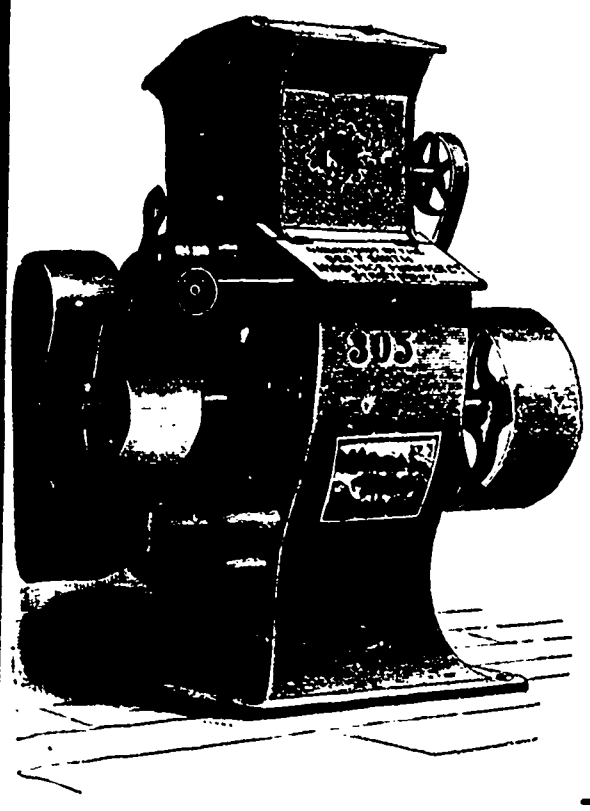
The Geo. T. Smith Middlings Purifier Co.



Office of Campbell, Stevens & Co.,
Chatham, Ont., May 15th, 1890.

S. S. HEYWOOD, ESQ.,
Manager Geo. T. Smith M. P. Co., Stratford, Ont.

Dear Sir: I went down to Aylmer Roller Mill, Stevens & Sinclair, as promised, to start up the Three Roll Chop Mill made by you. That Chop Mill was a surprise all round. After getting chop mill in place with spouting to and from, the mill was shut down to put drive pulley on main shaft. Belt to drive it with had not arrived. I found an old three-inch belt, patched it up a little, and put it on, put the feed in and away it went, working on barley and corn at the rate of 15 to 20 bushels an hour, and it was running over an hour before the engineer knew it was running, then he came upstairs and saw it or I do not think he would have known the difference. They got the belt that night, and now are troubled with hard work, taking chop away and keeping spout clear.

Yours truly,

J. R. WALKER,
Head Miller.

St. Louis Hotel, Quebec, 5th February, 1889.

S. S. HEYWOOD, Esq.,
Manager Geo. T. Smith M. P. Co., Stratford, Ont.

Dear Sir: I am favored with your letter of the 1st instant, forwarded to me here, and have to thank you for the liberal spirit in which you have met my suggestions. I enclose check for $500, in full of balance of your account, accepting with thanks your proposal to this effect.

Sincerely yours,

A. CROSS.

P. S. Should have stated that I consider you have acted with great fairness and liberality in your endeavors to have the machinery made complete and satisfactory, and should I be in the position of having another like undertaking, I should be pleased to have it in your hands.

A. C.

River Beaudette, Que., Feb. 7th, 1890.

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

Dear Sir: Yours of the 4th inst. at hand. In answer would say the short system mill (two breaks) you built and started for us about thirteen months ago is running splendidly, our custom continually increasing. The contract was for a 50 barrel mill. We often exceed that quantity, using much less power than when we used stones to do same amount of work. The millwright work was done in a satisfactory manner, machines run well, and no trouble with machinery. I have no hesitation in recommending your mills to the public.

Yours truly,

WM. BRODIE.

The above letter from the Hon. Judge Cross, of Montreal, deserves a word of explanation, the circumstances under which it was written being perhaps without parallel in the history of mill building. Our contract for the mill at River Beaudette, of which Mr. Brodie is tenant, was with the Hon. Judge Cross, who owns it. After machinery had arrived at mill and millwright had commenced work, the mill building was levelled to the ground by a cyclone. The machinery was, of course, more or less damaged, and considerable extra expense of millwright work incurred, and it was the adjustment of this account to which the Judge so pleasantly refers.

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

SECOND-HAND MACHINERY FOR SALE.

1 No. 2 Smutter, manufactured by W. & J. G. Greey,	$ 50
1 No. 2 Smutter, manufactured by Howes & Babcock,	70
1 Run Chop Stones, against sun, four feet six inches,	60
1 Four Break Machine, 16 in. x 20 in., Goldie & McCulloch,	250
7 Garden City Purifiers, each	50
6 Barter Purifiers, each	100
2 Jones Iron Rolls for breaks, each	30
1 Single 12 x 24 Roller Mill, Gear Drive, manufactured by Goldie & McCulloch,	100
1 Double 9 x 18 Roller Mill, Gear Drive, Barter,	200
1 Double 9 x 18 Roller Mill, Gear Drive, Goldie & McCulloch,	175
1 4-break Machine, rolls 6 in. x 16 in., Goldie & McCulloch,	200
1 Slide Valve Engine Cylinder, 10" x 14" manufactured by Corbett & Sons, Tubular Boiler, 42" x 10', 47 3" tubes and all connections, Stack 60' x 20", necessary guy wires, pump and heater,	800
3 Run of Stones, all attachments, each	100
1 3 Becker Brush, manufactured by Goldie & McCulloch	50
1 Double 9x11 Style B Roller Mill, E. P. Allis & Co.	175

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

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

Cyclone Dust Collector.

THE GEO. T. SMITH MIDDLINGS PURIFIER CO.

STRATFORD, ONT.

Electrical Mechanical and Milling News

Vol. XIV.—No. IV. TORONTO AND MONTREAL, CANADA, JUNE, 1890. { Price, 10 Cents / $1.00 Per Year

ELECTRICAL,

Mechanical and Milling News,

PUBLISHED ON THE FIRST OF EACH MONTH BY

CHAS. H. MORTIMER,

Office, 14 King Street West,

TORONTO, - - CANADA.

Temple Building, Montreal.

ADVERTISEMENTS.

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

Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach this office as early as the 15th day of the month.

SUBSCRIPTIONS.

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

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

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

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

EDITOR'S ANNOUNCEMENTS.

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

OUR MONTREAL OFFICE.

In order to further extend the influence of this Journal, keep *en rapport* with everything of interest pertaining to the particular industries of which it is the representative within the Dominion, and serve in the most effectual way the interests of our subscribers and advertisers, we have established a permanent office in the City of Montreal. It is located in the Temple Buildings on St. James street, and being in the heart of the business portion of the city, is convenient of access. We shall be glad to welcome there old acquaintances as well as any new ones. All enquiries relating to the editorial or business departments of the paper, presented personally or by letter at our Montreal office, will receive prompt attention.

THE people of Newfoundland are seeking to obtain the sympathy and moral support of Canada in their difficulty with regard to the treaty rights of the French fishermen. The delegates who recently laid the case of Newfoundland before the commercial organizations of Canada, very properly received assurances in the direction indicated. Canada would do well, however, not to let sympathy go the length of inviting Newfoundland to enter the Dominion. It is not long since the people of the Colony were said to be averse to becoming a part of the confederation, but there are indications that she would now be willing to come in, if by so doing she could rid herself of her present difficulty. In addition to the fact that Newfoundland, apart from her fisheries, is an unproductive country, Canada already has quite enough territory and national problems enough to consider without adding thereto. Let the energies of Canadians be devoted to the development of their present possessions.

THE demand for electric lighting apparatus on the part of Canadian town and city municipalities has been to a large extent supplied, and the manufacturers of electric plant are beginning to turn their attention to other fields. The part which electricity is destined to play in the manufacturing world is fully understood, and the last few weeks have witnessed the formation of several electric power companies. Within a very few years at the most, electric power will be used for an almost infinite variety of purposes in the industrial establishments of this country. There remains also a wide field for the introduction of the electric light in our mills and factories.

THE people of the West Indies will take a practical step towards the development of trade between that country and the Dominion of Canada by sending an exhibit of their products to the Toronto Industrial Exhibition next September. Our manufacturers should not forget the exhibition to be held in the city of Jamaica in January, 1891. They will be serving their own interests as well as those of the country at large by sending suitable exhibits there. In this connection it may be mentioned that exhibitors at this exhibition are not required to pay any rent for the space they occupy, and 100 horse power is provided free of charge. If water, gas or steam is required, for showing machinery in motion or for other purposes, the rate of speed required must be made known. Exhibitors must provide their own countershafting, pulleys, and steam-pipe connections.

OUR Montreal contemporary, the *Insurance Chronicle*, refers to an instance in which it is alleged that hose hung on the wall of a public institution for fire protection purposes, burst in a dozen places when it was sought to be used for sprinkling the lawn, and the manufacturers on being asked for an explanation, coolly replied that this quality was simply an ornamental article made to hang up in factories to satisfy insurance requirements. Our contemporary expresses the opinion that "this is about the kind of security belonging to more than half the fire extinguishing appliances found in factories and public institutions." We should regret to believe that so far as factories are concerned the condition of things is as bad as represented. That too much carelessness obtains with respect to providing and maintaining efficient apparatus for fighting fire, is beyond question. If the insurance companies were in the habit of insuring property beyond its value, or even to the extent of its value, the owners of mills and factories might in some instances rest content with a pretence of satisfying insurance requirements. Seeing that at least one-third of the loss in case their premises are destroyed must fall upon their own shoulders, the condition of their fire-extinguishing appliances should never be to them a matter of doubt.

THE Committee appointed by the Legislature of the State of New York to investigate the dangers of electricity, has presented its report. After having examined a large number of persons occupying prominent positions in the electrical field, the Committee arrives at the conclusion that it is not possible for the Legislature to form satisfactory rules and regulations for an industry which is not only highly technical, but constantly developing and presenting new conditions, rendering rules proper this year possibly obsolete next year. There should, however, be some form of supervision by properly qualified State or local authorities over the commercial use of electricity, analagous to the supervision now exercised over steam boilers. Regulations should be framed with competent expert advice and entrusted to authorities who have power to modify them so as to meet the changing conditions which the rapid growth of the industry constantly brings about. There are two questions upon which the Legislature might properly act by providing: First, that no electric light or power current of over 250 volts pressure be allowed to enter any building; second, that after, say Jan. 1, 1892, no overhead conductors carrying currents for lighting or power purposes be allowed in any city of the State having a population of 125,000 persons or over, and that the local authorities in the various cities coming under this description, in the absence of any State authority, be empowered and directed to make proper provision for the burial of such wires. The Committee make the important statement that most of the sixteen persons killed by electricity in New York City were employees of electric companies; in the majority of cases death resulted from contact with continuous currents used for arc lighting, the primary cause of the fatalities having been due to carelessness on the part of the electric companies in using poorly insulated or badly arranged conductors, and in neglecting other precautions required for safety.

THE question is frequently asked, "Has the time gone by when wheat can be regarded as intrinsically worth one dollar per bushel?" This is not intended to apply to a time of scarcity from bad crops or other causes, but to times when there is a fair average crop on this continent. We are of the opinion that in the not distant future wheat will again be worth a dollar a bushel. The reasons for this belief are not wanting. Recent low prices of 70 to 80 cents per bushel are the result of world-wide overproduction. The idea that wheat was the money-making crop, led the farmer to turn his attention too much to the raising of that cereal, as more recently the farmers of some Ontario counties have done with barley. After years of low prices for wheat, rendering its production unremunerative, necessity compelled our farmers to turn their attention to other branches of agricultural industry. Out of that necessity has come our great cheese, fat cattle, peas and barley productions. Notwithstanding the largely increased land areas placed under cultivation during recent years in the Canadian Northwest as well as in the Northwestern States of the neighboring Republic, the total wheat acreage on this continent is not increasing in proportion to the population. This fact will have a significant bearing upon future prices. We are aware that India and other countries which a few years ago cut no figure in the world's markets, are now our competitors for breadstuff orders in Great Britain. It should not be forgotten, however, that this competition began when the equivalent here of wheat prices in the British markets, was upwards of $1 per bushel. It is now admitted that with English wheat 30 to 32 shillings per quarter (90 to 96 cents per bushel in England) wheat growing in India can not be made remunerative. In Great Britain the wheat acreage is decreasing, and as we have said, on the continent of America the increase of acreage is not keeping pace with the increase of population. In view of all these circumstances, the presumption is reasonable that the law of supply and demand will in the near future tend to increase the price of wheat. These, however, are not the only causes operating to bring about this result. The depression in trade in Great Britain during the former part of the last decade, by which millions of artisans were put upon part time, undoubtedly reduced to a considerable extent the consumption of bread per capita. Now that an improvement in trade has set in, consumption will go up again. It is not a truism that cheapness in price always means increased consumption. As an illustration of this, a poor man once said to the

writer, "Of what benefit is it to me that flour is selling retail at $4 per barrel, when I have not got the $4 to pay for it. As a rule better times mean increased consumption, even though prices should again go up to the coveted dollar a bushel. Roller flour is another item, unknown a few years ago, tending to increase consumption. Seven years ago the world was mostly fed upon flour, a barrel of which was made from 260 lbs. of standard wheat. The introduction of roller flour has, however, so changed the tastes of the people, that even the farmers themselves now demand a quality of flour that takes 8 per cent., or 22 lbs. more wheat per barrel to make. There is no reason to believe that any family will on this account, eat 8 per cent. less bread than *heretofore, as the quality is so much superior.* Taking into consideration the changed circumstances mentioned, we repeat that the probabilities are that the average price of wheat in the present decade will be considerably higher than in the decade just past.

SIXTY-THREE varieties of wheat are reported to have been sown on the Brandon Experimental Farm this year. It should be possible to obtain from such a diversity of samples a variety capable of evading the injurious pranks of diversified climatic conditions.

IT seems altogether probable that the United States is about to take steps to cripple the two Canadian transcontinental railways in their competition for through traffic with U. S. roads. The Senate committee on Interstate Commerce has presented its report, in which it is recommended that so long as the entrance fee of 50c. and clearance fee of 50c., or $1 every time an American vessel visits a Canadian port on the great lakes or their tributaries, is demanded, all Canadian vessels be required to pay like fees in the ports of the United States; that so long as the discrimination in tolls of 18c. per ton on products of the United States in favor of Montreal or ports below that city on the St. Lawrence river is made by the Dominion Government, a discriminating toll on the tonnage of Canadian vessels should be imposed upon all such vessels every time they pass through the Sault Ste. Marie canal, and that either such a license system shall be established as will be applicable to the Canadian railroads doing business in the United States, or that some other plan, not injurious to the general trade and commerce of the country, be adopted which shall secure to American railroads an equal chance of competing with Canadian railroads. We are not of course so unpatriotic as to desire to see Canadian railroads deprived of any of the traffic which they have succeeded in securing. At the same time we are not insensible to the fact that in their efforts to secure this traffic the Grand Trunk and C. P. R. have dealt most unjustly with Canadian shippers, by charging them higher freights than were being paid by American shippers, and neglecting to furnish them with the number of cars required and at the time required. In fact, American shippers have received every consideration, while Canadian shippers have received none. Whatever therefore may be the consequences to the Canadian roads of the repressive measures which the United States Government is asked to adopt, the interests of Canadian shippers will not unlikely receive benefit therefrom.

A BILL designed to regulate the method of assessing machinery in mills and factories, for taxation purposes, has passed its second reading in the British Parliament. It provides that with the exception of gasworks where the plant is necessarily part of the premises the only element to be taken into consideration in estimating the rating liability of any factory or workshop shall be its motive power, with the fixed appurtenances, such as shafts, wheels and drums, for the transmission of such motive power. On the other hand, it is expressly stated that no machinery, whether attached to the tenement or premises, or not, shall be considered in estimating the rateable value of any tenement or premises occupied for any trade, business or manufacturing purposes. This measure is evidently very much required, in view of the statement of Sir William Houldsworth, seconder of the Bill, that the difference in the rating of manufacturers' plants as between certain parishes, was as 5 to 1. The London *Miller*, referring to the effect of this lack of uniformity in methods of assessing machinery, says: "As a matter of fact, manufacturers no longer to use a popular but expressive phrase 'know where they are,' and are utterly unable to make those calculations as to the cost of their production which are indispensable to their business. How can a manufacturer make large plans for the extension of his works, if he is uncertain as to the incidence of one of the most important charges to which he is subject? Of the utter capriciousness of the present system of rating, an excellent example will be found in the case of a well-known flour miller, who owns two large and well-fitted mills not many miles apart, and who is assessed on the whole plant of the one, while only rated on the fixtures of the other." The method of assessment in Canada is, we believe, uniform throughout each province, however it may vary as between different provinces. In Ontario, which doubtless may be taken as an example of the most liberal legislation yet adopted on the subject, the practice is to assess all machinery to the full value of the manufacturer's interest therein as personal property. Should there be claims against the property, the amount of such claims is deducted from the assessment. The statute empowers municipalities *at their discretion to remit the taxes on any machinery* used for the purpose of manufacturing an article not previously made within the bounds of such municipality. It will thus be seen that hereafter, or so long as present practice obtains, Canadian machinery users will receive less liberal treatment than is provided for their British contemporaries under the Bill to which we have referred.

THE condition of business throughout Canada during the past six months has been too stagnant to be satisfactory, and little improvement is looked for until the new harvest is gathered. The feeling prevails that a bountiful harvest such as has not been experienced for several years, is required to counteract the influences which have obtained tending to depress trade, and cause the wheels of commerce and industry to revolve with accelerated motion. In view of the prevailing condition of affairs as outlined above, it is with regret we observe that the spring bulletin of the Ontario Bureau of Industries regarding crop prospects, is far from encouraging to those who have been looking forward to a harvest more than usually plentiful. Respecting wheat conditions throughout the province the bulletin speaks as follows: "Fall wheat presents a very uneven condition. Some fields are exceptionally fine and others unusually *poor in appearance in the same township and even on* the same farm, according to the soil, cultivation and physical aspect of the country. Hence it is extremely difficult to make an accurate report upon the outlook of the crop. Throughout the west seeding was driven late into the fall on account of the drouth, and the acreage was somewhat reduced thereby. When winter set in the crop had hardly made sufficient headway to stand the alternate freezing and thawing of the mild winter which followed, with insufficient snow to protect the young plants. On this account the crop suffered more or less from winter killing, and in the extreme west it is very uneven and poor. Considering all these unfavorable conditions, however, the crop may in other portions of the province be said to have wintered better than was expected, as seen in Huron, Bruce, Brant, and some other counties, but the night frosts and cold, dry northerly winds and rains, commencing in February and continuing late into the spring, played havoc with the crop and greatly reduced its vitality and retarded its growth. On low, loamy soils the condition of the crop is very unpromising on account of the frost's action, being patchy and delicate, but on light, rich loams, where well underdrained, and especially where protected by bush or the lay of the land, and where the crop was got in early and *the land well prepared, it generally presents a very fine* appearance. This is particularly the case in Norfolk, Welland, Huron, Brant and some other counties, while the worst reports come from Essex, Kent, Lambton, Lincoln and Halton. In these latter counties, Lambton and Essex especially, it is probable that a considerable portion of the wheat land will be plowed up and seeded anew. Many farmers are harrowing spring wheat into the bare patches amongst the fall wheat. Little or no damage is reported from worms or insects of any kind. The recent rains appear to have improved the outlook, although the crop is still backward, and with a favorable season there is reason to anticipate a fair although not a large harvest. Correspondents exhibit a remarkable unanimity in their statements regarding the small amount of wheat in the hands of farmers."

MONTREAL, 7th May, 1890.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

DEAR SIR, We notice in your May issue an item purposing to give the present duties exacted by Custon House on electrical goods. It is well to point your attention to its incompleteness in the omission of the following: Copper wire, 15 *ad valorem;* covered wires, for electric purposes, other than cables, 35 *ad valorem.*

The first is new, the second an addition of 10 to the old tariff.

Yours respectfully,

J. ROSS, SON & Co.

THE CHANTELOUP ESTATE.

MONTREAL, 6th May, 1890.

Editor ELECTRICAL, MECHANICAL AND MILLING NEWS.

REFERRING to an item on page 3 of your May issue, said to be an extract from the *American Machinist* respecting the will of the late F. Chanteloup, manufacturer, of this city, I think it would be well to correct the erroneous statements that have appeared in the above paper as well as in the press generally, concerning the disposition of the estate.

1st. The estate, at its utmost, is not half a million, but a quarter of a million.

2nd. The estate was not divided amongst his employees. It is true that he left three or four of his chief men about $2,000 each, and to subordinates, sums ranging from $500 to $50 the whole probably not exceeding $15,000.

3rd. The residue was left to a niece, daughter of his brother, at the time of the death living in France whom he had lost sight of for 16 years.

4th. The heiress, accompanied by her husband is now in Montreal with proofs of her identity, and will take possession after the legal formalities are completed.

The matter itself is not very important to the commercial world, apart from the wild inferences drawn from the supposed facts, but I have seen this so often in the papers that when I saw you circulating it too, I thought it might do good to inform you of the real facts.

I am, yours respectfully,

J. Ross.

REPAIRING LEFFEL WATER-WHEELS.

A CORRESPONDENT writes us as follows: Thousands of these water wheels have been in use in Canada for periods ranging from fifteen to twenty years, and are getting shaky and being replaced. To a miller doing a small business, the replacing of one of these wheels means an expense which at present he can ill afford. The writer, in using these wheels for seventeen years past, has ascertained the three weak points at which they first give out.

First, the stuffing box casting becomes shaky and will not hold the neck of the wheel firm. In one instance the casting broke. To send away and get a new one, supposed a week's idleness. My remedy was, to break off the whole top of the casting, plumb the wheel, tie a piece of thick brown paper around the neck that comes up through the casting, plug with putty to a depth of about two inches around the neck, and then fill in with Babbit metal the space two inches deep around wheel, doing away with gluts altogether. The wheel ran as good as new.

Second, the step wears down letting the wheel partly down into the circle nozzle of wheel. My remedy for this is to turn the wheel on its side, push it up to its proper place, then push up spider till the lignum vitæ step is tight to slip of wheel again, boring new holes through the casting to receive the set screws. In order not to weaken the casting it is better to turn the spider around into a new place. If there should be a piece of casting on end of spider's arms, hindering it from going up, take a cold chisel and cut them off.

Third, a wheel sometimes appears to its wonted powers. At full gate it seems not to have more than three-quarter power. As a rule this comes from the small pins in quadrant becoming worn and only holding gate three-quarters open. To remedy this take off your quadrant and go to the nearest blacksmith who, in half an hour will punch out the old, worn pins, and put in their place new steel pins, and your wheel will then have full power again.

Mr. James Greenless, of Alliston, Ont., has purchased the Cremore saw mill from James Jerrett.

Messrs. Ludlam & Co., of Windsor, Ont., will erect a planing mill and establish a lumber yard at Comber.

The Beck Manufacturing Co., of Penetanguishene, is rebuilding the burner at the big mill, and fitting up ready for the season's cutting.

Messrs. Frances Bros., of Pakenham, Ont., have sold to Messrs. Saxe Bros., of Albany, N. Y., the White Fish Lake Indian reserve for $100,000.

Mr. Brimacombe's steam saw mill near Tyrone, Ont., has been destroyed by fire for the third time. The origin of the fire is unknown, and the loss will be heavy as there was no insurance.

A saw mill 122 feet long, is said to have been invented to be exhibited at the World's Fair which will cut up a log into boards and deliver them at the other end of the mill in thirty seconds from the time the log comes into the mill. The inventor has taken out patents for United States, Canada and England.

THE BALL E. L. COMPANY'S NEW PREMISES.

THE accompanying illustration represents the new factory and offices of the Ball Electric Light Company, at No. 70 Pearl St., Toronto. The difficult task of removal and getting things into working shape again, has been successfully overcome, and business in the new and larger premises is in full running order.

The first floor is used for heavy machine work, the construction of dynamos, motor and power generators, and for the final assembling and testing of same. Two engines are in operation; one drives the shafting and machinery, the other is used for testing purposes. Accommodation is provided on this floor for the accountants, order and shipping clerks.

The general offices and sample rooms as well as the packing and shipping rooms are located on the second floor. This floor is also largely occupied by the lamp department. Switchboards, cut-outs, instruments and various other accessories to arc and incandescent lighting are constructed on this floor.

The third floor is occupied by the armature and magnet winding department. The company have under consideration placing here wire covering machinery to meet their own requirements.

A number of new tools have been added to the manufacturing plant. A testing room and laboratory has also been fitted up. The whole arrangement of the factory is such as will facilitate the construction of the company's apparatus.

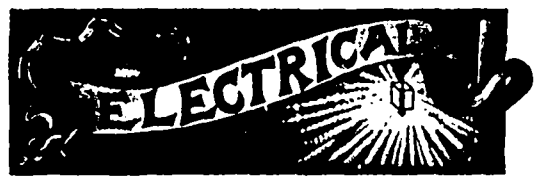
They report that the demand for their 4-ampere or 1,000 candle power arc apparatus is still on the increase, and that during the past year they have installed (including those now under construction), their 4-ampere system in twenty towns varying in population from 1,000 to 3,000, mostly in Ontario, and that most of them would have gone without electric light for at least some years, were it not for the fact that the introduction of the Ball economy arc lighting system has enabled the low rental of from 15 to 20 cents per night to be charged for a brilliant, steady and noiseless arc light, and still enable the purchaser of the apparatus to make a plant in size anywhere from 25 lights upwards, a paying investment, when used either for street or commercial lighting. So far it seems that the Ball Company have the field in this system of lighting exclusively to themselves, both in Canada and the United States, no other machine having yet been constructed to operate a 4-ampere arc light.

The Ball company have also perfected an automatic regulator for their arc dynamos. This regulator can be applied to any of the dynamos constructed by the company without bringing them to the factory, and is claimed to be no infringement on any existing patents. The company do not claim that a regulator is necessary for any of their arc machines, but it is desirable where incandescent lamps are operated on arc circuits to prevent an excessive current from injuring the life of the lamp. It is also a convenience when used on arc machines for factory lighting, where a large number of lamps are liable to be turned on or off at once.

FEEDING WATER TO STEAM BOILERS.

AN eminent foreign engineer expresses an opinion decidedly adverse to the ordinary method of feeding steam boilers in the coldest part, or most remote from the furnace. The boiler sheet has always about the same temperature as that of the water in contact with it, and the feed should not be introduced in such a manner that the hot and the cold water rest in strata; for in this case the plates in contact with the feed water, which goes to the bottom by reason of its greatest density, will have at times a much lower temperature than the rest of the boiler, and, on this account, there must result a different amount of expansion between the upper and lower sheets, this tending either to open the riveted joints or to produce corrosion and rapid deterioration of the boiler. The conclusion is, therefore, that the feed water should be mixed at once with the heated water in the boiler, thus preventing the former from sinking in a mass to the bottom of the boiler, and remaining there for some time at a comparatively low temperature. It has also been advised that the end of the feed pipe be so curved as to discharge into a small vessel placed in the steam space, from the edges of which vessel the water flows gently in minute quantities. Other engineers feed in the steam space, discharging into a long pipe, where a large portion of the impurities are retained, the water suddenly heated to a high point precipitates its impurities.

It is reported that the Bell Telephone Co. have contracted for the construction of a double copper telephone line connecting Ottawa, Montreal and Toronto, at a cost of $35,000.



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

The town of Cottrook, Que., has the question of adopting the electric light under consideration.

The new electric street railway line in North Toronto will go into operation almost immediately.

The managers of the Whitby Ladies' College have decided to light the entire building by electricity.

The village of Markham, Ont., has passed a by-law appropriating $2,000 for electric light purposes.

The Ball Company started in operation last month new plants in the towns of Kincardine and Durham, Ont.

The National Electric Tramway Co., of Victoria, B. C., will extend its line to Esquimault, at a cost of $85,000.

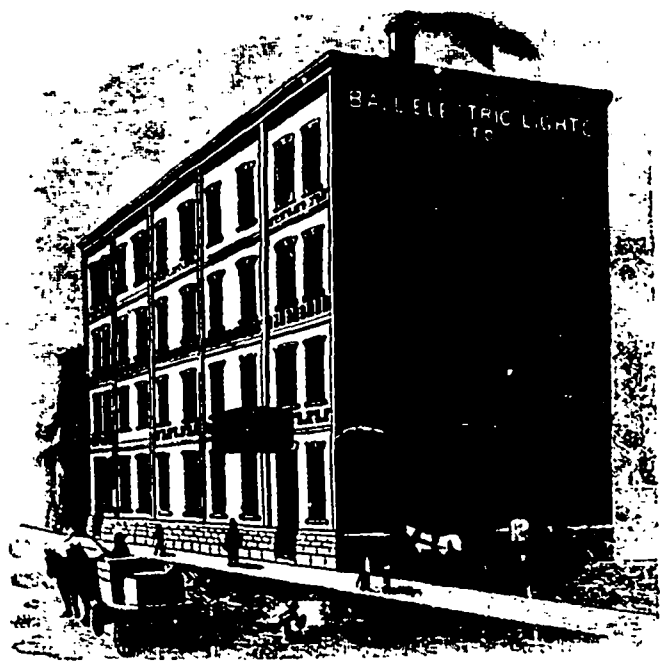
The Royal Electric Co. have recently installed an electric plant in Messrs. Ira Gould & Son's flouring mills at Montreal.

A 300 light incandescent electric plant has been placed in the Vaudreuil Hotel, near Montreal, by the Royal Electric Co.

A display of electrical apparatus is to be one of the prominent features of the Western Fair at London, Ont., in September.

The Halifax Illuminating and Motor Co. has purchased from the Royal Electric Co., of Montreal, a 100 arc light electric plant.

The Fort Wayne Electric Company, through their agent, Mr. T. Cooper, have just closed a contract with the St. Thomas Electric Light and Power Co., Ltd., for a 1,500 light incandescent plant of the Sluttery induction system.



NEW PREMISES OF THE BALL ELECTRIC LIGHT COMPANY.

A Halifax paper states that the swallows build their nests inside the arc light globes in that city.

The directors of the Hamilton Street Railway Company are said to be considering the question of adopting electricity.

The Woodstock, N. B., Electric Light Company, have found it necessary to duplicate their machinery, owing to the demand for power.

A Sprague motor for the proposed electric street railway at St. John, N. B., is being constructed at the Edison factory at Sherbrooke, Que.

It is reported that the St. Thomas Electric Light Company have decided to supply consumers with incandescent lights at one cent per hour per light.

It is expected that the directors of the Hamilton Gas Light Company, at their approaching meeting, will decide to put in an electric light plant.

The Chandler Electric Light Co. will be notified that when three years have expired their contract for lighting the city of Halifax will be terminated.

The electrical supply store of Mr. T. W. Ness, corner St. Peter and Craig streets, Montreal, was damaged to the extent of $8,000 by fire on May 27th. Insured for $5,500.

It is said that the Edison manufactory of electric appliances, who intend starting a Canadian branch, have made Capt. S. Neelon an offer for his mill property at St. Catherines.

The St. Thomas Gas Company have purchased a Westinghouse alternating incandescent electric plant, which includes a 750 light dynamo. Two hundred lights have already been installed.

The Keegans-Milne Company have been appointed Canadian agents for Crompton & Co., Lim., Chelmsford, Eng., for the sale of their electrical appliances. The company's headquarters are in Montreal, and our readers will shortly have an opportunity of becoming better acquainted with them.

The prospectus of the St. Thomas Electric Light and Power Company has appeared. The capital stock is placed at $40,000. This company will take the place of the Fort Wayne Company, from whom they will purchase the necessary plant, etc. The provisional directors are Judge Hughes, A. E. Wallace, G. R. Pennington, D. E. Broderick, W. H. Murch, George T. Claris, F. Ferguson, Hugh McPherson and Robt. McLaughlin, T. Cooper, Secretary, and A. E. Wallace, Treasurer.

The Economic Light and Manufacturing Company of Montreal is applying for incorporation with a capital of $10,000, for the purpose of carrying on business in all appliances, apparatus, etc., for lighting purposes. The names of the applicants are Messrs. Allan Cameron, Geo. H. Patterson, Wm. H. Olive, Theodore V. R. Brown, Nelson V. Smith, Dr. D. E. Gaud, John L. Caverhill and John F. Mackie.

The engine in the Barber & Ellis Company's establishment, Toronto, having broken down, an Eddy motor, which had done duty for a section of the works on night shifts, was brought into requestion, and performed so satisfactorily the work of driving the machinery on the entire three flats, that the company are seriously contemplating the adoption of electricity as a motive power for the future. The day of the electric motor is at hand.

Mr. A. A. Knudson, of New York, who, as our readers will recollect, managed the electrical exhibition at St. John, N. B., last summer, is the inventor of a system of stringing wires in cities which he calls the "aerial conduit" method. The conduit, which is but 6½ by 8 inches, and will contain as many as 500 telephone or telegraph wires and twenty or more electric light wires, is supported on hollow wrought iron pillars, from 18 to 20 feet high, placed 60 feet apart on the sidewalks, on a line with the gas lamps.

The report we publish of the progress made by our Canadian friends, contains some very interesting facts. It is most active to notice some of the differences between their practice and our own. Belting direct from engine to dynamo does not seem to have found favor with our more northern neighbors; so that the large slow speed engine appears to be more extensively used in the Dominion than here. It is worth noticing, too, that Canadian engineers have taken full advantage of available water power. As to the electrical systems used, there are wide differences between the distribution of the spoils there and here, as will be seen from tables. Some of the machines little used here seem to have been pushed across the border with commendable vigor.—*Electrical World.*

A despatch from Three Rivers, Que., says: At a meeting of the Council held on May 17th, the long discussed question of lighting for the city was at last solved, the Royal Electric Co. obtaining a contract for $35,000. The city will own the plant and operate it itself. It will comprise a plant of a capacity of 80 arc lights for the lighting of the streets and of 2,000 incandescent lights for the lighting of stores, public residences, etc. The electrical system will be the Thomson-Houston for the arc lights and Thomson's alternating for incandescent, manufactured by the Royal Electric Co. The lighting station is to be located in adjoining buildings at the water works. The steam plant will be of large improved compound-condensing engines, supplied by four large steel boilers.

The Governors of Notre Dame hospital have made a move in the right direction by adopting electricity for the lighting of the hospital throughout their buildings, says the Montreal *Gazette*. As a sanitary standpoint, superior light and more comfort for the patients, it will be a great improvement over their present system of illumination. The popular summer resort Vaudreuil will also be benefited this coming season by having a thorough electric system, not only for a thorough lighting of every room in the de Lotbinière house, but all the private cottages will be lighted by electricity. The system to be used will be an automatic self-regulating incandescent "Thomson" system, manufactured by the Royal Electric company, of Montreal, and will consist of 200 lights. These contracts have been obtained by the above company, through their representative, Mr. A. J. Corriveau, after a severe competition.

At one of the most extensive timber yards in England, a crane on a new principle of operation has been erected, used for raising the incoming logs of timber from the canal. An electric motor is attached to the frame of the crane, and geared with friction gearing to a central shaft, which, by means of three levers and a foot brake, performs the operations of hoisting, slewing and propelling the crane. The current is conveyed to the electric motor by two copper tubes laid along the tramway on which the crane runs, and taken off suitable contacts. In other respects the crane is of the ordinary build. The power is derived from an 18 unit Crompton dynamo, which supplies 300 incandescent lamps employed in lighting a factory; it gives a current having an electro-motive force of 110 volts, and some 30 amperes are used for working the crane. It was specified that the crane should lift 15 cwt. as a maximum load, and raise 10 cwt. at a speed of 80 feet per second, and slew at the same speed; it, however, lifts 18 cwt., and in other respects also improves upon the specifications.

It is interesting to notice says *Modern Light and Heat*, how the demand for certain raw materials used in the manufacture of electrical apparatus increases with the growth of the electric lighting industry and how such large demands for use in this direction have produced a marked increase in the price of the material. Copper, mica and platinum are familiar examples. The value of platinum until within a few years has not exceeded $7 per ounce and in 1880 was only $6. At the present time, however, the demand is said to be more than 25 per cent. in excess of the supply, and the price has advanced beyond $11. Platinum is admitted into the United States free of duty but is subject to an export duty from Russia of 3 per cent. The Russian Government now has under consideration the question of increasing the duty to 33⅓ per cent., and should this be done it will materially advance the price in this country, as the greater part of our platinum comes from the Ural Mountains. Although platinum in minute quantities is used in nearly all electrical apparatus for contact points, the greatest demand for the material is created by its use in incandescent lamps. With the advancing price the refuse platinum which exists in broken lamps will become more valuable and should bring a higher price when returned to the manufacturer.

GENERATION, DISTRIBUTION AND MEASUREMENT OF ELECTRICITY FOR LIGHT AND POWER;*

APPLIANCES THEREFOR AND PARTICULARS OF CANADIAN INSTALLATIONS.

By A. L. Lawson, M.Can. Soc. C.E., A.I.E.E., A.I.E.E.

ALTHOUGH hardly fourteen years have elapsed since the first application of electric arc lighting on a commercial scale, and only about nine years since the practical introduction of incandescent electric lighting, yet the production of electric currents by mechanical means had long before that time received much attention from men who had successfully solved that problem, and to whom our indebtedness is too often ignored. They were not patentees but inventors, and the splendid results of their labors were often freely given for the public benefit without thought of personal advantage. Greatest among these disinterested discoverers and benefactors was Michael Faraday, who in 1831 discovered the law of induction of currents and the principles of magneto electricity, and who published to the world his researches with the remark, "I have rather been desirous of discovering new facts and new relations than of exalting those already obtained, being assured that the latter would find their full development hereafter, a prophecy most amply fulfilled.

Profiting by the knowledge obtained from Faraday's researches, Pixii of Paris constructed in 1832 the first appliance embodying the principle of magneto-electric induction, and for several years thereafter many inventors worked on the same subject, but it was not until 1860, just 30 years ago, that Dr. Antonio Pacinotti, of Florence, invented the first generator of electricity, having an electro-magnetic field and an annular armature, a machine which may be justly described as the prototype of all the dynamo-electric machines now known as Gramme armature dynamos. The exciting current, however, was not obtained from the machine itself, as is now the common practice in all continuous current generators, but was derived from a battery connected to the wires forming the field winding.

In 1866, the idea of a self-exciting dynamo suggested itself, almost simultaneously, to S. A. Varley, of London, England, and to Dr. Werner Siemens, of Berlin, Germany. Mr. Varley patented his machine towards the close of that year, and the publication of that patent took place in July, 1867. In January, 1867, Dr. Siemens described publicly for the first time the dynamo-electric machine which he had invented the previous year. Sir Chas. Wheatstone also invented, about that time, a machine which was self-exciting, and which he had had constructed in the workshops of Mr. Augustus Stroh, of London.

In 1870 Mr. Z. T. Gramme, of Paris, invented the armature winding which bears his name, and the commutator and connections thereto one of the most important improvements in the development of dynamo electric machinery.

In 1876, C. F. Brush, of Cleveland, Ohio, invented his arc light dynamo with cast iron field magnets and cast iron armature, a type of machine of which the first constructed is still running in Baltimore, and which, while closely resembling the Pacinotti and Gramme machines, had its distinctive peculiarities. From this machine and the series arc lamp, invented by Mr. Brush, may be said to date the commercial development of arc lighting, and it is probably to the interest evoked by the success which attended Mr. Brush's inventions that the present success of electric lighting generally is due.

In 1879, Mr. T. A. Edison, who had been engaged for some months in experimental work, produced a lamp which gave rise to great expectations and much speculation. His experiments did not indeed result at that time in a commercial article, but they were the foundation of his success the following year, when he abandoned the attempt to use filaments of platinum iridium wire and resorted to carbon as the light giving medium. But it was not until 1881, when he succeeded in obtaining a really durable incandescent lamp, that the application of electricity to domestic lighting became a possibility, and its adoption only a question of time.

Mr. J. W. Swan, of England, and Mr. W. E. Sawyer, of New York, who had been experimenting on the same lines for probably a much longer period than Edison, both invented, about the same time, lamps embodying the elements of the success which afterwards attended their endeavors; but whilst to the three distinguished inventors mentioned is due the credit of the production of really commercial incandescent lamps, the fact that they were simply perfecting the ideas of other investigators, who had long previously experimented on the same lines, seems to have been generally forgotten.

* Paper read before the Canadian Society of Civil Engineers at Montreal, May 8th, 1890.

On September 4th, 1882, the Edison station for the distribution of current to supply incandescent electric lights, located in Pearl Street, New York, the first permanent station of its kind, was put in operation.

In 1870, not a single horse-power, whether produced by steam or water, was used for electric lighting, or for the manufacture of electric lighting apparatus, yet now it is estimated that out of a total of five and a quarter millions horse-power developed by steam engines and water wheels on this continent, half a million horse power, or nearly ten per cent., is used in the production of electric current for the distribution of light and transmission of power, and in the manufacture of electrical machinery and appliances.

At the beginning of 1886, there were in the United States and Canada 450 local electric lighting companies operating central stations. At the beginning of 1887, the number had increased to 750; and at the beginning of 1889 to nearly 1,200; while in January, 1890, there were 1,185 different companies operating central stations in the United States, 147 in Canada and 25 in Central America and Mexico, besides 200 gas companies, etc., engaged in electric lighting, making a total of no fewer than 1623.

At the end of 1886, there were 1,000 incandescent and nearly the same number of arc isolated plants. The number of private plants now in the United States is 3,025; in Canada and miscellaneous, 196, and in Central America and Mexico, 200, making a total of 4,300 isolated electric lighting plants, large and small.

The following was the condition of the arc lighting business at the beginning of the year mentioned:

Year	Arc lamps in use.	Year	Arc lamps in use.
1882	6,000	1886	90,000
1883	12,000	1887	150,000
1884	24,000	1888	115,000
1885	48,000	1889	210,000

while in 1890 the lamps in use number 235,000. Of these about 68,000 are of the Thomson Houston manufacture, and 49,000 have been made by the Brush Electric Company.

Between November, 1886, and January, 1889, the number of incandescent lights in America more than quadrupled, increasing from 525,000 to 2,500,000. At the present time there are fully 2,800,000 incandescent lamps in use, of which 808,500 are supplied from alternating current plants, and of these 408,350 with the necessary apparatus, including 25,000 converters, have been furnished by the Westinghouse Electric Co., 208,760 by the Thomson-Houston Co., 111,500 by the Fort Wayne Electric Co., and the majority of the remainder by the Brush Electric Co. since September last. In addition to these the Thomson Houston Company has furnished plant for direct current distribution of a total capacity of 144,000 lamps, the Brush Company for nearly 200,000 lamps, and the Westinghouse Co. for 45,000 lamps. The estimated total capitalization of electric lighting and electric manufacturing companies in America at the present time is $250,000,000.

ELECTRIC LIGHTING IN CANADA.

Being one of the pioneers in construction of electric lighting plant in Canada, and the manufacturer or constructor of nearly 50 per cent. of the total capacity of incandescent lighting installations now in operation in the Dominion, the writer submits the following brief history of the progress of the celebrated industry in this country:

Ten years ago there was not one electric light plant in operation in Canada. The first plants erected were Brush arc lamps of small capacity. About the end of December, 1882, some Thomson-Houston arc lights were placed on exhibition in this city by the Thomson-Houston Electric Co., of Canada, afterwards changed into the Royal Electric Co., of Montreal, lighting St. James Street, Beaver Hall Hill, and part of Dorchester Street, but the first permanent installation for street lighting in Montreal was that supplied from a Brush dynamo, owned by the Harbour Commissioners, who by this means lighted the harbor, wharves and approaches.

In the fall of 1883, some 50 arc lights of the Hochhausen and Vandepoele systems were placed in the streets of Toronto, and Winnipeg also had some arc lights put into operation about the same time. In May, 1885, Ottawa adopted the Thomson-Houston arc light for its streets, replacing thereby both gas and oil, and in 1887 Quebec followed its example, and Halifax and other places followed.

In 1889, Montreal gave a contract for the electric lighting of the whole of its streets to the Royal Electric Co. for a period of five years, a portion of the city having been lighted by the same Company since 1886. Hamilton is now also lighted by the arc light, and St. John, N. B., has recently contracted for the lighting of the whole city, dividing the lighting between the companies operating the Thomson Houston and the Brush systems, so that the following cities may be said to have adopted exclusively the arc light in place of gas or oil.

Montreal, Ottawa, Quebec, Hamilton, London, Vancouver, Victoria, Winnipeg, Halifax, St. John, N. B., St. John's, N. F., Moncton and Sherbrooke, besides the majority of the towns throughout the Dominion, so that now comparatively little work remains to be done in arc lighting, incandescent lighting for residences and stores being the principal field remaining unoccupied, and there can be no question that the large majority of this work will be done on the alternating current system, which is so admirably fitted for the lighting of our widely-built cities and towns, and for the utilization of our numerous water powers for this purpose.

In 1882, two private installations of incandescent lights were made in the city of Montreal. The system employed was the Maxim, which was put into the St. Lawrence Hall and Bank of Montreal. So crude was the construction of these plants that they proved unsatisfactory, and after a very short time both were discontinued. In the St. Lawrence Hall only one lead was carried from the dynamos to the lamps, the return being made through gas and water pipes, a method which, it need hardly be pointed out, would not now be permitted by the Board of Fire Underwriters. The wire used in the Bank of Montreal for mains did not even have the coating of paint which would have gained for it the misnomer of "Underwriters wire," but was merely single cotton-wound magnet wire. This is not pointed out as reflecting in any way on the Maxim Co.: all companies' systems at that time were about equally crude.

In the Fall of 1882, a contract was made for lighting the Canada Cotton Co.'s mill at Cornwall with the Edison light. A plant of 500 16 c. p. lamps capacity, constructed under the superintendence of Mr. Byllesby, now Vice President of the Westinghouse Co., was started on the 28th day of February, 1883. In June, 1883, an exhibition Edison incandescent plant was placed in the *Mail* building, Toronto, but was discontinued a few months later.

The Montreal Cotton Co.'s mill at Valleyfield, were next lighted in September, 1883, 800 lights being placed, which number was subsequently increased to about 1,100. The Canada Cotton Co.'s plant was also increased at the end of the year to 1,200 lights, and it is now the largest private installation in Canada. In January of 1884, two competitive plants of small capacity were placed in the Parliament Buildings at Ottawa, for the lighting of which the writer furnished, in 1886, Edison machinery of a total capacity of 1,000 lights.

The first incandescent electric light station in Canada was started at Victoria, B. C., in January, 1887, and was followed by that of Vancouver, B. C., completed in September of the same year. The distribution from both stations is on the three-wire system.

The station at Calgary, N. W. T. was completed and started in October, 1887, and in January, 1888, the station at Valleyfield, with overhead conductors—at that time the best constructed of all the Edison stations in Canada—was put into operation. For these four stations the writer supplied and erected all the machinery, and remodelled the stations originally constructed in the two first named places.

The Cornwall station on the Westinghouse A. C. system, completed the same year, was the first A. C. station in Canada.

Toronto is the only place in which underground wires have yet been placed, but the Edison station, from which they are fed, has only lately been put into operation. It is the intention of the older Toronto Electric Light Co. to put under ground the wires for arc lights and for the alternating current plant about to be installed.

The Barrie central station, which the writer has constructed, is the latest completed central station plant, and the only one in the Dominion on the A. C. system carrying 2,000 volts in the primary wires and nearly 100 volts in the secondaries, and it is one in which the highest quality of insulation, both of primary mains and house wiring, has been used.

At the present time there are 13,530 arc lights and about 70,765 incandescent lamps in use throughout the Dominion. There is hardly a village in Ontario, having a population of over three thousand inhabitants, which has not an electric light station of some kind in operation, and few of the important towns of the other Provinces are without electric lighting. Most of these, it is true, are arc lighting stations, but about a dozen supply the incandescent light only, chiefly to stores and public buildings, the lighting of residences being yet scarcely entered upon. Several of the local companies which have hitherto supplied the arc light alone, or with a few incandescent lamps in series with their arcs, or in series-multiple with them, have recently purchased and put

in operation incandescence A. C. plants; and the various lighting companies for the supply of incandescent lights only, have also found it necessary in most cases to add arc lighting to their business, it having been sufficiently demonstrated that the incandescent light is unsuitable for street lighting, the public demanding from electric lighting, whether arc or incandescent, a much better illumination than is usually obtained from gas lighting, and in this respect the incandescent light has failed to meet the expectations even of its own advocates. The Edison municipal system has been used for street lighting on the Lachine Canal, and Vancouver, Valleyfield, and Chatham, N. B., but is being replaced by arc lights in the two first named places.

The principal electric lighting stations in Canada of which the capacity is 100 arc lamps of 2,000 nominal candle power or over, or 1,000 incandescent lamps of 16 candle power or more, are:

Place.	No. of Arc Lights.	Inc. Lights 16 c p	System.
Barrie, Ont.	75	1,250	Ball Arc, Brush A. C. Incandescence
Brockville, Ont.	105	1,000	Ball and Reliance Arc, Slattery A. C. Incandescence.
Cornwall, Ont		1,300	Westinghouse A. C.
Gazette Printing Co. Montreal, Que.		1,350	Edison.
Halifax, N. S. *	200	1,050	Thomson Houston and Fuller Wood Arc, Slattery Inc.
" *	250	1,400	Thomson-Houston and Ball Arc and Westinghouse A. C. Inc
Hamilton, Ont.	394	2,000	Thomson Houston Arc, Westinghouse A. C. Inc
Lachine Que	30	1,500	Thomas-Houston Arc and A. C. Incandescence.
London, Ont.	100		Thomson-Houston.
"	150		Ball.
Montreal, Que.	1,440	2,000	Thomson-Houston.
Ottawa, Ont.	522		Thomson-Houston.
"		4,000	Westinghouse A. C and Weston multiple series.
Peterboro, Ont.	137		Thomson-Houston.
Quebec, Que.	602	1,000	Thomson-Houston.
St. Catharines, Ont.	105	215	Thomson-Houston Arc, Weston multiple series, Inc.
Sherbrooke, Que	167	500	Ball and Thomson-Houston Arc, and T. H., A. C. Inc
St. John, N.B.	325	1,000	Thomson-Houston.
"	205		Brush.
Toronto Ont	750	1,000	Hochhausen-Wright Arc, and T. H. series Incandescence
"		10,000	Edison.
Truro, N.S.	60	1,800	Thom.-Hous. Arc, Mather Inc.
Valleyfield, Que.		1,200	Edison.
Vancouver, B.C.	100	1,150	Thomson-Houston Arc, Edison Incandescence.
Victoria, B.C.	50	1,200	Ball Arc, Edison Inc.
Winnipeg, Man.	200	1,000	Brush and Thomson-Houston Arc, and T. H. Inc.
"		3,000	Edison.
Yarmouth, N.S.	100		Fuller Wood.

The private installations for incandescence lighting in Canada, having a dynamo capacity exceeding 600 lamps of 16 c. p., are:

Name of Owner.	No. of lamps 16 c. p.	System.
Canada Cotton Co., Cornwall, Ont.	1,250	Edison.
Montreal Cotton Co., Valleyfield Que.	1,000	"
New York Life Co., Montreal, Que.	1,000	Brush.
Parliament Buildings, Ottawa, Ont.	1,000	Edison.
Stormont Cotton Co., Cornwall, Ont.	850	"
Victoria Cotton Co., Marysville, N. B.	850	"
Canadian Pacific Ry. Stat'n, Montreal	800	Thomson-Houston.
Magog Print Co., Magog, Que.	700	Edison & Thomson-Houston.
Watt & Co., Guelph, Ont.	600	Brush.

The following is a summary of the number of lights of the various systems now in operation in the Dominion:

System.	Arc Lights.	Incandescent Lights.
Thomson-Houston	6,105	14,600
Edison	.....	23,500
Brush	3,529	1,660
Brush	615	3,300
Hochhausen (Wright's improved)	750	.....
Reliance	1,780	.....
Westinghouse	.....	6,850
Slattery	.....	5,850
Ball	....	4,515
Mather	...	3,125
Weston	180	5,365
Fuller Wood	425	....
Other systems	150	1,500

ENGINES.

Whether the system to be employed be the low tension incandescence, the alternating current incandescence, or the high tension continuous current arc system, the three which are to-day practically the only ones operated to any extent in America, one of the chief points to be considered in the construction of a station is the economical generation and application of the prime power. Unfortunately in a great many cases where steam power is used it was assumed in the early stages of electric station construction that any kind of steam plant would answer. Old slide-valve engines which drove as antiquated machinery as themselves in machine shops, saw mills, woollen factories, and like places during the day were used at night for the running of electric light machinery, and very good reason naturally existed for the complaints made of the unsteadiness and unsatisfactory character of the lights supplied.

High speed engines belted direct to the dynamos were next tried, and having been found to give much better results in point of steadiness, a number of builders, who had had no experience in such work, undertook the manufacture of this class of engines, and evidently tried to combine the old designs for agricultural engines, upon which their previous practice was based, with some of the principles embodied in the best class of engines sold in the United States for electric light purposes. The product was a mechanical curiosity, and a failure. It is safe to say that in not one of the Canadian shops building these engines in the early history of electric lighting in Canada was there a proper equipment for the manufacture of high-speed machines of any kind. No parts were made to gauge so that in the event of a break-down the broken part could be duplicated without sending it back to the shop as a model. A reaction soon afterwards set in in favor of slow-speed engines, especially for arc lighting, and at the present time, with few exceptions, engines of the Brown and Wheelock types are used in all arc light stations in Canada operated by steam power. For the running of incandescence plants, however, high-speed engines, mostly of American manufacture, have obtained the preference to which their excellent qualities and performance entitle them.

Brown engines furnish the motive power for the central stations in Montreal, Toronto and Winnipeg, both Brown and Wheelock engines are used in Halifax and London, and Wheelock engines in Hamilton, while Armington & Sims engines are the prime motors in the stations in St. Johns, N.F., St. John, N. B., Calgary, Alta., Vancouver and Victoria, B.C., and in the Parliament Buildings at Ottawa.

The economy of many stations could be increased by the intelligent use of the indicator, instead of trusting to the valves of engines being properly set by guess work, as is now so frequently the case. 14,750 h. p. generated by steam engines is used for electric lighting and electric railway working in Canada.

BOILERS.

With the exception of the Royal Electric Co.'s east end station in Montreal, the ordinary horizontal fire tubular steam boiler has been used in every station. In that case the Babcock and Wilcox water tubular boiler is employed. In some cases the Jarvis setting has been adopted, but not to any great extent.

WATER-POWERS.

At Quebec, power is obtained at the Falls of Montmorency, nine miles distant, to drive the Thomson-Houston arc dynamos and Thomson-Houston A. C. incandescence plants.

At Peterboro', water power is used to drive Thomson-Houston arc dynamos, from which 137 arc lights and a number of Bernstein incandescent lamps in series are supplied. At Barrie, Ont., a stream five miles distant from the town furnishes the power for both the arc and Brush A. C. incandescence plants.

Also in Ottawa, Cornwall, Smith's Falls, St. Catharines, Welland, Dunnville, Thorold, Sault Ste. Marie, Sherbrooke, Joliette, Valleyfield, Almonte, and some other places, for both factory and central station lighting, water furnishes the motive power.

ATTACHMENT OF DYMAMOS.

The dynamos are not coupled direct to engines in any of the Canadian stations. Ordinary double leather belting, made without seams or rivets, is generally used. In a few cases link leather belting has been tried, but the results have so far justified the opinion that this belting has been invented chiefly to find a market for scrap leather. Belting should not be overtaxed. One inch width of double leather belting running at a speed of 750 feet per minute will easily transmit one horse power, and at this tension will last a long time. Some dynamo manufacturers, in order to impose the belief that their machines use but little power, are in the habit of providing a much smaller margin than this per horse power. The only advantage, of which the contractor receives nearly the whole benefit, is that the first cost is decreased. The disadvantages, which affect the purchaser, are the necessary excessive tightness of the belt, and the consequent heating of journals, rapid wear of the belt, and large oil consumption. Rope driving may eventually be used, as it has many advantages, but so far, with one exception in an isolated plant, the method has hitherto not been tried in Canada.

ARC LIGHTING SYSTEMS.

The arc lighting systems in use in Canada are the Thomson-Houston, Ball, Brush, Reliance, American or Fuller Wood, Hochhausen (Wright's improved), and Weston. The large majority of machines and lamps in use are of the Thomson-Houston and Ball systems.

In the Thomson Houston, in the Brush and in the Fuller Wood or American systems, a current of 9.6 amperes is used, with a pressure varying according to the number of lamps in circuit. In the Ball system a current of 8 to 8½ amperes has been the standard, but lately that company have supplied several plants having a current of only four amperes, the lamps for which are nominally of 1,000 candle power each. In the Hochhausen Wright system, a current of 10 amperes is used. In the Weston system, the current is about 18 amperes, and the P. D. between the terminals of each lamp 25 volts. On account of the short arc and the consequent hissing, the Weston lamp has not found general favour in this country. The regulation of the Thomson Houston machine is excellent. The lamp also has the merits of simplicity of construction and steadiness in running. The feed is purely gravitational like the Brush feed, controlled by electro-magnetic action, there being no clock-work or gearing. It is not, however, quite so steady as some clock-work arc lamps, and requires the feed rod to be kept very clean in order to secure the proper working of the clutch. With the rack and pinion lamps this is not of such importance, and the difference in the running of the two kinds of lamps sometimes observed may, to some extent, be due to the cleaning of the Thomson Houston lamp rod having been neglected.

In regard to the rating of arc lamps some change seems to be desirable. At present lamps taking 48 volts and 9.6 amperes, lamps of the same voltage taking 10 amperes, and lamps of 50 volts and 8 amperes, are all compared the one with the other, and each is called 2,000 candle power, which is manifestly absurd. The current and pressure, or watts per lamp, should be given in all specifications, tenders and contracts.

STREET WIRING FOR ARC LIGHTS.

In wiring for arc plants, as is generally known, one wire of uniform section is carried from the machine to the lamps, where it is cut, and one end placed in the first binding post and the other in the second binding post, and so continued, the pressure falling on an average about 48 volts for each lamp in circuit, where the lamps, as is the general practice on this continent, are always run in series.

For lamps of 2,500 nominal candle power, No. 6 wire, American gauge, and for lamps of 1,200 nominal candle power No. 8 American gauge wire is used for the leads. Up to within the past two years, the insulation known as "Underwriters' wire" was used, but lately this has given place to much superior quality. Unfortunately, there is still room for improvement even on the best which has yet been supplied in Canada.

SYSTEMS OF DISTRIBUTION FOR INCANDESCENCE LIGHTING.

In the distribution of current for incandescence lighting from central stations, the multiple arc two-wire system with low tension continuous currents was first used during 1882 and 1883.

In private installations at that time the tree system of wiring was usually followed, and it has not yet been entirely abandoned, although used in very few installations at the present date. In one station in the Maritime Provinces wired on this principle, the pressure varies from 125 volts at the lamps nearest the dynamo to 110 volts at the furthest point of distribution. But since 1884, very few stations indeed and few isolated plants of more than moderate size have been constructed on other than the feeder system of distribution.

A very short experience of distribution on the multiple arc system demonstrated that lights singly controlled could not be furnished economically by it at a greater distance from the central station than a quarter of a mile radius. The three-wire system, invented by Dr. John Hopkinson, and elaborated by Mr. Edison, was a temporary and partially successful solution of the difficulty, but this system, although it greatly reduced the quantity of copper necessary, only increased the radius of distribution on a paying basis by another quarter of a mile, and, while satisfactory for thickly populated towns, still left the distribution of light in suburban districts or openly built country towns as far from attainment as ever. The adoption of the alternating current system of distribution solved the difficulty.

The method of regulation first employed for the maintenance of equal pressure at the ends of the feeders in the three-wire system, consisted of placing adjustable resistances or feeder equalizers in each circuit, more or less resistance being inserted by hand, according to the indications of the pressure indicators. Where the frames of such equalizers were made absolutely fire-proof, such a system of regulations in small stations having only three or four sets of feeders radiating from it was in a measure unobjectionable, but when it came to the

* The two stations marked thus have the nominal capacity given but actually run at present about 20 per cent. of the number of lights at which they are rated.

distribution of several hundreds, perhaps thousands, of amperes of current, through dozens of sets of feeders, the loss in these equalizers became a serious matter, and perfect regulation was difficult of attainment. In several cases also the heating of the equalizers was the origin of fires which resulted in the burning down of the stations, the destruction of the Edison stations in Boston and New York being cases in point. In recent practice these equalizers have not been used, but a method of interlacing the feeders as well as the distributing mains has been adopted, necessitating a somewhat larger outlay in conductors, but not involving, as in the other case, a loss of energy by the heating of useless resistance. With this interlacing the pressure at the lamps is much more nearly constant than under the old method.

At the price of labor and fuel and the selling prices current in this country, it may safely be said that the economical distribution of light or power, on the three wire system, is limited to half a mile radius from the station in our most thickly populated towns. In both the United States and Canada, distribution by this system has been carried out on a much wider area, for a limited number of lights and under special circumstances, but it is doubtful if there is a single city in Canada which will return any dividend on the investment to a company placing low tension wires carrying a pressure of even 300 volts underground, and there are not more than six cities in the whole Dominion which will yield any return on this system with overhead wires, unless the charges for electric lights be at least 50 per cent. more than the current prices for gas.

ALTERNATING CURRENT DISTRIBUTION.

In the method of distribution by high tension alternating currents, the converters, indicated by Fig. 1 and more practically explained by the specimens on the table, are placed in parallel circuit. As shown, the current from the dynamos does not enter the premises of the consumer, but merely passes through the fine wire in alternately opposite directions, and generates, by induction, a current in the secondary or thick wire of the converter or transformer, which induced current is carried into the houses and through the lamps.

There are at present no alternating current motors in use developing large powers, but probably before many months machines will be supplied which will convert the electrical energy of alternating current into power with high efficiency. Ganz & Co., of Buda Pesth, have indeed nearly completed a station from which to distribute power by A. C. motors, and the Westinghouse Company are just completing a contract for A. C. motors for mine working. It is also the case that the A. C. system will not easily lend itself to the charging of storage batteries without a complication of commutators and other apparatus. But there does not appear to be any demand for the charging of storage batteries except what can be supplied from continuous current stations or isolated plants now in operation, or for which special dynamos would not be best used separate and distinct from any other circuit.

(To be continued.)

COST OF WELDING BY ELECTRICITY.

FROM carefully conducted tests recently made in England with a Thomson electric welding plant to ascertain the time required, the power consumed, and the probable cost per weld, it was found that 10 welds of one inch round iron with round ends could be made in 13 minutes, and that a weld with a most excellent finish could be made in considerably less than two minutes. In another test of a number of pieces of 1½ inch round iron it was found that two and a half minutes was ample time for each weld. Computing upon this basis, and taking the maximum horse power necessary, making allowance for the fact that the engine power was needed only about one half the time, the engine running light the other half, it was found that the cost of the electric weld was somewhat less than that of the same work done at a fire in a blacksmith shop. The cost of the plant and its maintenance is not, however, considered in this. It is in this direction that a great saving is made by electric welding, as by the electrical process the number of welds which can be made in one day by two men and a single machine, is very great. When welds have to be made with great exactness, and where the heating must not extend far upon either side of the weld, the electrical process is far ahead of any other. *Railway Review.*

The incorporation is announced of the Reliance Storage Battery Company, of Ontario, with a capital stock of $100,000, and head quarters at Waterford, Ont. The incorporators are Isaac Edward Voss, druggist, John William Thompson, Elias Edwin Slaght and Frank Brown Allan, manufacturers, and Edwin James Mason, electrician, all of the village of Waterford.

THE NEW DEPARTURE IN MILLING.

FOLLOWING is a condensed statement concerning the new model flouring mill soon to be put in operation in Jackson, Michigan, by the inventor, Mr. George T. Smith: "My new mill will be a forerunner of a great change in mill-building. The mill is going to be a great success for the following reasons. It has now become a settled fact that the less you handle the stock during the grinding and bolting process, the better the results; the flour is much better in quality, and a larger percentage of high grade flour is made. The short round reels have been used to advantage on account of their gentle treatment in bolting, but we have been unable, up to this time, to avoid handling the stock over a great number of times. It is a very complicated and endless threshing of the stock about through spouts, up elevators and down the back legs of elevators, until no one can tell how far it has travelled or how many times it has been carried up from basement to garret. For instance, the grain is slightly ground through the first roll on the lower floor; from that roll it passes down through a spout to an elevator, which takes it to the top of the mill; from the elevator it passes down again through the spout to the roll, then down through crooked and angling spouts, generally through two or three floors, to another roll, to be again ground and again sent down through spouts, up elevators, travelling and threshing about until a part of the product has passed up 16 elevators and through 60 spouts. First-class millers know that this sort of treatment is a great injury to the flour, and that much of the best stock has been worn into fine worthless dust. With the general reduction system it has been impossible to avoid this complicated way of grinding and bolting. In my plan we have almost entirely done away with the expensive, elaborate and unnecessary way of getting wheat into flour. My plan is so very simple that it is hardly necessary to explain it. The wheat passes through the first roll into the conveyor under the roll, which conveys it into the spout leading to the head of the reel below, it is then bolted in the ordinary way. The product to be ground again is taken by another conveyor back to the next roll below it. An opening, the whole length of this roll, is left on the top of the conveyor, so that no choke of meal is possible. The conveyor takes it to a spout, which lets it drop straight down into the head of the reel, so that all the trouble and danger of passing it down through the crooked and angling spouts has been done away with. In this plan the rolls are placed upon a very solid frame, instead of a shaky floor, and, by passenger elevator, the roll and bolts can both be operated better, and therefore can be attended to with much less trouble. Nearly all of the spouts of this mill are in reach of the miller when he is passing up and down the elevator. Not over one-fourth as much room in the mill building is used as in the old way. This room is often valuable. The mill building is not filled up with a forest of unnecessary elevators and spouts. We have made an estimate of power required to drive from 25 to 30 elevators, the number generally required in a mill making the same reduction, and we could hardly believe our own figures; it is a large percentage of the power required for the whole mill. What we claim and guarantee is: First, better flour with the same amount of wheat. Second, twenty five per cent. less power required to run the mill. Third, less labor is required. Fourth, less expense in keeping the machinery in repair. Fifth, machinery runs better with less trouble. The rolls or any machine can be taken out and others put in their place with much less trouble than in any other way of constructing a mill; any flow-sheet can be used, and any kind of reels, round or hexagon. The writer has probably done more experimenting than almost any one else in the trade, and has been instrumental in bringing out improvements that have been generally adopted among millers. I have known that the gradual-reduction system has been handicapped by the increased amount of handling the stock that was necessary to make the number of reductions required. You will see that a great improvement has been made when we do away with this present system of running the product all over a ten-acre field during the manufacturing process. The elevators and spouts cut no figure in the manufacturing; they are of no use except in getting the ground product from the rolls to the bolt, and from the bolt to the rolls, and if that can be done in this plain, simple and cheap way, which I have shown in this plan, we will soon put an end to the swamp of spouts and elevators. I say we have done it in a more practicable way. In a few years the old way will be looked upon as one of the queer things of the past. I am having encouraging letters from millers; they seem to favor it and believe in it. This is unusual, as they generally fight everything new."

USEFUL INFORMATION

THE PROTECTION OF IRON FROM RUST. Herr Haswell, of Vienna, proposes to protect iron from rust by coating it with a layer of electrolytically deposited manganese dioxide. The iron is made the anode of an electrolytic bath, containing 4 05 to 5 per cent. solution of chloride or sulphate of manganese, and from 5 to 20 per cent. of ammonium nitrate. Carbon is used for the cathode. On passing the current the iron becomes coated with a firmly adherent and movable film of manganese dioxide.

Many people think that gutta percha and india rubber are the same or very similar gums. This however, is a mistake. India rubber is the solidified sap of a South American tree. It is of a soft, gummy nature, not tenacious, but very elastic, is easily decomposed to oily substances, and does not stand acids well. Gutta percha, which is only found in the East Indies is obtained from the gutta tree. It is a brownish gum, which solidifies by exposure to the air.

ALARM FOR HOT BEARINGS. An ingenious invention hails from Copenhagen, Denmark. The idea embodied is to arrange an explosive in association with certain chemicals so that a certain degree of heat will cause an explosion, and give warning before the heat reaches a destructive stage. Its special application is to the preservation of bearings. A small piece of sheet metal something like a cartridge shell is filled about half way with the explosive. A paraffine globular capsule, hollow inside, is filled with sulphuric acid and sealed. This globule is laid on top of the explosive, and a mixture of chlorate of potash and sugar is filled in all around it, then a stopper or plug of cork or rubber is put in, sealing the cartridge. A hole is drilled in the box or bearing, and the cartridge set in. Should the bearing run dry, the heat will melt the paraffine capsule, letting the sulphuric acid come in contact with the chlorate and sugar mixture, which will immediately explode the cartridge, causing a loud detonation and a light, and a volume of smoke, so that attention is called to the condition of the bearing.

MODE OF ASCERTAINING THE NUMBER OF REVOLUTIONS OF A REVOLVING SHAFT. Several rough and-ready methods of ascertaining the number of revolutions of a shaft are known to engineers, but the following one, suggested by M. C. Meigs, of Washington, is so simple, ingenious, and, when carefully conducted, so accurate, that we are sure its reproduction here will interest our mechanical readers. A lead pencil is tied fast to the end of the shaft whose revolutions are to be counted, in such a manner that it shall describe a circle of convenient size for observation. If, now, a piece of paper be held lightly against the pencil, the motion of the pencil will describe a circle on it. If, however, the paper be moved backward and forward while the contact with the pencil is maintained, the pencil will describe a series of loops intersecting each other. By timing the period of contact, and then counting the number of loops recorded on the paper the number of the revolutions of the shaft will be given with close approximation of the truth.

EFFICIENCY OF CHIMNEYS. The *Journal du Gaz de l'Eclairage* quotes from a German source some experiments upon works chimneys. An old chimney, 97 feet high, with internal diameter of 10·9 to 13 8 inches, and with total passage, from fire to chimney top, 98 feet, was taken down, and a new chimney, with an intended total draught of 95 feet and a minimum internal diameter 25 5 inches, was planned out. When the chimney had gone up 30 feet, it was tried. Already there was a great improvement on the old chimney; again at 49 feet still better, and at 52½ feet the draught was excellent, the smoke issued clean, without soot, and there was an economy of from 15 to 20 per cent. in fuel. So the chimney was finished off at that height. Herr Huth thinks chimneys are usually made too narrow, and the mischief is aggravated by increasing their height, so fuel escapes unburned. Herr Ramdohr of Gotha, confirms this, and recommends a uniform internal diameter as being more rational and as protecting the brickwork from the hot and rapid axial steam. The cross section of the chimney should be from one-fourth to one-eighth the grate area, and the height, not less than 40 feet, should not exceed 100 to 120 feet the diameter being made to suit, unless the chimney is at a distance, in which case it may be 160 to 200 feet, the diameter being regulated according to the amount of soot which escapes.

HORSE POWER OF BELTS. We are getting wearied of rules says *Industry*, for the horse power of belts. They nearly all relate to so many "feet per minute of one inch in width," and a variation of velocity to compensate for quality or the condition of belts. Now the whole of these rules, so far as we have examined them, can be resolved into so many superficial feet of belt for a horse power, that is, the superficial feet passing a fixed point in a given time. If this is assumed then the variations of quality can be provided for in a natural way, by allowing a greater or smaller number of feet for a horse power, without interfering with velocity, which is a non-variable quantity and should never be employed as such in computing the power of belts. The true variable is surface. Anyone can compute in a moment's time how many square feet of belt passes a fixed point, per minute. If a belt is 12 inches wide, then every foot of movement gives a foot of surface, if 6 inches wide, two feet of movement gives a foot of surface, and so on. This found, the following table furnishes divisors for horse power, as nearly as any general rule will apply:

LEATHER BELTS, SINGLE THICKNESS.

	Feet per minute
On smooth iron pulleys	80 feet
On wooden pulleys	65 feet
On covered pulleys	50 feet.

GUM BELTS AVERAGE THICKNESS.

On smooth iron pulleys	60 feet
On wooden pulleys	50 feet.
On covered pulleys	35 feet.

A grist mill is talked of at Blytheswood Ont.

Mr Robertson, of White Lake, Ont., has purchased the mill at Eganville.

The new roller mill at Gananoque, Ont., will be in full operation by August 1st.

Another advance of ten or fifteen cents a sack is contemplated by Manitoba millers.

Arrangements are in progress for building two more grain elevators at Carman, Man.

A large steam flour mill will likely be started in Pembroke by Mr John McLaren, of Renfrew, and Mr. J. P. Miller, of Pembroke.

A steam elevator with a capacity of 35,000 bushels will be built at High Bluff, Man., this summer by Mr. John Dilworth.

Mr. Wm. Brown, proprietor of the Sterling Mill, Cadmus, Ont., has added some new machinery to the flouring department.

The material for the new grist mill at Bennuller, Man., is on the ground, and the building will be proceeded with at once.

The total quantity of wheat in store at Port Arthur is about 400,000 bushels, and nearly all this is held on account of millers.

A. Sauve, of Curran, Ont., some time ago traded his grist mill for a stock of stoves. He has just made a failure of his new venture.

E. Whitelaw, of Woodstock, Ont. is having plans prepared for a new flour mill which he will erect this year at Pilot Mound, Man.

The Millers' National Association of the United States intend holding a convention in Minneapolis on the 17th, 18th and 19th of June.

Two gold watches and sixty dollars cash were recently stolen from the residence of Mr. J. D. Stanley, the well known London miller.

On the night of May 17th, Reynold's flour mill at Stayner, Ont., was entered by burglars, who cracked the safe and abstracted therefrom about $60 in cash.

Work is being pushed on the flouring mill and warehouses of the Mount Royal Milling Company, at Victoria, B. C., the cost of which will be about $50,000.

The Beautiful Plains Milling Co., recently organized at Beautiful Plains, Man., have let the contract for the building of their new mill to a Minneapolis firm.

The Manitoba Elevator Company have received the Letters Patent from the Government for the organization of their company. The headquarters are to be at Wawanesa.

The firm of Barclay & Matheweson, millers, of Cannington, Ont., has been dissolved, Mr. Barclay going out of the firm. The business will be carried on in future by Mr. Matheweson.

The Toronto Board of Trade will memorialize the Government to appoint a Committee to enquire into the dispute between farmers and millers as to the reliability of the grain testers.

Thomas Pell, an employee of the Classic City mills, Stratford, while went up in the loft to shovel a load of bran down the chute by some means he got in the chute himself and was smothered.

Messrs. R. H. Henstreet, D. H. Price, Chas. Herendeen, Chas. Yorke and Jehiel Yorke, of Alymer, have given notice of an application for a charter of incorporation under the name of the Oriental Mill Co.

The *Modern Miller* rightly says that millers who can afford it find it greatly to their advantage to use the electric light in their mills. One can hardly appreciate the advantage of it until they have tried it.

It is understood that Mr. H. J. Sanderson, a well known millwright engineer, will receive the appointment of Secretary to the National Association of British and Irish Millers. He is spoken of as a desirable man for the position.

Messrs. Campbell, Stevens & Co., the well-known millers of Chatham and St. Thomas, Ont., have dissolved partnership. Mr. Campbell retires from the business at Chatham and assumes proprietorship of the mill at St. Thomas.

Mulloch & Herriot, owners of the flour mill at Plum Creek, Man., are having some little trouble with the C. P. R. Co. regarding shipping facilities, in consequence of which they threaten to sell their mill to the Northern Pacific and Manitoba Railway, Morden branch.

A Minneapolis firm is said to have received the contract for remodelling Alexander Kelley & Co.'s mill at Brandon, Man. The capacity will be increased to 200 barrels. Allis rolls and Case reels and purifiers are to be used. It is the intention to have the change completed before the new crop is marketed.

Thomas Fee head miller in Hilliard & Peplow's mill at Peterborough, Ont., was caught in the gearing on the lower floor on May 2nd and literally torn to pieces. He was alone when the accident occurred, and when discovered life was extinct. It is supposed that he had climbed up to examine a spout, and slipped, falling into the two revolving bevel gear wheels driving the roller shaft.

The Samson Milling and Maizo Company was recently organized and incorporated with a capital of $25,000, and a monopoly for fifteen years to manufacture and sell maizo in the Dominion. Maizo is a white, flake-like appearance and is made from corn. It is used for culinary purposes in a variety of ways. In the United States it is used extensively, the supply in the market not being equal to the demand.

A flour drying machine is in use in Austrian mills which is composed of five iron compartments, one above the other, separated by double partitions and communicating by pipes. A revolving vertical axis with blades lifts the flour to the highest of these compartments, all of which are heated by steam coils entering at the bottom, at a temperature gradually declining from 158 to 95 degrees, Fahrenheit. The vapor from the flour is carried off by pipes.

It is possible says the *St. Louis Miller*, for a good miller in charge of a good mill to atone to some extent for poor stock, but it is not within the possibilities for the good mill and good stock to atone for a poor miller. Observe. In the first instance the stock will be worked to best advantages cleaned, ground and separated to suit all conditions well understood, and percentages of all grades arranged to hold the different products at the highest possible point of perfection. In the second place, poor cleaning, improper grinding and separating will *interfere* with proper accomplishment. So if the miller attempts to make good flour his offal is ruinous to profits, and if he attempts to make clean offal he ruins the flour.

A Montreal despatch contains the information that some months ago when the arrangement for placing all grain in the C. P. R. and G. T. R. elevators within twenty-four hours of its arrival first came into force, the suspicions of the traffic managers were awakened by the discovery that a number of cars contained far more grain than the quantity set down in the bill of lading. Enquiries were instituted, when it was found that an extensive system of underbilling was carried on over the country, defrauding the two railroads, it is estimated, of as much as $20,000 per month this spring, and the result is that notice has been given to the Corn Exchange that hereafter no grain will be taken in bulk for track delivery, but all shipments must be sent *through* the companies' elevators.

According to the testimony of the Budapesth *Pester Lloyd*, the Haggenmacher "Plansichter" is a success. That journal has received from the Concordia Flour Mill, one of the great merchant mills for which the capital of Hungary is so famous, a very favorable report concerning the work of the "Plansichter," or horizontal scalper, lately patented by Mr. Carl Haggenmacher. It should be premised that this mill has fitted an entire department with this machine, in consequence of the satisfactory results of the experiments to which the "Plansichter" was subjected by the technical advisers of the mill about a year and a half ago. The report sets forth that each "Plansichter," measuring three meters (the meter is, roughly, 3 ft. 3 in.) in length, and one meter in width, takes the place of at least four reels of a length of 3 meters a piece. The sifting process is more thoroughly effected than by the latter machines, while there is no need for any "finishing." The wear of the silk surface is said to be considerably diminished, and there is also a smaller consumption of power. It would, moreover, appear that the total yield is increased, while the color and general quality of the flour leave nothing to be desired.

I am more and more impressed, as I go about in mills, with the idea that the average mill-owner does not keep himself so thoroughly informed about the doings in his plant as he should, says a writer in the *Milling World*. I have asked the owner of a good sized mill if he knew of a certain leakage or wastage at a certain point in his mill, and he has replied "O! I don't know! I can't take time to nose around the mill, looking for faults here and there. It's a small matter, anyway, and it would not pay for the trouble of correcting it." In that case the leakage was not a small one. It was a large one. It meant only a few cents a day, but it meant hundreds of dollars a year, and it was only one of several leaks. Some were larger. Some were smaller. The owner, who could not, according to his erroneous idea, spare or afford the time to examine the leaks and check them, was losing every year a sum large enough to pay a hundred or five hundred times the amount it would cost to stop the wastage. Such cases of wasting at the bung, while imagining a great saving at the spile, are frequent. Mr. Owner, do not despise the "small things" in your mill. Everything in it represents a cent or a dollar of your money. Every grain of good wheat wasted, every pound of good flour lost in dust or bran, every pound of coal burned needlessly, every spurt of steam into the air without cause, every bit of silk senselessly torn or thrown away, means the absolute wastage of just their value in dollars and cents. You can not afford to throw away money needlessly in these things, as you certainly will unless you keep a sharp eye on every detail.

With commendable enterprise to cultivate home industry, says the Victoria *Colonist*, the Victoria Rice Mill Company have undertaken a project which cannot fail to command the support of the farming population of this province and particularly of this island. The idea of the management is to induce the cultivation of sufficient wheat to supply the wants of British Columbia, and to keep in the province all that capital which is now necessarily spent in the purchase of wheat for our domestic wants. With this end in view they have purchased a car load, fifteen tons, of Red Fyfe wheat from Manitoba, which is to be distributed gratuitously among the neighboring farmers and also those in the Fraser River district. The only drawback is the risk of changing it from the dry climate of Manitoba to that much milder one in which we live, but the farmers anticipate very favorable returns. The experiment will show them that they are able to grow sufficient wheat to keep a mill running here and also retain a large portion of capital in their own district. Ten tons of this wheat have been sent to Ladner's Landing to be distributed in the Fraser district, while five tons will be sent to the Saanich district. Next year it is thought the company will experiment on the Ladoga wheat. The mill company say there will be a market for six thousand tons a year. They are building their new flour mill with a view to an increase, but they want no less than that quantity now. Their idea, in effect, is to have everything grown in the country and retain the capital now going out. The mills are at present being put in readiness for their increased capacity, and the company expect to be running by September, when the yield from the present experiment will be coming in.

We have been favored with some particulars concerning the life of the late Mr. Elias Snider, a pioneer Canadian miller, who died at his residence near the town of Waterloo, Ont., on April 24th. He was born at Waterloo in the year 1815, being one of the first children born of white parents in that section of country. From his boyhood he was associated in business with his father, Jacob C. Snider, who built the Pioneer Mills at St. Jacobs, and carried on distilling both at Waterloo and St. Jacobs. In 1853 he acquired the Union Mills property and sold it the following year at an advance of £3,000. In 1860 he purchased the German Mills, where it is claimed the first high grade flour in America was manufactured by means of a new grinding process for which Mr. Snider's miller, John Brown, was granted a patent in 1869. The parties to whom the Union Mills were sold, being unable to fulfil their agreement in the matter of payments, Mr. Snider resumed control of the property, and formed a partnership with Mr. Sam. S. Snider, which continued until 1879, when the mills passed into the hands of the present proprietors. Mr. Snider's twelve children survive him, among them being E. W. B. Snider, representing Waterloo in the Local Legislature, the wife of Mr. Aaron Kraft, of the Union Mills; William B. Snider, of the Union Mills, ex-Mayor of Waterloo and Warden of the county; Tilman R. and Amos Snider, of the German Mills. The deceased was held in the highest esteem in the community where his long and useful life was spent.

The town of Perth will bonus to the extent of $1,000 a bolt manufacturing company.

The Hercules Mfg Co., of Petrolia, are said to be seeking inducements from the cities of London and St. Thomas with a view of removing their works to one or other of those places.

The foundry and machine shop of Robt. Law at New Westminster, B. C., has been purchased by a syndicate of local men, who will at once extend and improve the business. It is the intention of the new company to build a boiler shop in connection with the foundry.

As the result of the inducements offered by the tariff to manufacturers of mining machinery to locate in Canada, news reaches us that the firm of Rand Brothers, manufacturers of mining machinery, New York, have decided to establish a branch factory at Sherbrooke, Que., for the manufacture of rock drills, air compressors and all kinds of mining outfits.

Amongst other things the late G. A. Hirn turned his attention to the important economic question of the lubrication of machinery, and upset the previous prejudice against the use of mineral oil for this purpose. He also demonstrated experimentally that, while the old laws of friction enunciated by Morin were sufficiently accurate for the contact of one dry metal against another, these laws are powerfully modified when the surfaces are well lubricated, as with machinery. Now the friction varies as the square root of the pressure, and as the surface and the velocity; so that the theory falls in with that of the viscous flow of liquids. These laws have received confirmation of recent years by the experiments carried out under the auspices of the Institution of Mechanical Engineers.

The location of the power plant with reference to its connection with the machinery of the mill is important. Where steam is to be the motive power, as is the case with most establishments, the location of the engine and boiler would seem in most cases only a matter of choice, yet in all cases reference should be had in the location so that the power may be transmitted to the line of shafting by which the machinery is operated in the most practical manner, to avoid the necessity of using a driving belt either too long or too short, and also that the leading or slack side of the main belt may be run to the top of the driven pulley. By that means the sag of the belt, instead of falling away from the pulley, as would be the case where the slack side runs under the sag, falls under towards the driven pulley, and by embracing more of its circumference increases the frictional surface, and thereby increases the power. This alone in many instances, renders the use of the larger pulley unnecessary.

VALIDITY OF CONTRACTS BY TELEPHONE.

A DECISION involving the validity of contracts made by telephone was rendered by Judge Valliant, in the Circuit Court at St. Louis, in the case of the Paddock-Hawley Iron Company vs. Pullis et al. The plaintiff company sued to recover the value of certain lots of iron sold to the defendants, regarding the price of which there was a dispute. The defendants testified that they called up a certain number and asked who it was, and the answer came back that it was the plaintiff company. Defendants then asked the price of iron delivered through the month of August, and the price which they claimed as the contract price was given. The plaintiffs' testimony was to the effect that there were but two men connected with its concern who had authority to make such contracts, and that neither of them had ever heard of the telephonic conversation until after the controversy arose. The plaintiffs recovered a verdict. Judge Valliant, in overruling a motion by the defendants for a new trial, said that contracts by telephone, when proven, were as binding as any other contracts, but that there was a practical difficulty in the uncertainty of the proof, which uncertainty was chiefly on the point of identifying the person with whom the witness held the telephonic communication, and that it had never been held that a telephone message purporting to come from a certain party, but with no other evidence of identification, was binding on such party.

ON BULGED PLATES.

OUR illustration this month shows a section of sheet that was recently removed from a large newspaper office. The exhaust steam from the engine was used for the purpose of heating the building, and all returns from the heating system, as well as the drips from the engine, were carried back to a tank and from there pumped into the boilers. A heavy animal oil was used for lubricating the cylinder of the engine, and the feed water in its natural state contained a considerable amount of vegetable matter. The organic matter thus carried into the boiler could not all be removed, for the blow off pipe did not enter the drum at the lowest point, as it should, and a considerable quantity of water and oily matter could not be blown out. Hence any deposit that might lodge on the bottom of the shell remained there and was burned on, forming a coating that prevented the water from coming into direct contact with the iron. The sheet thus protected from the cooling effect of the water got overheated, and the steam-pressure within the boiler caused a bulge at the softened spot, as shown in the cut. The boiler from which this piece was taken was made of the best material. Otherwise it would probably have fractured, rather than come down as much as it did, and an explosion would have been the result. Of course it is not necessary to have oil in the boiler, in order that bulging may result. A deposit of scale on the fire-sheet often causes a noticeable bulge in the plate, even when the scale has fallen down from the tubes, and is lying in a loose heap.

It is generally admitted that a coating of oil or scale will cause a plate to bag, but it is not always understood that a *very slight* coating is frequently sufficient to bring about this result, especially in the case of oil. A coating of oil that might escape the scale is, of course, not so bad, since it allows more or less water to circulate through it, and the plate cannot so readily become excessively over heated.

It should be understood that the foregoing remarks on the danger from oil apply to the heavy oils, such as are used for lubrication, and not to the more volatile ones, such as kerosene. The lighter ones volatilize and pass off with the steam; while the heavy ones decompose and bake on the sheets. Kerosene, in fact, is sometimes purposely introduced into boilers to loosen up scale; though it never should be so used without the exercise of care and judgment. *The Locomotive.*

A BULGED PLATE.

DEMONSTRATED AND DISPUTED POINTS IN MILLING.

By J. Murray Cast

A PROGRAMME of a mill is that which shows the point from which each product is taken and the place to which it is delivered, from the time the wheat enters the first cleaner, on through the several manipulations, until it passes off as flour, bran and pollard. A programme is the science of milling. However good a line of machines we may employ, if the programme is deficient the mill may be a complete failure. After the wheat has passed the cleaning machines and been delivered to the first break, the balance of the programme consists, when correctly made, in one continued effort to separate the bran and germ from the starch and gluten, and the latter being reduced to a granulation best suited for flour. The above sentence embraces the whole science of milling. There is nothing else in it only to separate and granulate; but to accomplish this has brought forth an astonishing number and variety of machines as well as systems of separation, or programmes.

The most perfect programme is that one which delivers the bran and pollard to the bin quickest, or at least as much of it as it is possible to do, and which, when it has made a separation of impure stocks, never permits them again to become mixed with the good and pure material. The shortest programme now in use is as follows. First operation. Deliver wheat to millstone hopper from farmer's bag. Second operation. Bolt it through No. 6 or 7 cloth and scoop it up with a wooden paddle out of a box below the reel. There are plenty of mills of this kind still in operation, some not ten miles from London; and there are bakers in London who have pretended to say that they would not try any flour only such as the miller made on the above system. It does not require much experience or expert talent to programme this kind of a mill; hence the science of milling, as developed in former days, consisted in stone dressing and balancing, and whatever advantage one mill obtained over another came from this, as the programme was alike in all.

The shortest programme in roller-milling which can be made to act automatically and make a good finish would consist of one wheat-cleaner; one 4-roll mill (corrugated) making two breaks, and one 4-roll mill (smooth) for middlings; one short reel for first-break, with tail-sheet for middlings; one similar reel for second-break; one purifier and one reel for first middlings; and one reel for second middlings. A mill with this limited number of machines may be so programmed as to make no return, a fairly good finish and a very white flour, but of a soft texture. The plan consists in the use of a fine corrugation, 20-cut on first-break, 24 on second, and large differential, 6 to 1 if possible, to get on first break. Then spread or deliver wheat thinly and grind nearly to a finish at one operation. This will make a very large percentage of flour from 60 to 80 per cent. being reduced so that it would pass a No. 9 cloth, which is fine enough for this flour. The bran being so softened by this severe break, the flour may be bolted out without scalpers, and there being so little middlings made, the one double stand of rolls will finish them; consequently the yield may be as good as in some of the most elaborate mills.

This class of mill is especially adapted to small water-powers, having only 6 to 10 horse-power. I have erected many such mills in the United States, and they have proved successful. They make a very white flour, in fact, the whitest flour whole product I have ever seen has been made on one of these very short mills; but it lacks in sharpness of granulation, and therefore I do not advocate it as the most approved roller system, but it is a great advance over the millstone, and is applicable to mills of limited power and within reach of millers of limited means. It would be a desirable system for the small water-powers of France, in which country there are about 15,000 of these small mills, all being of about the same style. In that country also the baker looks for color more than granulation, and consequently the softness would not be so much of an objection.

Leaving this shortest style of automatic roller mill, as applicable to mills of 6 to 10 horse power, we come next to those mills having from 15 to 25 horse-power; and the intelligent expert who understand his business and I may say right here that it requires years of experience and many failures to learn it, and that it has the most intricate difficulties and modifying conditions of any business known, he who understands his business will first study the possibilities of the power and what he can rely upon in the most unfavorable circumstances, and then calculate the extent of the system from this standpoint. It is a very grave mistake to load a mill of limited power down with a lot of surplus machinery; it is almost criminal, from the fact that it not only requires of the miller payment for unnecessary machines, but it loads upon him the expensive burden of running them for years to the reduction of his output and to his great loss. Yet this very thing is constantly being done, very often, for charity's sake I will say, through a lack of sufficient experience on the part of the expert, who has seen Jones's mill and builds one like it, although Jones has double the power; therefore the expert is not able to adapt himself to the new conditions and so makes a failure. The miller gets a mill in which he expects to make flour just as good as Jones makes, but his mill drags, and he takes off feed until it is not loaded, when it manages to turn in a breathless sort of manner; but a mill with purifiers half loaded, and bolts running with half feed, can never make any thing but a dark flour.

It is a much worse fault, but not generally recognized, to have a mill under-loaded than over-loaded, as in the latter case the finish may not be so good, but the flour will be better; while in the former case, especially in the European single conveyor system, which gives no control, the flour will always be dark in color. This is inevitable, and so the business of an expert in programming the flour stock is one of grave responsibility. But I started to say that the next mill above the 3-break mill for light powers is the one in which from 15 to 25 horse power can be relied upon. In such a mill we may use four double stands of rolls, four scalpers, four finishing reels and two purifiers, making the size of machines to correspond with power and capacity required. In a mill of this kind I would use three breaks on wheat and five reductions on middlings. This will produce a good mill and one that will compete favorably, in quality of flour, with the most elaborate plants. This plant should be erected for such mills as require from 1½ to 2½ sacks per hour.

Last week I wrote with special reference to mills having small power. These small mills represent probably, in number, two-thirds of the mills of the world. The question whether they can put in rolls depends upon the simplicity of the system. If a simplified system requiring small power can not be furnished them, they must ultimately become idle. This represents the loss of many million pounds' worth of once very productive property. So every one who takes a step in the direction of the needs of these small mill-owners is performing a good act. The big ones are able to take care of themselves and to pay for best expert talent, so we may pass them by and devote this portion of the article to the demonstrated points in programming.

Selecting the numbers of cloth and wire used in separating is a part of the duties of him who makes the programme. To perform this work properly requires a knowledge of the various classes of wheat, the effect of the climate, the capacities of silks, etc. A mill built in the highlands of Scotland would admit of two numbers of cloth finer for the flour than one situated in the fogs of London. In the clothing of the scalpers for the breaks I find a great variation in Europe. Some mills have 12, 16, 20 and 24 cuts on the third, fourth, fifth and sixth breaks; others have 24, 28, 30 and 36 cuts for the same breaks. Now both these numbers are not right; they are both extremes. The former will make too much chipped wheat, the latter too little good middlings and semolina; but of the two extremes, in large mills, the former would be by far preferable, because a remedy might be had in re-scalping and sending the "chips" to a special break.

Upon the general system of correct programming I can say most in least space by presenting a number of rules which I think have been clearly proved. 1. In a six-break mill never send the chop from the first, second and sixth breaks along with the third, fourth and fifth breaks. The first is black flour; the second is granular, but very dark; the sixth is both dark and soft. If mixed before bolting, the whole mill is contaminated. 2. Never mix bran or last reduction middlings with those produced by the breaks in advance. 3. Never mix second middlings with those from the breaks, except in very short mills, where it cannot be avoided. 4. Never mix bran or second germ stock with tail sheets and second middlings of a granular quantity. 5. Never mix the tails of purifiers handling coarse stocks with those of purifiers handling fine stocks. 6. Never mix very coarse middlings with very fine and attempt to grind together. 7. Do not undertake to use purifier on any stock finer than No. 9. 8. Make no returns.

Each one of these rules might become the subject of a long article, and the reasons given why the rules are correct. The fundamental thought in all of them is to keep separate the pure from the impure and the branny from the granular material. It will be proper for me to point out how these rules are often violated. Granular stocks not infrequently become mixed with branny stock from the tails of the purifiers. They have been clothed too fine or have the cloth filled up, or the rolls are not properly set, and a large amount of middlings goes over the tail, thence into a branny stock, and finally to the pollard bin. The way good stock frequently becomes mixed with poor stock occurs from sending the second middlings along with the second germ and bran middlings. The one is a fine white material, the other a coarse, dark, branny material. The system of shaking trays just above the purifier-riddle not unfrequently steals a large amount of fine white middlings, and mixes it with bran and fiber.

There is nothing so treacherously deceptive and ruinous to the miller as the mixing of fine middlings with coarse pollard, and there is no fault so common. The bran covers up the middlings so that they are not perceptible, except on careful inspection or sifting, which is too much neglected. If you are not satisfied with your yield, take a pound of fine and coarse pollard, sift it over a cloth that will pass the middlings, if any, and from this estimate how much of it is made in a day, and you may be astonished to find that your loss from an unexpected source, which would take but five minutes to discover, really amounts in the year's run to more than all you have made. These remarks of course apply only to those whom they will fit." *London Miller Gazette.*

TESTS ON THE FUSING POINT OF FUSE WIRES.

IN the following we give the results of certain tests made on fuse wires in the Laboratory of the Massachusetts Electrical Engineering Co. They were made at the request of the engineering department of the company, in order to determine more positive data than was known regarding the actual fusing points under varying conditions of use of such wires.

The method of conducting these tests was as follows: Fuse wires of various grades and makes were bought from the most reliable dealers. By a conveniently arranged switch, ammeter and adjustable resistance, any current up to 200 amperes could be passed through the piece of wire under test for a given length of time. The current could either be gradually increased through the fuse wire or be adjusted to any strength, and then suddenly passed through it.

The following table is made up from averages of a number of the tests made on smaller sizes of wire:

Nominal amp. or safe carrying capacity.	Fusing point in less than 10 seconds, 1 inch long.	Fusing point in 30 seconds, 1 inch long.	Fusing point in 10 seconds, 2 inches long.	Fusing point in 10 seconds in closed box, 2 inches long.
2.	7.0	6.0	6.6	6.6
2.5	7.8	6.2	7.3	7.2
3.	12.0	9.2	10.0	9.8
3.5	12.5	10.0	10.6	10.2
4.	13.0	11.0	11.0	10.7
6.	14.7	13.8	13.5	12.1
7.	15.3	14.5	13.2	12.9
8.	18.0	16.5	14.0	13.5
10.	20.0	18.7	18.0	17.6
15.	36.0	34.0	28.0	27.0
20.	53.0	47.0	45.0	43.5

A similar series of tests were made on several makes of wires, and the following conclusions reached:

A longer piece of wire will fuse with less current than a shorter. This is due to the less rapid conduction of heat from the centre of the fuse wire into the binding posts and main wires.

The fusing point in a closed box is lower than that in the open air, the difference varying with the condutions in each case and due to the more or less rapid radiation of heat from the wire.

The fusing point varies with the temperature of the air surrounding the wire.

The fusing point varies with the length of time the current flows; that is, it will fuse at a lower point if the current flows for a longer time.

The requirements for a good fuse wire are:

1°. The nearest approach possible of the fusing point to the safe carrying capacity.

2°. A constancy under varying conditions of position and temperature.

3°. Rapidity of fusing at the proper current.

4°. It should not throw the particles of molten metal or "splutter," thus endangering the surroundings from fire.

The best wires tested had a fusing point in enclosed place for the smallest sizes, of about 200 per cent. above their safe carrying capacity, of the medium sizes of about 100 per cent. and the largest sizes of about 50 per cent., and less, above their safe carrying capacity. These tests and experiments are being carried still further in this laboratory with a view of devising, if possible, some better system of fuses.

EARTH CURRENTS.

IN a paper recently read before the Naples Academy of Sciences, Signor Palmieri gave an interesting account of some earth currents phenomena observed by him in connection with an ordinary overhead telegraph line, five miles long, running from Resina to the Vesuvius Observatory, *i. e.*, from S. W. to N. E. Previous observers have noted the fact that in wires placed in the magnetic meridian, the direction of the earth current was from north to south, and in wires placed equatorially from east to west. Accordingly in the wire experimented on by Signor Palmieri the current *ought* to have been from N. E. to S. W., instead of from Resina to Vesuvius as was the case. Matteucci has observed that in wires inclined at an angle to the horizon, the earth currents are always in an upward direction. Now the difference in level between Resina and the Observatory was nearly 1,000 feet. Signor Palmieri, therefore, extended the line from the Observatory in practically the same direction for a distance of nearly 200 yards, and earthed it on the reverse slope of the mountain 52 feet below. If the new line were earthed at the Observatory, the galvanometer showed that a current of less intensity but opposite in direction to the Resina Vesuvius current was flowing in the wire. If the Resina Vesuvius line were joined up to the extension line, the earths now being at Resina and at the point 52 feet below the Observatory on the reverse slope of the mountain, the galvanometer deflections were found to be proportional to the algebraical sum of the current intensities. Signor Palmieri concluded his remarks by pointing out that previous observations which did not take this phenomenon into account were entirely vitiated.

MILLS AND WATER RIGHTS.

FEW subjects in which mill owners are interested are susceptible of a greater variety of opinion and discussion than the riparian rights of water-power owners. In cases where several mills of manufacturing establishments are located upon the same stream, many intricate and perplexing questions arise concerning the rights and privileges of one over the other. Much litigation has grown out of such cases from time to time, and many decisions of the courts may be found on the records, some of which appear to be somewhat conflicting. There is what may be termed an unwritten law, which is frequently applicable to such cases. This law is founded upon reason, common sense and equity, and in almost every case which has been taken to the courts of highest resort this principle of law has been sustained.

This unwritten or common law gives to all owners whose lands are situated on each side of a stream a clear title to the centre thereof, except such as are navigable; in such cases the state or general government reserves the title to a sufficient portion of the lands under the water to meet the necessities of the public. But on streams that are not navigable the title to the centre is vested in the owners of the lands bordering on the same, and, while each owner is clearly vested in such title and has the full and unrestricted right to the use of one half of the water, he has no right whatever so to use it as to divert it from its natural channel, except upon his own lands, or to infringe upon the rights of others whose lands may be situated below him, but in all cases he is bound to return the water upon leaving his own premises to the original channel.

In case of a fall so situated, if the owner on one side of the stream chooses to improve the same and use the water upon his own premises for manufacturing purposes, there is nothing in the law or equity to prevent him from erecting a suitable dam across such stream, although a part of the structure must necessarily rest upon the lands under the water of the adjacent owner; but in no case will he be justified in raising the water so as permanently to cover any part of the lands of the adjacent owner above low-water mark, without compensation for the lands so used. In case the water is to be used on both sides of the stream for such purposes, then the owners of the land adjacent are jointly liable for one-half of the cost for constructing the necessary dam and keeping the same in repair. As each party in such cases is clearly entitled to the use of one-half of the water in the stream, it follows that each may insist upon the water being drawn from the pond at the same level, and the law will not justify either party in making any excavations in the the bottom of the pond or in placing any obstructions therein, whereby more than an equal quantity of water may be diverted to one side or the other; and in times of scarcity, when the supply is not amply sufficient for both parties, either party may insist upon a still more accurate division by not only drawing the water from the same level at the pond, but also drawing it through the same-sized aperture. But whenever there is a surplus and water is running over the dam, neither party is bound to observe this rule, but may increase the size of the opening to the full extent of the surplus; but in no case has either party the right so to enlarge this aperture as to draw the water below the level of the dam.

It frequently happens that several mills are located upon the same stream, one below the other, and those below often suffer inconvenience in times of low water from the shutting down of those above, while their ponds are being filled. In ordinary cases it would appear that, while those below may suffer considerable inconvenience at times from this cause, yet from the fact that the water stored in the ponds above may be considered as stored for their benefit as well as the others, no real damage is sustained in consequence. This, however, is not always the case; neither is this rule applicable in all cases. One case will illustrate this. A has a manufacturing establishment situated at the head of a rapids with several mills situated on the same stream below him. A's pond being somewhat more than three miles long and covering a large area, in the summer, when the stream was low and the pond drawn down to its lowest point, then when the head-gates where shut down it would require a full week to fill up again. A's wheels used a large quantity of water, and when run to their full capacity they would exhaust the supply in about three days. It was his practice to run the works by water exclusively until the pond was exhausted, then shut down and run by steam until the pond filled up.

B had a mill situated below him, with a moderate sized pond, and wheels that used much less water, and when A's works were running by water, he could not use one half of the flow, and the balance ran over the dam and was lost. B, owning the lands on both sides of the stream, brought a suit in equity, claiming that he was entitled to the use of and required all the water that the stream would afford, but by the manner in which A was using it he was practically deprived of the use of a certain part of it. In this case it was held that, although A had the undoubted right to the use of all the water in the stream, yet he only had a reasonable right to its use, and no right to use it in such a manner as materially to damage those below them by holding it back an unreasonable time and then drawing it in such quantities that more than one half flowed over the dams below and was wasted. *Such use was held to be practically diverting just so much water from them, and as effectually so as if it had been diverted from them by another channel.* While the right of A to fill his pond was admitted, yet the rights of those below him in the use of the same water were such that he had no right to use it to their damage.

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

The courts, in nearly every case where it is shown that water is used in an unreasonable manner or diverted from its natural source to the damage of mill-owners, have promptly awarded damage for the same, and even the State has no legal right to grant the privilege of taking water from such waters as are under State control, without the consent of the riparian owners of the lands situated upon the outlets thereof. *This point has been* recently settled by the Court of Appeals in the case known as the Honeoye Millers vs. the city of Rochester. Hemlock Lake is situated in Livingstone County, N. Y. Being a navigable body of water, it is claimed to be the property of the State and under its control. By an act of Legislature the city of Rochester was authorized to construct a suitable conduit and draw from said lake water for domestic and other uses to the amount of 9,000,000 gallons per day. The outlet of Hemlock Lake is known as Honeoye Creek, upon which are located a number of mills and manufacturing establishments.

Soon after the said water works were completed, suit was commenced by the mill-owners along this creek for alleged damage to riparian rights by diverting a portion of the waters of the lake from its natural course. The general defence set up by the city was that, the lake being a navigable water, it was the property of the State and under its control, and that the State had the right by act of Legislature to make any disposition of its waters that it might choose. This was met by the arguments on the other side that, while the State might have control of the lake, it had no control of the water *after it had passed out of the lake and entered Honeoye* Creek, and that certain riparian rights existed along said creek over which the State had no control; and those rights called for all the natural flow of water that the lake afforded, and that by diverting a portion of the water from the lake the supply in Honeoye Creek was diminished, and consequently they were damaged thereby. The court sustained this argument, and judgment was rendered against the city of Rochester in the sum of $90,000. C. B. Tompkins in *The Mechanical News.*

Some European railway companies have adopted a system of portable electric lighting plants on their lines. The object is to have a light at hand for application at any given point for important purpose, such as the illumination of the scene of an accident, the disembarking of troops, etc.

TRADE NOTES

The offices of the Canadian Office and School Furniture Co. have been removed from Toronto to Preston, Ont.

Among recent purchasers of the Ball Company's 4 ampere apparatus are the Chesley, Arthur, Colborne and Hagersville Electric Light Companies.

The Hercules Manufacturing Company, Petrolea Ont., will supply the machinery for the new roller flour mill being built at Russell, Man., by Mr J G Bolton

The Ball Company recently shipped a dynamo for incandescent lighting to the steamboat "City of Midland." It will go into operation in a few days. They have also supplied the same vessel with a search arc light.

CALKIN ELECTRIC LIGHT COMPANY.

THIS company was incorporated a short time ago at St. John, N. B., with a capital of $150,000 to enable them to put in a complete new arc and incandescent plant. *The Telegraph* is pleased to learn that the Messrs. Calkin have consummated all negotiations and have contracted with the Fort Wayne Electric company, of Fort Wayne, Ind., for 4,000 incandescent lights of the Slattery induction system and 240 arc lights of the Wood system. The plant will be installed at once. Four 150 horse power compound condensing engines will be used to furnish the power. Messrs. Keasley & McLane have secured the order for the boilers, which will be built by Messrs. McLaughlin Bros. of this city.

The contract and all negotiations have been carried to a successful termination by Mr W. J Morrison, representing the Fort Wayne company, and Mr. Geo. E. Calkins, of this city These gentlemen leave for Montreal, Toronto, Hamilton and Fort Wayne, Ind., to purchase all necessary supplies required in the construction of the plant. When completed this plant and station will be the finest in the Dominion. We are inclined to think that Mr. Calkin has made a good choice of apparatus in buying the system manufactured and controlled by the Fort Wayne company. The following clipping from *Progressive Age* of New York, the leading gas journal of the United States, shows that the systems are much appreciated in that country:

"The eyes of the gas fraternity connected with the gas companies now operating electric light, or contemplating the introduction of the electric light, have been turned on General Hickenlooper, of the Cincinnati Gas Light and Coke Company, for some months past. *Progressive Age* has published repeatedly various items and articles concerning the progress made by this company in its introduction of an electric plant, and in our issue of September 1st, last, we published drawings of the proposed station to be erected by that company. General Hickenlooper employed Mr. George F. Card, who is well known to the electric fraternity as a most thorough and accomplished expert in electric matters, to make a tour of the various leading cities of the country for the purpose of examining the different systems in use and methods of operating them, so that his report would enable the officials of the Cincinnati company to determine the system best adapted to their requirements. In due time Mr. Card made his report, which resulted in the adoption of the arc and incandescent system of the Fort Wayne Electric Company. The plant now consists of 500 arc lights of the improved Wood system, and 2,000 incandescent of the Slattery system. The Cincinnati *Enquirer* of recent date contains an interview with General Hickenlooper, from which we take a few statements that will be of general interest. In the course of his talk with the *Enquirer* reporter, General Hickenlooper denied the reported consolidation of his company with the Thomson-Houston, and during the interview said as follows:

"We have, as any interested person can see for himself, the best system and most perfect arc lamp ever invented, giving a light superior in steadiness and brilliancy to any lights heretofore seen in this city, and we consequently anticipate no difficulty in scooping the patronage. We have been in active operation only about a month, with the most encouraging results, having in that short time introduced 140 arc lights and nearly 800 incandescents. We have just closed a contract with Joseph T. Carew for lighting his mammoth establishment with 100 arc and over 1,000 incandescent lamps."

WOOD SPLIT PULLEYS.

THAT the Dodge Manufacturing Company was the first party in the United States to make a successful Wood Split Pulley and interchangeable for shafts of different sizes is not denied by any one, and that they have thus been great benefactors to mechanics and manufacturers is also not denied says, *Power and Transmission*. That they have stood by the manufacturers with the best belt pulley that can be purchased, at reasonable prices, is demonstrated by the numerous failures among the imitators who have been constantly springing up. In no case has an imitator equalled the product of this company or produced a pulley not in infringement of their patent rights and making every user and consumer liable to annoying suits at law. A good wood split pulley can not be made without the use of some of the patents belonging to the Dodge Company and the various attempts to do so have not been successful, but have resulted in some remarkable mechanical monstrosities which nevertheless have been put upon the market guaranteed by their authors to be as good as the Dodge "Independence." In no case has this proved true. The "Independence" has now been upon the market for over nine years and over five hundred and eighty thousand (580,000) have been sold, and in every case with satisfaction to the consumer. Every pulley is sold on the following special guarantee:

"We guarantee every pulley made by us shall be, in every respect, as represented.

We guarantee the poplar face in every case, to transmit from 25 to 60 per cent. more power with the same belt, than any iron pulley made, with like tension belt.

We guarantee the compression fastening in every case to be perfect, and to hold firmly upon the shaft.

We guarantee the compression of wood on iron to hold stronger than set screws in any case, and to be the most perfect fastening ever invented.

To summarize: We guarantee satisfaction entire.

Any pulley found defective and not as represented, may be returned at our expense. We will allow any party who is skeptical as to the merits of our wood split pulley, and who means business, a trial of 30 days, and if not satisfactory, to be returned at our expense."

LUMBER PRICES.

LUMBER.

CAR OR CARGO LOTS.

1¼ and thicker clear picks, Am. ins	$40 00	42 00
1¼ and thicker, three uppers, Am ins		37 00
1¼ and thicker, pickings, Am ins		27 00
1 x 10 and 12 dressing and better	19 00	20 00
1 x 10 and 12 mill run	14 00	14 00
1 x 10 and 12 dressing	14 00	16 00
1 x 10 and 12 common	12 00	13 00
1 x 10 and 12 spruce culls	10 00	11 00
1 x 10 and 12 maple culls		9 00
1 inch clear and picks	32 00	35 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	16 00
XXX shingles, sawn	2 50	2 75
XX shingles, sawn	1 50	1 75
Eastlake galvanized steel shingles, 24 W. G., per square		1 [illegible]
Eastlake galvanized steel shingles, 2[illegible] W. G., per square		2 [illegible]
Eastlake painted steel shingles, per sq.		4 00
Round painted galvanized steel shingles, per sq.		3 00
Round painted painted steel shingles,		4 25
Round painted, unpainted, Terne tin shingles		4 00
Manitoba galvanized, steel siding, per square		5 00
Manitoba painted steel siding, per sq.		5 00
Painted sheet steel pressed brick		3 50
Painted crimped steel sheeting		3 40

Price of Copper shingles according to weight.

YARD QUOTATIONS.

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

B. M

1½ inch flooring, dressed, F. M	28 00 32 00
1¼ inch flooring rough, B. M	18 00 22 00
1¼ " dressed, F. M.	25 00 28 00
" undressed, B. M	18 00 19 00
" dressed	18 00 22 00
" undressed	12 00 15 00
Beaded sheeting, dressed	22 00 25 00
Clapboarding, dressed	22 00
XXX sawn shingles, per M, 16 in	2 60 2 75
Sawn lath	2 00 2 20
Red oak	30 00 40 00
White	35 00 45 00
Basswood, No. 1 and 2	18 00 20 00
Cherry, No. 1 and 2	70 00 70 00
White ash, No. 1 and 2	25 00 25 00
Black ash, No. 1 and 2	20 00 30 00
Dressing stocks	16 00 22 00
Picks, American inspection	40 00
Three uppers, American inspection	50 00

MONTREAL PRICES.

Lumber, Etc.	
Ash, 1 to 4 in., M	$15 00 25 00
Birch, 1 to 4 inch, M	15 00 25 00
Basswood	12 00 20 00
Walnut, per M	50 00 100 00
Butternut, per M	22 00 40 00
Cedar, flat	00 04 00 06
Cherry, per M	60 00 80 00
Elm, Soft, 1st	15 00 17 00
Elm, Rock	25 00 30 00
Maple, hard, M	20 00 25 00
Maple, Soft	16 00 18 00
Oak, M	40 00 95 00
Pine, select, M	35 00 40 00
Pine, 2nd quality, M	20 00 25 00
Shipping Culls	14 00 16 00
Mill Culls	8 00 10 00
Lath, M	1 50 1 70
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 70 3 00
Roman " "	2 70 3 00
Fire Bricks, per M	20 00 20 00

NEW YORK PRICES.

WHITE PINE.

Uppers	$45 00 62 50
Selects	41 00 53 00
Fine common	36 00 48 00
Cutting up	28 00 30 00
Common	21 00 25 00
Norway	24 50 26 50
Pickets	14 00 23 00
Shippers, according to quality, for different parts	17 50 32 00
Coffin boards	21 00 23 00
Box	15 50 17 00
Ceiling	24 00 42 00
Shelving	25 00 27 00
Moulding	14 00 17 50
Bevel siding	16 50 24 00
Bridge timber	28 00 30 00

EASTERN SPRUCE.

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

SHINGLES.

Pine 16 in., extra	$ 3 10 3 25
18 in., extra	4 [illegible] 4 60
18 in., clear butts	3 15 3 25
16 and 18 inch, Jacks	4 50 5 50
Cedar	2 25 [illegible]
Cypress	6 00 [illegible]
Redwood, per bunch	1 25 1 50
Vatent washi	1 00

TIMBER.

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, ¾ in	23 00 24 00
No. 1 ceiling, ¾ in	25 00 26 00
No. 1 ceiling, ⅝ in	18 00 19 00
Timber	14 00 15 00

ALBANY, N. Y. PRICES.

SHINGLES AND LATH.

Shingles, shaved pine	6 50
2nd quality	5 00
Sawed, extra	4 80 4 90
Sawed, clear butts	3 00 3 75
Cedar, XXX	3 50 4 30
Shingles, cedar mixed	2 60 3 00
Hemlock	2 25
Lath, pine	2 25 2 30
Spruce	2 00 2 20
Hemlock	1 75 2 00

HEMLOCK.

Boards, 10 inch, each	13½
Joist, 3x9	33
Joist, 2"x4	13
Wall strips, 2x4	10

PINE.

2" in. and up, good	58 00 60 00
4ths	53 00 55 00
Selects	48 00 50 00
Pickings	43 00 45 00
1¼ to 2 in., good	50 00 55 00
4ths	45 00 52 00
Selects	40 00 45 00
1 inch, good	50 00 [illegible] 00
4ths	45 00 [illegible] 00
Selects	40 00 [illegible] 00
Pickings	35 00 38 00
Cutting up, 1 to 2 in	30 00 35 00
Bracket plank	32 00 36 00
Shelving Boards, 12 inch and up	28 00 32 00
Dressing boards, narrow	20 00 22 00
Shipping boards	16 00 18 00
Box boards	13 00 15 00
10 inch boards and better	30 00 34 00
Common	16 00 22 00
12 in. boards dressing and better	32 00 36 00
Common	16 00 22 00
1¼ in siding selected 13 ft	43 00 45 00
Common	16 00 21 00
1½ in siding, selected	43 00 46 00
Common	16 00 21 00
Norway, selected	24 00 26 00
Common	12 00 16 00
10 in. p. k. 13 ft. dressing and better, each	45 50
Culls	23 25
10 inch 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 ⅞ in	11 50 12 00
Stocks No 1, 1 and ⅞ in	22 00
No. 2, 1 and 1¼ in	[illegible] 00

WHITE PINE ROUGH.

Uppers, 1 and 1¼ in	42 00 44 00
1½ and 2 in	43 00 45 00
2½, 3 and 4 in	52 00 55 00
Selects, 1 inch	36 00 37 00
1¼, 1½ and 2 in	34 00 35 00
2½, 3 and 4 inch	44 00 46 00
Cuts, No. 1, 1 inch	28 00 30 00
1¼, 1½ and 2 inch	31 00 33 00
2½, 3 and 4 inch	37 00 40 00
No. 2, 1 inch	17 00 18 00
1¼, 1½ and 2 inch	23 00 24 00
Moulding, 1 inch	31 00 33 00

MACHINERY

FOR SALE.

LIST of Miscellaneous Machines, etc., for sale by H. W. PETRIE, Brantford and Toronto.

ONE Corn and Cob Crusher.

FIVE Grain or Feed Mills.

ONE Crag Wheat Scourer.

ONE Mill Stone Dresser.

ONE Corn Husker.

TWO Corn Shellers

TWO Paint Mills.

ONE Tile Machine.

ONE Clay Crusher.

ONE Copper-jacketed Kettle.

TWO Copper Dye Kettles

TWO Set Cracker or Biscuit Machines, with Dies.

ONE Sugar or Sorgum Mill.

ONE Union Leather Splitter.

ONE Steam Rock Drill.

ONE Foot Press for Canners' use, with Dies.

ONE Fruit Evaporator.

ONE Caligraph Typewriter.

ONE Clover Thresher and Huller.

ONE Ditching Machine.

ONE Wiard Sulky Plow.

ONE Hosiery or Bobbin Winder.

ONE Set Scouring Rolls.

ONE Chase Flock Cutter

ONE Lot Press Plates.

TWO Meat Choppers.

ONE Large Clothes Mangle.

ONE Shooting Gallery Tube.

ONE small Bone mill.

ONE Run 48 inch Buhr Stones.

ONE Run 42 inch Buhr Stones.

10 Water Wheels, different sizes and makes.

ONE Lot Spur and Bevel Gears.

ONE Lot Shafting, Hangers and Pulleys.

ONE Lot Balance Wheels.

ONE set Cheese Box Machinery.

ONE Lot Cook's Patent Levels.

TWO Steam Fire Engines.

FIVE Hand Fire Engines.

TWO Hose Carts.

EIGHT Steam Pumps.

ONE No. 10 Centrifugal Pump.

THREE Hydraulic Rams.

ONE Champion Spark Arrester.

ONE Lot Lifting Jacks.

ONE Lot new Portable Forges.

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50 H. P. Slide Valve Engine, our own make.
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30 H. P. Slide Valve Engine, our own make.
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30 H. P. Brown Engine.
20 H. P. Beckett Engine.
25 H. P. Westinghouse Engine.
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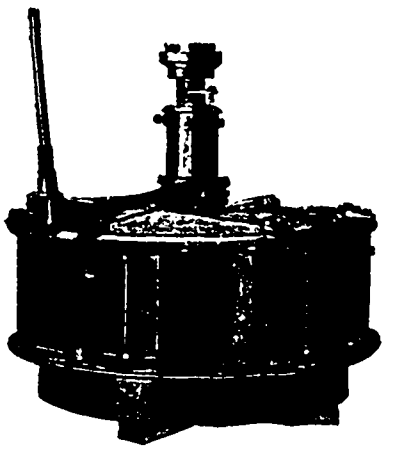

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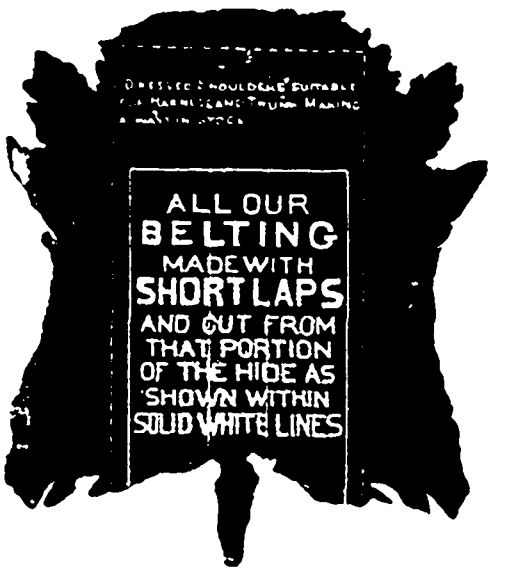

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