50 barrels capa[illegible] motive power is furnished by 3 Leffel water-wheels under [illegible] head. The flooms and penstock have also been rebuilt. [illegible] drive is used for the rolls, and is very satisfactory.

[illegible] that grain absorbs moisture enough on a sea voyage [illegible] freight charges has been verified by some test experi[illegible] at the California agricultural college. Various kinds [illegible] were placed in a moist atmosphere, and the increase in [illegible]. The greatest was during the first 24 hours, the [illegible] being nearly 33 per cent of the total absorbed during [illegible] exposure. It was computed that perfectly dry grain, would absorb as follows: Oats, 29.08 per cent; barley, 28.17 per cent; wheat, 25.02 per cent. Under ordinary conditions the percentage is, perhaps, not so high, 15 to 16 per cent. probably being near the average.

On the evening of Saturday, Nov. 9th, death removed a prominent and highly respected Canadian miller in the person of Mr. Solomon Hannant, of Milton, Ont. Mr. Hannant was born in Norfolk, England, in 1838, where he served his apprenticeship as a miller and came to this country a young man, where he has ever since been actively engaged in the milling, flour and wheat business, and was well-known and respected in all business circles more intimately connected with this particular trade. Mr. Hannant came to Milton about twenty years ago—having previously carried on business in St. Catharines, Brantford, and Belleville—and with a short temporary absence remained there ever since. He took an active interest in municipal affairs and discharged with ability and satisfaction to his constituents, the duties of Mayor of the town. In the business world he was held in the highest esteem for his integrity of character. He leaves a widow, three sons and two daughters to mourn his loss.

The October crop bulletin of the Manitoba department of agriculture, now just at hand, places the result of this year's grain crops in that province at the following figures:

	Acreage.	Yield, bus.	Yield per acre.
Wheat	623,245	7,201,519	12.4
Oats	218,744	3,415,104	16.8
Barley	80,238	1,051,551	13.6

The average acreage and yield of these grains for the years from 1883 to 1887 have been:

	Acreage.	Yield, bus.	Yield per acre.
Wheat	339,950	7,137,210	20.6
Oats	155,716	5,302,963	33.7
Barley	53,383	1,308,437	25.8

From these figures it will be seen that while the present year's wheat crop is above the average in aggregate yield, this was only the case from the fact that the acreage was nearly double the average, the yield per acre being over 8 bus. beneath the average.

ELECTRICAL SPARKS.

Nanaimo, B. C., will organize an electric light company.

The electric light and gas companies of Kingston have amalgamated.

Arthabaskaville and Victoriaville, Que., are to be lighted by electricity.

The poles are up and the wires strung for the electric light in Penetanguishene.

The Heisler Electric Light Company have decided not to introduce their lights at London.

A number of incandescent lights are being placed in the shops and private residences at Oshawa.

Mr. Wm. Roberts, of Toronto, has been granted a patent in the United States on a secondary battery.

The Ingersoll Town Council has finally adopted the Heisler electric light, and passed a by-law ratifying the contract.

The Hamilton Electric Light Company are putting in another 300 horse power engine. The fly-wheel is 16 feet in diameter, with 38 inch face, and weighs ten tons.

Mr. A. A. Knudson of St. John, N. B., read a paper before the New York Electrical Society a few days ago, on the recent St. John Electrical Exposition, of which he had charge.

The Royal Electric Company of Montreal have obtained the contracts for extending the electric light system at Sherbrooke and also for supplying Richmond, Que., with electric light.

It is rumored that the Edison Company, of Sherbrooke, Que., is negotiating for the purchase of suitable manufacturing premises in Hamilton, Ont., with a view to removing its business to that city.

The Municipal Gas Co., composed of American and Maritime province business men, has been incorporated under the laws of New Brunswick to supply gas and electric light. Its authorized capital is $500,000.

The fact that the town of Port Hope owns stock to the amount of $14,000 in the local gas company, led to the proposition being made to dispense with the electric light for street purposes. After a long fight the motion was voted down.

W. H. Boisfeuillet, manager of the Hamilton Electric Light Company, expects to have the new electric light plant, consisting of 25 arc and 32 incandescent lamps, in working order in a day or two. The city will hereafter be lighted entirely by electricity.

It would at first sight seem absurd to talk of a static electrical machine being run as a motor, but that the usual static machine, such as the Holtz, can be converted into a motor when supplied with a continuous charge from a second machine, is an established fact.

On the 8th December next, the fete of the Immaculate Conception, the lighting of Notre Dame Cathedral, Montreal, will be inaugurated. There are to be 400 incandescent and 15 arc lights, the former being placed in the chancel. The Royal Electric Company has the contract for the work and the power will be derived from two Woodbury dynamos in the basement.

Victoria *Colonist*: Two handsome street cars for the Victoria Electric railway have arrived. The new cars are well built, with bodies sixteen feet long. The seating capacity is thirty to a car, while in a pinch sixty passengers can be crowded on board. Lighted with electricity and provided with electric bells worked on dry batteries, the cars are complete in all their appointments.

The electric light is a source of economy in many establishments. A London newspaper points out that in the Holborn Restaurant its use has enabled the proprietors to dispense for four years with repairing and redecorating. In one of the public departments £600 a year has been saved by reason of the fewer leaves of absence granted to clerks for sickness. Because of its greater healthfulness, introduction of the electric light into crowded factories will be a great boon to workmen.

The change from animal power to electricity of an entire street railway system, including fifteen miles of track and eighteen cars, as was accomplished some time ago at Montgomery, Ala., is indeed an event which speaks volumes for the strong confidence that the operators of street railways already have in the capacity for work and economy of the electric locomotive. But while the smaller cities are thus making rapid strides, we find the larger ones still holding off and watching the results obtained. This is but natural when we consider that many of the larger companies number their cars by the hundred, and their horses by the thousand. To alter the former to electric traction, and to do away with the use of the latter altogether, is an undertaking which involves other considerations than accrue in smaller towns.

Our Boston contemporary, *Modern Light and Heat* contains the following: The Chandler Electric Light Company, Halifax, N. S., is one of the most prosperous corporations in the Dominion of Canada. Having purchased a large block of land abutting on the harbor, it is now erecting a central station thereupon for supplying lights throughout the city, and ultimately to furnish power for the street railway. A chimney stack 130 feet high is being erected, and the big block to contain the steam and electric plant will be proceeded with at once. Six Babcock and Wilcox boilers will be erected, and Messrs. J. A. Grant & Co., of Boston, have contracted to supply two of the well known McIntosh-Seymour high speed engines of 125 horse-power capacity each, in addition to those already supplied by the same firm. Considerable additions will also be made to the electric plant so as to render the new station in every way one of the finest and best equipped to be found anywhere.

While we frequently hear of telegraphic bulls, there can be no doubt that by far the greater number are never heard of beyond the parties interested in them personally. These mistakes are for the most part due to the number of times the message is repeated or retransmitted by different operators. The present system of telegraphy is not only open to the liability of errors of transmission and reception, but it also requires a skilled operator at each station. If, therefore, there were an instrument which should record the message transmitted by the first operator, and this record itself be the transmitting medium for any further repetitions, not only would the liability to errors be diminished, but the cost would also be greatly decreased because their record could be conveyed through the machine at a comparatively rapid rate. This idea is embodied to a certain extent in the Wheatstone automatic system of telegraphy, by which a very high rate of speed has already been attained, but this system requires the message that is to be forwarded to be first prepared by the perforation by hand of the transmitting slip.

In the discussions which have been carried on in regard to long distance distribution by means of converters and alternating currents, it has been predicted more than once that the time would come when the continuous current would be equally applicable to the same purpose, and that with it some of the difficulties met with in the employment of the alternating current would be removed. The idea of interrupting the continuous current for the purpose of obtaining a rise and fall in magnetism in the converters is not new by any means, but the obtaining of a direct current from the extra current is a novel application of this method. Again, the employment of a coil with but a single winding to take the primary current and deliver the secondary, is also a new departure in this line. In a system brought out some time ago, the secondary or extra current generated in an electro-magnetic coil is utilized as the working current. The secondary current is ordinarily of a higher potential than the primary or inducing current, but by suitably uniting a number of coils, so that they discharge in parallel, their potential is reduced below that of the primary which passes through the coils in series. We are not informed as to the efficiency of this system, but it would be interesting to know how it compares with the alternating current method with double wound converters.

There are at present four methods by means of which passenger cars can be lighted by electricity, namely—lighting by primary batteries carried on the train, secondary batteries carried on the train and charged at a terminus, secondary carried on the train and charged by a dynamo carried on the axle, and finally, the system of having a separate plant in the baggage car of the train, with engine and dynamo for lighting direct. The objection raised against the last method is that the cars can receive no light when detached from the dynamo car. In all the other methods with the exception of the first, the secondary battery must be looked to for bridging over irregularities. Which of these methods is to be the final one adopted can no more be determined now, than can the question as to which is the best primary battery. The question must to a great extent be a matter of circumstances and adaptability. On roads with very light grades, it would be out of place to put in the system of batteries and charging dynamo driven from the axle, as the benefit to be derived from the momentum of the train running down grade would not be available on such a road. For those who argue that the locomotive must not be called upon to do more work than it now performs either in the charging of the batteries or their hauling on the cars, the solution of the problem lies in the direction of the method of a separate lighting plant on the train. It is evident therefore, that a wide latitude is permissible for the gratification of individual tastes and the adaption to existing conditions. It is said on good authority that storage is no dearer than gas for same amount of light, and that further, obvious improvements both in the batteries and the lamps, will make this balance turn decidedly in favour of the electric light, even on the single ground of economy. It seems to be tolerably well established that if the storage battery can perform the duties of car lighting satisfactorily, its cost will not stand in the way of its introduction on a large number of roads in this country, especially on competing lines, which offer every attraction and comfort in order to draw passengers.

ON PUMPS FOR BOILER FEEDING.

OUR illustrations, this month, show two arrangements of pumps that were designed for boiler feeding by this company, and have now been in successful operation for a considerable time by the Boston Duck Company, Bondsville, Mass., and the Otis Company, Ware, Mass., respectively. The particular difficulties that these systems were designed to overcome were as follows: In each case a large amount of water is used, and in order to run economically it was desired to return the drip from the various mills to the boiler room. This was attended with considerable difficulty, as the boilers are higher than the points where the traps must be placed. A survey of the yards showed that certain points could be selected, though at considerable distances from the boiler houses, to which the drips could be easily returned; and it was resolved to place the receiving tanks at these points. In order that the pumps might be flooded, it was necessary to place them in the same pits with the tank, several hundred feet from the boilers: and after some consideration it was decided to do this, and to arrange the pumps so that they might govern themselves automatically, and not need the personal attention of the firemen.

Fig. 1 shows how this was accomplished at Bondsville. Into the tank, A, all the drips from the mills are discharged, by means of traps of our own design. The exhaust from the pump also discharges into the same tank. The water in tank A is maintained at a constant level by means of a governor, J, which controls a valve, H, in the feed pipe G, in the usual way. This governor communicates with the tank by means of the pipes shown, which are provided with cocks L, and K, so that the governor may be shut off from the tank when desired. Within the tank the feed pipe is perforated as shown at V so that the incoming water may condense any steam it may come in contact with, and be itself heated thereby. A blow-off is provided at N, and a three-inch overflow at P, which discharges surplus water into the blow-off through R, and allows any uncondensed steam to escape through Q.

The pump, B, draws its supply from the tank through pipe D, and discharges through M, which passes to the boiler room. Steam to operate the pump enters through the pipe C, which is provided with a reducing valve, as shown, which serves to maintain the pressure on the steam end of the pump constantly at 35 pounds, which is indicated by the gauge E. The water pressure in pipe M is indicated at F.

The operation of this system is very simple. If the attendant in the boiler-room shuts off all his valves, the pressure in the water pipe M immediately runs up to from 100 to 105 lbs. the steam and water cylinders of the pump being so proportioned that when this pressure is attained the water in M just balances the reduced steam pressure in C, and the pump can no longer run. It therefore remains motionless until a valve is opened somewhere on the pipe M. Then, the pressure in M being relieved, the pump is no longer balanced: the steam pressure preponderates and the pump starts. This adjustment is so fine that if the attendant opens his valve a single spoke, the pump responds immediately, and moves so slowly that its motion can hardly be seen: while if he opens all his valves wide the pump instantly starts at full speed.

To prevent unpleasant rattling and pounding in the boiler-room a standpipe, S, is provided near the boilers, which acts as an air chamber and causes the whole to work smoothly and noiselessly. It happens occasionally, as for instance when the temperature of the boiler feed is changed, that some of the air in S is absorbed or dissolved by the water, so that in time say once in two or three months pipe S becomes filled with water and ceases to act as an air chamber. In this case it is only necessary to stop the pump for a few moments and open the small cocks T and U. Water then runs out at U and air bubbles up through T into the air chamber overhead. When sufficient air has entered the small cocks are closed and the system is ready for operation once more.

The plant at the Otis Company's mills is similar in principle, but somewhat more complicated in its details owing to the fact that a power pump is there used, in addition to a steam pump. The operation of this plant will be understood from Figs. 2 and 3, which are respectively an elevation and plan of the whole system. In these figures A is the tank for receiving the drips, X is the governor and U the valve that regulates the flow of water from the river into the tank through the perforated pipe V. The power pump, B, has two fly-wheels, C and D, on one of which runs the driving belt. It draws water from the tank through pipe E, and delivers through G K L to the boilers. The steam pump, P, is provided with a reducing valve, Q, as in the plant previously described; it draws its water from the tank through M and delivers it to the boilers through RR¹L. At T a pipe is shown which runs through the mills and supplies water in case of fire or other emergencies. Valves are provided at S and N that allow the steam pump to be shut off entirely if desired, and similar valves, H and F, are provided for the horse power pump.

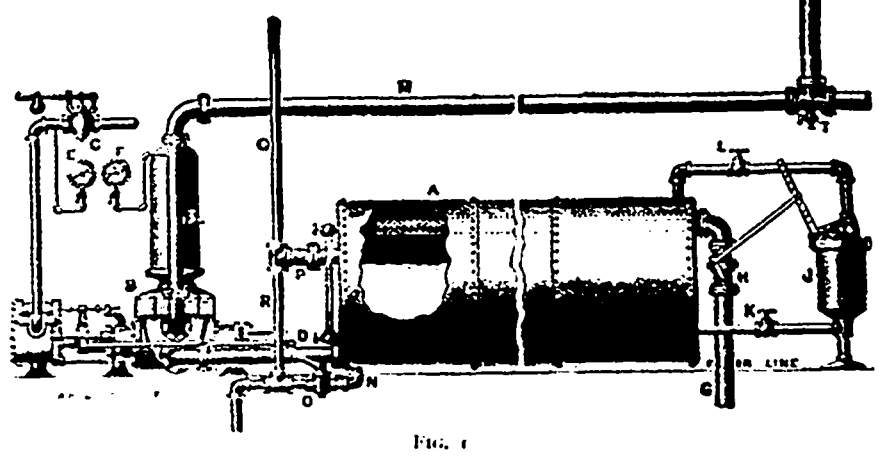


Fig. 1

The action of these combined pumps is as follows: The power pump, B, runs continuously, while the machinery is in motion, and it is ample in size to supply all the ordinary wants of the boilers. In case the demand for water is less than the supply that this pump affords (which is frequently the case), the surplus passes back to the tank A through a relief valve, J, which is set to open at 115 pounds water pressure. Under these circumstances the steam pump, P, remains motionless: for the steam pressure in it is kept constantly at from twenty-four to twenty-five pounds by means of Q, which corresponds to a pressure in the water end of 105 pounds, so that it is impossible for this pump to start unless the pressure in KL falls to 105 pounds or less—that is, it is impossible to start while the demand for water does not exceed the capacity of the power pump.

To follow the action of the pumps, let us first suppose that all the valves in the boiler-room are closed. Then the pressure in the main, KL, rises at once. As soon as it reaches 115 pounds the relief valve, J, opens, and

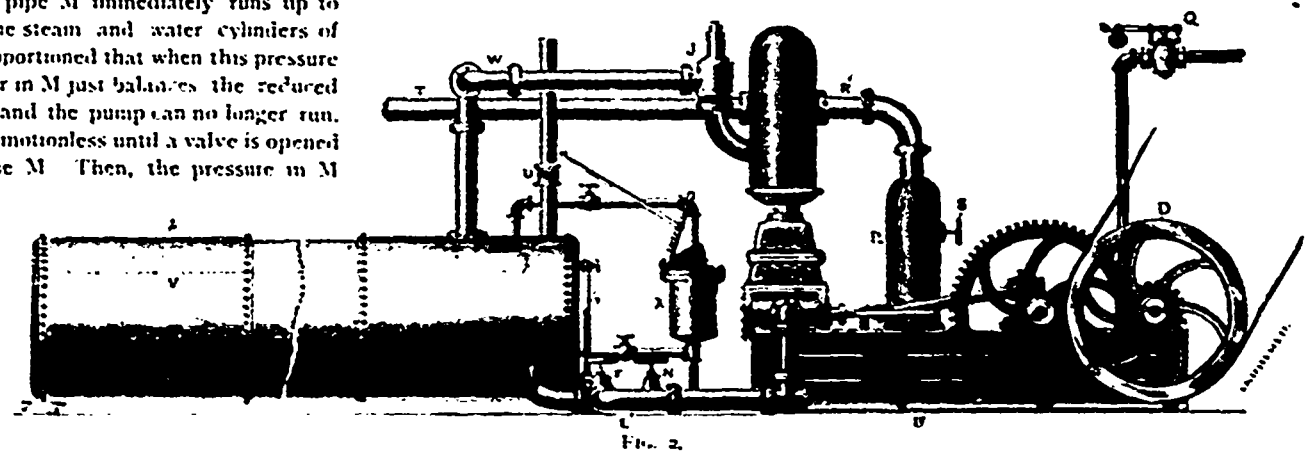


Fig. 2.

after that the entire delivery of the power pump passes through J and W and back into the tank A. Now let us suppose that the belt on the power pump breaks. Immediately the delivery of this pump ceases, and the valve J closes. The pressure in the main, KL, is now 115 pounds and both pumps are motionless. Now suppose an attendant in the boiler-room opens a feed valve there, the pressure in the boiler being only 80 lbs., water begins to flow from the main into the boiler; but this reduces the pressure in the main, KL, which pressure, at the time of opening the valve in the boiler-room, was 115 lbs. The moment that this pressure falls below 105 lbs., however, the steam pump, P, ceases to be balanced: the steam pressure preponderates over the water pressure, and the pump starts with a velocity proportional to the demand for water, the working of this pump, from this moment on, being exactly the same as the working of the pump shown in Fig. 1.

Now let us go back to the beginning once more, and suppose that the belt on the power pump does not break, but that the demand for water, owing to a fire breaking out or to any other cause, suddenly increases, so that pump B can no longer supply it. The pressure in KL then decreases as before, the relief valve, J, closes, the steam pump, P, starts up the moment the pressure in KL falls to 105 lbs., and both pumps run together, the lower pump at a uniform speed and the steam pump at a variable speed, depending on the amount of water that is wanted.

When night comes on the lower pump of course stops at six o'clock, and the steam pump at once starts automatically and takes its place; and at seven o'clock in the morning the power pump starts once more and the steam pump stops.

In both of these plants pressure gauges are attached to the steam and water pipes, so that an occasional visit to the pump-room shows at once whether everything is working properly or not. Both systems also have an air-chamber in the boiler-room, as shown at S in Fig. 1; and it seems proper to say that in each case the pumps have worked smoothly from the outset, and to the entire satisfaction of everyone.

In order that the advantage in economy that comes from returning the drips from the various pipes may be appreciated, we would call attention to the following figures: The water in the tanks of these systems has a temperature of between 160 and 190 Fah. Now one of the companies referred to in the beginning of this article uses five boilers constantly, and for these boilers and the dye houses between 15,000 and 20,000 pounds of water are required per hour. To raise this amount of water from say 70 to 170°, as many heat units must be expended as would evaporate say 2,000 pounds of water per hour; that is to say, it would be necessary for this company to run six boilers instead of five, if the drips where thrown away.—*The Locomotive.*

FUSED JOINTS.

FREDERICK J. SMITH writes to the London *Electrical Review* as follows: May I be allowed to introduce to your notice a method of making electrical joints by fusion. I was anxious to construct a somewhat complicated network of conductors in such a manner that the system might (as far as possible) be free from Peltier effects. When solder is used we know that such effects exist. In order to avoid this source of trouble I have used joints made by fusing their ends of copper conductors together by means of the oxyhydrogen blowpipe. As many old joints, on which a current has been acting during the usual hours of house lighting, have now been tested and found as strong as when first made, I venture to suggest the method to some of your readers to whom, perhaps, it may be of interest. It is as follows:

A V-groove is cut in a piece of dry fire brick, or a piece of hard quick lime, the ends of the wires to be joined are placed side by side in the groove, and then the flame of the blowpipe is brought down upon them; in the case of a joint made in No. 12 wire, the ends were fused together in 32 seconds. Care must be taken not to prolong the heating after fusion is complete; if the heating is prolonged much after fusion the copper is suddenly converted into minute spheres, which scatter themselves about and leave a thin place where the joint should be. My first joints were made long before oxygen could be bought at its present price; with oxygen as now supplied, joints can be easily and cheaply made in big wires and leads; no flux was used in making any of the joints, nor were the ends cleaned previous to their being heated."

A writer in the *American Machinist* says an easy method for recovering babbit metal from dross is to wash the dross with plenty of water in a fine meshed sieve; if in lumps, crush fine in a mortar before washing.

TRACTIVE FORCE OF LEATHER BELTS ON PULLEY FACES.*

SCOTT A. SMITH, PROVIDENCE, R. I.

IT is of the highest value to users of leather belts to know the exact conditions which give the greatest tractive force of belts on pulley faces; in immediate connection with this, it is essential to have knowledge of what constitutes the best leather belting.

It is the opinion of the writer that the best belts are made from all oak-tanned leather, and curried with the use of cod oil and tallow, all to be of superior quality. Such belts have continued in use thirty or forty years when used as simple driving-belts, driving a proper amount of power, and having had suitable care.

In the best methods of currying, only a very small quantity of the stearine of tallow enters into the leather; the oleine of the tallow and cod oil, during a period of four weeks employed in a suitable currying process, oxidize under the influence of heat, moisture and much hand and machine labor intelligently used, and become, or partake of the nature of a gum or varnish, most intimately united with fibres which interlace in all directions.

Such leather contains no free oil, which would, if of animal or vegetable origin, have a natural tendency to generate free acid injurious to the fibres. Belt leather thus made has a supple character, with a little elasticity and compressibility which eminently fits it for tractive use on a pulley face.

When a new belt is put to use with the flesh side to the pulley, there is on it a certain quantity of stearine from the tallow (rubbed down to give smoothness to that side; this grease acts, or aids, by increasing the surface of contact, to give an extra tractive quality to the leather. If the grain side is run to the pulley face, then, in the first use of the belt, there is more tendency to slip, owing to the absence of grease on the surface, and also to the fact that the grain is hard; and in case of small diameters of pulleys, the belt face is wrinkled, thus it is less in a condition to be brought into intimate contact, under pressure, with the pulley face over its whole contact surface, than is the softer flesh side. The stearine on the surface of the flesh side, and the softness of its face, operate to exclude air from between the two surfaces, thus affording the benefit of atmospheric pressure, the strongest element in its tractive force, to hold the belt to the pulley face. In addition, when the two surfaces of leather and iron come together, on one or both of which there is a semi-fluid to interpenetrate into the pores of the two faces (providing there is a minimum of this material, or only sufficient for this interpenetration) then this material becomes an impediment to the slipping of the belt to the extent of the cohesion to, or affinity for, the iron and leather.

This statement, in relation to the action of stearine on the flesh side of leather, and the running of that side to a pulley face, is not given in the sense of an approval of either the one or the other, but to illustrate by a familiar fact. Stearine has no legitimate place on, or in, leather. Also the flesh side should not be run to the pulley face, for the reason that the wear from contact with the pulley should come on the grain side, as that surface of the belt is much weaker in its tensile strength than the flesh side; also as the grain is hard it is more enduring for the wear of attrition; further, if the grain is actually worn off, then the belt may not suffer, in its integrity, from a ready tendency of the hard grain side to crack.

The most intimate contact of a belt with a pulley comes, first, in the smoothness of a pulley face, including freedom from ridges and hollows left by turning tools. Second: In the smoothness of the surface and evenness in the texture, or body, of a belt. Third: In having the crown of the driving and receiving pulleys exactly alike, as nearly so as is practicable, in a commercial sense. Fourth: In having the crown of pulleys not over ⅛", in a 24" face, that is to say, that the pulley is not to be over ¼" larger in diameter in its centre. Fifth: In having the crown other than two planes meeting at the center. Sixth: The use of any material on, or in, a belt, in addition to those necessarily used in the currying process, to keep them pliable or increase their tractive quality, should wholly depend upon the exigencies arising in the use of belts; and the use of such material may justly be governed by this idea, that it is safer to sin in non-use than in over-use. Seventh: With reference to the lacing of belts, it seems to be a good practice to cut the ends to a convex shape by using a former, so that there may be a nearly uniform stress on the lacing through the centre as compared with the edges. For a belt 10" wide, the center of each should recede 1-10".

An impediment to the just use of leather belting, in minor cases, comes from the fact that many manufacturers of machinery will adhere to the custom of putting too small receiving pulleys on to their machines, to indicate to the purchaser that little power is required to operate them. I have a feeling of pride in having the acquaintance of an eminently practical man who takes off a pulley 6" diameter by 4" face on a circular-saw arbor, and substitutes a pulley 9" in diameter by 6" face.

A few words as to hemlock-tanned leather, or leather tanned by the use of half hemlock and half oak bark. I do not consider them as worthy of much consideration, as many makers of that class of belting stock have been obliged to abandon its manufacture during the past forty years. It is a less costly and less enduring product. It goes without saying that a well-made "hemlock" belt is better than a poorly-made "oak" belt; duly considering all the processes involved in the making of each.

I would maintain that a skilled maker of oak-tanned belting can meet any and all legitimate requirements, whatever they may be. Some uses of a belt demand that it shall be much softer than for other purposes: some that it shall be elastic; other cases need a very rigid and non-elastic belt. For quarter-twist belts, owing to the firmness of oak-tanned leather, the belts should be specially shaped by the maker for that use, both in the length of the belt and at the ends.

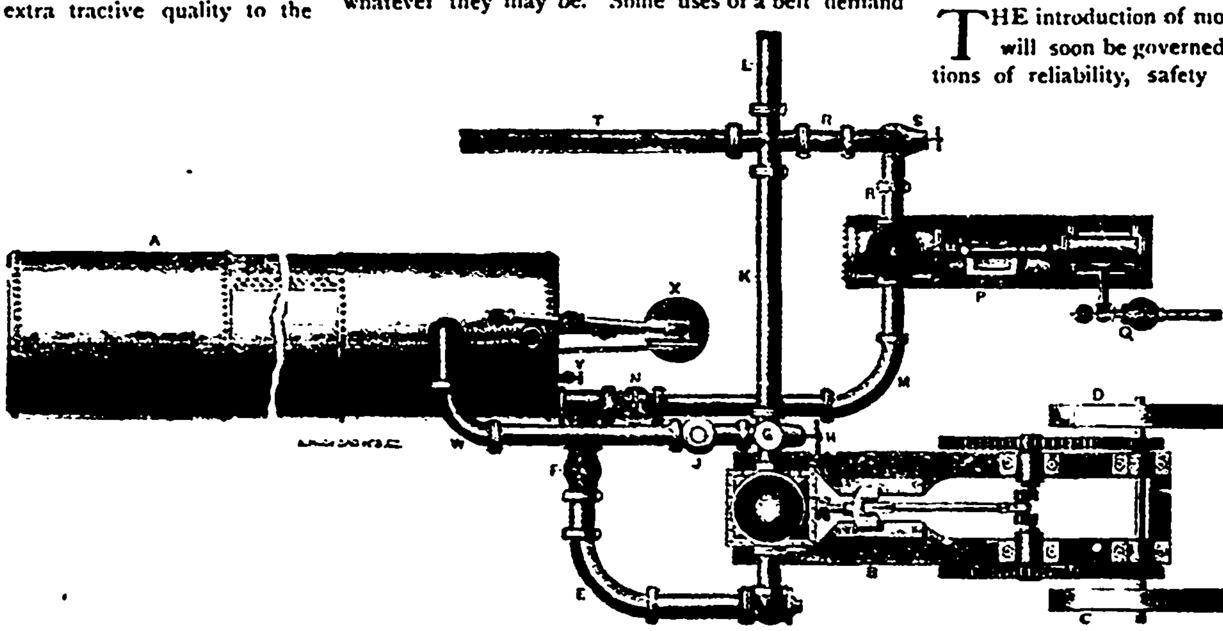


FIG. 3.

Referring again to the subject of oils on leather; mineral oils always act to negative oxidations of the oils in the currying process; hence they are detrimental for that use. If added after the currying process is completed, then they tend to undo the currying by softening the oxidized oils.

A question not to be ignored relates to the action of air and other influences in keeping belts from full contact with the top side of a receiving pulley, when belts are run at very high speeds; this is caused by the massing of air at this point; by excessive crowns in pulleys, giving much convexity to the belt to hold air on or in its concave side; by the rigid character of many belts, and by centrifugal force.

Much leather belting is made, which, when finished, has a very rigid character. It has gone into the hands of users in that condition for these reasons: First, because a desire has grown with some users to have belts extremely rigid against stretching—apparently forgetting that such rigidity ensures that a belt shall have a comparatively short life. Second, to make a belt very supple and very uniform, in its body, and over its whole surface, necessitates expensive methods in currying. The continued demand for lower and lower prices has induced the leaving out of that amount of careful hand labor which always gives suppleness to leather, if otherwise well qualified; and in place of it has come a "machine" surface finish, which, to the eye, passes for the genuine article. This suppleness—sometimes called mellowness—gives to the leather due pliability, and such belts run satisfactorily at high speeds.

While the "suppleness" of belt leather has been denominated "mellowness," it should be stated that there is a resistnace to flexion, in the best leather, due to its components of fibers, interlaced, in all directions, and a body of flexible gum, which while it readily bends, yet it as readily returns to its initial shape; but the best is fully appreciated only through experience.

Rigid belts are sometimes made pliable by saturation with "belt oil," but the inevitable result, in time, is a disorganized belt; slipping will come, and the addition of more oil only results in its acting as a lubricant, by piling up on the surface.

There is some doubt in my mind as to the desirability of perforating belts, or the drilling of pulley faces, to overcome the difficulty mentioned, so far as it comes from the air, which is not so much a real difficulty when properly made belts are used as it is with rigid belts.

Free oils added to curried leather give "momentary" added strength by filling all the pores to distention, thus locking fibres to place; and by softening the fibres and allowing a strain—for instance, at lace holes—to be distributed over very many fibers.

As friction is due—largely—to the unevenness of two surfaces in contact under motion, and as the best tractive quality of belts comes from the evenness and smoothness of the two surfaces of belt and pulley face, it easily follows, from what I have said, that the value of the tractive force of a belt on a pulley face is due, first, to atmospheric pressure; second, to the tractive adhesion of the leather fibers and the oxidized oil of the currying process.

*Presented at the XIXth Meeting, Erie, Pa., 1889, American Society of Mechanical Engineers.

THE BEST FORM OF MOTOR.

THE introduction of motors for power transmission will soon be governed by their cost. The questions of reliability, safety and convenience are all important, but dollars and cents are the most conspicuous considerations, and this point is by no means overlooked by the manufacturers of motors.

The evolution of a perfect machine of this character is necessarily a slow process. Its original design and construction is in the hands of the inventor and a few practical mechanics. When it is placed in actual service, the modifications begin. It is strengthened in one part and lightened in another. Its construction gradually simplified. The arrangement of the parts is changed in order to facilitate examination and possible adjustment. Nothing but the lapse of time and the exigencies of actual service will develop all the faults and suggest all the improvements which may be made. When practical perfection is eventually attained, special machinery may be devised, which will bring the cost of production down to the lowest point, greatly enlarging the sales, even if the profit on each motor is reduced. This is the natural course through which any line of manufacturing must pass in order to attain the highest degree of perfection.

So long as competition tends toward the production of a better article at less money, it is beneficial, provided it is done at a reasonable profit; when, however, an effort is made to reduce cost by introducing an insufficient quantity of material, or that of an inferior quality, the result is more likely to show loss rather than gain. The high speed at which dynamos and motors are run, and their susceptibility to damage if not properly balanced and fitted, has led up to first-class workmanship. Therefore, it seems reasonable to suppose that in this particular branch of the electrical business there is little apprehension of retrogression.—*Electric Power.*

At two o'clock on the morning of Nov. 5th, Howson Bros.' roller flour mill at Teeswater, Ont., was discovered to be on fire, the flames first making their appearance on the third story. Unfortunately the fire had obtained too good a start to be put down by the efforts of the firemen. The engine house containing the boiler and engine was saved, also a frame storehouse, but the balance of the mill was totally destroyed. The origin of the fire is unknown, but is supposed to have started from the overheating of one of the boxings. The loss will be about $16,000. Insurance on building and machinery in the Millers' and Manufacturers', $4,000; British American, $3,000; Wellington and Mutual, $2,000; on stock, etc., Millers' Mutual, $2,600.

MINOR MILLING MATTERS.

FOLLOWING is an abstract of a paper prepared by J. H. Macdonnell, of Stockton-on-Tees, England, for the Paris convention of the National Association of British and Irish Millers, read by Secretary Chatterton. The subject is "Minor Milling Matters," and the substance is as follows: "One of the chief matters in the modern system of flour milling, which up to a recent date has received but scant attention, is that of thorough and efficient wheat cleaning. We all know how frequently flour mills have been remodelled and fully equipped with the most perfect rolling, purifying and dressing machinery, while the wheat-cleaning departments were never even looked into. It is also pretty well known that, whereas all this outlay and labor had been spent on the mill proper, uniform good results were not always obtained, and that a change from one kind of wheat to another greatly altered the quality and value of the flour produced, the difference showing itself more pronouncedly in the 'patents.' In fact, impurities showed themselves in the semolina and middlings, which no amount of manipulation on the purifiers could eliminate. Millers who carefully studied the matter and made microscopical examination found that much of the impurity was mineral matter, and in searching back found that the wheat-cleaning machinery was unequal to the task of removing this matter completely. Others overlooked the cause and condemned the wheat, which, if properly and sufficiently treated, would have yielded a high-class flour.

"As well as mineral matter, there are frequently found among the middlings small foreign particles of about the size and practically the same weight as the particles of middlings, which, when rolled, become reduced to fine powder, pass through the flour-dressing machines and contaminate the flour. This is owing to the fact that some seeds about the same size and gravity as the wheat have not been extracted. I am going on the assumption that ordinary small seeds have been extracted. In some mills one may find the inner casing of the first break rolls, and indeed of the second-break also, covered with a layer of dark-brown dust, proving conclusively that the wheat in those mills might be more thoroughly cleaned. This all points to the necessity which exists for the securing in the first place the most perfect arrangement possible for thoroughly cleaning and polishing the wheat berry, while extracting every particle of foreign matter, if the highest standard of flour is sought after. The details of such an arrangement may have been thought of minor consideration by some millers, but it is on these very minor matters that the successful result of the manufacture, or the contrary, depends. It is unnecessary for me to point out the *modus operandi* which, to my mind, presents itself as the most perfect by which to attain this thorough and efficient wheat-cleaning. You have to keep in view the fact that, owing to our dependence on the markets of the world for the greater portion of our wheat supplies, the variety of quality are numerous, and that provision should be made to handle each and all of them to the best advantage, always remembering that the arrangement must be so comprehensive that any change of wheat coming from the east to the greatest variety of foreign matter, or varying in size from the smallest to the largest, can be dealt with in a satisfactory manner. I would impress this recommendation as one may say, 'Well, my mixtures are generally made up of such and such wheats, the impurities in which I know to be so and so, which can easily be eliminated by this or that apparatus already in the place.'

"That may be all very well for a year or two, until the particular wheats you depend on are not to be had, then the difficulty comes in. But, without waiting for this difficulty to arise, how often does it not happen that a cheap wheat is offered, which you know would answer your purposes very well, but you are deterred from buying it owing to the impossibility of dealing with the impurities in it with your present imperfect appliances? Get these, then, into the most perfect and complete order that you can, if they have not already been remodelled; and when the alterations are being carried out, see that the arrangement is made with as few complicated, and what are called 'combined,' machines as possible, and that plenty of light and air is admitted all round, and particularly that the wheat leaving every machine is well aspirated. Have neither a fan or a dust collector in your screen house. Let those be placed outside the mill for the greater safety of the property and the reduction of fire insurance rates. After the wheat has been cleaned and sized, and before passing it through the automatic weighing-machines preceding the first-break rolls, I recommend a thoroughly good aspiration, so that no possibility of any dust may remain in it. It a crucial test is required to ascertain if the wheat is really clean, put a handful of it into a tumblerful of clean water, agitate for a few moments, and if the water remains clear you may be satisfied the wheat is fit to mill, but if the water becomes discolored you will understand that the wheat cleaning has been imperfectly done.

"Now that rotary scalping sieves are more generally employed, the first break rolls may be set to break the wheat more severely where they are used to treat the chop than where the ordinary scalping reels perform this work, and yet, although the rolls are set closer together, the quantity of break flour will be found to be less from a sieve than from a reel, the quality of the semolina better, and a larger quantity of the germ detached. With reference to breaks, I consider the number of these might with advantage be reduced from the usual six to five, or, when very dry wheat is handled, to even four. In thus reducing the number of breaks I do not for a moment suggest the idea of reducing the granulated surface; on the contrary, I should recommend that it be increased and extended to rather more than millers now employ for six or seven breaks. If the rolls are employed for granulating, it is advisable to have them as long as the circumstances of the situation will permit, 30 inches to 36 inches are perfectly safe to work with, and these keep cooler generally than shorter rolls. The aim should be to get the wheat or chop spread evenly along the entire length of the rolls, and only permit the feed to be one particle thick at any part of the roller surface, the object being of course to produce the broadest and cleanest bran-flakes, the largest quantity of good bright semolina and a minimum of break-flour. The feed-rolls or other feeding arrangements have a great deal to do with the attainment of this object, and millers will learn something by experimenting with quick-feed rolls in comparison with the ordinary slow-going rolls.

"I have heard millers say that it is unnecessary to employ aspiration on the break-rolls, but with all due respect for their opinion I think it very much needed for several reasons. The point to aspirate from is a good deal governed by circumstances, but where these will allow I certainly think from the top of the machine is the correct place and not from the hopper beneath, or, as may be sometimes seen, from the conveyor, which takes the break-meal to the elevator or the scalper. The heated air, evaporation and light dust naturally ascend, and it is only necessary to provide a means for their escape at the top, aided by slight aspiration, to get rid of these from the roller casing. Millers are all now pretty well convinced, I think, that up to a certain point sieves are better for scalping the break products than ordinary reels. One thing is frequently overlooked, whether sieves or reels are employed, and that is that the semolina and middlings leaving them and going to the purifiers are laden more or less with break-flour. Nothing is more fruitful of loss than this; it is prejudicial, too, to the quality of the bulk of the flour thereafter. First, the loss is considerable, as the moment the material goes on the purifiers, the flour is taken up with the fluffy and fibrous matter from the middlings, and although these fluff and fibers may be returned to the duster, the identity of the flour is lost, it is no longer so good as at the first. Flour in the middlings also causes an obstruction of the meshes of the purifier sieve surface, which hinders the proper working of that machine, while a part of the flour gets down with the middlings to the reduction rolls, becomes darkened in the rolling and prevents the rolls doing good work on the middlings. Some millers may say: We knew all this well enough before, and our technically educated purifier and machine men are quite capable of attending to such minor matters of detail. Granted; but permit me to say there is very constant supervision required, and it is not always found that the smartest milling student at the technical examination proves to be the most attentive man to mind such minor matters. It will repay you occasionally to look into these things for yourselves.

"In some mills centrifugals are employed to dust the middlings, but the most gentle centrifugal has a tendency to break the middlings and sensibly reduce the quality and quantity of the 'patents.' The purification of semolina and middlings is perhaps now receiving more attention than at any previous time in the history of modern milling, and no miller need be at a loss to know where he can get machines to suit his purpose; but let me again impress the fact that unless the wheat has been thoroughly cleaned to begin with, and all impurities extracted, the purification of the semolina and middlings will be unsatisfactory with even the most perfect purifier, but having the semolina and middlings absolutely pure, properly sized and correctly distributed to the reduction-rolls, it will be found that their gradual reduction will be produced with greater facility and ease than under less particular treatment; the power required for reductions will be smaller. The number of the covers may be lowered without detriment to the color of the flour, the flour will be light and granular, and a general clean-up of the offals quickly and perfectly attained. As in the case of the granulating-rolls, with the reduction rolls, the surfaces should be long enough for the distribution of the feed to them to be as thin as possible without leaving any portion uncovered. You will have noticed that I have confined my remarks to roller-milling principally, but it is not unlikely before another decade we may have to write of a different kind of milling. The details will, however, always remain about the same, and it will be to the interest of every miller to see that these are all carefully and strictly carried out at all times in order to insure good work, satisfactory reports of the quality of the flour from customers, a good yield of products and a pleasing and profitable balance-sheet at the finish."

ELECTRIC LIGHT AND INSURANCE.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

THIS is a subject which has been dealt with time innumerable by much abler pens than mine, but is one that cannot be too forcibly brought before the minds of the general public, as well as all insurance men from the office boy to the Chairman of the General Board of Underwriters.

To-day when nearly every new residence is wired for electric light, which is considered as important as putting in gas pipes, and where the wires are concealed behind walls and under floors, in such a manner that they can not be opened up and tested at any time, it behooves the builder to be very careful and cautious how such work is done.

So little is known by the general public about electric light wiring, that it is an easy matter for unprincipled electricians to pull the wool over their eyes. There are numbers of buildings now wired for electric light that I am confident no company will ever operate lights on.

Now, as to the wire, (I am speaking now of incandescent wiring), where the wires are placed in the walls and behind plaster the wire must be perfectly and absolutely moisture proof and thoroughly impervious to the action of wet plaster or dry rot; I have seen specimens of fibrous covered wire taken from the walls of a building after being up only a short time, that have actually had the insulation rotted off the wire. The greatest precaution must be taken against this, and for this class of work nothing but an improved class of rubber insulation should be used.

Then as to the manner of putting up the wires: none but capable men should be allowed to erect wires of any description that have to carry even the smallest quantity of electricity, and no matter how good the quality of the wire used, bad construction will spoil it all. The [illegible] skilled lineman may calculate for, and use too small wire, to either save his employer money, or through ignorance; then what is the result? when the current is turned on the building, the wires, which may have been put in several years previous, will get hot and perhaps destroy the insulation—then the only thing to do is to call in the services of a competent expert and make tests with a galvanometer all over the building, probably tearing up floors, partitions, or whatever conceals the wires. Then again, the cause of the trouble may be so concealed as not to be found until some serious accident occurs, such as a fire.

Insurance companies are not half enough awake to their own interests in allowing electric light to be operated, as they are to-day in some houses and factories. Electric wires properly put in and carefully tested are much safer to have in the house than gas or water pipes, but when the work is done in an inferior manner they are dangerous in the extreme, and can and will be a prolific source of fire, and consequent destruction of property. There should be in every city or town where insurance companies hold risks and where electric light is in operation, a first-class inspection made of all wires by competent electricians. Such inspection should be thorough, and done only by qualified electricians, who will fully realize their importance and responsibility in granting a certificate for the work. Electrical engineers who make these inspections should be thorough in detail also, and should be fully able if necessary to take off their coat and make a first-class job of wiring themselves. The greatest care should be exercised in the selection of such men, and none but first-class electricians and men of actual experience should have the power to grant such a certificate. Until this is done insurance companies may expect to carry some very precarious risks, and pay heavily for them.

There are to-day a number of so-called electrical engineers who have no record, experience, or ability,

consider themselves perfectly capable of making jobs of electric wiring, but who are actually doing some done wiring that is a disgrace to the profession and a standing menace to insurance companies. This is a matter of such vital importance, not only to the insurance company but also to all first-class electric light manufacturers and contractors, that all should be united in raising the standard for wiring as high as possible. Very frequently this poor class of wiring is not confined only to the class of muddlers referred to, but also to good substantial companies. For instance, a company or contractor desirous of figuring on a job of wiring or complete installation, finds he is under-bid by opponents who will guarantee to the purchaser as good a quality of work at a much cheaper rate. Naturally, there being no laws to govern this, the purchaser gives the preference to the lowest tenderer with work guaranteed as equal; but who is capable of judging of the quality of the work when everything is covered up and finished, and no inspection made by a competent electrician? After receiving a few rebuffs and losing several contracts by this means, the contractor desirous of doing good work and holding up the standard, does inferior work himself in order to compete with opposition.

Is it not much better to place any wiring contract in the hands of experienced and trustworthy concerns, who make a business of doing good work only, open to inspection at any time, and who are fully established in the country and not likely to move out at any time and leave the result of their bad work behind? I could mention numerous instances of execrable work done in Canada, but it is not my intention to hurt any one's feelings.

I feel confident that the insurance people will take this matter up at an early date and make the necessary appointments, and I call on all good, substantial and well-intentioned electric concerns who have a stake in this country and a reputation to make or keep up, to support the insurance companies in an undertaking which will help increase their legitimate business and cause a feeling of security to be felt in the minds of the general public.

One word to the general public: First—In letting contracts for wiring of buildings, be sure that the parties to whom you give the contract are responsible and have a stake in the country in the shape of an established business, well equipped factory, and in good financial standing, so that in case of future inspection by some duly authorized electrician, should the work not pass satisfactorily, you would then have a responsible concern to fall back upon. Secondly—See that the work is done as contracted for, and that nothing but the best material is used, especially where the wires are concealed. Thirdly—Be careful and have your contract read so that you can have recourse against the contractors if the work should be defective. Fourthly—Have all your contracts read, "that the wiring must be done strictly to conform to the rules as laid down by the Board of Fire Underwriters of New England." Fifthly—Make your contractors do the work in such a manner that there will be no loss whatever on the circuits, *i. e.*, that all the wires must be large enough in sectional area to safely carry all the lamps or current required without any loss on same, and where the wiring is done so, if you expect current to be supplied from some outside source, either immediately or at some future date, that either storage battery, high or low tension currents can be safely used without loss. In order to do this, the specification should call for large enough wire to carry without loss any current from 50 volts pressure or greater. ... volts pressure is about the lowest electromotive force used by electric light companies.

The alternating systems which are coming into such general use use only this pressure in buildings. Storage batteries use generally from 50 volts upwards, and ordinary ... tension systems use from 75 to 220 volts, so that if your buildings are wired for 110 volts pressure you will be left to the tender mercies of one company operating ...s pressure, but if the wiring is done for 50 volts, it is ...te for any current of greater pressure, and if more than ... company is operating lights in your city and you ...ould not be pleased with the class of light received, you can easily call in the services of some other company.

Since writing the above I learn on good authority that the Board of Fire Underwriters of Montreal have taken up the matter, and henceforth no risks will be carried on buildings wired for electric light until a certificate has been granted by Mr. H. F. Badger, who is a competent electrician and one of the best posted electrical experts in America. I am much pleased with his appointment and trust all other cities will follow suit wherever electric light is used.

Yours truly,

NOTATU DIGNUM.

TRADE NOTES

The Royal Electric Light Co., of Montreal report the following sales: to Sherbrooke, P. Q., one 500 light alternating incandescent plant; Richmond, P. Q., one 15 arc light plant, and 350 alternating incandescent plant complete; the Dominion Paper Co., Kingsley Falls, P. Q., 100 straight incandescent; Dominion Wire Mfg. Co., Lachine, P. Q., 150 lights straight incandescent; Ottawa Electric Light Co., Ottawa, 70 light arc plant and 70 arc lamps, and several other minor plants.

We have received from Messrs. Dick, Ridout & Co., a circular, in which they make this announcement: "Owing to the steady expansion of our business, we have found it necessary to remove our office to our works on Bay street. We shall now be able to give a more personal supervision to our several manufactures, and especially to hurried orders, to see that they are made correctly and shipped with dispatch." We are pleased to note this evidence of development in trade on behalf of one of our most enterprising manufacturing firms.

We have noticed a good deal of discussion in American electrical journals lately, concerning long circuits. They make no mention of the fact that probably the longest circuits in the world are in the city of Quebec. The Quebec & Levis Electric Company operate successfully both arc and incandescent lights from power at the Falls of Montmorency, which are situated some ten miles from the outskirts of the city. One arc circuit is 37 miles long, and at present they are operating incandescent lights furnished from dynamos of the alternating type manufactured by the Royal Electric Co., of Montreal, the lamps being situated over 14 miles from the dynamos, or exceeding 28 miles of circuit. This will be increased very shortly as the plant has only been running a few months. This is believed to be the greatest distance in the world that incandescent lamps are operated from alternating dynamos with transformers. The long arc circuits have been in operation several years.

The Dodge Wood Split Pulley Company, of Toronto, are in receipt of a letter from Mr. R. W. Leonard, chief engineer of the Engineering Department of the Cumberland Railway and Coal Company, Spring Hill, N. S., in which he says: "Your transmission has been working steadily for the past month, raising 300 tons of coal forty feet in ten hours, and turning a revolving coal screen at a distance of 870 feet from the engine. It gives entire satisfaction." Regarding this the Pulley Company say: "This is one of the many satisfactory endorsements which we are receiving from men of high order in mechanics, after having tested the merits of our system for transmitting power. Here we have an illustration of a case where power is wanted at a distance of nearly 900 feet from the engine. Shafts are neither parallel nor in line, and to add to the difficulty four railway tracks intervene. By any other means we think it will be allowed this would appear to be a somewhat difficult as well as expensive undertaking, while as a matter of fact the drive was in operation at the colliery in twenty days from the day we received the order, and that it was satisfactory is proven by the unsolicited letter of approval of Engineer Leonard. We believe that there are numberless cases in the Dominion where fine power continually runs to waste for the simple reason that those who might avail themselves of it do not know how cheaply and simply such power might be conveyed to any distance where required.

COST OF TRANSMITTING ELECTRICAL POWER.*

THIS paper has except incidentally, nothing to do with the pros and cons, the advantage and disadvantages of electrical power transmission, these points having been considered at length in a paper read before this association last April, and to which all interested in such treatment are referred.

In giving any general estimate certain conditions must be assumed, and every item of cost in the estimate is fixed and determined by these conditions. The exact conditions assumed may not be duplicated precisely in any one of a dozen actual installations, and in so far as the conditions vary, the cost will be varied, sometimes but little, sometimes very much.

Tabulated statements are quite likely to mislead if applied to particular cases; they are valuable in a general way and as an aid when one can weigh the value of certain conditions.

There are various systems and modifications of the same available in electrical power transmission, the one most desirable in any particular case being determined largely by the way the power is to be applied.

The items that make up the aggregate cost are about the same for all systems, but may differ greatly in value; and even in the same system of transmission local conditions will influence their value considerably.

The influence of different systems of transmission upon cost is largely due to the relative amount of copper necessary for conductors.

If the power is to be used as a single unit, a system can be employed that will cost much less, for the same distance and the same power transmitted, than if applied in a number of independent units; the per cent. of difference increasing with the distance.

According to the table it costs, exclusive of motors, \$169 18 per horse power to transmit 100-horse power five miles, using a system which will allow of employing an indefinite number of motors entirely independent of each other in location and automatic operation; now, it will serve the purpose just as well to employ this 100-horse power as a single unit, as in the case of an engine or water wheel belted on a jack shaft, the cost per horse power of generators (dynamos) may be reduced from \$62.50 to \$55.55, the cost of wire from \$88.20 per horse power to \$12.40, and the cost of line from \$18 48 to 13.50 or 81.45 total, and 14 less horse power will drive the generators.

At the same time, however, if it is desirable to employ independent units of power, the great advantages offered by electrical transmission and subdivision of power, in flexibility of system, in control, and in economy of power, more than outweigh the difference in cost between the two systems.

If there was a question of transmitting 100-horse power five miles, and customers for the power were assured either for it in a single unit or in a large number of small units, the plant in the former case costing \$8,145,00 (exclusive of motors) and in the latter \$16,918,-00, this investment would yield the larger dividends under ruling prices.

If the transmission and distribution of power electrically is a profitable investment,—as is found to be the case in all large cities at the present time,—why will it not pay the manufacurer, who employs a large aggregate power in small units, scattered over considerable area, as in textile manufacturing, to put an equivalent capital representing electric equipment into his own business, and the resulting dividends into his own pocket? I throw this out for you to consider at your leisure; it is certainly worth investigating. When some responsible company, engaged in the manufacture of electric motors, wakes up to the fact that it only needs a sample plant, employing a considerable aggregate power, to convince manufacturers of the justice of the claims made for the advantages of electrical power transmission, by giving them practical evidence of their genuineness in their own business, such company will make it an object for some one to equip a cotton mill with such a plant.

The first cost of electrical transmission must not be judged by the results attained by ordinary mechanical means, but by its own results, peculiar to itself, and now fully demonstrated in actual practice.

With the ordinary mechanical means employed for the transmission and distribution of power, a large proportion of the total power is wasted in turning idle shafting, belts and loose pulleys, by reason of waste spaces or machines not running. On this account from 30 to 50 per cent. of the power generated in our mills and factories is unremunerative, expended for no earthly good, utterly lost. With a judiciously designed electrical transmission, 90 per cent. of the power developed by the motors ought to be expended in remunerative work; turned into a definite quantity of yarn or wool.

An important point in this connection is, that the actual efficiency in electrical transmission is greater than the theoretical. The size of wire is calculated for a maximum load; this is seldom imposed, and the efficiency increases in the ratio that the load is lessened. For example, if the wire is calculated for a loss of one-horse power with full load, it will lose but one-half horse power with half load.

As the cost of dynamos and motors is reasonably constant under most conditions, the weight of copper necessary has the greatest influence upon the cost. This, for any given power, is dependent upon three factors: distance, which is usually fixed; tension of the current, which allows a considerable latitude for choice; and the loss allowed on the wire, which may be from five per cent. upward, according to circumstances. With latitude for choice, the most economical loss can be readily determined in any particular case. According to Kapp, "To do this we must know the annual cost of an electric horse power, inclusive of interest and deprecation on the building (power house), prime mover and dynamo; we must know what is the cost of laying one additional ton of copper, and we must settle in our mind what interest and deprecation shall be charged to the line."

* Abstract from a Paper read by W. S. Kelley, Lowel, Mass., before the New England Cotton Manufacturers' Association, Boston, Oct. 30, 1889.

Messrs. Perley & Pattee, of Ottawa, are introducing into their lumbering operations a steam logger, 28 feet long, weighing 12 tons, and capacity to draw as many as 30,000 or 40,000 feet of logs.

The partnership existing between Isaac Hoffman, Mathias Wegenast, and Adam Klippert, of Listowel, Ont., as cabinet makers, saw millers, and door and sash makers under the name of Hoffman, Wegenast, & Co., has been dissolved. The business will be carried on in future by Messrs. Wegenast and Klippert.

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		27 00
1¼ and thicker, pickings, Am ins		25 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	15 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	24 00	25 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
1¼ inch flooring	14 00	15 00
1½ inch flooring	14 00	15 00
XXX shingles, sawn	$2 20	@2 25
XX shingles, sawn	1 20	1 25
Eastlake galvanized steel shingle W. G., per square		4 25
Eastlake galvanized steel shingles, 26 W. G., per square		5 00
Eastlake painted steel shingles, per sq.		4 00
Eastlake painted steel siding, per sq.		3 50
Manitoba galvanized steel siding, per square		4 50
Manitoba painted steel siding, per sq.		3 50
Special galvanized steel siding, per sq		4 50
Special painted steel siding, per sq.		3 50
Imitation brick siding, per square		3 50

YARD QUOTATIONS.

Mill cull boards and scantling		10 00
Shipping cull boards, premissions 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
" " " 22 "	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		28 00
" " 34 ft		28 00
" " 36 ft		30 00
" " 38 ft		32 00
" " 40 to 44 ft		35 00
Cutting up planks, 1¼ and thicker, dry	25 00	26 00
" " board,	18 00	22 00
Dressing stocks	16 00	22 00
Picks, American inspection		40 00
Three uppers, American inspection		30 00
Cedar for block paving, per cord		5 00
Cedar for Kerbing, 4 x 14, per M		14 00

B. M.

1¾ inch flooring, dressed, F. M.	28 00	32 00
1½ inch flooring rough, B. M.	18 00	24 00
1¼ " dressed, F. M.	25 00	28 00
" undressed, B. M.	18 00	19 00
" dressed	18 00	22 00
" undressed	12 00	15 00
Beaded sheeting, dressed	22 00	25 00
Clapboarding, dressed		12 00
XXX sawn shingles, per M, 16 in	2 65	2 75
Sawn lath	2 00	2 20
Red oak	35 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	30 00	30 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M	$14 00	@18 00
Birch, 1 to 4 inch, M	15 00	25 00
Basswood	12 00	20 00
Walnut, per M	60 00	100 00
Butternut, per M	22 00	40 00
Cedar, flat	00 00	00 00
Cherry, per M	60 00	80 00
Elm, Soft, M	15 00	17 00
Elm, Rock	25 00	30 00
Maple, hard, M	20 00	25 00
Maple, Soft	17 00	18 00
Oak, M	40 00	55 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	11 00
Lath, M	1 50	1 55
Spruce, 1 to 2 inch, M	10 00	12 00
Spruce Culls	4 50	6 00
Shingles, 1st quality	2 00	2 50
" 2nd "	1 25	1 50

Cement, etc.

Portland Cement, per barrel	$ 2 50	@ 2 75
Roman " "	2 50	2 85
Fire Bricks, per M	20 00	27 50

NEW YORK PRICES

WHITE PINE.

Uppers	$46 00	@72 00
Selects	40 00	52 00
Fine common	35 00	45 00
Cutting up	31 00	39 00
Common	17 00	25 00
Norway	19 50	26 50
Pickets	14 00	23 00
Shippers, according to quality, for different ports	17 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	34 00	37 00
Bevel siding	16 00	23 00
Bridge timber	28 00	50 00

EASTERN SPRUCE.

9 to 12 in	16 50	17 00
8 to 12 in	16 00	16 50
7 to 12 in	15 00	16 00
6 to 9 in	14 50	15 00
Special lengths	16 50	18 00
Lath	2 15	2 20
Piling, per lineal feet	05	06

SHINGLES.

Pine, 16 in., extra	$ 3 10	@ 3 25
18 in. extra	4 35	4 50
18 in. clear butts	3 15	3 25
16 & 18 in. stocks	4 50	5 30
Cedar	8 75	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, ¾in	23 00	24 00
No 1 ceiling, ¾in	25 00	26 00
No. 1 ceiling, ½in	18 00	19 00
Timber	14 00	15 00

ALBANY, N. Y. PRICES.

SHINGLES AND LATH.

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

HEMLOCK.

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

PINE.

2½ in. and up, good	54 00	56 00
4ths	49 00	51 00
Selects	44 00	46 00
Pickings	39 00	41 00
1¼ to 2 in., good	45 00	50 00
4ths	43 00	45 00
Selects	40 00	40 00
Pickings	33 00	35 00
1 in., good	50 00	55 00
4ths	45 00	48 00
Select	40 00	43 00
Pickings	35 00	38 00
Cutting up, 1 to 2 in	25 00	28 00
Bracket plank	32 00	36 00
Shelving boards, 12 in. and up	26 00	32 00
Dressing bds., narrow	25 00	22 00
Shipping boards	16 50	18 00
Box boards	14 00	16 00
10 in. boards and better	28 00	34 00
Common	15 00	20 00
12 in. boards dressing and better	29 00	36 00
Common	15 00	22 00
1¼ in. siding selected 13 ft.	40 00	45 00
Common	15 00	20 00
1½ in. siding selected	43 00	46 00
Common	14 00	19 00
Norway, selected	22 00	25 00
Common	12 00	16 00
10 in. p. k. 13 ft. dressing and better, each	45	50
Culls	23	25
10 in. boards, 13 ft., dress, and better each	28	33
Culls	17	22

BUFFALO AND TONAWANDA PRICES.

NORWAY PINE—ROUGH.

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

WHITE PINE—ROUGH.

Uppers, 1 and 1¼ in	42 00	44 00
1½ and 2 in	43 00	45 00
2½, 3 and 4 in	52 00	55 00
Selects, 1 inch	36 00	37 00
1¼, 1½ and 2 in	34 00	35 00
2½, 3 and 4 inch	44 00	46 00

The City Engineer of Winnipeg has submitted to the Governor-in-Council, plans for the construction of works on the Assiniboine river at Winnipeg to utilize the water power of the stream.

The vast increase during the past few years in the uses to which rubber can be put, is causing that commodity to cut a very important figure in various trades—notably that of electrical apparatus.

The Gravenhurst *Banner* furnishes the following facts about lumber cut by the mills in the neighborhood of that excellent town. Thomson & Baker, at J. Chowe's mill, West Gravenhurst, 3,000,000 feet, 2,000,000 at Bank mill, 3,000,000 at Heath, Lait & Turnbull's mill, Huntsville, also 5,000,000 shingles at Thomas Baker's mill, Gravenhurst, and 8,000,000 at H. L. & L.'s mill, Huntsville, 1,250,000 at the Bank mill, and 2,000,000 lath, Isaac Cockburn 4,750,000 feet of lumber, 100,000 lath, 2,250,000 shingles, Mickle, Dement & Son—the old mill was run 31 days and then burned down—cut 2,200,000 feet of lumber, 814,000 lath and 3,800,000 shingles, new mill 6,300,000 feet of lumber and 1,300,000 lath, No. 3 mill 4,000,000 feet of lumber, 1,500,000 lath. In addition to these about 3,000,000 feet of lumber was cut at Clarke's mill, Windermere, also shingles at Bracebridge.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Hot Water Heating Apparatus, Brampton, Ont.," will be received until Wednesday, 18th December next, for the construction of a Hot Water Heating Apparatus at the Brampton, Ont., Post Office Building.

Plans and specifications can be seen and form of tender and all necessary information obtained at this Department and at the Clerk of Works Office, Brampton, Ont., after Wednesday, 4th December next.

Persons tendering are notified that tenders will not be considered unless made on the printed form supplied, and signed with their actual signatures.

Each tender must be accompanied by an *accepted* bank cheque made payable to the order of the Honorable the Minister of Public Works, *equal to five per cent.* of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order, A. GOBEIL, *Secretary.*

Department of Public Works,
Ottawa, 8th Nov., 1889.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Vault," will be received until Thursday, the 5th day of December, inclusive, for the construction of an Iron and Steel Vault in the Eastern Departmental Building, Ottawa, according to a specification to be seen at the Department of Public Works, Ottawa.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to *five per cent. amount of tender*, must accompany each tender. The cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 14th Nov., 1889.

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