

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- Additional comments:/
Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured pages/
Pages de couleur
- Pages damaged/
Pages endommagées
- Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- Pages detached/
Pages détachées
- Showthrough/
Transparence
- Quality of print varies/
Qualité inégale de l'impression
- Continuous pagination/
Pagination continue
- Includes index(es)/
Comprend un (des) index
- Title on header taken from:/
Le titre de l'en-tête provient:
- Title page of issue/
Page de titre de la livraison
- Caption of issue/
Titre de départ de la livraison
- Masthead/
Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	14X	18X	22X	26X	30X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12X	16X	20X	24X	28X	32X

THE DOMINION MECHANICAL & MILLING NEWS

DEVOTED ESPECIALLY TO THE INTERESTS OF OWNERS AND OPERATORS OF

Flour Mills, Saw Mills, Planing Mills and Iron-Working Establishments.

Vol. VII.—No. V.

TORONTO, CANADA, MAY, 1889.

{ Price, 10 Cents
\$1.00 PER YEAR.

THE TORONTO WHEAT CLEANER.

THE machine illustrated herewith is designed to do all the cleaning required in a mill of medium-size. There is combined in this machine, separator, smutter and brush, each distinct from the other.

The grain is fed into the shoe at the top of the machine, and after passing through the sieves, is caught by a current of air before entering the scouring cylinder. After leaving the scouring case, it is subjected to another current of air, passing from thence to a second pair of sieves, from which it discharges into a hopper, feeding directly to a horizontal brush. The brush is partially encased by a corrugated adjustable concave, arranged so that it may be set to or from the brush when running. The concave is corrugated parallel lengthwise with the brush, thereby insuring the frequent turning over of the grain in every possible way before it enters the other air trunk, where another current of air acts upon it.

The manufacturers claim for this machine over all others the advantages of extreme simplicity, ability to accomplish in a small space, and with one belt drive a large amount of work. It dispenses with the cost of setting up two or more machines, besides saving the space which such machines usually occupy. These are advantages of no small importance to millers. In no other way than by the method of arrangement shown in this machine, can a brush be made to wear as evenly and work as evenly on the grain. The manufacturers do not hesitate to say that this machine driven by a three-inch belt will clean at least thirty bushels per hour. Machines will be made in three sizes, adapted for any capacity.

This machine is manufactured by Messrs. A. Laidlaw & Co., Toronto, who will cheerfully answer all inquiries concerning it.

MELTING ZINC.

ZINC is troublesome to cast, and more troublesome when small thin molds are to be cast. Lining the mold with whitening and water which must be allowed to thoroughly dry, will often cause the metal to fill the mold well. Burning of the zinc (oxidizing) may be prevented by covering the metal white in crucible or ladle, with a layer of common salt, a little muriatic acid, which amounts to the same, as a coat of zinc oxide is immediately formed on the surface of the melted metal, which effectually prevents further oxidation from action of oxygen in the atmosphere.

It is an improvement to keep a layer of charcoal on top of the zinc, or any other soft metal which can be melted in a ladle. The coating of oxide forms a protection against oxidation to only a certain degree, while the layer of charcoal tends to reduce the oxide again to its metallic form. Indeed, it is possible to recover lead, tin, zinc and antimony from the "dross" or oxide which gathers in the ladle. It is only necessary to melt the oxide with charcoal, salt, and soda to get it again into useful shape.

The dross should be powdered, likewise the salt, charcoal, and soda. Mix them together and melt. The soda and salt melt into a pasty mass and the carbon unites with the oxygen of the dross, leaving the metal free but burning off the charcoal. The salt and soda act simply as flux in reducing the oxides.

BRITISH COLUMBIA LETTER.

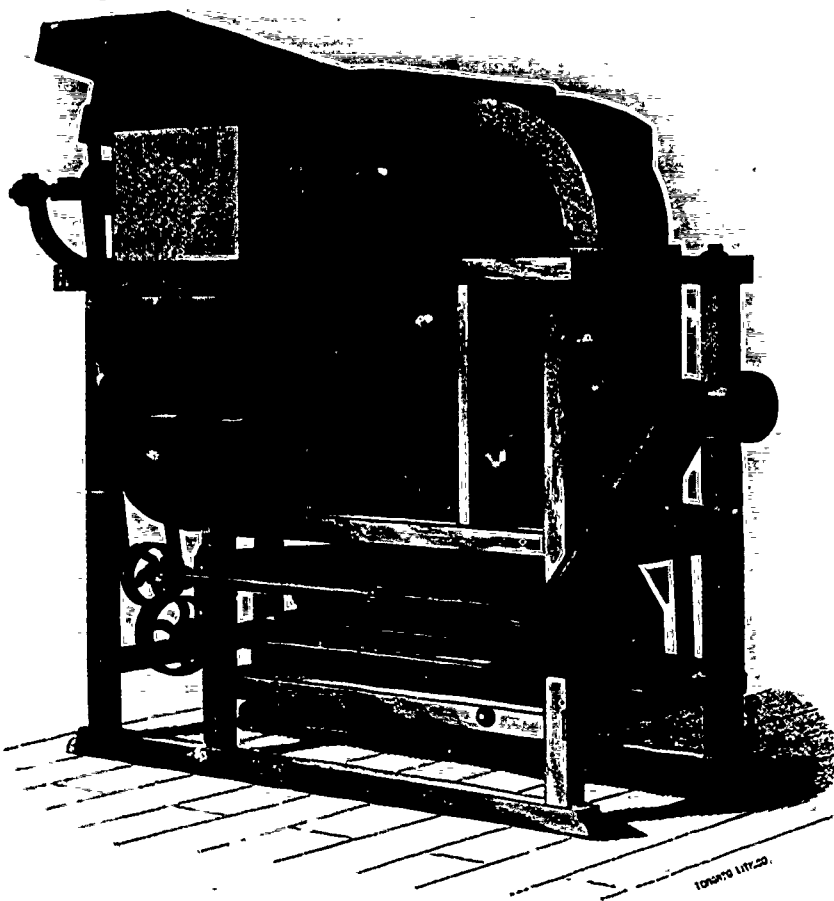
By R. E. GOSNELL.

IT is within the memory of the present generation when the same peaceful, prosperous condition of things did not exist in the sunset province of British Columbia that now characterizes its welfare. It will be remembered that Lord Dufferin, in his diplomatic mission to the province some years ago, refused to pass under arches in the streets of Victoria, the mottoes on which were too suggestive of disloyalty. The feelings that actuated the citizens of the Island City was not then inspired by malevolency of disposition or lack of love for the empire, because British Columbians of that day, and some of them are to this day, more British than

sources of the confederation, and at the same time seeing no hopeful signs of the conditions of the union being fulfilled, it is little wonder that her people should take the utterances of such men as Mr. Mills—that it would be better to let British Columbia cut adrift and sink quietly into the arms of Uncle Sam and become a prospecting ground for Yankee speculators, than that the Dominion of Canada should be bankrupted in order to make good the terms of a bad bargain—as the expression of the general Canadian sentiment and act upon it in good faith. The invaluable services of Lord Dufferin in restoring confidence in the pledges of 1871 can never be truly estimated. The wonderful success of the syndicate in completing the union by rail five years before

the most sanguine had predicted, and the consequent prosperity to British Columbia, and the great impetus it has given to the development of wonderful latent resources demonstrate at once two things: The shortsightedness of those who opposed a policy that has opened up hopes and aspirations for Canada, once undreamed of, and the wisdom of those men who gave this country a constitution. The latter were either wise as statesmen or builded better than they knew. The niche in the Canadian arch which the province of British Columbia will inevitably fill, will be an honorable one, more especially when it is considered that in addition to her vast riches of yet undeveloped mines, fisheries, timber and agriculture, her geographical position makes Vancouver described by Mr. Van Horne, at the Toronto Board of Trade dinner, as "The Tyre of the Pacific," the converging point for the future steamship lines from China and Japan, India, Australia, New Zealand, South America, San Francisco and Alaska, as well as the export port for the same. Does it not once more in the history of human affairs demonstrate that the stone that was rejected by some of the nation builders has become the head of the corner?

As the object of your excellent journal is not in the line of all the resources which constitute the national wealth of British Columbia, I shall not refer to the agriculture phases of the Province, although agriculture is not regarded as particularly a prominent feature in what we are capable of. It may be surprising to many to be told that comparatively limited as is its agricultural area, British Columbia is capable of producing more and better fruit than the present entire product of Canada and the United States. From a horticulturist point of view it represents the *summum bonum* of the world. It has also extensive wheat and grazing areas, of the richest possible character in the Spallumcheen, Okanagan, Shuswap valleys, and away north as far as Fort Simpson. I shall not take up the time of your readers in discussing the fisheries wealth of the province that is already recognized as the salmon grounds of the world, with an undeveloped sea coast extensive as that of the Atlantic, and Japan currents to convey fish food in the place of Arctic currents in the eastern side of Canada. Her fisheries will yet support a population of not less than 50,000. It would not be a part of the objects of this correspondence to speak of our mines, the treasures of which in gold, silver, lead, copper, iron and coal it would only be the veriest guess work to estimate. Any one of these elements is sufficiently fertile in itself to make this a great and a rich province, if it possessed no other, but what is more particularly interesting in this connec-



THE TORONTO WHEAT CLEANER.

the people of Great Britain, but the greater force of strong self-interest. Their cause was stronger even than what is implied in that term; it was one of self-preservation. Isolated from the other provinces not only by a range of mountains practically unsurmountable, but by a stretch of 2,000 miles of prairie and desolate expanse of rock, muskeg and forest, with no other intercourse than with a foreign nation accessible only after a week or two's sail, at San Francisco, or with far-away England, by a six months' voyage around Cape Horn. Not only that, but they had allied themselves politically with other provinces to form part of a confederation, the success of which at that time was quite as problematical as that greater expansion of political alliance now discussed under the name of Imperial Federation, the condition of which was union by railroad connection, and consummated in the completion of the C. P. R., but which, at that time, was a problem so great that some Canadian statesmen did not hesitate to denounce British Columbia as the white elephant of Canadian affairs. Under these circumstances, isolated from the country with which she was connected by what appeared an unnatural union, buffeted by the burdens which she imposed on the re-

tion is the vast timber wealth of British Columbia, to which the world is looking as a final resort for its lumber supply.

No computation can be made of the timber area, or the market value of it, which British Columbia possesses. Comparatively speaking, it is an unexplored region, and everywhere there is timber. The interior is a "sea of mountains," the sides of which and the valleys between are covered with forest almost impenetrable, although the destruction by forest fires has been something enormous in recent years, seriously diminishing its value and driving out and away to the north the fur bearing animals. But for the needs of the present generation, and so far as they are accessible, the forests of cedar, Douglas fir and spruce are sufficient for all practical purposes. Notwithstanding that there are 25 sawmills in operation at the present time with an annual output of about 275,000,000 feet, the evidences of their operations are scarcely perceptible as yet, and but a very limited survey is necessary to impress one with the extraordinary resources in timber which the province possesses. Her forests are very dense and her timber very large. After a limit has been culled by a sawmill company here, it is still so rich in standing trees that an Eastern lumberman would regard himself as wealthy in owning it. The density of the forests, and the great size to which the Oregon pine and cedar grow, even when the soil is comparatively worthless for agricultural purposes, are due to the climate and to the quantity of moisture with which the pools are constantly fed. In the east, it is regarded as a sort of maxim that the land that grows heavy timber must necessarily be good land, but here, that rule may almost be reversed. The roots spread out enormously and absorb everything nutritious to them within reach. A British Columbia forest is almost inaccessible, if not wholly so, on account of the vegetation that luxuriates. The moss sometimes completely envelops the trees, trunk, branches and all, and the appearance of this is striking when observed to its fullest extent, and is one of the things remarked by visitors. It is not a rare thing to see ferns growing out of this bed of moss, extending all over a tree. This feature of the country, the denseness of the foliage, very seriously interferes with the enjoyment of the sportsman.

In future letters I shall endeavor, having given the foregoing as a preliminary, to go more fully into details of the lumber industry in British Columbia, and if it be not interesting to your readers it will certainly not be the fault of the subject.

A DYNAMO WITHOUT DANGER.

THE Troy, N. Y., *Times*, states that Charles F. Wingler, an electrician of Hoosick Falls, exhibited at the factory of Miller, Hall & Hartwell, to the engineers of that city, recently, a dynamo upon which he had been experimenting for the past five years, which avoids all self-induction and work, without danger to those operating it. To accomplish the object it was necessary to do away entirely with self-induction and prevent contrary currents, which in the ordinary electric machines are so dangerous. It was also necessary to dispense with the wire which forms a part of the electromagnet. This was found to be no small task, as a certain amount of wire is needed to produce a strong magnetic field. The inventor overcame the difficulty with a clever contrivance, a set of compound electromagnets having been made which required less than a quarter of the wire used in the ordinary magnet. The danger was reduced in greater proportion. The dynamo exhibited was used to operate ninety-six incandescent lights and one arc lamp. The wires at any point may be touched without the least shock or any of the dangerous effects usually attending contact with an electric current. The inventor placed both hands on the brushes and no shock was given, and there was no place in any part of the apparatus where there was danger. Mr. Wingler as an experiment, made an arc lamp of his arms. He wound the positive and negative wires around the two carbons, and holding one carbon in each hand, brought them together, giving the same dazzling light seen in the lamps which light the streets. He was obliged to drop the carbons, as the intense heat made them too hot to be held. The wires were connected at the Miller, Hall & Hartwell factory with gas and water pipes, and it was impossible to receive a shock from the pipes. Miller, Hall & Hartwell have formed a stock company, recently incorporated, for the manufacture of the dynamos. The power used to operate the dynamo is not expensive, all of the lights at the factory being operated with less than 4-horse power—half the power absorbed by an ordinary dynamo of equal size. A number of patents have just been received for the dynamo, but foreign patents are still pending.

JOTTINGS OF A TRIP OVER THE MARITIME PROVINCES.

By L. A. MORRISON.

IN my former letter, written shortly after my arrival in St. John, I referred to the lumbering interests of New Brunswick. In some respects the provinces are about on a par. In both of them the lumbering up to 1870 cleared out the most of the good timber, so that the present lumbering operations are making a very thorough clean-up of all the timber and material, such as spruce, cedar, hemlock, birch, etc., and by the end of this century, or very early in the next, the lumbering business of both provinces will practically be at an end and the forests exhausted. This will be a serious matter in a number of ways:—

(1). Lumber will have to be brought from Ontario and Quebec for necessary purposes of building and manufacturing.

(2). A very considerable portion of the population now employed in lumbering, saw-milling, and shingle-milling operations, will have to find remunerative employment in other lines of industry, or emigrate.

(3). A considerable amount of invested capital and plant will become unremunerative to a very great extent, and therefore practically almost valueless.

(4). Present and added capital and labor will have to seek employment in other and more permanent lines of industry, national development and usefulness.

In view of these facts and conditions I may be permitted, from a practical standpoint, with the utmost good-will, to offer suggestions, not only in the line of this industry, but as bearing on the provincial and national good. It is this were the only important industry of these provinces which was likely to assume such a condition as I have indicated, it would seem almost as if the disturbance in financial, mechanical or industrial aspects would soon rectify itself, but what I have indicated as likely to result in lumbering business has already taken place, to some extent, in ship-building, shipping and fishing business. The first of these industries (ship-building) has been an important factor in financial and mechanical matters in both these provinces for sixty years past, and where twenty years ago it was nothing unusual to find fifty to one hundred vessels on the stocks each winter in the harbors of St. John and Portland, many of them of large proportions, during this present winter scarce a dozen were built, and these altogether fishing craft of no particular value or importance. The settlers along the East River, at New Glasgow, N. S., also tell of the river for miles being lined with vessels under construction each winter in years gone by, but this winter scarce a vessel is on the stocks over the whole range of the river, and these are only examples of every other ship-building place in the whole range of the ports and rivers of the provinces. This is a result of the unprofitableness of investment in wooden shipping, and the general dullness and scarcity of freights for this class of shipping, growing out of the partial decline of the lumbering and fishing interests, and the desire for rapid freight transit, which, while it gives profitable employment to faster (iron) steamships, leaves much less to do for the old style coasting craft.

Then the partial decline of West India and other trade has rendered shipping and shipping business of less value, so that it is important for those who have had, as well as for those who now have, investments in these and other decreasingly remunerative lines to see carefully where investments can be obtained which have a reasonable promise of permanency and profitableness. Many of the wealthier men of the city of Halifax, who have made their money to a large extent in shipping and commission business, have been putting it of late years into bank, loan and insurance stocks, and as a result, this little city has five chartered banks with a paid-up capital of four millions, besides three private bankers with a reported capital of a quarter of a million, and with loan company and insurance and other stocks, making a sum total of about eight to ten millions invested in this way. This thing can be overdone. Banks serve a useful purpose, but are only a means to an end. In the development of the agricultural, mineral and mechanical industries, requirements and resources of a country, banking establishments have their legitimate place and sphere of usefulness. Their multiplication beyond the necessities of commerce retards rather than advances progress. To make them an end, practically defeats their purpose. It may serve the desire of investors in bank stocks and grant them a life of comparative indolence, but the industrial resources of a country are not developed, nor the wealth permanently increased, by investments in this way. It is also a misfortune when the capitalists of a country in seeking investments, do not with some show of patriotism at least, endeavor to develop the natural resources of the coun-

try, and so permanently increase the wealth thereof. It is to be regretted, too, that all over this fair Canadian heritage of ours there are men in and out of business whose patriotism is based on the personal gain to themselves which will result from their actions or opinions, and who would barter our national birthright for some visionary "pottage" fad of present commercial emolument. (This is a digression from my subject, but as these "jottings" are written in spare moments on the train, I may be permitted an occasional break in the argument to relieve the monotonousness of the position, even though there may not appear at first sight to be any relation between the "position" and the "argument").

These provinces have within their borders, in practically unlimited abundance, all the natural materials required for the profitable permanent investment of all the brains, capital and labor they can command. There ought not to be a single pound of merchant iron or steel, pig, bar, or plate, imported into this Dominion. It is the fault of the people of Nova Scotia that there is, because I do not believe that any one of a dozen sites in Pictou county in that province, can be excelled on the face of the earth for the location of a profitable puddling furnace for smelting iron, on account of the quality and apparently unlimited quantity of iron ore, limestone and coal, in immediate and convenient proximity to each other. Very much credit is due to the Londonderry Co. for the energy and perseverance they have displayed in developing their works under some mechanical disadvantages as to the location of their raw material, and also to the Nova Scotia Steel Co. at New Glasgow, for the pertinacity with which they have stuck to and developed their rolling mill business until they now have proved their competence to supply bar and plate steel of most excellent quality at reasonable prices and with a profit to themselves. It is to be hoped that these pioneer establishments will soon be followed by others, and then from these will spring up a large variety of establishments using iron for raw material and manufacturing such machines, implements and articles of merchandise as not only these, but the other provinces, to some extent require. The development of the local fields will make considerable demands on the iron industry and the development of gold and gypsum mining on both iron and coal.

In my next letter I will take up the machine shops, planing mills and other manufacturing establishments, and may express some caustic opinions.

SHARING PROFITS.

DUNDAS, ONT., April 9, 1889.

Editor MECHANICAL AND MILLING NEWS.

DEAR SIR,—We have before us your paper for April, in which an article appears on sharing profits with employees, which must have been written under a misapprehension as to the name of the firm. The system, we understand, was introduced by Messrs. Peter Bertram & Co., of the axe factory here, to insure the regular attendance of the workmen, increase the output without addition to plant or machinery (as their work is by the piece) thus bringing mutual benefit to both employers and employees as the result has shown.

Yours truly,

JOHN BERTRAM & SONS.

INSURANCE RESTRICTIONS ON OIL FUEL.

THE Hartford Insurance Company has laid down the following strict rules in regard to the use of crude petroleum as a fuel:

1. No storage of crude petroleum for fuel shall be allowed in any position where, in case of accident, it can flow toward the insured premises, or within less than 50 feet if wholly under ground, or 100 feet if wholly or in part above ground. This excludes all storage in boiler rooms, or adjacent to premises, or feeding from oil cars.

2. Delivering of oil to furnaces must be by suction or other process, whether by pump, vacuum, or any other appliances that will accomplish the end sought, the supply to be lower than the furnace, so that, when not being used, the flow shall be away from, and not toward the premises. This prohibits the feeding of oil by gravity pressure or by other means from a storage supply higher than the premises.

Where the foregoing conditions are fully complied with, and storage tank, if wholly under ground, is 100 feet or more from risk, or if wholly or in part above ground is 200 feet and upward distant, permission to use oil for fuel will be granted without extra charge. If storage tanks are located less than 100 feet and not less than 50 feet of risk, wholly under ground, or from 100 feet to 200 feet if wholly or in part above ground, the extra charge will not be less than twenty-five cents.

Western Letter.

SEEDING operations in Manitoba have progressed favorably since my last time of writing. Seeding was partially stopped for about a week, by a light snow and cold weather, during the latter portion of March, but with this exception, the weather conditions have been very favorable. The springs are usually dry in this country, or rather I might say, the early portion of the spring is usually dry. Rain during seeding time is a rare occurrence. The dry weather is very favorable to seeding, which commences as soon as the snow is off the ground, and the frost out deep enough to harrow. About the time the grain is all in the ground, the rainy season commences and then follows about a month of pretty wet weather. This year has been no exception to the rule so far. We have had two light showers, but not enough to interfere with seeding, and the weather has been clear, warm and dry. Seeding has therefore gone on rapidly, and by the 15th of April a great many of our farmers were practically through with their wheat seeding. Some who were a little behind the majority, were not through for a week later. At the time of writing, early sown wheat is showing up nicely, and farmers are busy sowing oats and barley. Reports as far as received, point to an increase in the acreage of wheat of about one-third over the acreage of last year. There will also be a large increase in the acreage of other grains this year. The early and favorable spring is giving farmers every opportunity to put in a big crop, and they are taking advantage of these conditions to the fullest extent.

Our dry springs have one disadvantage, which is not known in the east. In this prairie country the wind gets a full sweep of the fields, and we occasionally have winds here too. On light soil, when loose and dry, the wind will occasionally blow the grain out of the ground. I have known instances where the grain was blown into ridges, and sometimes blown off the fields on the unbroken prairie. Damage from wind, however, is of very rare occurrence, and could be largely prevented by rolling the land. Very few farmers, however, roll their land here, as time is a great object in the spring. We have had one very heavy wind this spring, lasting about twelve hours, and some slight damage to seeded fields is reported from one or two points where the soil is light. Nothing to speak of, however, and it is not too late to repair the injury. Altogether the outlook at the time of writing is very encouraging. Our rainy season will be the next thing in order, and if that comes on in good time, a good harvest will be just about assured.

It is reported here that dissensions have arisen among the stockholders in the Lake of the Woods Milling Company, operating the large 1,200 barrel mill at Keewatin. Important changes in the company are looked for, and it is said that an investigation of the company's affairs is being made. It is stated by some who should know, that the company has not found the milling industry very profitable so far, and it will be no surprise if this turns out to be the case. This has not been a very favorable season for Western millers. Even those who were well established, and had their expenses down to a minimum, have found it a poor season for profits. The Keewatin company have therefore had a bad year to commence with, and with new enterprises on a large scale, it always takes some little time to get things running smoothly. The Keewatin Company had its full share of trouble at the start, in getting the mill into satisfactory shape, and a good deal of time was lost, owing to the distance of the mill from a foundry. As soon as the company had flour ready for the market, the management of the institution began a vigorous onslaught upon prices. The manager of the company is understood to have introduced his flour to the market with the assertion that prices were too high, and quoted figures away under current prices. This seemed a peculiar course to follow, for a person who had goods to sell to declare that prices were too high. A similar announcement was also made in Manitoba in regard to wheat, but in an opposite direction, namely, that the price of wheat to farmers was too low, and that the company would be willing to buy at higher figures. Later on, the Keewatin company offered to deliver flour in Winnipeg at about 30 cents per 100 under prices ruling here. This cutting in prices, taken with the extra expenses at the commencement, and the unsatisfactory season, makes it a matter of no wonder if the first balance sheet of the company should not show a very satisfactory balance on the profit side.

Notwithstanding that the past winter has not been a favorable one for milling, and that prospects for the immediate future are not very bright, there does not seem to be any disposition to stop building new mills in

this country. A number of new milling schemes are talked of, and it is quite probable that several small country mills—that is mills with a capacity of from 75 to 150 barrels per day—will be established here this summer. Ontario parties are interested in several of these schemes. Neepawa, Morden, Boissevain, Killarney, Birtle and other points, are among the places where mills may be started. Bonuses are offered or expected in about every instance, varying from \$2,000 to \$6,000. Moyer & Co., of Listowel, Ont., are among those who are negotiating to start a mill here. Manitoba has now a considerable number of country mills of the class mentioned, nearly all of which have been established through inducements offered in the way of bonuses. It is very questionable, however, if the majority of these mills have been operated with profit. On the contrary, it is likely that a number of them have not proved very profitable investments, from one reason or another. Some have been established by persons without capital, and put up as cheaply as possible, the main object being to get the bonus. Such mills, of course, are not profitable investments, as they cannot be operated to advantage. The establishment of a mill at one point, has often caused a feeling of rivalry, and led to the bonusing of a mill at another town in the district. In this way the mills have been multiplied. It has been an easy matter to work up bonuses, as the farmers are led to believe that they would get higher prices for their wheat, if a mill were built. This, however, has not always proved true, as the millers often could not afford to pay higher prices than were offered by grain buyers. A great many of the smaller country mills throughout Manitoba are only operated about half the time, and this would seem to indicate that they could not be paying very well. We would therefore advise Ontario millers who think of coming to Manitoba, to consider the matter very carefully, and not to jump at the conclusion that milling will pay better here than in the East. A small bonus should not be any inducement for a miller to come up here to start a mill, unless there is good reason to believe that the enterprise is one which would pay on ordinary commercial principles, and without the bonus consideration. It is one of the great arguments against bonusing, that it frequently leads to the establishment of unprofitable enterprises. If the enterprise is a good one, well and good, but a person should not go into an enterprise for which a bonus is offered, unless it is one which could be undertaken with every likelihood of success, without the bonus. There may be profitable openings for a few country mills in Manitoba, provided they are established on the most approved principles, by practical men, with capital. But with the milling industry reduced to almost a science, it is a question if the small mills can compete to advantage with the large mills. In Manitoba at the present time, flour is being shipped from the large mills into towns and districts where small mills are running.

Hastings Bros. & Co., of Winnipeg, have after all decided to change the location of their mill which they intend building this summer. When they first announced that they would build a 600 barrel mill, bonuses were at once offered from several quarters. Port Arthur offered the largest bonus, amounting to \$10,000 cash, a free building site, and tax exemption for a period. The company favored Winnipeg, but the city council did not seem inclined to grant a bonus. Port Arthur was therefore selected, and it was understood that all arrangements had been made to build the mill there. But at the last moment, the Winnipeg council has decided to offer Hastings Bros. & Co. tax exemption for ten years and a free site for the mill worth about \$5,000. This the Company has decided to accept in preference to the much larger bonus offered by Port Arthur. The advantages in favor of Winnipeg are: competition in freight rates, and nearness to the base of supplies. By building the mill here, the company will be able to concentrate their business in one quarter. The company intend establishing a number of elevators at points throughout Manitoba, and if the mill had been built at Port Arthur, the company would also have been obliged to open an office in Winnipeg, for the management of their elevators and grain purchasing department. Thus the business would have been divided between Port Arthur and Winnipeg, causing extra expense. We congratulate Port Arthur upon its not getting the mill, as the town was paying altogether too much for the mill, in proportion to the benefit to be derived therefrom. Even had the mill been established at the Port, the business and investment of the company would still have been largely in Manitoba. The main benefit to Port Arthur would be from the employment of labor, and a flour mill, even when on a very large scale, is not a great employer of labor.

The decision of the department at Ottawa to allow

the grain interest here to have full control of the selection of standards for grading western wheat, has given general satisfaction. Local grain men have felt confident all along that the Government would decide the matter in favor of the western interest. Hereafter standards for grading Manitoba grain will be selected at Winnipeg instead of Toronto, by a board of nine persons, who shall be residents in the West. The inspector at Port Arthur will be a member of the board. Brandon, Regina, and Portage la Prairie will have one member each, and the balance will be from Winnipeg.

Electrical Department.

NEW SOURCE OF ELECTRICITY.—A new source of electricity has been discovered by Professor Braun, of Tubingen. Hitherto it was found impossible to transform mechanical work direct into electricity. The German professor says that he has succeeded in doing this. Physicists have known for some time that currents may be produced in metal wires by bending them. Professor Braun has found that nickel wire develops the strongest currents by winding it into a spiral and connecting its ends with a delicate measuring apparatus (multiplier). The pointer of the multiplier deflected considerably according as the spiral was elongated or compressed, showing that relatively strong currents were created; the current flowing during the elongation of the spiral in a direction opposite to that in which the wire had been run in its passage through the draw plate. The interest in the phenomena observed will be enhanced as soon as there is a prospect of increasing the strength of the currents to a degree which will render them available for practical purposes. As Professor Braun has succeeded in putting in circuit a number of spirals like galvanic elements, and thus obtaining stronger currents, there is a probability of constructing engines which will perform useful work. Yet we cannot help thinking, remarks *Iron*, that the currents would prove too feeble, and that they would develop but little mechanical energy on account of the great molecular friction. Should the anticipations of the discoverer be fulfilled, however, the currents would supply to the engineer the cheapest means of transforming work into electricity direct. Professor Braun's experiments also confirm the well-known law of reciprocity. In passing through a spiral the current of Bunsen's elements, he could prove an elongation or compression of the spiral according to the direction of the current.

ELECTRICAL VS. ROPE TRANSMISSION OF POWER.—Of the several methods of transmitting power to a distance, that by means of wire ropes has usually been referred to as the most economical for moderate distances, and the success of the rope transmission, which for many years has been in operation at the Falls of Schaffhausen, on the Rhine, has been cited as justifying this opinion. It seems that hereafter the plant is to furnish a demonstration of the superiority of electric transmission. A correspondent of *Industries* says that "After two years of negotiations, the company who own the Schaffhausen teledynamic transmission plant have at last succeeded in overcoming the obstacles, legal and otherwise, which hitherto stood in the way of an extension of their system, and they are now erecting five more turbines on the left bank of the Rhine below those now at work. The water for actuating these turbines will not be taken from the Rhine fall, but it is part of water now running to waste over a weir of 600 feet in length, the concession for which was obtained by the company in 1863. Each of the new turbines will be of 300-horse power, the total quantity of water available being forty tons per second, with a fall of thirteen feet. Instead of using teledynamic transmission, such as is employed in the other station, the company propose to use electric transmission of energy. There will be dynamos at the turbine station, and cables stretched across the river, by which the current will be carried into Schaffhausen, and there be used to actuate electromotors." The substitution of electric transmission for the compressed air at the Chapin mine, Michigan, says the *Engineering and Mining Journal*, is now admitted to be desirable from an economic standpoint, and this is, with the exception of the Birmingham, England, compressed air system, the largest plant of the kind in the world. It would seem therefore, that electrical transmission of energy is destined to supersede both wire rope and compressed air transmission, except, possibly, under circumstances which are specially favorable to the latter while unsuitable to the former. The results of experiments, as shown by the actual substitution of one system for the other, outweigh all arguments based on fine mathematical calculations, or on theoretical deductions, and we therefore attach special importance to this announcement.



PUBLISHED MONTHLY,

BY

CHAS. H. MORTIMER,

Office, 81 King Street West,

TORONTO, - - CANADA.

ADVERTISEMENTS.

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

Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach this office as early as the 2nd day of the month.

Special advertisements under the headings "For Sale," "For Rent," &c., if not exceeding five lines, 50 cents for one insertion, or 75 cents for two insertions. If over five lines, 10 cents per line extra. Cash must accompany all orders for advertisements of this class.

SUBSCRIPTIONS.

The DOMINION MECHANICAL AND MILLING NEWS will be mailed to subscribers in the Dominion, or in the United States, post free, for \$1.00 per annum, 50 cents for six months. Subscriptions must be paid strictly in advance.

The price of subscription may be remitted by currency, in registered letter, or by postal order payable to C. H. Mortimer. Please do not send cheques on local banks unless 25 cents is added for cost of discount. Money sent in unregistered letters must be at senders' risk. The sending of the paper may be considered as evidence that we received the money.

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

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

Failure upon the part of subscribers to receive their papers promptly and regularly should be notified at once to this office.

EDITORIAL ANNOUNCEMENTS.

Correspondence is invited upon all topics pertinent to the mechanical and milling industries.

This paper is in no manner identified with, or controlled by, any manufacturing or mill-furnishing business, nor will a bestowal or refusal of patronage influence its course in any degree. It seeks recognition and support from all who are interested in the material advancement of the Dominion as a manufacturing country, and will aim to faithfully record this advancement month by month.

Readers of the "MECHANICAL AND MILLING NEWS" will confer a favor upon the publisher and derive material benefit themselves by mentioning this paper when opening correspondence with advertisers. Drop us a postal card when you have written to an advertiser, give us his name, and then we will put you in the way of getting the benefit. Don't forget this.

THE Minister of Agriculture is being urged to extend the Canadian patent term to 20 years, divided into four optional terms of five years each, with progressive fees of \$10, \$20, \$30 and \$40 for each term respectively.

WE call the attention of manufacturers to an important advertisement published in this paper, asking tenders for the supply of pumping engines and other materials required in the extension of the Toronto water-works system. The latest date for receiving tenders is the 3rd day of June.

ONE of the strongest evidences of the decline of the timber supply in Michigan may be seen in the fact that the numerous saw mills destroyed by fire are rarely rebuilt. The Georgian Bay district and British Columbia are destined to engage the attention of lumber manufacturers to a large extent in the near future.

MANITOBA shipments of flour to British Columbia are reported to have almost dropped off. Manitoba dealers are getting such good prices for their wheat east that British Columbia has been neglected. It would be well, however, for Manitoba millers to use every exertion to retain the position they have gained in competition with Oregon millers on the Pacific coast.

FROM the fact that some of the milling journals of the United States have commenced publishing the seductively worded advertisements of patent medicine manufacturers, we are led to infer that the manufacturers and users of milling machinery across the border are not enjoying good health. This is the season when people are heard to complain that their system is run down, but long "system" millers at least should not be troubled from this cause. A revival of the export flour trade would, we believe, prove the best tonic for both long and short "systems." Canadian millers are sick also—sick of unjust treatment. They require the same treatment as manufacturers in other lines are receiving in order that their health may be restored.

THE Toronto *Mail* briefly sums up the situation in these words:—The millers, backed by Conservative members, have asked in vain for relief from a position that, in consequence of the unjust bearing of the tariff upon them, is worse than free trade. Other manufacturers oppressed by the tariff have laid their case before the Ministers; but neither they nor the Conservatives who have helped them have been able to make the slightest impression. The Cabinet is either careless of industrial interests or it is too weak to act."

THE Dominion Government is asked to impose an export duty of \$4 a ton on raw wood ashes, to come into effect at some fixed date to enable contracts now made to be completed. It is believed that the imposition of this export duty will check the destruction of the forests, and enable the Canadian manufacturers of pot and pearl ash to continue a trade which has been an important one in the past, but is now on the verge of ruin. The large prices which American buyers are willing to pay for raw wood ashes, has increased the cost of manufacturing pot and pearl ash in Canada, to a point where it is found impossible for the manufacturer to export at a profit.

WE note with pleasure that the effort to establish an annual exhibition in the city of St. John, N. B., is meeting with success. Notwithstanding that the Provincial Government has declined to assist the project, we learn that the stock of the Exhibition Association has nearly all been applied for. The holding of such an exhibition will stimulate production and improvement in the maritime provinces, and what is of equal importance, will attract visitors from the West, thus developing interprovincial trade and strengthening the bonds of Canadian nationality. Success to the St. John Exhibition.

AN organization has been formed in New York for the purpose of developing trade with the countries south of the United States. The total imports of these countries amount to about \$450,000,000. Only 11 per cent. of these imports come from the United States, the larger proportion being supplied by England and France. We agree with the *Empire* that the opening for South American trade is just as good for Canada as the United States, and unless we go in and possess the land we shall find the ground preoccupied. A subsidized steamship line is declared to be one of the most important things necessary to secure the trade.

THE oatmeal millers' combination, which appears to have met with very indifferent success from the start, is said to have dissolved into its original elements. Half a dozen members of the organization met in this city a few days ago, and decided to disorganize. The persons who oppose the appeal of the flour millers for an increase in the flour duty, on the ground that if granted they would combine and increase prices, should be able to see in the fate of the oatmeal millers' combine, the lack of foundation for such an opinion. If the owners of twenty or thirty oatmeal mills find it impossible to maintain a combination, how absurd it is to suppose that the owners of two thousand flour mills scattered over the Dominion from Prince Edward Island to British Columbia, should succeed in doing so!

WE direct the attention of engineers to the valuable paper on "Steam Boilers and Boiler Joints," by Mr. St. John, Steamboat Inspector, Toronto, appearing in the present number of the MECHANICAL AND MILLING NEWS. This paper was originally read before the Society of Engineers, of Toronto. Its length renders it impossible for us to print it entire in the present number. Our readers will doubtless look eagerly for the concluding portion, which will appear in our issue for June. We may state that we have made arrangements to publish from time to time the interesting papers read before the Society of Marine and Stationary Engineers of this city. The members of these Societies, as well as stationary engineers throughout the Dominion, are invited to possess themselves of the information contained therein by becoming subscribers to this journal.

OCCASIONALLY we find an American journal which is not so blinded by American conceit as to be incapable of making honest comparisons. One such, in discussing the small proportion of American exports to Mexico and South America as compared with those of England and other European countries, makes a comparison of English and American business methods which is anything but favorable to the United States. After referring to the trouble which European firms take to learn the language, requirements and business customs of the people with whom they desire to trade, the journal

in question concludes by saying: "We call them 'greasers' and drop the matter. We talk about push and American methods. It is a name that we have given to ourselves, we have not earned it through outside testimony."

THE old proverb which declares that "It's an ill wind that blows nobody good," has found another illustration in the use which has been made of the wreck of the great Nova Scotia timber raft which went to pieces on its way to New York. The Hydrographic Office at Washington conceived the idea that the floating logs might serve to indicate the general direction of the ocean currents. Instructions were accordingly issued to the masters of vessels to note the position of each log which might come under their observation, with the object before stated. As the result of these observations the office at Washington has issued a carefully prepared pilot chart. This chart, which represents the courses which the logs took after the raft was broken up, and the points in mid-ocean in which they were found, shows at a glance the general direction of the currents, and gives an object lesson to the mariner that could scarcely have been given in any other way.

MR. L. A. MORRISON, of Toronto, a gentleman well known in manufacturing circles throughout Canada, has lately returned from a prolonged visit to the Maritime Provinces, during which, as a wide-awake business man, he lost no opportunity of acquainting himself with the resources of that portion of the Dominion, as well as the character and methods of its people, more particularly those engaged in manufacturing. The results of these observations Mr. Morrison has kindly consented to place before the readers of the MECHANICAL AND MILLING NEWS in a series of articles extending over several months. Mr. Morrison comes back strongly possessed of the idea that as Canadians we have in this broad Dominion a grand heritage, out of which to construct a powerful and prosperous nation. His reasons for thinking thus, will doubtless be fully set forth by his own pen. It is our hope that this series of articles may help to bring the business men of east and west closer together, and tend to the promotion of interprovincial trade, as well as a deeper patriotism for our common country.

A YEAR or two ago the milling industry of Great Britain was in a very depressed condition. It was then that the editors of American milling journals were given to offering cold comfort to the British miller by assuring him that while his condition was certainly an unpleasant one, he must make up his mind to grin and bear it, as the superiority of American wheat, American machinery and American brains was certain to insure the continued supremacy of American flour in the British market. To-day, the tables are turned in favor of British millers. The advance in the price of wheat in the United States, due to a short crop, has increased the cost of American flour to an extent which will not allow it to be exported and compete with the product of British millers, with their abundant supplies of grain from Russia and other countries. In consequence, the British millers who, by the way, have also greatly improved their milling facilities, are grinding at a profit, while American millers are surveying their idle mills and sadly wondering whether it will ever be possible to regain their lost advantage in the British markets. In the case of the British millers the whirligig of time has certainly brought its revenges.

THERE are numerous evidences to be met with of the growing respect for Canada on the part of the people of the United States, or at least that portion of them whose good opinion is worthy to be desired. The growth of this feeling is due, we believe, to admiration of the pluck and enterprise which Canadians have exhibited of late years in carrying to successful completion such gigantic undertakings as the construction of the Canadian Pacific Railway—designed to open the way for the population of our vast territories in the Northwest and on the Pacific coast, and also to stimulate and develop our commerce, both domestic and foreign. The head of one of the largest manufacturing concerns in the city of Philadelphia who recently visited Canada after an absence of ten years, expressed to us his surprise at the development which had taken place in the interval since his former visit. In his opinion the progress made by the Dominion during the last decade has been not one whit behind that of the United States. He could easily see that Canada's progress in the future would be much more rapid than in the past. The means of intercommunication by rail and water having been provided, rapid increase of population and commerce would undoubtedly follow.

DR. Ryerson, of Toronto, has done the public a service by calling attention in a recent lecture before the Canadian Institute to the prevalence of color blindness, and the need for periodical scientific tests of the ability of railway employees to distinguish color of signals as a safeguard to the lives of the travelling public. Dr. Ryerson says: "I feel sure that an examination of five hundred to one thousand employees would show a percentage of color blindness." In most continental European countries we are informed the examination and elimination of the color blind on railroads is under Governmental direction and control, but in Canada, the matter is left entirely in the hands of the railroad companies. Dr. Ryerson appears to think that under the Canadian system tests are not made scientifically or as often as they should be. If this can be shown to be the case, the public should unanimously call for legislation which will result in proper attention being given to this important matter.

WHEN journals published in the interests of United States millers, and naturally desirous of securing as wide a market as possible for American flour, are compelled by a sense of fair-play to admit the justice of the demands which Canadian millers are making for an increase of duty on imported flour, the Dominion Government would seem to be left without a single argument, except the one of political expediency, for refusing to allow the millers to share in the protection accorded by the National Policy to the other manufacturing industries of the country. The *Milling Engineer*, of Milwaukee, refers to the subject as follows: "The millers of Canada are on the warpath and propose to have an increase in the duty on American flour or know the reason why. Their grievance, as they state it, is that whereas the American miller has to pay a duty of 50 cents per barrel on flour imported into Canada, the Canadian miller, if he imports American wheat, has to pay a duty of 71 1/4 cents per barrel, it being estimated that it takes 4 3/4 bushels of wheat to the barrel of flour. This being the fact, the Canadian millers have a strong case, and if right, should be successful in their appeal. A country which does not protect its home industries cannot expect to prosper." The *Milling World*, of Buffalo, remarks: "Disinterested sympathy outside of Canada will certainly be with the millers in this case. They certainly have the right to adequate protection freely granted to other manufactures." What does the Government propose to do about it?

ASYNOPSIS of the report of the Labor Commission has appeared in the daily papers. We are pleased to learn from the report that the rate of wages paid in Canada at present is higher than ever before, while the cost of the necessities of life is less. Many of the recommendations contained in the report are of a commendable character, such, for example, as the following: That the hours of labor should be as short as possible; men running stationary engines should be certificated; boilers should be inspected; boards of arbitration and conciliation to settle labor disputes should be established; employees should always be paid in currency and not in scrip; liquor should not be sold in the vicinity of mines; wages should rank as a preferential claim upon an insolvent's estate; the employment of children under fourteen years of age should be prohibited; in factories where women and children are employed, the hours of daily labor should not exceed ten, and night work should be abolished; wages should be paid not less frequently than once a fortnight; the school curriculum should be so changed as to fit the scholar for a mechanical calling; greater safeguards should be provided by railroad companies against accidents to their employees; Sunday labor should be prohibited. The carrying out of these suggestions should meet with the approval of all who have at heart the progress and welfare of humanity. There are other recommendations in the report however, the wisdom of which is not so apparent, as instance the following: The Government should set aside a labor day—in order we presume, that certain loud-mouthed agitators may have an opportunity of impressing the public with a sense of their greatness; garnishment of wages should be done away with—in order, we suppose, that the dishonest mechanic or laborer may cheat his grocer and butcher.

The first exhibition will be opened at Santiago, Nov. 15, 1889. It has but a single object—the introduction of the best flour mill machinery into Chili. It practically recognizes the necessity of the very best machinery to enable Chili to compete as an exporter of flour; that the present export of Chilean wheat would be worth more to the national wealth if it was converted into flour. There are about 750 flour mills in Chili, but only three are of the modern system for crushing, instead of grinding, wheat.



Mr. J. Brennon is erecting a shingle mill at Phepston, Ont.
 The Longford Lumber Co., have taken out 25,000,000 feet of logs.
 Messrs. Bostal and Bailey are about to start a planing mill in Windsor, Ont.
 Mr. Brimacombe's mill at Tyrone, Ont., has been rebuilt, and is again running.
 T. W. Flett's saw mill at Nelson, New Brunswick, was recently burned.
 The new mill at Collingwood, Ont., will be run night and day during the coming season.
 The Gilmours and the Rathbuns have each about 800,000 feet of logs on the Moira River.
 Messrs. Roop & Bent, Springfield, N. S., have purchased a new outfit of saw mill machinery.
 H. Williams' planing mill at Campbellford was recently damaged by fire. Partially insured.
 The two mills of the Beck Co., at Penetanguishene Ont., will cut about 35 million feet this season.
 The Rathbun Company's mill at Lime Lake, Ont., was burned recently. Loss \$1,500; insurance, \$1,000.
 Col. Martin's saw mill at Fletcher, Ont., was burned on April 2nd. The estimated loss is \$2,500, partially insured.
 Mr. A. T. Mohr has leased the old Malloch & Adams mill at Sandy Hook, Ont., and will begin operations at once.
 Mr. John Gorman of Fitzroy, Ont., is erecting a steam saw mill on the Mississippi, which will be operated this season.
 One of Messrs. McLachlin Bros.' mills on the Madawaska River was started on the 4th April, the earliest ever known.
 Mr. Alexander Gibson, St. John, N. B., has purchased the McLaggan mill at Blackville, N. B., for the sum of \$22,000.
 The Hepworth saw mill and a million feet of lumber adjacent thereto, narrowly escaped destruction by fire a few days ago.
 A. Doolittle's saw mill near Centreville caught fire while the workmen were at dinner, April 18th, and was totally destroyed. Loss, \$2,000.
 Mr. Dymont's new mill at Thessalon, Ont., is to be fitted up with all the latest improved machinery, and will cut 80,000 feet a day.
 The new McLaren-Ross Lumber Co., which will operate in British Columbia, has a capital of \$500,000, of which \$350,000 is paid up.
 Messrs. Ross, Hall & Brown have purchased the machinery in the Winnipeg Lumber Company's mill, for their new mill at Rat Portage.
 A fire which took place at St. Angele, St. Sauveur, Que., the other day, damaged Marquis' saw mill to the extent of \$6,000. No insurance.
 It is said to be possible for Canada to secure a profitable trade with Japan in finished lumber, planed and matched stuff, sashes and doors.
 Blair & Johnston's mills at Uthoff, Ont., were consumed by fire on April 10th: also about 30,000 shingles belonging to Mr. W. Richardson.
 Messrs. W. S. Ramsey & Co., are putting a new foundation under the mill at Jackson's Point, Ont., and making other improvements.
 The new Company which has taken the Chemainus Mill, B. C., will erect three large saw mills throughout the province during the coming summer.
 Mr. James McLaren, of Buckingham, Ont., is sending away a large gang of men to his recently purchased timber limits in British Columbia.
 A. F. Dulmage, Government Timber Inspector at Rat Portage, is reported to have suddenly disappeared, leaving a shortage of \$20,000 in his accounts.
 J. C. Schliehaus, mill-owner at West Lorne, Ont., had a finger of his left hand severed and two others badly crushed, by a circular saw in his mills recently.
 The Eau Claire Lumber Company, of Calgary, will be permitted to purchase the land now leased from the Dominion Government, upon which its mills stand.
 Mr. James McLaren has engaged Mr. Isaac N. Kendall, of Carleton Place, Ont., to superintend the mechanical part of the construction of his saw mills in B. C.
 Mr. A. Thompson, of Strathroy, is making active preparations for the erection of a new saw mill there, which he hopes to have in running order in the course of a few weeks.
 Morris & Banks intend establishing a saw mill at Shawnigan Lake, B. C., and expect to secure the right to cut timber all around the lake within a mile from the shore.
 In the Dominion Parliament Hon. Mr. Foster stated that the Government had not yet definitely decided as to whether they would remove the duty from export logs or not.
 Mr. E. Southworth, of the Marmor saw mill, was recently struck in the eye by a flying piece of lumber and will lose his sight. Last summer he was caught in the machinery and almost killed.
 The sudden death of Mr. James Barnes, who carried on an extensive milling business at Wanstead, Ont., occurred recently. The deceased was much respected by a wide circle of friends.
 Messrs. Dodge and Hughes, President and Vice-President of the Los Angeles Planing Co., were in British Columbia recently, looking for a suitable site on the coast for a large planing mill.

The partnership existing between James Anderson and John Grady, under the name of the Vancouver Lumber Company, Vancouver, B. C., has been dissolved, J. Grady retiring from the business.
 The Dominion Lumber Company has applied for incorporation. The chief place of business will be at Vevee City, in the townships of Ratter and Dunnett, Nipissing District. The capital stock is to be \$260,000.
 The Northern Pacific Lumber Company is being formed to carry on lumbering, milling, mining, and general business. Capital \$100,000. Among the stockholders are Frank Ross and J. T. Ross, Quebec, and L. G. Little, Montreal.
 Messrs. Moiles Bros., of Sault St. Marie, Mich., in order to avoid payment of a mortgage of \$45,000 on their mill, removed all the machinery and moveable property to Canada. The firm has recently purchased a site at Spanish River.
 Mr. E. R. Eddy has advertised for sale his large sawmill and piling grounds in Hull, P. Q., a mill site in Nepean, and large valuable timber limits up the Ottawa and its tributaries. The sale will take place on the 14th of August, unless the property is previously disposed of by private sale.
 Mr. D. Ross, of Whitemouth, Man., last winter took out over 3,000,000 feet of logs and has them all piled on the river bank handy to his mill. The mill, though comparatively small, works night and day during the sawing season, and turns out 24,000 feet per day.
 A Donald, B. C., paper says: This week a Dominion land surveyor surveyed four mill-sites on the banks of the Columbia east of Donald. One of the four has been applied for by a gentleman largely interested in the saw mills at Beaver. Four sites were also surveyed at Revelstoke, all of which are applied for.
 In the Dominion Parliament, Hon. Mr. Costigan has given notice of a resolution to provide that the rates and dues payable under the Cullers Act and the classification therein set forth, may be changed by Order-in-Council, and to make better provision respecting the reduction of the number of cullers and the annuities payable in consequence, and to provide that culling and measuring under the Act shall be compulsory only in respect of square and wavy timber.
 At St. John, N. B., there are 18 lumber manufacturing concerns, whose total equipment of machinery is: 21 gangs, 24 shingle machines, 27 lath machines, seven rotaries, six single saws, 3 mulays, two piling machines, 19 box machines, four clap-board machines, eight stave machines and seven heading machines. During 1888 St. John turned out 157,026,928 feet of deals, 58,340,000 shingles, 105,446,000 pieces of lath, 364,200 boxes, 992,000 pieces of clapboard, 3,411,819 staves and 400,800 pieces of heading. A total of 1,611 hands was employed, and \$395,045 was paid out in wages for the year.
 It is predicted by some, says the *Northwestern Lumberman*, that owing to improvements in the methods of making wood pulp, the time is not far distant when most of the refuse of the mill may be profitably converted into pulp. It is said that a good enough print paper for ordinary newspapers, can be made from pulp made from sawdust and shavings. Pulp manufactured from slabs and edgings has a longer fibre, and will consequently produce a better grade of paper. From two to three cords of mill refuse, not including sawdust, will make a ton of pulp worth at present market conditions \$80. Nobody need look for the time, however, when a pulp factory will be a regular attachment of a saw mill. It is one thing to run a saw mill, but quite another to operate pulp works.
 The quantity and value of forest products exported from Ottawa to the United States for the first quarter of the present year, are as follows:

Lumber feet.....	26,326,855	\$387,521 67
Laths, pieces.....	6,747,450	7,938 71
Hemlock bark, cords.....	994	5,020 00
Railway ties, pieces.....	9,575	1,932 80
Shingles, M.....	562,500	1,033 20
Box shooks.....		56,785,11
Poles, hop, pieces.....	77,805	331 00
Posts, pieces.....	580	51 60
Wood, cords	24	24 00
Doors and mouldings.....		822 00
Pickets, pieces	373,949	2,293 13
Total value of exports.....		\$463,753 22
Lumber for consumption, ft.....	16,458,228	\$232,745 70
" in bond for export, ft.....	9,868,627	154,775 97
Total, ft.....	26,326,855	\$387,521 67

In the senate last week, in reply to a question as to what course the Government intended taking with regard to the sawdust nuisance, the Hon. Mr. Abbott, on behalf of the government, said that the question of compelling lumbermen to deposit sawdust elsewhere than in the rivers, or to destroy it, was one affecting an enormous manufacturing interest, and that, so far as the government had been advised, the proposed destruction of mill refuse would involve a very large outlay. He was greatly in hopes that the representations of the damage the depositing of sawdust in the rivers and streams rendered to the fisheries and navigation would be found exaggerated, although there was no doubt that a great amount of injury was done by the present system of throwing it into the streams. It was announced last year that the government intended taking action in the matter, and he was happy to inform the house, that investigation had been diligently pursued ever since parliament met last session. As regards the Ottawa river, a survey had been made, and the report of the experts who have been intrusted with the work, confirms to a considerable degree the report of the committee of the Senate, which was laid before the government last summer. Since then the mill owners had desired to be heard, and represented that they might have a voice in the investigation, which is still being continued. On behalf of the lumbermen, Sanford Fleming was engaged to report on the sawdust question. As soon as this report was received on behalf of the government, he promised the whole question would be gone into and some remedy adopted for the evils which the deposit of sawdust on the Ottawa river produces, of a character appropriate to their extent and importance.

A TERRIBLE CATASTROPHE.

WE are indebted for the following facts and illustrations concerning a terrific boiler explosion at Hartford, Conn., to the *Locomotive*, published by the Hartford Steam Boiler Inspection and Insurance Co. :

At 4.50 a.m., February 18, 1889, a tubular boiler of about sixty nominal horse power exploded in the cellar of the Park Central Hotel, corner High and Allyn streets, Hartford, Conn. The building, a fine looking five-story brick structure, was completely demolished, and the inmates were buried in the ruins. The work of rescue began at once, and ten persons were taken out more or less severely injured and sent to the hospital; while twenty-three bodies, many of which were so mutilated as to be scarcely recognizable, were sent home and buried by sympathizing friends. In several cases whole families perished. The loss is estimated at \$75,000, none of which can be recovered, as the property was covered by fire insurance only, which does not indemnify against loss or damage by explosion. Such was the violence of the catastrophe that the roar and shock of it were heard and felt for miles around the city, and surrounding property suffered a damage of thousands of dollars.

Our illustrations will give the reader a good idea of the appearance and magnitude of the hotel. Fig. 2 shows it as it was before the explosion, and Fig. 1 shows what was left standing of the rear portion of the building. This had afterwards to be pulled down, thus making the destruction complete.

The cause of this terrible disaster was an iron boiler of the horizontal tubular type, about four years old, and of the following dimensions: diameter 54 inches; length 16 ft. 3 inches; shell plates of Bay State refined iron, 5-16 inches thick, double riveted; heads (iron) 3/8 inches thick; tubes 3 inches in diameter, 15 feet long and 58 in number. Two engineers were employed, one of whom has held a marine license; one of them stood watch by day, the other by night. The boiler was inspected annually by the State Inspector of Steam Boilers, First Congressional District, and was last tested by hydrostatic pressure in August, 1888, and a certificate given conformably to law, for a steam pressure of 75 lbs. per square inch. It is not true, as was stated in various papers, that this boiler had been inspected by the Hartford Steam Boiler Inspection and Insurance Company. This company had never inspected the boiler in question, nor had it any knowledge of it.

The work of recovering the fragments of the boiler was undertaken promptly after the explosion, and as fast as they were brought out of the ruins they were carefully measured, and the work of reassembling them was be-

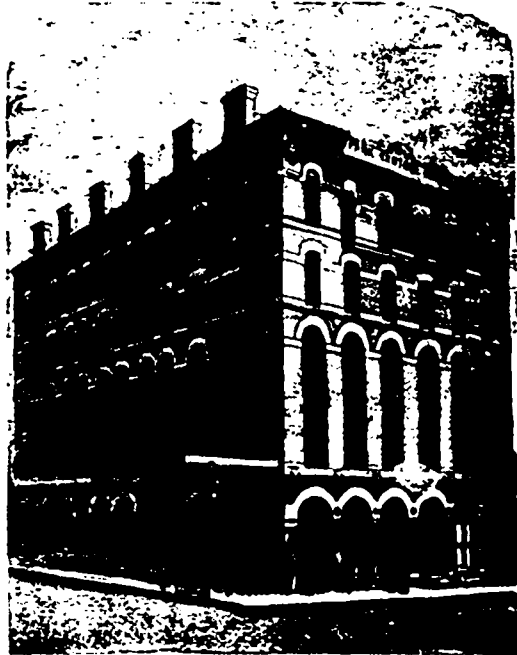


FIG. 2.—THE HOTEL BEFORE THE EXPLOSION.

gun. The result is shown in Figs. 3 and 4. It will be readily seen that, although a few small pieces were lost, the five principal pieces into which the boiler separated (see lines of fracture, Figs 3 and 4) were recovered, and their position, conditions, etc., carefully noted; and these tell the story of the explosion.

It was thought at one time, before the wreck was cleared up, that owing to defects and general structural

weakness known to have existed in the building, it was possible that the building had fallen first and in its fall wrecked the boiler; but as soon as the pieces of the boiler were examined from the ruins, that belief was dispelled, and it was apparent that a boiler explosion was the cause of the calamity, and not the effect.

There was some diversity of opinion as to the cause of the explosion, but it was thought from the first, by the representatives of this company, that there was no evidence of low water, nor any appearance of overheat-



FIG. 1.—THE PARK CENTRAL HOTEL AFTER THE EXPLOSION.

ing upon the shell plates or heads. This opinion was fully sustained by the subsequent discovery of the back head of the boiler with the fusible safety-plug still unmelted.

The shock of the explosion (which was felt for miles around the city), and the general destruction of the hotel and injury to adjoining property, must, of necessity, have arisen from the release of a very considerable force; and this force we believe to have been the stored energy in the water contained in the boiler at the time of the explosion, the approximate amount of which we will endeavor to compute from the available data. In view of all the facts that have been brought out by investigation since the explosion, we are of the opinion that

it cannot be accounted for upon any other hypothesis than that of the pressure greatly in excess of the seventy-five pounds allowed by the State Inspector's certificate,—how much greater, is a matter of conjecture. The steam gauge, one of the Bourdon patent was found in the ruins in a dismembered condition (unfortunately it had been so badly shattered as to be of little service in unraveling the mystery), but it was noted that the steam tube or Bourdon spring had been straightened out so as to receive a permanent set; and there were no indications that this had resulted from any other cause than a high pressure. As Bay State refined stamps were found upon the plate of the boiler, it will, perhaps, be fair to assume it to have been of the tensile strength usually accorded to that quality of iron plate; that is, 45,000 lbs. per square inch of sectional area. This, in a boiler of 5-16 inch thickness, double riveted, and 54 inches diameter, would give a safe load

of 104 lbs. (see United States Steamboat Inspector's Manual, p. 76), and a bursting pressure of some 375 lbs. The steam nozzle and man-hole of this boiler were placed upon the same sheet, the openings being 8 1/2 inches and 12 1/2 by 16 1/2 inches respectively. It will be apparent from a study of the illustrations that this portion of the shell would not be as strong as other parts of the shell of like area. Under an excessive pressure the longitudinal section of the middle part in the line of the man-hole opening would be the weakest, and there would be a distortion, as it flattened down in assuming an oval shape under a gradually increased pressure, from a concentration of the strain at that part. That this was the case seems demonstrated by the drawing down of the plate on that line; for this was the only place, so far noticed, where there was any perceptible reduction of thickness in the plate along a line of rupture. This strain would have to be withstood by the man-hole frame; and when that fractured, the opening being so close to the edge of the sheet, rupture and explosion were inevitable. (See Fig. 5.)

The man-hole frame is thought to have been shattered, but no pieces have as yet been found.

If, as we believe, this middle sheet was weaker than the others, a much lower pressure than 375 lbs. (the theoretical bursting pressure) would cause rupture. Suppose, then, for the purpose of our computation, that the pressure at the time of rupture was 200 lbs. per square inch, the corresponding temperature being 388° Fahr. It is true that we cannot tell the height of water in the boiler at the time of the explosion with precision, but the fact that the fusible plug was found intact and that it readily fused when subsequently heated, establishes beyond dispute that there must have been at least enough water to cover it; and our calculation will assume this to have been the case. On making this assumption we find that the boiler contained 5,552 li. of water and 48 lbs. of steam. When the explo-

sion occurred a portion of this mass of water was vaporized, the temperature of the remaining water being thereby reduced to 212 degrees. The assumed original temperature being 388 degrees, the fall in temperature was 388°—212°, or 176°; and this multiplied by 5,552 lbs. gives 977,150 British thermal units, which is the amount of heat given off and immediately converted into mechanical energy. The difference between the total heat of a

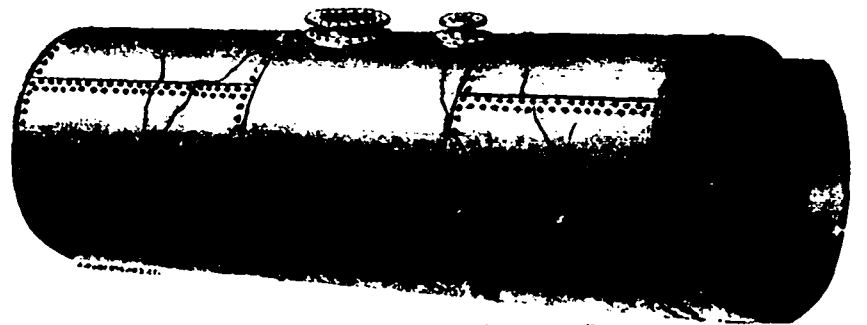


FIG. 3.—ELEVATION OF THE RESTORED BOILER.

pound of steam at the assumed pressure and at atmospheric pressure is 1200°.2—1146°.6; or 53°.6; and this, multiplied by 48 lbs., the weight of steam in the boiler, gives 53°.6 × 48 = 2572. British thermal units. Now if we add this to 977,150 (the heat given off by the water) we have 979,722 heat units, which is the amount of heat given off in the form of mechanical energy. Since one

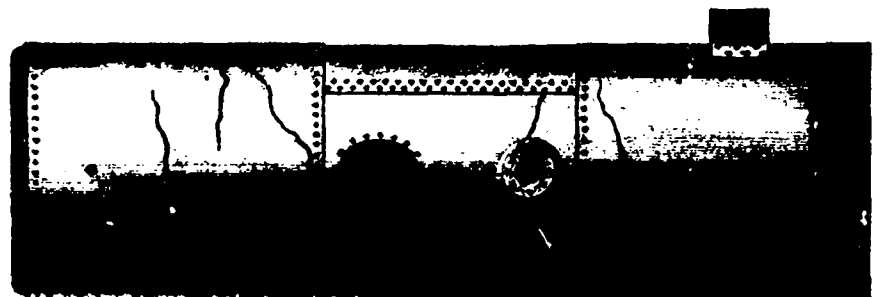


FIG. 4.—PLAN VIEW OF THE RESTORED BOILER.

heat unit is equivalent to 772 foot pounds of energy, the heat given off by the boiler was equivalent to 772 × 979,722 = 756,345,000 foot pounds.

This large number of foot pounds means this: The mechanical energy developed by the liberation of the

water and steam in the boiler, at the temperature due to 200 pounds pressure, was sufficient to raise 756,345,000 pounds one foot; or, if we assume that the boiler and fixtures weighed 6 tons, it would have been sufficient, if applied vertically to the boiler alone, to raise it in the air to a height of many thousand feet.

We may more fully understand the magnitude of the force confined within the boiler by comparing it with the destructive effect of the wind at the time of a violent hurricane that destroys buildings and uproots large trees. The wind, we are told, has a maximum velocity at such times of one hundred miles per hour, and exerts a pressure of 50 lbs. per square foot; while in the boiler under consideration the pressure is believed to have been $200 \times 144 = 28,800$ lbs. per square foot.



FIG. 5.—THE INITIAL RUPTURE THROUGH THE MAN-HOLE.

Many of the most destructive explosions of which we have any knowledge, have been caused by an inoperative safety valve, an accumulated pressure, and a full supply of water in the boiler; indeed the greater the quantity of water at such times, the more disastrous the effect.

There are many stories in circulation as to the want of care and proper management of this boiler. The



FIG. 6.—THE SAFETY VALVE.

coroner is now engaged in an investigation, and it is hoped that he may clear up the mystery of the safety-valve, and among other things, tell us whether it was purposely set fast, or became so in some other way. It was of the common lever variety, with a conical valve 3 inches in diameter, and it was amply large, when in working order and intelligently used, to discharge all the steam the boiler was capable of making. Fig. 6

shows the valve as it appeared after the explosion. The observed tendency of a conical valve to stick in its seat, and the ease with which it may be tampered with, have led to the introduction of various improved safety-valves. Figs. 7, 8, and 9, represent portions of the head. There are other details of the boiler that might be discussed with advantage, and will be, in a later issue of the *Locomotive*; but it would not be courteous for us to discuss them now, while the official investigation is in progress.

The facts that we have outlined seem to justify the

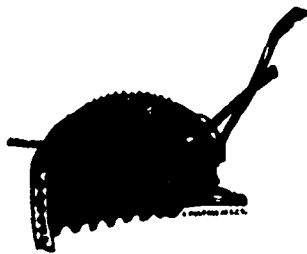


FIG. 7.—UPPER HALF OF FRONT HEAD.

following hypothesis: That the fire was not properly banked by the engineer who went off duty at midnight; or that if it was, one of the two tramps who were allowed to sleep in the fire-room, and lost their lives there, had opened the damper and closed the fire-door after the engineer was gone, probably not realizing the danger of the act; that the safety-valve was inoperative and that steam accumulated until the strain on the shell reached the limit of strength of the weakest point, which weakest point is shown by the explosion to have been the man-hole frame and middle course sheet; that the explosion wrecked the partition wall in the cellar, against which the boiler was placed, and that it then raised the building, displacing connecting walls, joints, and supports, drawing them inwardly with the exception of the front



FIG. 8.—LOWER HALF OF FRONT HEAD.

wall on High street, which, not being connected, was blown outwardly, and fell into the street.

Explosions of boilers similarly placed have not always wrecked the building as completely as this one did, but of course there is the possibility that the other explosions were not so violent. When boilers are placed beneath buildings (and it is impossible to avoid placing them so, in some cases), the result is apt to be very serious in the event of an explosion, for such walls as are not blown down at the time are often so badly shattered that they have to be pulled down and rebuilt. In this case if more of the main walls had remained standing it is probable that beams and other parts would have lodged against them in such a manner as to save many of the lives that were lost.

We shall be glad to record for the benefit of our readers the result of the coroner's inquest, and also to

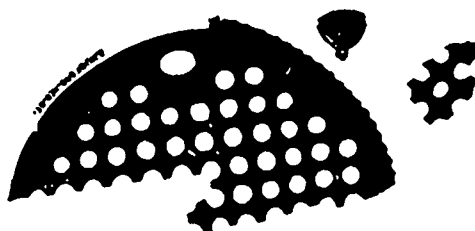


FIG. 9.—LOWER HALF OF BACK HEAD.

describe some examinations and tests of our own concerning the iron-boiler plates, giving the conclusions we have drawn from them and discussing some other matters not referred to in the present article.

FAILURE OF THE COPPER SYNDICATE.

DISASTER has fallen upon the French copper syndicate, the most impudent and the most gigantic corner attempted in modern times. The great syndicate has gone the usual way of combinations of that sort. It did not own the property it sought to control. It simply aimed to speculate on a gigantic scale, and the Frenchmen have discovered that a single firm, however strong financially, against the whole world fights a losing fight. That discovery has cost them from \$35,000,000 to \$40,000,000. May the knowledge they have gained satisfy them for their outlay. They attempted too much.

It is known that copper can be produced and laid down in the markets at prices ranging from 10 cents a pound downward to 7 cents and even less. The syndicate proposed to put up the retail price to 17 or 18 cents a pound, or even higher. That was where they made their mistake. They offered large prices and stimulated production. Overproduction swamped them. Meanwhile, the consumers have only been slightly hurt. The damage falls on the syndicate. Another lesson has been added to those that illustrate the folly of attempting speculative corners in important products.—*Iron Industry Gazette*.

STEEL CASTINGS.

IN a paper read before the American Society of Mechanical Engineers, Mr. R. T. Morgan, Sr., said:

All of the conditions specified for casting of iron must be duplicated in the manufacture of steel castings, but on higher and more exacting planes. In the manufacture of iron castings, most of the practice of the world has been carried on (governed in many conditions necessarily specified here as to the use of mixtures of material) by grades bought from leading producers according to the standard fixed by the breaking and eye test, using cupolas or air furnaces, with coke and coal to do the melting. All the operations depend on the crude tests last specified, and the reliability of the supply of the best materials from reputable manufacturers of coal, coke and iron. A great many responsible, reputable founders, having experienced, practical men employed in their foundries under such conditions, have turned out some of the most varied, complicated and best castings made for years. Some few of the modern and best have had their chemical laboratories, and as far as material is concerned, have gone beyond the general practice of iron founders and are certainly entitled to the best results. But while these show by comparison the possibility of getting the best iron castings, just as wrought iron has been manufactured in rolling mills under similar crude practical conditions, the manufacture of the many grades of steel required for the best steel castings of varying sizes and kinds, has made necessary all the higher conditions of chemical and practical knowledge combined. Steel castings, by whatever method the steel is melted—whether open-hearth, Bessemer, crucible, or some other—require each a different treatment to produce similar results in two different kinds and sizes of castings, following with keener practical care every operation specified for iron castings. After this, practical machine and other testing records should be made, so that every known practical chemical operation shall have been recorded for future use, with a careful watch also upon the practical use of castings made. All this takes time, just as has been necessary for the steel rail men to find out its necessary good qualities. Steel castings require higher class conditions than iron, depending more on the chemical than practical, but requiring both to a higher degree for steel than iron. The manufacturer having the best general conditions, and who will have the desire and determination to take none but the best stock, will certainly make the best steel castings. To enable him to do so, it will be necessary for him to get the best encouragement possible from the purchaser of steel castings at lowest competing price, but will be willing to pay more for the best castings made under careful and costly conditions, than for castings not so good made under inferior conditions. This latter enters into the question as much as either and all of the others.

Steel castings made an annealed well have an average of at least four times the tensile and wearing qualities of best cast iron. With the many conditions specified here carefully attended to, the splendid results attained by leading manufacturers of iron castings in the leading countries of the world are possible, and I have not the least doubt that their success will be fully equalled in time in steel castings. Of this we have many satisfactory evidences already from some leading manufacturers of steel castings, who have turned out complicated examples both large and small.

We learn from the *Gravenhurst Banner*, that Messrs. Mickle, Dymest & Son have about completed a very successful season's saw logging operations. The stocks taken out are as follows: In the townships of Oakley and Mindon (five camps)—ten million feet; from Sherbourne and Ridout townships—five million feet, these fifteen millions will be watered in Black river and taken to the Barrie and Bradford mills for manufacture; from the townships of Draper, Macaulay, McLean, Ridout and Sherbourne—fifteen million feet, will be brought down the Muskoka river and Lakes Rosseau and Muskoka to Gravenhurst for manufacture at the mills here; and an additional two million feet from the lakes will be manufactured at Clarke's mill, Windermere, with about two million feet on Muskoka Bay, left over from last year, the firm will have a grand total of 34,000,000 feet to be cut into lumber during the ensuing summer.

STEAM BOILERS AND BOILER JOINTS.

By O. P. St. JOHN, STEAMBOAT INSPECTOR, TORONTO.

In considering the steam boiler, it would require more time than we have at our disposal to-night, to even briefly trace the evolution of the boiler of the present day, from its predecessors; much ingenuity has been exercised to obtain the various ends which were desired to be met. The great development in the steam engine, and the use of steam as a motive power, has called for a corresponding advance in steam generators. Theory and practical experience have long since indicated the economic advantages to be obtained by the use of high steam pressures, with high grades of expansion. The difficulties that stood in the way of the safe and successful use of high pressures, have gradually been met and overcome, until the 7 and 10 pound pressures so commonly used 50 years ago, have made way for pressures varying from 75 to 200 pounds per square inch. One of the chief obstacles in the way of this progress, was the difficulty of obtaining steam generators of sufficient strength and simplicity, combined with reasonable cost for construction and maintenance. Cast iron, copper, wrought iron, and steel have successively been used as materials for the construction of boilers. With the advent of the "Bessemer" and "Siemens" steel, it would seem that we can scarcely look forward to any further advance in the direction of obtaining a stronger material, but this is a progressive age, and we cannot tell what new discoveries may be made in the future.

The great variety of shapes in which boilers are made is due to the object of the designers in trying to secure strength, economy, sufficiency, durability, etc. All of these points are important, and worthy of every consideration. In what I shall say to you to-night, however, I propose to deal with the first and most important of these points, that is strength.

If the strength of the boiler was the only consideration, we would make it spherical, or a hollow ball, for the reason that the sphere or globe is the strongest known form to resist internal pressure. But for many reasons, such a boiler could not be made economical or efficient, and we are therefore compelled to fall back upon the next strongest form which is the "cylindrical." The question naturally presents itself: Why is a cylindrical boiler stronger than a flat sided boiler, or an elliptical boiler, or any other of the various shapes which might be used? It is a well known law in hydrostatics that when steam or gas of any kind is confined in a closed vessel, the pressure is exerted equally in all directions, and the line of pressure is always at right angles to the line of resistance. In acting against the circumference of a cylinder, the pressure would therefore be regarded as radiating from the axis, and exerting a uniform tensional strain throughout the surrounding material. The pressure at work, therefore, at any given point in the circumference to rupture the cylinder longitudinally, or in a line parallel to its axis, is counterbalanced by an equal pressure upon the opposite point, on a line drawn through the centre of the circle, and as this pressure must be exerted on equal areas, in order that the action and reaction may be equal, the force at work tending to rupture the cylinder in a line parallel to its axis, may be considered as the pressure exerted on the semi-circumference. From this it will be seen that under pressure the cylinder is perfectly at rest. Assuming it to be a true circle, there is no distortion of its shape. In the case of a flat-sided figure, however, it is quite different. In the flat-sided figure 1, the top and bottom

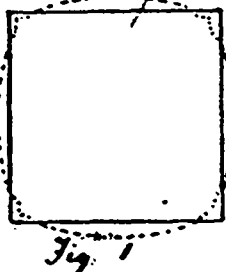


Fig. 1

are strengthened at the corners by their attachment to the sides, and the sides are in like manner strengthened by their attachment to the top and bottom. If this figure be subjected to internal pressure, it would gradually assume the shape shown by the dotted lines, and if the pressure was increased and the material was sufficiently flexible and elastic, it would gradually assume the form of a cylinder—this distortion of its original shape and its constant variation under increasing and decreasing pressures, would subject the material to a strain considerably in excess of that due to the pressure alone. To hold such a figure in shape, it would require to be stayed from top to bottom, and from side to side.

Returning to the cylindrical form, we will next consider the force at work to rupture it in a plane parallel with its axis, and its strength to resist such rupture. As I have already said, the force at work tending to rupture the cylinder longitudinally, may be considered as the pressure exerted on the semi-circumference, but as the pressure is exerted equally in all directions, it follows that it is not equally effective in producing a strain perpendicular to the diameter. To illustrate this we will assume Fig. 2 to be a cylinder 42 inches diameter, 1/2 of

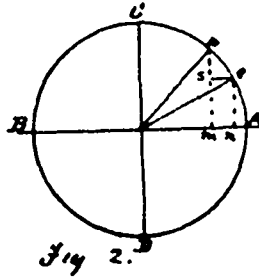


Fig. 2.

an inch thick and 1 inch deep (or long). I take this size for the reason that it has long been the standard for an iron boiler to carry 100 pounds per square inch as a working pressure, and is therefore familiar to you all. If we consider the force at work to rupture this cylinder at any point in its circumference, say at A, it will be seen that assuming the material to be of equal strength and thickness, the same force would be at work to rupture it at B, and this would appear to be the semi-circumference, A C B multiplied by the pressure, but as this pressure is exerted equally on all portions of the circumference in lines radiating from the centre, it is exerted directly upwards and downwards only along the vertical diameter C D; as we recede to the right or the left of this line the pressure is exerted diagonally, with correspondingly diminished vertical effect, until at the points A and B it vanishes altogether. If we take P Q, a very small portion of the circumference, and S the angle it makes with A B, we find the force exerted on the arc P Q, along the radius which passes along its centre, will be pressure multiplied by P Q. If we decompose this force, the vertical component will be found to equal the pressure = P. x p. q. x cosine of the angle S, but p. q. x cosine S is equal to the base of a right-angled triangle having the chord of the arc P. Q. for its hypotenuse, and projecting the two extremities of this base upon the diameter A B at m n, we have the vertical component of the pressure equal to P x m n. If we take in like manner the balance of the semi-circumference, we find the sum of all the vertical components will equal the diameter A B, hence the rule for calculating the strength of a cylinder, S equal tensile strength of material, t = thickness and D = diameter, then Rule = $\frac{S \times D}{2}$ = bursting pressure.

I may perhaps explain the counterbalancing of the pressure in a way more readily understood. Suppose that instead of a cylinder as in figure 2, we had a semi-cylindrical figure as in Fig. 3. Assuming this figure to

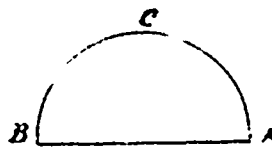


Fig. 3

be 42 inches diameter 1 inch long, and the pressure 100 lbs. per square inch, it will be seen at once that the pressure on the semi-circumference A B C, must be counterbalanced by the pressure on the diameter A B. Were this not the case we would have the area of the semi-circumference = $\frac{42 \times 3.1416}{2} = 65.9736 \times 1 \times 100 \text{ lbs.} = 6597.36$ pounds upward pressure, and the diameter $42 \times 100 = 4200$ lbs. downward pressure. Assuming the weight of the vessel or form as being 100 pounds, and we would have 6597.36 lbs. upward pressure against 4200 x 100 or 4300 lbs. downward pressure, and we would have solved the problem of the man who tried to lift himself over the fence by the straps of his boots. From this we see also that the cylindrical shape is stronger than the elliptical as in Fig. 4. We have the smaller diameter A B = 40 inches, and the larger diameter = C D = 44 inches, A B = 40 inches x 100 pounds = 4000 pounds, while C D = 44 x 100 = 4400 pounds.

In this illustration we have used a cylinder of 1 inch in length. If we join to this a second ring also 1 inch long, we have twice the surface acted upon by the pressure, consequently twice the gross pressure, but at the same time we have twice the material to withstand the pressure, consequently we see that so far as its inherent strength to withstand internal pressure is concerned, the length of the cylinder makes no difference, but while this is true in so far as internal pressure is concerned,

it is not so when expansion and contraction are considered as an element of weakness. In a cylinder with flat heads, the strength imparted to the shell by the ends renders it less liable to distortion at the ends than at the centre, and were the material of which it is composed sufficiently elastic, it would, if subjected to increasing internal pressure, gradually assume the shape of a barrel, and from that approach the form of a sphere or globe.

It is difficult to determine to just what extent the heads strengthen the cylinder, but it may be assumed that where the length of the cylinder does not exceed twice its diameter, its strength very closely approximates that of a sphere.

We have considered the strength of a cylinder to resist rupture in a plane parallel with its axis. We will now consider its strength to resist rupture in a plane at right angles to its axis, or in other words, its strength to resist being torn from end to end. In this case it is plain that the force at work to tear it apart, is the pressure multiplied by the area of the heads or ends, and that its strength to resist such pressure is the strength of the material multiplied by the sectional area of the circumference of the ring or cylinder. Referring to Fig.

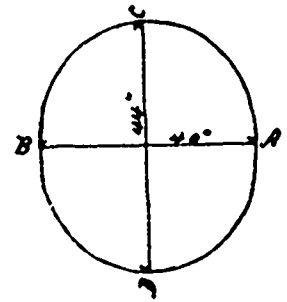


Fig. 4

2 again, and assuming the strength of the material to be the same across the grain of the plate, as it is lengthwise of the plate (and in boiler steel as manufactured at present there is found to be very little difference), say 60,000 pounds per square inch, we find the resistant strength to be $(42^2 \times 3.1417) \times .25 \times 60,000 = 1,979,208$ pounds, and this divided by the area of the head = $\frac{1,979,208}{42^2 \times .7854} = 1428.56$ pounds per square inch required to tear the cylinder apart endwise. Comparing its strength in this direction, with its strength to resist fracture longitudinally, as found by the rule already demonstrated, we find $\frac{60,000 \text{ lbs} \times (.25 \times 2)}{42} = 714.56$ pounds per square inch required to rupture the cylinder longitudinally, or just one half the strain required to tear it end from end. When we consider that the area of the ends is often very much reduced by tubes, flues, etc., this proportion is considerably increased. Notwithstanding all this, it must not be concluded that a cylindrical boiler is always more liable to burst from longitudinal, than from transverse weakness. There are elements of weakness in the unequal expansion and contraction of boilers, and from other causes which renders their strength more nearly equal in both directions, than would at first appear.

In our consideration of the strength of the cylinder, we have assumed it to be of uniform strength and thickness throughout. Theoretically such a boiler subjected to increasing internal pressure would gradually stretch until the limit of elasticity was reached, when it would give way all around at the same instant, and literally be "blown to atoms." This argument is of course hypothetical. In practice it would be found that there would always be some line of weakness where the fracture would take place. And this brings me to the second part of my subject this evening, viz., boiler joints.

If we could draw boiler shells in the same manner as small tubes are drawn, or if we could roll them from a solid block as locomotive tires are rolled, we would not require to make the careful calculations that are now necessary to determine the exact strength of the boiler joint. Until some method of constructing shells out of solid metal is devised, we will be compelled to join the edges of iron and steel boiler plates by either welding or riveting. Welding is a costly process, and cannot always be depended upon, consequently we are in a manner compelled to fall back upon riveting as a means of joining the edges of boiler plates.

Probably few engineers can be found who would venture to assert that the lap riveted joints of a new boiler are stronger than the solid plate; yet strange as it may appear, this was the general opinion not a great many years ago. By what method of reasoning this view was reached it would be hard to say, but it was only after repeated experiments had demonstrated its fallacy that the error was abandoned.

*An address delivered before the Canadian Marine Engineers' Association, 17th March, 1889.

Generally speaking, the riveted joints are the weakest part of a new boiler, particularly where no large, un-strengthened drum, or man holes are made.

Since the strength of any structure must of necessity be the strength of its weakest part, the subject of riveting becomes all important in arriving at a correct estimate of the strength of a boiler.

(To be continued.)

THE "CASE" INTER-ELEVATOR FLOUR DRESSER.

WE present herewith illustration of the above machine, which Messrs. John Inglis & Sons, of Toronto, have the exclusive right to manufacture and sell in Canada. The machine is compactly built and handsomely finished, the frame being made of selected hardwood and the body of select light wood. It is designed with the object of economizing space. The Inter-Elevator round reel is mounted on an iron shaft, and has a solid, dust-tight head, which effectually prevents specking. A series of iron spiders attached to the reel shaft, support the Inter-Elevators, which pass spirally the length of the reel. These elevators carry up the stock, greatly increasing the bolting capacity of the ascending side of the reel, and discharge their contents in a thin, even sheet, against the silk on the descending side, thus utilizing two-thirds of the circumference of the reel. The spirality of the Inter-Elevators causes them to act as conveyors, carrying the stock slowly and evenly the entire length of the reel. Another advantage lies in the continual division of the stock, each elevator taking up a portion of it, thereby separating, agitating and keeping it alive. The tail of the reel is moveable, and by a simple device the cloth can be effectively tightened at any time.

The cloth cleaner is a revolving canvas cloth and is so adjusted as to keep the cloth meshes free and open without wearing the silk.

The conveyors are built side by side, and are driven by a five-inch sprocket and chain from a ten-inch sprocket at the head end of reel shaft. This insures a considerably faster motion to the conveyor than that of the reel itself, and thereby prevents any danger of choke-ups. The machine is driven by pulley or sprocket at either head or tail.

Where the reels are placed one above the other a short cross shaft is used at head end of one of the machines, fitted with a suitable bevel gear for driving reel. The other reels are driven by sprocket and chain from the tail end of this one. The cut offs are very conveniently arranged for adjusting them from either side. A positive cut off can be obtained at any desired point.

The manufacturers offer to supply attachments for changing over old hexagon reels of any size or length to the Case Inter-Elevator Round Reel.

POINTS ABOUT ADVERTISING.

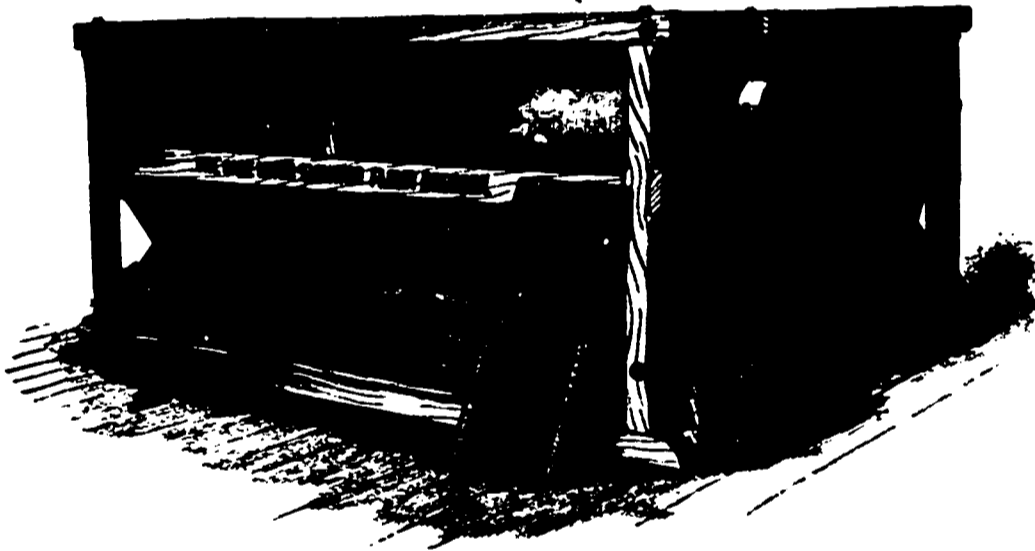
NEWSPAPER men in soliciting advertising are often met with the statement "I do not need to advertise just now; I am unable to fill my orders; when business begins to slacken up I shall perhaps avail myself of your columns." It is the old story of the leaky roof which did not need repairing when the weather was fair, and could not be repaired while it rained. The wisest business men and the most successful ones are those who keep their names prominently before the public when trade is good as well as when it is poor. The time to boom a town is when everybody is interested in it. When the interest fails, one might as well try to sweep back the receding waves of the ocean, as to withstand the stampede of waning confidence. When trade is driving, is the time to make one's business so well known that when the dull season comes there will still be customers to keep the manufacturer busy. Said a business man "I must advertise if I would get good results from any man on the road. Before I advertised, my travellers entering an office would be told 'we are not acquainted with your house,' and in many cases found that they could not secure an order which performance would be given to a competitor before their eyes. As soon as I began to advertise I had a different experience. My men found that it was equivalent to a letter of introduction from a mutual friend. 'Oh yes, we have noticed your advertisement and we feel acquainted with your house.' In this influence alone our advertising pays." This is no unusual experience. Men will deal with those whom they know, or of whom

they have heard so much that they feel acquainted. A constant and continual advertisement in a reputable journal which is constantly seen, is like the dripping water which is wearing away the flinty rock, slowly it may be but surely. Circulars are thrown in the waste basket. Catalogues may find lodgment on a shelf, but the frequent arrival of a reputable journal is a constant and sure reminder which sooner or later must bear fruit. It is the non-advertiser who complains of hard times. When everybody is rushed, it is no trick to secure custom, it is when his neighbors are idle, that the man who has wisely kept his name and goods before the public, finds himself so well known that he gets his full share of what patronage is to be had. The time to make hay is while the sun shines. Repair the roof while the weather is favorable, and there will be no leak when the storms come.—*Dixie.*

THE CARE OF PLANING MACHINES.

NOTWITHSTANDING all that has been said and written from time to time upon this subject, says the *Timberman*, still many operators of planing machines complain of their machines making wavy work, and in many cases candidly admit that with all diligence and careful investigation they have failed to discover the cause thereof. There is a maxim that there is never an effect without a cause to produce it, and when a well constructed machine turns out wavy work, there must be a cause, which if sought for by a careful and skilful operator, there is no good reason why it should not be discovered, and when discovered the circumstances of the case should always suggest the proper remedy.

It is true there are many light, cheap made machines in use that never can be expected to run out smooth work, for the lack of sufficient strength to resist vibra-



THE "CASE" INTER-ELEVATOR FLOUR DRESSER.

tion. For such machines there is but one effectual remedy. But a well constructed machine of sufficient weight and solidity to resist vibration under all ordinary conditions should never turn out wavy work. The causes which lead to this effect are so many, that we shall not attempt at this time to point out all of them, but only some of the most prominent ones that are most frequently met with.

Unbalanced cylinders, cutter heads and knives are no doubt the most frequent, and neither the cylinders nor matchers should be allowed to run in this condition for one hour after being discovered. It is not only the damage to the lumber and reputation of the mill that is involved by such conditions, but serious injury to the journals will be the result if allowed to run for any length of time in this condition. The side of the journal next to the heavy side of the head or cylinder will be constantly pressed against the box, in its efforts to find its true centre of gravity, and the result will be that this side of the shaft will wear entirely upon one place and soon become oval or egg shaped. In this condition it never can be successfully run, even if ever so well balanced afterwards, without constant heating.

Round journals and well balanced tools is one of the necessities for good smooth work. Other causes sometimes more obscure may combine to cause wavy work, even when the conditions just referred to are all complied with. A cylinder may be loose in the boxes or the pressure bar may not be properly adjusted, but these things are so easily detected by an experienced operator that such conditions should not be allowed to exist. Anything that will produce a vibration in the principal working parts of a machine is apt to manifest itself upon the surface of the lumber.

Loose rolls in their boxes and imperfect gearing is also a fruitful source of these troubles. It frequently happens that by constant use, the roller boxes become

worn so that there is play between the boxes and the journals. With the top rolls it makes but little difference, but with the bottom ones, especially upon the end to which the gears are attached, it makes all the difference in the world. The gears by which they are driven in many cases become worn, and perhaps by neglect or oversight may run so close together as to bottom and crowd each other, this causes the shaft, when loose in the boxes, to be constantly in a state of vibration. In such cases these vibrations of the rolls will surely manifest themselves in a wavy appearance upon the surface of the lumber. When such is discovered to be the case the gears should be carefully adjusted so that they may run free and smooth without any tendency to lift, and then if the rolls still continue to vibrate in the boxes and keep up that wavy appearance, there is no other remedy but to have the boxes taken out and bushed so as to fit the journals.

Old, hard and uneven belts with thick laps is another cause of inferior and wavy work. A belt of this kind whenever it passes over the pulley, gives it a jerk that will cause a vibration in the cylinder and never fails to leave its trade mark upon the surface of the lumber in the shape of a corrugation that is easily recognized by the experienced operator.

There are so many things about a planing machine to be looked after in order to turn out good smooth work at all times, even with the best machines in the market, that it may be truly said that "eternal vigilance is the price of good planing."

CONCENTRATION IN MANUFACTURE.

IN manufacture, the tendency is towards the concentration of effort, as against trying to cover so much ground, says the *American Machinist*. The manufacturer who imagines he can cover

all the ground, is likely to find himself in competition on every line with those who are putting a good deal of energy into each particular line he is working at. It is the case of too many irons in the fire. Some of them will be burned and none of them properly heated.

When the builder of machine tools wants a steam engine to drive his works, he could, of course, build it; but doing so would be a very unwise proceeding on his part. His neighbor who builds steam engines can give him a better job at half the money. He has expended years of energy in finding out how to build good engines at small cost.

Time was when a machinist was an all-around man. He turned his work in the lathe, planed it on the planer, chipped and filed it at the vise and fitted it to the machine on the floor. This has been changed by degrees, until now a manufacturer who should try to work on this plan would be considered on the wrong track.

After all, is it any worse policy than to expect to build pretty much everything in the machine line in one machine shop? There is really no difference that we can see. It is in either instance a case of division of energy, with the quotient too small for the best practical purposes. The machinist who is equally good at every detail of the business must permit a good deal of his energy to lie dormant. It is a waste of material. It is fair to assume that if he had spent more time in one particular direction he would have become more proficient in that direction than he has by too great a diversity of application. Then all he has to do is to stick to that line in which he can accomplish most. By doing so he earns more money for himself and for some one else.

The McKee & Co., of Dundas, Ont., have ordered an 80 H. P. Wheeler engine and 200 H. P. boiler from Messrs. Goble & McCulloch, Galt.

The Royal Electric Co. at Montreal have awarded a contract to Robin & Sailer for three driving belts, two of which are to be 36 inches, and one 30 inches wide, and each about 200 feet long. These are to be run on the new engines of the R. E. Co.

Messrs. James Jones & Son, the well-known mill furnishers of Toronto, Ont., print in their advertisement in the *MECHANICAL AND MILLING NEWS* this month a strong testimonial concerning the merits of their machines and system, from one of their customers who speaks from experience.

Messrs. A. Laidlaw & Co., of Parkdale, Toronto, have secured the contract to remodel Messrs. Thompson & Dunn's mill at Orillia Ont., putting in a full line of rolls, and Laidlaw & Co.'s new patent combined separator and brush machine, flour ball and bran duster. The work will be commenced at once.

DISTANCE IN ELECTRICAL TRANSMISSION.

It is conceded by all electricians that the cost of electrical transmission increases rapidly with increase in distance, while the efficiency, or percentage of the power at the generating station which can be delivered at the receiving station decreases as the distance increases.

Tables showing Cost of Complete Electric Plant for Transmission of Power Various Distances. Potential at Central Station, 500 Volts. Loss on Line, 10 per cent. Copper Wire, going and return.

Table with columns: H. P. Transmitted, Cost of Wire, Cost of Line Construction, Cost of Dynamos & Motors, Total Cost of Plant. Rows for distances: ONE MILE, FIVE MILES, TEN MILES, TWENTY-FIVE MILES, FIFTY MILES, ONE HUNDRED MILES.

In explanation of this table, Mr. Mansfield says: "I have calculated these figures on the arbitrary potential of 500 volts, which is very low for the transmission of large powers; nevertheless it was necessary to assume some basis. This potential is generally used to-day for power circuits."

"It will be noticed that the cost of copper is the principal item. To reduce this I will state the following electrical fact:

"The cost of copper decreases as the square of the potential increases. Take, for instance, the extreme case in the last table, viz., 500 horse-power transmitted 100 miles. If we double our potential, making it 1,000 volts, the cost of our copper will decrease to one-quarter, or \$10,000,000. If, now, we again double, we decrease to one quarter again or, at 2,000 volts potential, the cost of copper would be \$2,500,000. The total cost of the electric plant at this potential is \$2,622,500. Obviously, there is a limit to the increase of potential; and in the transmission of such enormous powers I would place that limit at one more doubling, or 4,000 volts. This is a possible voltage, for there are many electric light circuits in our large cities to-day of this potential, and even higher."

"One thousand volts is a safe and easily handled potential; and if this potential were used, a large saving would evidently be effected. Professor Thompson has devised and patented a method whereby very high potentials can be used to overcome distance, and at the receiving station be reduced to lower safe-working potentials. This plainly means a tremendous saving in cost of copper."

These figures will give some idea, says the Milling Engineer, of the cost of an electrical transmission plant. To transmit 100 horse-power five miles, allowing for an increase of potential to 2,000 volts, requires an investment of about \$20,000 in addition to the cost of the power plant at the generating station. This would indicate that electrical engineers have yet to work out a cheaper plan in order to compete with steam power. There is no question but the next few years will witness some remarkable developments in this direction.

WIRE CLOTH.

The classification of wire cloth differs in different countries, but as a rule the small numbers denote the large, and the higher numbers the smaller sizes of the meshes. In Germany the number of the cloth gives the number of threads found to the space of one Prussian inch; in Austria, to one Viennese inch; in France and Switzerland, in one Parisian inch; in England and the United States, to one English inch. Consequently the numbers of the wire cloth bear the same proportion to each other as that of the length of the various inches; and are best illustrated by their reduction to the metric system.

Table showing metric equivalents: One inch English measure equals 25.40 mm, Prussian 26.15, Viennese 26.34, Parisian 27.07.

The difference between the Prussian and Viennese measure is so small, that they can be accepted as the same for all practical purposes, and this generally forms the type for the classification of most of the wire cloth in use. Whether round wire is used or square wire, the numbers are the same. The shape is only of importance in the final application: for assorting and sifting of the grain, the round wire is preferred, but for cleaning purposes where friction is required, square wires have been found to do better service; their time of service, however, is short, as the sides of the wire, subject to the constant friction, soon lose their sharp edge and become round.



The Dominion Safety Boiler Co. has been incorporated. The Alliston roller mills are being rapidly converted into a foundry. John Frederickson will start a shingle mill near Oyster Harbor, Vancouver Island, B. C. Messrs. Heatty & Sons have introduced electric lights into their foundry at Welland, Ont. It is said that the exhibit of steam engines at the Paris Exposition will be the finest ever seen. The Windsor Board of Trade have appointed a committee to induce manufacturers to locate in that town. Mr. R. Whitelaw, of Woodstock, Ont., has the contract to supply a \$1,200 boiler to the Windsor waterworks.

Messrs. Nelson & Forsythe, Berlin, Ont., are erecting a 75 x 50 foot extension to their foundry and machine works. A new planer weighing over three and a half tons was lately added to the plant of Haslam & Lee's saw mill at Nanaimo, B. C. A free building site, exemption from taxation, free water and electric light, will be given as an inducement to start a foundry in Collingwood.

\$45,000 stock has been subscribed to the Economy Engine Co., Gananoque, Ont. When \$20,000 more stock is taken, work will be commenced.

Messrs. Howd & Son, Port Colborne, Ont., have put in machinery for making hatchets, and expect to be able to turn out 500 per day.

James Campeau is removing his wood-working machinery from Amherstburg to Windsor, and will run a sash, door and blind factory at the latter place.

Dr. Coleman is said to be making preparations for the erection of a new foundry building on a large scale on his property near the railway track in Seabroth.

A fourteen-year-old son of Mr. Robert Stewart, Gaelic planing mills, had three of his fingers severely cut the other day while working around a circular saw.

A new steam engine has lately been added to the iron-working establishment of Messrs. Pines & Clark, Herwick, N. S. The firm are erecting a plow factory.

Alliston treeholders have voted as a unit to give up the town's claim to the Vulcan foundry and grant five years tax exemption to Mercer Bros. & Co., who will operate the works.

Mr. Allen Hulter, who has for the past ten years represented Berlin manufacturers in the Maritime Provinces, has left for Yokohama, Japan, to open up trade there for Berlin's industries.

It is said on the strength of the \$10,000 bonus voted by the town of Rat Portage in aid of the erection of smelting works at that place, Prof. Powers has sold \$150,000 of the Company's stock and purchased the machinery.

At the annual meeting of the McClary Manufacturing Company, London, Ont., Mr. John McClary was elected president; W. M. Gartsshore, vice-president; George McClary, treasurer, and W. A. Gunn, secretary.

Messrs. Stahlshmidt, Klotz, Bostwick and others, of Preston, have applied for incorporation as a joint-stock company, to be known as the Dominion of Canada Manufacturing Company, to manufacture school, office, bank and church furniture, and fittings, etc., with a capital stock of \$100,000.

Since the death of Mr. Errington Gibson, senior member of the firm of E. Gibson & Sons, planing mill operators, Halifax, N. S., his sons Fulton, and Edwin Gibson, have undertaken the continuance of the business. The factory is well stocked with the latest improved machinery for making all classes of builders' materials.

Instructions by the British Admiralty are to the effect that more care must be taken in the use of forced draft. The appliances for creating draft are not to be used at full power except for brief periods in emergencies, and not, under ordinary circumstances, for the purpose of getting up steam quickly. All rapid changes in the temperature of boilers is to be avoided.

A St. John, N. B., paper remarks that considerable machinery has been introduced there, of late years, for the manufacture of small lumber. In the early days the Canadians would cut nothing but deals of even feet in length, and certain standard widths. All that was left of the log was regarded as refuse. Now all the ends and edging are worked up into box lumber, barrel heads, etc.

The Canada Pipe and Foundry Company have given notice that they will apply for letters of incorporation for the purpose of manufacturing gas, water, soil and other pipes, all descriptions of castings, and also machinery, with a capital of \$100,000. The corporate members are Messrs. Thos. T. Turnbull, E. W. Wilson, F. Brown, Wm. Rodden, Jr., Wm. Cleminning, Jr., John Cleminning and Wm. G. Withers, all of Montreal.

The Milling Engineer of Milwaukee says: "Two or three eastern concerns are complaining because an English manufacturer made up his catalogue by copying their cuts and descriptive matter. That is nothing. A millfurnishing concern over in Canada picked up an old cut of a Corliss engine, made by the Lord knows who, and labelled it Reynolds' Corliss. It is one thing to steal and another thing to pick pockets, and so far the Canadian thief is the most despicable." Name, name!

There are in Switzerland, about 1,200 persons employed in making bolting cloth, although the industry is not prosperous. The demands in regard to strength and durability are greater than in former years, while no proportionate increase of price is obtained. In 1880 the price of raw material rose, while that of the finished silks fell, and in 1887 in demand there was a sensible decline, which is partly ascribed to the action of hostile tariffs, as in Germany, and to depression in the milling business in Russia.

In Montreal, says the Mississippi Valley Lumberman, paper is now being made from saw dust. The process is a new one, but is consuming all the saw dust from one mill, and is proving a success. The paper made wholly from saw dust is said to form admirable sheeting, and is fit for building after leaving the mill, being tarred and dried. In the production of the better quality of paper one-quarter of waste paper is used, the remainder being saw dust. It is estimated that about 12,000 tons of saw dust are converted into paper annually.

On April 1st, death removed one of the most prominent figures in the American manufacturing world, in the person of Mr. E. P. Allis, proprietor of the well-known Reliance Works, Milwaukee, Wis. Mr. Allis moved to Milwaukee in 1846, and in 1857 purchased a small machine shop, from which grew the mammoth concern of to-day. Deceased was in his sixty-fifth year. The Allis Co., it will be remembered, opened a branch establishment in Canada, and built a number of mills here, but afterwards sold out to the Gen. T. Smith Co., and removed from Canada.

It is stated that a call has been issued to the boiler manufacturers of Pennsylvania and adjacent States, to meet in convention in Pittsburgh, April 16. The object of the meeting is to form an organization to be composed of the leading manufacturers of steam boilers with a view to create a greater interest in the manufacture of boilers of all kinds and make the use of the very best material compulsory. By doing this, boiler makers expect to decrease the number of explosions, and establish a minimum price which will insure a reasonable profit on all boilers built, thus offering a premium for superior style and workmanship.

A new system has been discovered, it is stated, of coating iron with copper. At the commencement of the present year experiments were made at Fulton's ironworks, in Kilkenny, Ireland, for the purpose of testing the efficacy of the method. A piece of iron, after being raised to almost a white heat, was then thoroughly sprinkled with a white colored powder. It was next re-submitted to heat until the powder in its original form had entirely disappeared from the surface, when the iron was plunged into a quantity of melted copper, and allowed to remain there for not longer than a second. It was then removed and allowed to cool. After cooling it was observed to be completely covered with copper.

Mr. L. H. Breckenridge, the instructor in mechanical engineering in the Lehigh University, U. S. A., has lately been making some experiments for the determination of the pressure exerted in drilling cast iron. He made a cylinder in which was a plunger, having an area of ten square inches. Three small grooves were turned in the plunger near its lower end, so as to prevent any leakage of the oil with which the cylinder was partly filled. Two holes were drilled in the cylinder near the bottom, and a steam gauge and an indicator were attached. The indicator cord was attached to the hub on the shaft of the quick return motion lever, in order to obtain diagrams of considerable length. When the piece to be drilled was resting on the plunger, a diagram could be taken which would show the pressure exerted in forcing the drill through the work. With 1/2-inch twist drills the greatest downward pressure was 400 pounds; with 3/4-inch, 900; with 1-inch, 1,100 pounds; with one-inch, 1,450 pounds; and with 1 1/2-inch, 1,800 pounds.

PAGE

MISSING

PAGE

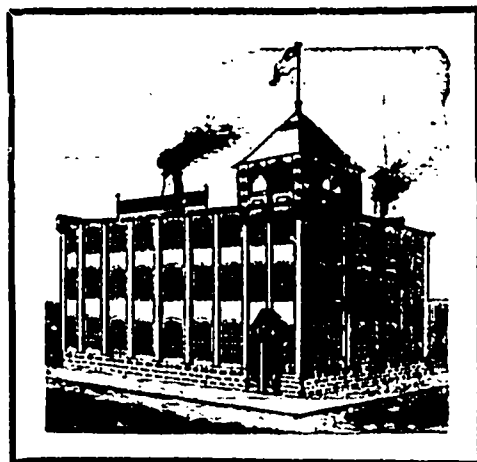
MISSING

THE BAG AND HESSIAN FACTORY OF CANADA.

BAGS

Of every quality and size.

THE
OLDEST, MOST COMPLETE AND BEST EQUIPPED
Bag Factory in the Dominion.



A Special Feature is the
MACHINERY FOR MANUFACTURING HESSIAN CLOTH.

Every quality and every width can be supplied same day as ordered.

BAG PRINTING IN COLOURS

We are now printing 5,000 to 10,000 Bags daily, and are turning out the **BEST WORK** in the country, at the **LOWEST PRICES.**

WRITE FOR SAMPLES OF OUR
BAG PRINTING IN COLOURS.

WE MAKE EVERY DAY
THIRTY THOUSAND BAGS
The CANADA JUTE COMPANY, Limited,
TORONTO AGENTS: MESSRS. STARK BROTHERS,
62 Front Street East, TORONTO.

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

A. ALIAN, President.

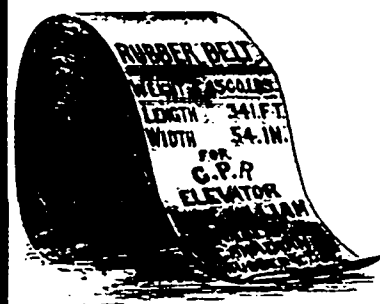
J. O. GRAVEL, Secretary-Treasurer.

F. SCHOLLES Managing Director.

CANADIAN RUBBER COMPANY OF MONTREAL.

SUPERIOR RUBBER GOODS.

—) OUR (—



Rubber Belting

IS UNEQUALLED IN AMERICA.

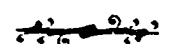
ALL KINDS OF RUBBER PACKINGS. RUBBER, ENGINE, HYDRANT, SUCTION, STEAM, BREWERS' AND FIRE HOSE.

RUBBER VALVES, CAR SPRINGS, WRINGER ROLLS, CARRIAGE CLOTHS, BLANKETS, ETC. MOULD GOODS OF EVERY DESCRIPTION.



Western Branch, Cor. Yonge & Front Sts., Toronto

J. H. WALKER, Manager.

CHEAP •  • EFFECTIVE

The "Case" Two-Break System

John Inglis & Sons,

Sole Licensed Manufacturers of the "Case" Short System Milling Machinery.

THE "CASE"

INTER-ELEVATOR SHORT SYSTEM

Will give the best results for any mill.

It is Automatic.

Easy to run and keep in order.

INEXPENSIVE AND PROFITABLE.

MOST SATISFACTORY.

Reduce your breaks • Increase your capacity • Make better flour and more room in your mill.
Full Particulars on Application. Write for Circulars.

Bodmer Bolting Cloth • Avery Seamless Steel Buckets • A Full Line Mill Supplies.
ROLLS RE-GROUND AND RE-CORRUGATED.

Engines

High-Pressure, Condensing and Compound.



Boilers

Marine, Stationary and Locomotive.

— Castings of all Descriptions —

JOHN INGLIS & SONS,

No. 6 Strachan Avenue,

TORONTO



Flour has declined 10 cents per sack at Winnipeg.

Midland's elevators have a capacity of 500,000 bushels.

Orgive's mill at Winnipeg is to be fitted up with the electric light.

A Penetang firm talk of building a new roller mill at Gravenhurst, Ont.

Messrs. J. Mattyn & Co., will erect a 30,000 bushel elevator at Alvinston, Ont.

Leopold Ranz, formerly of Pembroke, Ont., will build a grist mill at Eganville.

Mr. Jos. W. Warder has charge of Wm. Needler's roller mill at Bobcatygon, Ont.

Efforts are being made for the establishment of a roller mill at Pilot Mound, Man.

It is rumored that the old grist mill in Deloraine, Man., is to be moved to Boissevain.

The Stephenson mill at Omeuca, Ont., is being renovated and fitted up with the roller process.

The contract for the erection of a flour and oatmeal mill at Cunningham, Ont., has been given.

An elevator built at Carberry, Man., to take the place of the one recently destroyed by fire.

A device for conveying grain, ice, coal, etc., has been patented by Ebenezer Fisher, Kincairdine, Ont.

The by-law granting a bonus of \$1,500 and site for a grist mill at Ailsa Craig, Ont., has been carried.

Mr. John Plewes has sold his grist mill at Kimberly, Ont., and intends moving to Washington Territory.

The improvements to the G. T. R. elevator and wharf at Colingwood, Ont., are being rapidly pushed forward.

The *Mark Lam Express* says that of every eight loaves the Londoner eats, seven are made from foreign wheat.

Mr. McGinn, of the Lake of the Woods Milling Co., expects to leave Keewatin shortly and take up his residence at Winnipeg.

The mill wheels on the Welland canal are again revolving as the result of the letting in of the water into the canal a few days ago.

The municipalities of Russell and Silver Creek, Man., have each voted \$2,500 towards the erection of a flour mill at Russell village.

The warehouse of B. & E. Baxter, at Cayuga, Ont., containing 8,000 bushels of grain was totally destroyed by fire on the night of April 17th.

Messrs. Moodie, the well-known millers of Ridgeway and Dunnville, are going to purchase the old Keefer flour mills at Thorold, Ont.

The largest grain cargo that ever passed through the Welland canal was taken down a few days ago and comprised 71,500 bushels of corn.

It is estimated that there are about a million bushels of wheat in inland elevators in the Northwest, and over a million more stored at Port Arthur.

The Sturgeon River grist and saw mill, belonging to the Roman Catholic mission at St. Albert, N. W. T., was burned on the 24th March. Loss, \$20,000.

The Winnipeg millers are trying to so arrange matters that they will be able to close their offices on Saturday afternoons and give their employees a half holiday.

Whimster & Kayle, who have carried on a lumbering and milling business for ten years past at Strathclair, Man., have dissolved partnership, Mr. Kayle retiring.

American corn with an import duty of 75 cents per bushel is said to be entering Canada at such a rate that holders of Canadian barley and peas find it hard to compete.

The news comes from Winnipeg that the Lake of the Woods Milling Co. has inaugurated a flour war by selling at a considerable reduction on the prices of competitors.

Northwest advices state that Messrs. Moyer & Co., of Listowel, Ont., are proposing to establish a mill at Morden, Man., if given a loan of \$6,000, to be repaid with interest.

Brackmen & Kerr, proprietors of the Spanish oatmeal and flour mills, Vancouver Island, are erecting a large brick building at Victoria, where they will do a flour and feed business.

The question of the value of frozen wheat for seed is to be decided at the experimental farm at Brandon, with samples taken from wheat regularly graded by the inspector at Winnipeg.

The Ontario steamboat and freight managers and agents have, it is said, decided to keep the rates for flour and grain as last year and to charge to points east of Montreal the Montreal rate plus the arbitrary rate agreed on.

A Port Hope despatch states that Mr. John Helm's flour mill was damaged by fire a few days ago. The building is believed to have been set on fire by some evil disposed person. We have not learned the amount of the loss.

Some samples of wheat grown in the high altitudes of the Himalaya mountains of India have been received at the Ottawa Experimental Farm, and are said to mature very early. It is thought they may prove suitable for the Northwest.

The Grand Trunk Railway have been summoned to appear before the Interstate Commerce Commission at Washington, to answer charges of granting rebates and accepting less than published rates on traffic taken by it from points in the United States of points in Canada.

Bradstreet's estimates the quantity of wheat on hand in the United States and Canada March 1, 1889, at about 200,000,000 bushels. This is some 10,000,000 bushels less than was reported as being on hand one year ago.

Toronto grain men want their city to be made the distributing point for grain coming over the C. P. R. This grain is at present sent for distribution to Carleton Junction. A movement is also on foot to establish in Toronto an option market.

The bakers of Montreal recently held a meeting to discuss the proposed increase of the duty on flour. It was decided in the event of the price of flour being increased by an addition to the duty, to raise the price of bread proportionately.

The mills at Hunter River, P. E. I., which had just been fitted up for an oatmeal mill, were completely destroyed by fire with their contents recently. The building was insured, but there was no insurance on the new machinery, grain and meal.

We are informed by the *Deloraine Times* that Wm. Preston, of Stratford, Ont., is going to build a first-class roller mill at Boissevain, Manitoba, with a capacity of 100 barrels per day. The building is to be built of solid stone, 30x48, 40 feet high.

We regret to learn that a freset the other day did great damage to the grist mill of Duncan Walker, at Payne's Mills, in Southwold township. The whole structure was nearly carried away, and its contents, including the engine and boiler, were badly damaged. The loss is placed at over \$2,000.

A St. Thomas despatch informs us that Messrs. May Bros., who purchased the Lachlan Campbell flouring mill on Talbot street some months ago for \$0,000, have had workmen engaged at it ever since, and have now completed one of the finest mills of the West, having placed in it over \$5,000 worth of machinery.

D. S. Clemens, of Galt, and J. A. Markle, Indian agent at Birtle, have submitted a proposition to the town council of Birtle, Man., to build a 100 barrel flour mill in the town for a bonus of \$1,500 in cash, tax exemption for ten years and a free site, the rural municipality of Birtle also to give them \$4,000 in debentures, for which they guarantee special rates for gristing to actual residents of the municipality.

Mr. E. Odium, late of Japan, in an address to the members of the Vancouver, B. C., Board of Trade on the subject of trade between Canada and Japan, said the consumption of wheat flour was growing rapidly, but California was supplying most of that demand. He had imported some flour from the Ottawa valley, which was made from a mixture of Manitoba and Renfrew wheat, which he bought at retail prices, and could lay it down at a less price than the current prices in Japan and still make a small profit.

American millers, who have only one kind of wheat to grind the year round, and those devotees of single wheat milling, who would let the baker do the blending, will be interested to know says the *Millers Gazette*, that it is not an uncommon thing in English mills for millers to grind a mixture of six different kinds of wheat. At this moment a miller of our acquaintance is grinding a mixture of Californian, Hungarian, Russian Azima, Dede Agatch, Currahee and English, divided into 18 parts, and is getting a yield of 71 per cent. on the uncleaned wheat.

Fred Smith 14 years of age, son of Mr. Walter Smith, of Tilsonburg, had a close call from being smothered by falling into a bin containing some 5,000 bushels of oats in Mr. Tillson's oatmeal mill there. Just after falling, the spout conveying oats to the drying pan was opened, and the boy was drawn down with the grain until his feet stopped the oats running through the spout. Some of the other hands in the mill happening to hear his cries, gave the alarm, a board was knocked off the bin, allowing the oats to run out on the floor, and the lad was drawn out from under about seven feet of oats, almost smothered.

The British Secretary of State for India, has arranged a conference between millers and the various chairmen of the Chambers of Commerce throughout England, to discuss the best means of improving the condition in which Indian wheat arrives in Great Britain. There is reason to believe that dirt and inferior seeds are mixed with Indian wheat to add to profits, and that the system of "fair average quality," by which the acceptance of cargoes is governed, lends itself to such frauds. It is proposed to provide that if cargoes contain an excess of 2 per cent of such dirt and mixture there must be a reduction of price. It is claimed that shipments of Indian wheat contain 16 per cent of dirt and inferior seeds.

The *Winnipeg Sun* says of the Keewatin Milling Co. The names of the stockholders in this enterprise indicate that the Canadian Pacific railroad takes more than an ordinary interest in its management. Sir Donald A. Smith holds \$40,000 stock; Sir George Stephen a similar amount, A. Gillman, of Montreal, \$50,000; Mr. Mitchell, the manager, \$20,000; J. Mather, \$20,000. The erection of the mill cost about \$275,000 and the two elevators in connection, \$58,000. It is said that at present there are some 300,000 bushels of wheat in these elevators. A few cars are arriving daily. It is calculated that between the buying periods of each year the mill will require between 500,000 and 600,000 bushels to keep it running. If this is so, it is probable that there will be a considerable shortage this season.

A Belleville despatch says:—One of the finest water privileges in the country is at Glen Lewis, a point on the Moira river just south of Hog lake. There is no lack of water, but the dam which holds it back causes the inundation of hundreds of acres of land. The right of the mill owner to keep the water dammed back has been tested in the courts and established by legal decisions. Failing through legal means, aggrieved parties have resorted to violence. For the second time the dam was blown up by dynamite last summer, and about a week after the mills were burned. Nothing daunted, the owner proceeded to rebuild. The dam was replaced, and the mill was so near completion that it was intended to start operations in a few days, but news has been received that the dam has again been blown up.

A correspondent writes to the *Toronto World* from Burk's Falls, Ont., as follows: A word about the water power will now be in place. It is not at all utilized as it should be. There is power sufficient to drive a hundred mills, but only one mill has the

use of it. And that having now being gobbled by a Toronto bank as the largest creditor, is not at present running. A curious feature about this mill, as about many others in this section, is that they keep a fire walled in with stone at the bank of the river constantly burning up refuse slabs, blocks and pieces of lumber, etc., that would be made good use of elsewhere. It is said that it is done to keep them from accumulating in large quantities and thus being in the way of the work. It may be mentioned just here that there are two other very fine water power privileges within a mile of this place.

The Canadian Pacific's new grain elevator, just completed at Fort William, on Lake Superior, Elevator B, as it is called to distinguish it from the first elevator built there by the Canadian Pacific Railway company, has a capacity of 1,400,000 bushels. There are 14 elevating legs, each capable of elevating 7,000 bushels per hour. Each of these legs is furnished with a self-cleaning boot, the invention of W. J. Loss, the company's Superintendent of Buildings. Owing to a provision having to be made for tightening the belt which carries the elevating buckets, there has always been a certain amount of grain remaining in the boot, which requires to be frequently cleaned out by hand, and always so when changing from one grain to another. This boot has an ingenious arrangement, by which a shield is attached to the frame carrying the pulley. This shield is always just kept clear of the buckets, no matter what position the pulley takes in the boot while tightening the belt from time to time. Grain men will understand the advantages of always having a clean boot to start elevating with. The whole of these legs are driven by friction clutches attached to the shafting, two lines of which are run the entire length of the elevator. These two lines of shafting are driven by a single massive seven-ply rubber belt 50 inches wide and over 300 feet long. This method was first tried in Elevator B at Montreal, and found to work so satisfactorily that it was decided to accept the same arrangement at Fort William. This elevating machinery, with the steam shovels, will enable a train of 16 cars to be unloaded and stowed away in the bins in twenty minutes.

PUBLICATIONS.

WE have received from J. H. Brownlee, D. L. S., Brandon, Man., a copy of his new 25c. Indexed Map of Manitoba. The map is original and graphic, telling as it does its own tale of the young province. The fourteen pages of indexing make a complete guide to the map, which is folded into a neat cover for pocket or office reference. Mr. Brownlee's idea is to supply to eastern people a reliable low priced map—and in this he has succeeded. For further particulars, address J. H. Brownlee, Brandon, Manitoba.

We have been favored with a copy of the fourth bulletin issued from the Experimental Farm, Ottawa, relating to the results of the experiments with Ladoga wheat as an early ripening grain suitable for the Northwest. These results are said to be of a very satisfactory character.

PERSONALS.

Mrs. C. H. Waterous, wife of the founder of the Watrous Engine Works at Brantford, Ont., died recently at Montreal.

Goldie's mill at Guelph, Ont., was closed down for a day or two recently out of respect to the memory of Edward Neslin, an old employee.

Mr. Thos. Goldie, of Guelph, accompanied by Mr. Cargill, M.P., had an interview with Sir John Macdonald recently, to urge an increase in the duty on flour.

It is stated that Mr. Valancey E. Fuller having been appointed managing director of the Cochrane Roller Mill Company at Escanaba, Mich., will shortly leave Hamilton to reside there permanently.

There died at Hamilton, Ont., a few days ago, Mr. L. D. Birely, sr., one of the oldest millers in Canada. Mr. Birely carried on a milling business for upwards of twenty years near Storey Creek, Ont.

One of the oldest manufacturers in the Province of New Brunswick, departed this life on April 20th, in the person of Mr. C. D. Everett. Mr. Everett settled in New Brunswick upwards of sixty years ago, and founded flouring mills, which half a century ago did a large business. He also established extensive tide sawmills. Half a century ago, when the export of machinery to the colonies was forbidden in England, Mr. Everett brought out the first stationary engine and steam machinery ever employed in the Lower Provinces. This plant had been taken apart and packed in hogsheads, under which disguise it made a safe passage past the Customs authorities. Mr. Everett was 87 years old.

The quantity of lumber of all kinds on the Tobique river, New Brunswick, during the past winter is greater than for many years past. It is estimated that 75,000 railway ties will go down the various streams this spring. The cut of spruce logs is said to be one-half greater than last year, or nearly 10,000,000 feet.

A simple method of measuring belting in the roll, and said to be very closely correct, is as follows: The sum of the diameter of the outside and inside on the roll in inches, multiplied by the number of turns made by the belt, and this product multiplied by the decimal .1309, will be the length of the belt in feet.

Robert C. Blair Belledune, N. B., has secured a patent on a composition composed of crushed or flax seed meal boiled in a solution of washing soda dissolved in boiling water, for removing and preventing the formation of scale in steam boilers.

THE FLOUR DUTIES.

It has been pointed out, says the *Montreal Trade Review*, that while in 1881 there was invested \$13,000,000 in the flouring mills of Canada, which employed 100,000 men and produced an annual output of \$41,772,372, there was invested in the woollen mills \$5,272,376, the production of whose output of \$8,113,055 gave employment to 6,800 men, women and children. The difference in the output is indeed a marked one, and the character of the employees is very different, the former occupying men—heads of families—and the latter, men, women and children, the two latter classes, as investigation has shown, earning mere pittance. As to the way in which the fiscal policy encourages the two industries respectively, it is to be noted that while the Canadian woollen manufacturer is protected to the extent of seven and a half cents a pound, and 20 per cent. on the value of his cloth, the miller is absolutely discriminated against by from twelve and a half to thirty cents per barrel.

Not unnaturally the millers object to this condition of things and have been doing so most emphatically, as witness the deputation after deputation which they have sent to Ottawa to urge their claim, and so far to practically deaf ears, inasmuch as political exigencies will not permit of the desired change being made. Not being desirous of making the National Policy "jug-handled," framers and amenders sought to protect the Canadian farmer as well as the manufacturer, and in consequence duty was imposed on wheat, coal also being protected in the interest of the Maritime Provinces. However,

although wheat, coal and woollens, among other things, were made dutiable, it was found impossible to place flour—the manufactured wheat—on the same footing as some of the other articles for whose protection the tariff provides, and in consequence, with protected wheat, the Canadian flour miller finds himself discriminated against as the figures cited have shown. Indeed, Canada annually imports large quantities of flour to the disadvantage of the \$13,857,923 of milling capital, and of the 6,400 heads of families who formerly made their living out of its production. No wonder that the millers kick. It will therefore be well for the Minister of Finance to look into the matter and satisfy himself as to what it is possible to do in the way of "evening up" things which, as the figures show, are in a very disadvantageous position.

SHORT SYSTEM MILLING.

BY RAY.

THE products of the breaking operation are the same in the short as in the long system, the percentages only differing. With the short method fewer middlings are made, and they are more uniform in size, and therefore more easily purified. The percentage of patent flour from these, runs from 20 to 30 according to the variety of wheat used. For reducing these pure middlings I use a mill-stone. If the middlings are pure, I consider there is no better machine for the purpose, it being understood that the stone should be kept in proper order.

If there are no impurities in the stock to be reduced, most assuredly the stone will put none in, and it has this great advantage, that with it we can reduce the

middlings to flour at once without flaking the material, and thus reduce the volume of our second middlings to a mere nothing.

The percentage of flour made on the breaks, also varies with the variety of wheat, the amount made on the first two breaks which is fit for patent flour, generally running from 30 to 40 per cent.

Thus we have got rid of about 60 per cent. of the flour, and so far used only three operations, the bran portion being kept separate.

The middlings from the third or bran break, if the two previous breaks have been properly made, will be found so small in quantity and of such poor quality, that it is only a waste of time and wind to try to purify them.

We have now only the 3rd break middlings, a few 2nd middlings and the germ stock to handle. Two reductions on smooth rolls will be plenty for this.

I do not believe in sizing. I have tried it thoroughly, and find that I can make a much cleaner and more satisfactory flour by coming down close at every operation. This method produces a little flaked material which I handle on a centrifugal, the product of which is the only low grade we make.

I have materially added to the purity of our flour during the past month by changing some of the reels to the round form on a very simple method. It has increased our capacity considerably, and the flour is much clearer. The cost of the change was so small that it is not worth mentioning. The remainder of the reels will be changed just as soon as we can shut down for a day or two.

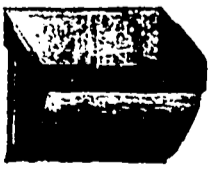
R. J. McAUSLAN,
MILLWRIGHT,
12 Marion Street, Parkdale, Ont.
Plans for Flour Mills, long or short system, also for elevators, carefully prepared.
Correspondence solicited.

Established 1859.
REYNOLDS & KELLOND,
Inventors of Patents, and Experts in Patent and Trade Mark Cases,
24 KING STREET EAST, TORONTO.
R. KELLOND, RESIDENT PARTNER.
General Office: 156 St. James St.; F. H. Reynolds, Resident Partner. Washington Office: Pacific Bldg., Street. Agencies in all foreign capitals.

TIMEWELL & SON,
Designs, Plans and Specifications prepared for all kinds of buildings. Tenders obtained, and buildings erected in any part of the province. Having had experience in the construction of Grain Elevators & Mills, we are in a position to supply working plans, &c. for these buildings, and the necessary machinery for capacity on the shortest notice. Correspondence free. No charge for preliminary designs.
ARTHUR T. TIMEWELL, M.C.S., C.E.,
ARTHUR W. TIMEWELL,
Caldwell Block, Main St., Winnipeg, Man.

SAW MILL FOR SALE.
Water power, good dam and race, 21 ft. head. Stock 200,000 ft. of lumber; also flouring mill site, Grand Trunk Railway switch on the premises. Apply to
H. N. SCHMIDT, Mildmay.

TURBINE PUMP AND HEATER FOR SALE.
Steel boiler, 75 horse power, Inglis & Hunter make; boiler in excellent condition. Also Pump and heater in connection. Will sell cheap. Apply to
H. N. SCHMIDT, Mildmay.

FAVORITE
Mill Buckets.

Manufacturer and Dealer,
JOHN RADIGAN,
19 and 21 Kelly St.,
HAMILTON, ONT.
SEND FOR PRICES.

MACHINERY
FOR SALE.

FOR SALE
FOR ACCOUNT OF THE
JOSEPH HALL MACHINE WORKS

- Iron Turning Lathes.
- Fire Extinguishers.
- Wood Turning Lathes.
- Sand Belt Machine.
- Upright Boring Machine.
- Emery Wheel Frame.
- Reaming Machine.
- Facing Machine.
- Horizontal Iron Boring Lathes.
- Punching Machine.
- Post Drilling Machine.
- Iron Column Drilling Machine.
- Gang Drilling Machine.
- Nut Tapping Machine.
- Cutting-off Machine.
- Set 40 inch Hand-Rollers, 3 1/2 dia.
- Travelling Crane and Cranes.
- Horizontal Engine, with Lift Pump and Heater.
- Cylinder 18 in. x 36 stroke, fly wheel 10 ft. in dia., in one casting.
- New Model Vibrators.
- Portable Engines.
- Horse Powers.

All for sale at sacrifice prices, and may be seen in the Toronto Bridge Buildings, Toronto.

John Livingstone, Trustee.
31 York Chambers, Toronto, 29th Jan., 1889.

H. W. PETRIE'S lot of Water Wheels for sale.

- 60 inch Turbine, Guldie & McCulloch, builders.
- ONE 60 inch Tyler.
- 48 inch Leffel.
- 60 inch Sclater.
- 48 inch Tyler in Scroll case.
- 48 inch Sclater.
- 45 inch improved Turbine Water Wheel.
- PAIR of Sampson Turbine Wheels, 42 inch, run together.
- 42 inch Sampson Turbine.
- TWO 40 inch Leffels.
- 36 inch Sclater.
- 35 inch Leffel.
- 44 inch Little Giant.
- 30 1/2 inch Leffel.
- 30 inch Barnham.
- 26 inch Leffel.
- 24 inch Leffel.
- 20 inch Leffel.
- 21 inch Archimedian.

- 15 inch Archimedian in Globe case.
- 12 inch Little Giant.
- 21 inch Little Giant.
- 17 1/2 inch Leffel.
- WATER Wheel Governor Galt, make.
- FULL particulars regarding any of above Wheels sent on application. Address H. W. PETRIE, Brantford, Ont.



Water Works Department

Notice is hereby given that the Committee on Water Works of the Municipal Corporation of the City of Toronto is prepared to receive

TENDERS FOR MATERIAL

Required for extending the Works and increasing the supply as follows:
10,400 feet of 48-inch diameter, flexible joint, cast iron pipe, or 10,400 feet of 48-inch diameter, steel plate pipe, with cast iron flexible joints; or 4,500 feet of 48-inch diameter, flexible joint, cast iron pipe; or 6,000 feet of 60-inch diameter, steel plate pipe, with cast iron flexible joints.
Two 48-inch double screw valves.
Two 36-inch double screw valves.
Two 30-inch double screw valves.
Two 24-inch double screw valves.
1,500 feet of 36-inch diameter cast iron spigot and faucet pipe.
About 48,000 feet of 12-inch cast-iron spigot and faucet pipe.
About 46,000 feet of 6-inch cast iron spigot and faucet pipe.
Thirty 12-inch valves.
Thirty 6-inch valves.
Thirty 4-inch valves.
Also, two pumping engines each of 2 1/2 million imperial gallons capacity per 24 hours; or two pumping engines, each of 3 million imperial gallons capacity per 24 hours, with boilers.
Specifications, forms of tender and any further information can be had upon application to the office of the Superintendent of the Department at the address below.
Sealed tenders for the above, or any portion thereof, addressed to the undersigned and marked on the outside, "Tender for Pipe," etc., as the case may be, will be received by registered letter only, up to the hour of 2 p. m. on Monday, the 3rd day of June, 1889.
The lowest or any tender not necessarily accepted.

JAS. B. BOUSTEAD,
Chairman Committee on Water Works.
Water Works Department,
City Hall, Toronto, Ont., 12th April, 1889.



TENDERS.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Indian Supplies," will be received at this office up to noon of THURSDAY, 9th May, 1889, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1890, consisting of Flour, Bacon, Groceries, Ammunition, Twine, Oxen, Cows, Hells, Agricultural Implements, Tools, &c., duty paid, at various points in Manitoba and the North-West Territories.
Forms of tender containing full particulars relative to

The Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods (separately or for all the goods called for in the Schedule) and the Department reserves to itself the right to reject the whole or any part of a tender.

Each tender must be accompanied by an accepted cheque in favor of the Superintendent General of Indian Affairs on a Canadian Bank, for at least five per cent. of the amount of the tender, which will be forfeited if the party tendering declines to enter into a contract based on such tender when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department for the proper performance of the contract. The lowest or any tender not necessarily accepted.

This advertisement is not to be inserted by any newspaper without the authority of the Queen's Printer, and no claim for payment by any newspaper not having had such authority will be admitted.

L. VANKOUGHNET,
Deputy of Superintendent-General of Indian Affairs.
Department of Indian Affairs,
Ottawa, April, 1889.

MILLERS' AND MANUFACTURERS

INSURANCE COMPANY.
HEAD OFFICE,
24 Church Street, Toronto.

JAMES GOLDIE, Guelph, President.
W. H. HOWLAND, Toronto, Vice-President.

- DIRECTORS.**
H. MCCULLOCH, GALT
GEO. PATTISON, PRESTON
W. H. STOREY, ACTON.
A. WATTS, BRANTFORD
S. NEELON, St. CATHARINES
W. BELL, GUELPH
H. N. BAIRD, TORONTO
W. WILSON, TORONTO
J. L. SPINK, TORONTO

HUGH SCOTT, Managing Director.
DOUGLAS SUTTON, Secretary.
GEO. HANSON, Inspector.

OBJECTS.

To prevent by all possible means the occurrences of avoidable fires.
To obviate heavy losses from the fires that are unavoidable by the nature of the work done in mills and factories.
To reduce the cost of the insurance to the lowest point consistent with the safe conduct of the business.
The Combined Losses and Expenses on the business of 1887 was under Fifty per cent. (50%).

COMPARISON OF DECIMAL WITH THE BINARY AND OTHER SCALES.

THE following table has been prepared for the use of machinists and other mechanics who have occasion to use ordinary steel scales as found in the market at the present time. These scales are usually divided into eighths, sixteenths, thirty seconds, sixty-fourths, tenths, twentieths, fiftieths, hundredths, twelfths, twenty-fourths, etc. The table shows at a glance the relative value of these divisions, and their decimal equivalents.

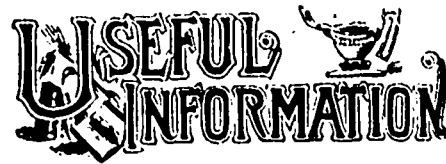


Table with columns for 8ths, 16ths, 32nds, 64ths, DECIMALS, 48ths, 24ths, 12ths, 6ths, 30ths, 20ths, 10ths, 8ths, 16ths, 32nds, 64ths, DECIMALS, 48ths, 24ths, 12ths, 6ths, 30ths, 20ths, 10ths. It lists various fractions and their decimal equivalents.

THE MANUFACTURE OF BRASS.

BRASS is formed by fusing together copper and zinc. Different proportions of these metals produce brasses possessing very marked distinctive properties. The proportions of the different ingredients are seldom precisely alike, these depend upon the requirements of various uses for which the alloys are intended. Peculiar qualities of the constituent metals also exercise considerable influence on the results. Brass is fabled to have been accidentally formed at the burning of Corinth, 146 B. C; but articles of brass have been discovered in the Egyptian tombs, which prove it to have had a much greater antiquity. Brass was known to the ancients as a more valuable kind of copper. The yellow quality was considered a natural quality and was not supposed to indicate an alloy. Certain mines were much valued, as they yielded this gold-colored copper, but after a time it was found that by melting copper with a certain earth, calamine, the copper was changed in color. The nature of the change was still unsuspected. Alloys of copper and zinc retain their malleability and ductility when the zinc is not above 33 to 40 per cent. of the alloy. When the zinc is in excess of this, a crystalline character begins to prevail. An alloy of one copper to 2 zinc may be crumbled in a mortar when cold. Yellow brass that files and turns well may consist of copper four, zinc one to two. A greater proportion of zinc makes it harder and less tractable; with less zinc it is more tenacious and hangs to the file like copper. Yellow brass, copper two, zinc one, is hardened by the

addition of two to three per cent. of tin, or made more malleable by the same proportion of lead. Copper, zinc, tin and lead in varying proportions form alloys, always in definite quantity for a given alloy. The ease with which some of the metals are burned away at comparatively low temperatures renders it a very easy matter to make several different kinds of metals from the same mix. This very thing occurs, and the great difficulty in getting bearing-brasses uniform in quality causes some engineers to babbitt all bearings as the best way to insure uniformity: One lot of castings may be soft and tough, another hard, and so on. Zinc is added the last thing as the crucible comes out of the furnace, and the mixing of the mass is a matter of uncertainty. If the metal is too hot for the zinc a large percentage goes off in the form of a greenish cloud of vapor, and the longer the stirring goes on the more escapes. The two metals which enter into the composition of brass have an affinity for each other, but they must be brought into intimate contact before they will combine. Some brass founders use precautions to prevent volatilization of the more fusible metals, introducing them under a cover of powdered charcoal on top of the copper.

The Neerawa Man. Register, says Dr. Harrison of that place, offers to build a mill of 125 barrels capacity with storage attached, for a loan of \$10,000; half the amount to be repaid in five years and the balance in ten years without interest. The amount to be secured to the municipalities by a first mortgage on the property and by an assignment to them of an insurance policy for the amount.

Asbestos powder, made into thick paste, with liquid silicate of soda, is used with great advantage in making joints, fitting tops, etc.

Drop oil is collected in many mills and factories to be cleaned and used again. A little apparatus has been constructed for this purpose which it is reasonable to suppose, is patented. It may be described as follows. The apparatus is a box-like concern, of several "stories," the interior either lined with, or else consisting entirely of, lead. Above it has a shoulder like a funnel, into which is poured the oil to be cleaned. The purified oil passes off through an escape pipe in the bottom. The different shelves or "stories" are perforated, and covered to a height of about two inches with raw loose cotton, through which the oil must percolate. The cotton serves as a filter, and retains all kinds of contaminations passed through the several shelves, it is nice and clean and drops into a vessel underneath. The dirty cotton is occasionally replaced by clean. This is about the most inexpensive way of effecting it that I know of. It is also necessary to add that the apparatus must stand in a warm place. The cleaning of the oil with chemicals is both a tedious and a doubtful process, because even after thorough washing it may still retain traces of acids, rendering it unfit for lubricating purposes.

The method hitherto employed for preventing condensation in steam cylinders is by jacketing the cylinder, either with some non-conducting material or with live steam. Mr. Bryan Donkin, jr., has, however, made a new departure in heating cylinders, which promises to give good results, if we may judge from the preliminary experiments tried at the works of Messrs. Bryan, Donkin & Co., Bermondsey, London, S. E. The apparatus employed consists of a series of Bunsen burners, placed at intervals round the steam cylinder, the gas jets heating the cylinder walls up to a temperature equal to or exceeding that of the entering steam. The steam on entering is therefore not chilled, and the expansion curve is raised. One feature in this invention is the thorough command which can be obtained over the temperature of the cylinder. Few or many burners can be employed, and the gas flames can be raised or lowered to any degree, to suit what is found to be the most economical temperature to work with. Of course, against the saving due to the absence of condensed water in the cylinder, must be placed the cost of the gas consumed in heating the metal of the cylinder. We have not been furnished with figures, but we are informed that the results obtained at present indicate a saving of 25 per cent. in the weight of feed water or steam used per indicated horse-power.

The artesian wells of Dakota are probably the most remarkable for pressure, and the immense quantity of water supplied, of any ever opened. More than a hundred of such wells, from 500 to 1,600 feet deep, are to-day in successful operation, distributed throughout 29 counties, from Yankton in the extreme South to Pembina, in the extreme North, giving forth a constant, never-varying stream, which is in no wise affected by the increased number of wells, and showing a gauge pressure in some instances as high as 160, 170, 175 and 187 pounds to the square inch. This tremendous power is utilized in the more important towns, for water supply, fire protection and the driving of machinery, at a wonderful saving of the original cost of plant and maintenance when compared with steam. In the city of Yankton a 40-horse power turbine wheel, operating a tow mill by day, and an electric light plant by night, is driven by the force of water flowing from artesian well, the cost of obtaining which was no greater than would have been the cost of a steam engine developing the same power, not counting the continual outlay necessary (had steam been employed) for fuel, repairs and the salaries of engineer and fireman. What has been accomplished through the aid of natural gas and cheap fuel in building up manufactories elsewhere, may some day be rivalled on the prairies of Dakota by tapping the inexhaustible power stored in nature's reservoirs beneath the surface. -Harper's Magazine.

As dynamos and steam engines are being introduced more and more into private houses, and in neighborhoods where vibration occasionally accompanying their operation is objectionable, some means for preventing the trouble is of special interest at this time. Various forms of foundations have been proposed for this purpose, very few of which, if any, have proved satisfactory. In a recent communication to the Societe des Ingenieurs Civils, M. G. Anthoni describes a method of overcoming the difficulties caused by vibration and noise from engines, and the point upon which he lays special stress is, in the case of machinery, the increase of the mass of the system to be isolated and its carriage by an elastic body, such as rubber. A large trench is dug out, at the bottom of which is placed planking, surmounted by a covering of sheet iron, on which are distributed a number of rubber cylinders, constituting at the same time an elastic and electric insulation. On top of these cylinders there is placed a second plate of sheet iron, riveted to a frame-work so as to give stiffness to the whole. On this is built a foundation in the usual way, provision being made for the foundation bolts, and sufficient space being left to properly allow of periodically cleaning the trough of any extraneous matter, without disturbing the elastic suspension. The foundation need not be of masonry, and in some cases it might be advantageous to replace it by a caisson filled with sand, which may be easily transported. The trench surrounding the foundation is covered at the top by a plank forming a border, but so as to allow of horizontal movement. The steam and exhaust pipes are given a spiral turn at their upper ends so as to permit of their being elastic under the movement which takes place, and so as to avoid the springing of joints. In the particular case referred to, the oscillatory movement is eight millimeters, and nothing is more curious than to see this whole mass, which weighs more than twenty-five tons, rapidly vibrating without one being able to feel the slightest vibration even at the edge of the trench.

THE J. A. CONVERSE MANUFACTURING CO.

A. W. MORRIS & BRO., - PROPRIETORS.

MANUFACTURERS OF

Cordage, Red Cap Binder Twine,

JUTE AND COTTON BAGS, CALCINED AND LAND PLASTER.

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

HEAD OFFICE, - MONTREAL.

BRANDS, ELECTROTYPES

— AND —
NOVEL DESIGNS

FOR
PRINTING

SUPPLIED GRATIS.

Toronto Branch:
20 FRONT STREET EAST,
W. C. BONNELL, Manager.
Telephone 475.

Hull Branch:
HEMNER & HART'S WHARF.
F. LEDDEN, Manager.

Winnipeg Branch:
MERRICK, ANDERSON & CO.
AGENTS.

Sample orders will always receive the greatest care.

BAGS

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

Full stock of our Manufactures at all branches.

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

GOLDIE & McCULLOCH,
GALT, - ONTARIO.

— To Parties who contemplate —

BUILDING OR RE-BUILDING FLOUR MILLS,

with the full or combined roller system, we are prepared to furnish estimates or specifications, using a full line of our machines---NONE IMPORTED---manufactured under Canadian Patents controlled by us.

ALL WHO INTEND TO MAKE CHANGES WILL DO WELL TO SEE US BEFORE DOING SO.



Wheelock Automatic Engine,
TURBINE WATER WHEELS,
Wood-working Machinery, - Wool Machinery,
Shingle and Barrel Machinery.

Special Price Lists furnished on application

FIRE AND BURGLAR PROOF
SAFES,
VAULT DOORS, & CO.
First Prizes Awarded, Toronto, 1882, 1884.
Correspondence solicited and orders promptly attended to.

IMPROVED FLOUR DRESSING MACHINE

Our machines, as shown above, contain important improvements covered by Canadian Patents which we control. Parties purchasing elsewhere will do well to look out for infringements. All our machines are made under our own supervision, of the best materials and workmanship. Satisfaction guaranteed.

GOLDIE & McCULLOCH.

LONDON MACHINE TOOL CO.,

LONDON, - ONTARIO,

MANUFACTURERS OF

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

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

Do you want a **Catalogue Printed**
Or do you know any one who does, if so refer to
Bingham & Webber
The Premier Catalogue Printers and
Pioneers of Art Printing in Canada.
Whose Office is in the Lakeside Court 25 1/2 Adelaide St. East, Toronto

IMPORTANT TO STEAM USERS.

THE PREVENTION OF BOILER EXPLOSIONS

AND OTHER ACCIDENTS TO STEAM BOILERS.

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

The Boiler Inspection & Insurance Company of Canada.
Head Office, - TORONTO.

Beaudry's Upright Cushioned
POWER HAMMER
Simple, Practical, Low-priced, Entirely New Design.
—SEND FOR PRICES—
MILLER BROS. & MITCHELL.
(Sole Makers for Canada) - MONTREAL.
Can be seen at Permanent Exhibition, Toronto.



ROBIN & SADLER

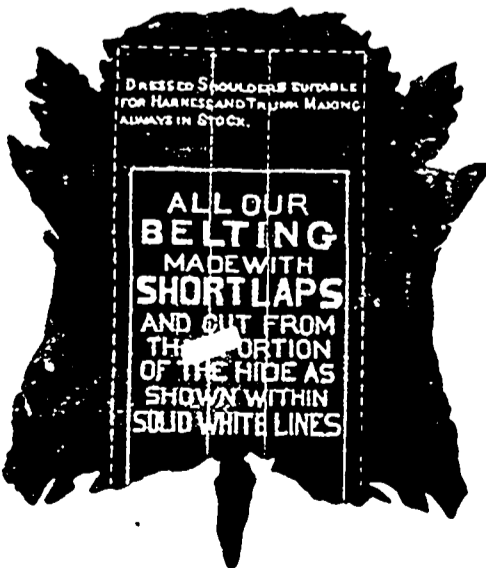
Manufacturers of

Leather

Belting

2518, 2520 and 2522
Notre Dame St.

MONTREAL.



DRESSED SHOULDERS SUITABLE
FOR HARNESS AND TRIMMING MACHINES
ALWAYS IN STOCK.

ALL OUR
BELTING
MADE WITH
SHORT LAPS
AND CUT FROM
THE PORTION
OF THE HIDE AS
SHOWN WITHIN
SOLID WHITE LINES

ROBIN & SADLER

Manufacturers of

Leather

Belting

129 Bay St.

TORONTO.

—All Sizes Kept in Stock, and Orders Filled Promptly.—

DEALERS IN

COTTON AND RUBBER BELTING,

LACE LEATHER, BELT HOOKS AND MILL SUPPLIES.

Victoria Wire Mills.

ESTABLISHED 1859.



Perforated Sheet Metals,

Steel and Iron Wire Cloth,

WIRE GUARDS FOR MILL WINDOWS, ETC.

B. Greening & Co.,

HAMILTON, ONT.

Send for Catalogue, mentioning your requirements.

W. Stahlschmidt & Co.

MANUFACTURERS OF

Office, § School,



Church and Lodge

FURNITURE

Preston, - Ontario.

SEND FOR CATALOGUE.

GEO. F. BOSTWICK,

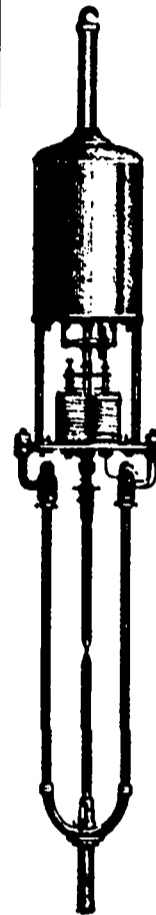
Representative,

24 Front Street West, - Toronto.

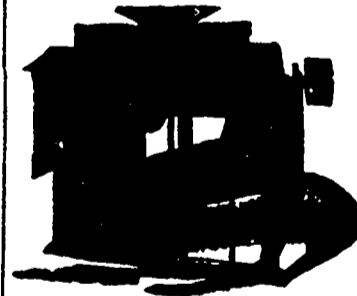
STEAM USERS
Desiring the services of **COMPETENT ENGINEERS** of any class, can obtain **sober, intelligent and reliable men**, by applying to
CANADIAN ASSOCIATION STATIONARY ENGINEERS
A. M. WICKENS, President, Globe Office, Toronto; M. J. WALLBRIDGE, Secretary, 48 Grand St. West, Toronto.

MACHINE KNIVES
Of every description, for
Planing, Moulding, Stave Cutting
SEND FOR PRICE LIST

KAY ELECTRIC CO.
MANUFACTURERS OF
ELECTRIC MACHINES
Of All Kinds.
Arc and Incandescent
DYNAMOS and LAMPS.
ELECTRIC MOTORS,
PLATING MACHINES
ANNUNCIATORS,
CALL BELLS,
MEDICAL BATTERIES
ETC.
Cor. Bay & McNab Sts.,
HAMILTON, - ONTARIO
Send for circulars and price list.



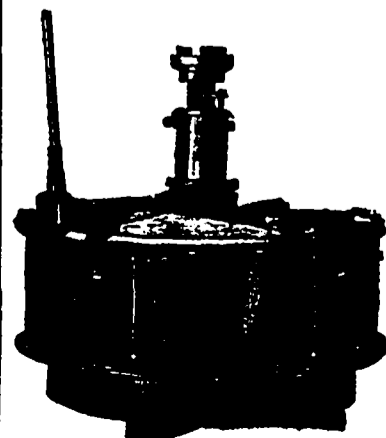
LIDLAW'S BARLEY CLEANER



The above machine is unsurpassed for thoroughly cleaning wheat, oats, barley and other grain. Read the following testimonials:

Shelburne, Ont., Jan. 23, 1888.
Messrs. A. LAIDLAW & Co., Parkdale.
Gentlemen,—Yours of the 21st received and noted. We have found your Barley Cleaner (No. 1, capacity 200 bushels per hour) a first-class machine, and have no hesitation in stating that it is more than pay for itself in a single season, especially in light and badly awned barley. We cleaned all the barley we handled this season, and find that the average increase in the weight was 10 pounds per bushel, and the average waste (light grain, dirt, &c.) about one bushel in seventy-five. It increased the value of our barley three to five cents per bushel.
Yours truly,
E. BZWICK & Co.
Toronto, June 3rd, 1887.
In reply to enquiry as to the working of your Barley Machines, we would state that they have given us entire satisfaction. Had we any light weight barley in our section last season, we are certain we could speak more positively as to their merits. They run well and fast, and are easily driven. Wishing you every success, we remain
Yours very truly,
J. MCKAY & COMPANY.

IT WILL PAY MILLERS, OWNERS OF ELEVATORS, ETC., TO EXAMINE THE MERITS OF THIS MACHINE.
Send for circular and testimonials.
A. LAIDLAW & CO., - PARKDALE, ONT.



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

LUMBER PRICES.

Table of lumber prices including sections for CAR OR CARGO LOTS, YARD QUOTATIONS, and various types of lumber like white pine, spruce, and hemlock.

Table of Montreal prices for various types of lumber such as white, basswood, cherry, and black ash.

Table of New York prices for white pine, including different grades and sizes.

Table of Eastern Spruce prices for various sizes and grades.

Table of Hemlock prices for different sizes and grades.

Table of Dresserd Lumber, Car Load Lots prices for various sizes of flooring and ceiling.

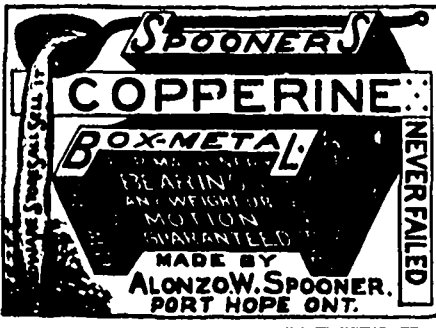
Table of Albany, N. Y. Prices for Shingles and Lath.

Table of Hemlock prices for boards, joists, and wall strips.

Table of Pine prices for various sizes and grades, including shingles and siding.

Table of Buffalo and Tonawanda Prices for Norway Pine.

Table of White Pine—Rough prices for different sizes and grades.



Jute and Cotton BAGS AND SACKS of every quality and size

MANUFACTURED AT TORONTO BAG WORKS The Pioneer Factory in Canada for Printing

JUTE AND COTTON BAGS IN COLORS.

Original Designs for Brands Prepared Free of Cost. Send for samples and price lists. Winnipeg Branch: GRANT & HORN, Agents, who carry a complete stock of our goods.

DICK, RIDOUT & CO.,

11 and 13 Front Street East, TORONTO

F. E. DIXON & CO.

MANUFACTURERS OF

PURE

OAK-TANNED

LEATHER

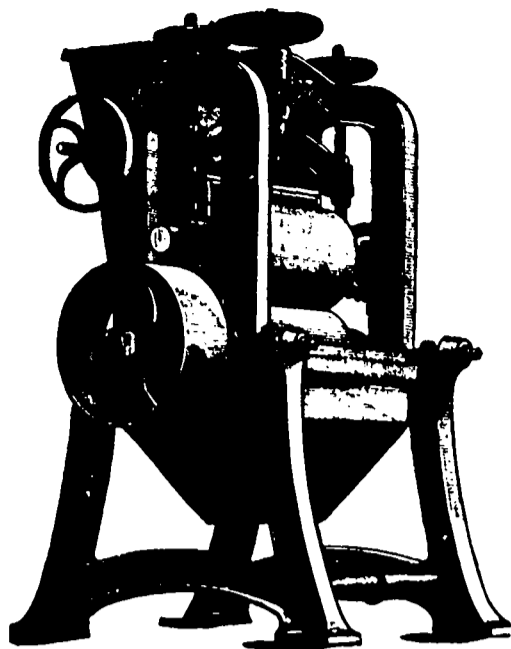


BELTING

Guaranteed in every respect equal to the best American or English Belting.

Send for Latest Discounts and our Pamphlet on Belting.

OFFICE AND FACTORY: 70 KING STREET EAST, TORONTO.



James Jones & Son, MILL BUILDERS

— AND —

MANUFACTURERS OF MILLING MACHINERY

- Special Machinery for the Short System of Milling -

AGENTS FOR MILLERS' SUPPLIES.

MESSRS. JAMES JONES & SON, Thorold, Ont.

CHELTENHAM, March 8th, 1889.

GENTS.—As my mill has been running some months, I am now in a position to give my opinion on your Short System of Milling. I will say it is no trouble to run it; there is no choking; the machinery runs complete. I cannot speak too highly of the Stone Roll for purified middlings. It is easily regulated. The bran and shorts are clean and the flour is up to the standard. Altogether I am well pleased with the mill and its work, and have to thank you for the manner in which you completed the contract.

Respectfully yours,

F. HAINES.

SOMETHING NEW.

After several years experimenting on the best mill for custom milling, we have lately brought out

OUR MODEL CUSTOM ROLLER MILL,

Which is the Simplest, Cheapest and Best Custom Mill ever offered.

We guarantee to produce as good results as can be produced from the wheat used. Parties desiring to change from the long system to the short system, or change from stones to rolls, or build new mills, will find it to their interest to consult us before placing their order. For further particulars, apply to

JAMES JONES & SON, - THOROLD, ONT.

WE WANT IT KNOWN TO EVERY MILLER

————) T H A T (————

DOBSON'S

Patent Flour Dresser

Is guaranteed to be SUPERIOR TO ANY OTHER BOLTING DEVICE for

Clear, Clean Bolting, or Re-bolting of all grades of Flour.

THEY CANNOT BE BEAT ON ANY STOCK,

— AND —

Are being extensively adopted for the entire bolting in both new and old mills.



Finely designed and mechanically constructed, slow speed, occupies small space, and has immense capacity.

Manufactured for the Canadian trade by

THE HERCULES MFG. CO.

PETROLIA,

ONTARIO.

Send for price lists, testimonials, &c.

Satisfaction guaranteed.

THE COCHRANE

ONE BELT DRIVE

CONTINUOUS TRAIN OF ROLLS

FIRMLY ESTABLISHED AS THE

MOST PERFECT SYSTEM KNOWN

We refer you to the following millers

USING THE COCHRANE ROLLS:

WILLIAM PARTLOW and JAMES SMITH,	-	Ingersoll.	H. BUCK,	-	-	Norwood.
THOMAS COOK,	-	Carville.	DOBSON & CAMPBELL,	-	-	Woodville.
V. DENNE,	-	Newmarket.	DOBSON & CAMPBELL,	-	-	Beaverton.
MELDRUM & DAVIDSON and H. A. MULHERN,	-	Peterboro'.	JOHN ACKLAND,	-	-	Delaware.
M. B. BURR,	-	Bloomfield.	JOHN CALDWELL,	-	-	Coventry.

Not one of whom could be induced to return to the old style of Belted Rolls.

GIVE US A TRIAL

IF WE DO NOT PROVE ALL WE CLAIM WE WILL REMOVE THEM AND MAKE GOOD
ALL DAMAGES SUSTAINED.

WE ARE NOW PREPARED TO FILL ALL ORDERS PROMPTLY.

ROLLS RE-GROUND AND RE-CORRUGATED

TO ANY CUT DESIRED ON SHORT NOTICE.

The W. F. Cochrane Roller Mill Supply Co. (Limited.)

ALSO MAKERS OF ALL CLASSES OF

Callenders used in Grain Mills, Rubber Factories, Paper Mills, Rolling Mills.

Machine Shop and Foundry,

DUNDAS, ONT.

(Old Gartshore Foundry)

THE GUTTA PERCHA & RUBBER MFG. CO.

OF TORONTO.

Office and Warehouse:
43 YONGE ST., TORONTO, ONT.

Factories:
121 TO 155 WEST LODGE AVE.,
PARKDALE, ONT.

ORIGINAL MANUFACTURERS
OF

PATENT PRESSED AND STRETCHED DOUBLE STRIP RUBBER BELTING

"MONARCH,"

"RED STRIP,"

"LION"

BRANDS OF

RUBBER BELTING.



"MALTESE CROSS,"
(Carbolized Rubber)

"BAKER FABRIC,"
(Cotton Rubber Lined)

"AJAX,"

BRANDS OF

FIRE HOSE

THE BEST IN THE WORLD.

ALSO MANUFACTURERS OF RUBBER CLOTHING, CARRIAGE CLOTHS, ORGAN CLOTHS, ETC.

— ADDRESS ALL COMMUNICATIONS TO —

THE GUTTA PERCHA & RUBBER MFG. CO. OF TORONTO, - 43 YONGE ST., TORONTO.
THE ONLY RUBBER FACTORY IN ONTARIO.

NORTHEY & CO.'S

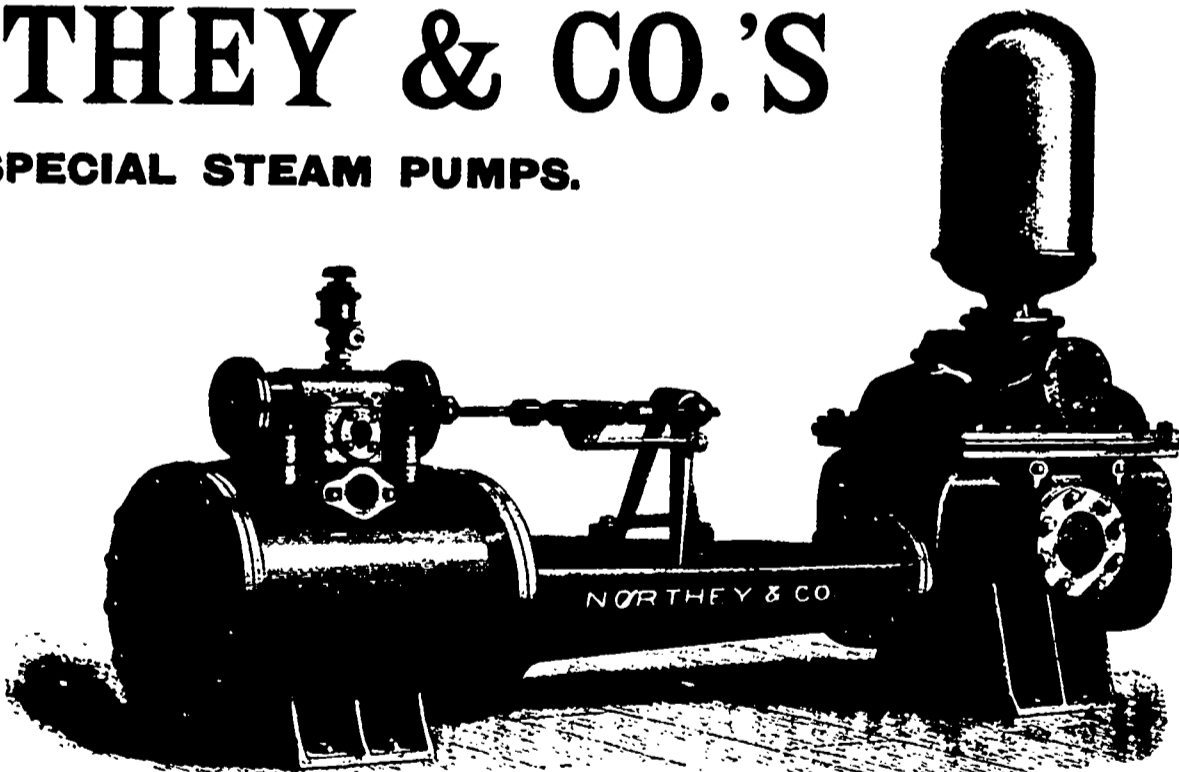
SPECIAL STEAM PUMPS.

PUMPS

FOR
BOILER FEEDING,
FIRE PROTECTION,
WATER SUPPLY,
MINING USE, ETC.
Single and Duplex
STEAM and WATER POWER
PUMPS

For all kinds of service.

These Pumps are of the latest and best design, the result of long and valuable experience in the Canadian Pump trade.



Independent
AIR PUMP
Condensers

FOR ATTACHING TO

— High Pressure —

STEAM ENGINES,

MARINE

AND

STATIONARY.

GREAT ECONOMY

In FUEL and POWER

GUARANTEED.

Prices and particulars on application.

NORTHEY & CO., - TORONTO, ONT.

Office and Works: Cor. Front and Parliament Sts.

THE BALL ELECTRIC LIGHT

ELECTRIC LIGHTING APPARATUS
TORONTO

PARKIN & CO.,
GALT FILE WORKS

(ESTABLISHED 1870.)

Manufacturers of all kinds of files and rasps. All descriptions of re-cutting done promptly. Terms and discounts given on application. Address GALT, ONT.

JR. COLLINS
MILLER'S BRANDS
STENCILS
OF every description
TORONTO

SHAVINGS AND SAWDUST
PRACTICAL FOR PRACTICAL BY A PRACTICAL
BOOK MEN MAN.
treats of the care, operation, designing and construction of wood-working machines. Substantially bound in cloth: 150 pages; illustrated. Price, \$1.50 by mail, postpaid. Address, C. H. MORTIMER, 31 King St. West, Toronto, Ont.

THE "EASTLAKE"
SHEET STEEL SHINGLES
— ARE —
Fire and Storm-Proof,
Durable and Cheap.
Our MANITOBA AND SPECIAL STEEL SHINGLING is specially adapted for Elevators, Warehouses, etc.
Imitation Brick for Churches, School Houses and Dwellings.
Our Goods are the heaviest and cheapest of the kind in Canada.
SEND FOR CIRCULAR.
METALLIC ROOFING CO. (LTD.)
82 1-2 YONGE ST., TORONTO