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DOMINION MECHANICAL & MILLING NEWS

DEVOTED ESPECIALLY TO THE INTERESTS OFOWNERS AND OPERATORS OF

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

Vol. XII.—No. 11. TORONTO, CANADA, FEBRUARY, 1889. { Price, 10 Cents. $1.00 Per Year.

MESSRS. GOLDIE & McCULLOCH'S MANUFACTORY AT GALT, ONT.

THIS well known firm occupies probably the first place of any of its kind in the Dominion, its business connections and its reputation extending throughout the entire Dominion, from the Maritime Provinces in the east to the far Pacific coast. The business was originally commenced, as far back as 1844, by the late Mr. James Crombie, who, beginning in a small way, and manufacturing stoves and such agricultural machines as were then in use, gradually extended his operations to embrace engines, boilers, and flouring and saw mill machinery, and in due course laid the foundation of the present extensive establishment. Mr. Crombie having acquired considerable means, sold out to the present owners in 1859, and under their energetic management, coupled with the excellence and reliable character of their goods and workmanship, the business continued steadily to increase, and has gone on extending till it occupies a position certainly second to none in this country. The manufacture of wool machinery was commenced about 1866, and in this department they are still the only general manufacturers in the Dominion, their list embracing almost all the machinery in use in woollen mills with the exception of spinning machinery and looms. In 1867 they added wood-working machinery, and this line has attained to very large dimensions, embracing an extensive assortment of such machines as are in use by builders, as well as improved shingle and barrel machinery.

MESSRS. GOLDIE & MCCULLOCH'S MANUFACTORY AT GALT, ONT.

In 1880 the manufacture of fire and burglar-proof safes was entered on and now constitutes one of the leading features of the firm's business.

An important branch of the firm's business has always been the erection and refitting of flouring mills, and their great experience in this work has enabled them amid all the transformations in flour milling of recent years to keep pace with the march of improvement. They own or control many valuable patents in flour mill machinery, which our limited space will not allow of specifying—the most recent addition being the Holt Dustless Purifier, which besides being, as its name indicates, entirely free from dust, and consequent waste and loss, is fireproof, and it is claimed can be driven by one tenth of the power of an ordinary purifier.

Among mechanical engineers a leading problem for many years has been to so improve the steam engine as to minimize the consumption of fuel, and the beautiful 200 h. p. Wheelock automatic cut-off engine which drives the machinery in the Goldie & McCulloch workshops, is one of the latest and most signal triumphs of engineering skill. Messrs. Goldie & McCulloch are the sole Canadian manufacturers of these engines. The chief features of the "Wheelock" are the great simplicity of the cut-off gear, the fewness of its moving parts, and the small power absorbed in working. During the past two years the engine department of the works has been taxed to its full capacity to supply the demand for these engines.

The ground covered by the entire establishment amounts to five acres. The buildings are all of solid masonry, two and a half and three stories high, and present an imposing appearance. The frontage on the west side of West Main st. is about three hundred feet, and on the adjacent side streets, 350 and 450 feet respectively. On the east side is the pattern storehouse, 86 feet square, three stories high, and the large building in which the safes are finished. All the buildings on the west side have been erected or rebuilt within the past four years. The general offices of the firm are detached, the building being a handsome specimen of cut stone work. We need hardly say that the interior of this fine establishment is fitted up in the most complete style of modern mechanical art. In variety and excellence of the machinery, tools and general equipment, it is probably not surpassed by any works of a similiar character on the continent.

LITTLE THINGS IN THE FOUNDRY.

AN absolutely necessary part of the equipment of a foundry is the cupola, says J. P. Pero in the *Practical Mechanic*, and a good one is a very valuable article. I do not mean by a good cupola, one that will take care of itself; do all the melting and furnish brains for the melter to bring about good results. Such a thing is of course impossible, although I have known of cases in which such a cupola would have been very highly prized. But by a good cupola, I mean one that is constructed upon sound scientific and practical principles; one in which may be realized the results of the study of the principles of combustion and the practical knowledge obtained by experience in the application of these principles. The mere fact of a cupola being constructed upon these principles, does not insure good results in melting unless it is properly managed; but all other things being equal such a one is decidedly superior to the one built hap-hazard, without the slightest conception of either the theory or practice of good melting.

In melting iron there are three results looked for: quality, speed and economy. Quality first, for poorly melted iron makes poor castings; speed and economy are after considerations, though very important ones.

Any cupola properly managed, will melt good iron; but when the requirements of speed and economy are taken into consideration, I think it is safe to say, that there are more cupolas in operation that do not meet the requirements than there are that do. I do not mean by this, that the patent cupolas are not good ones, for I know several styles that are exceptionally good melters, having personally directed their management, I know just what they are capable of doing; but I mean that when an agent tries to sell the proprietor of a foundry a cupola, he invariably shows him figures of melting done by those that were run to their greatest capacity, but rarely mentions what the same will do in an ordinary melt.

A fair test of the economical points of a cupola is a monthly, quarterly, or yearly footing up of its record; for the greater the amount melted in any cupola, the greater the ratio of iron to fuel will be, and one that is not economical in an ordinary melt cannot be called an economical cupola. A cupola whose record for three, six or twelve months shows a ratio of fuel to iron 1 to 8 is a good one well managed. There are many where record accurately kept show 1 to 10, and some 1 to 11; but these are exceptions, and it is often a question in my mind whether the melter doesn't throw in a little fuel on each charge "just to fill up the holes," thus helping the cupola in its melting without having been weighed and charged in the record, therefore affecting the ratio. There is one thing certain, that is: there are more foundries in this country that are melting less than eight pounds of metal to one pound of fuel than there are melting more.

In the construction of a cupola, the first question to be considered is the size. In determining the size, there are two important facts to bear in mind. First, a cupola of a much greater capacity than is required, is not only extravagant in the use of fuel, but is apt to cause inconvenience if not trouble in taking away the iron as fast as it is melted. Second, a small cupola, worked to its fullest capacity, is more economical in the use of fuel, than a large one worked to only a part of its capacity; but a small cupola, (or large one) that is run to a great deal more than its capacity, is a source of great annoyance, trouble, and oftentimes loss.

What is the capacity of a cupola? It is the amount of iron it will melt well without "bunging up," or leaving it in such a condition that a melter will spend half a day in getting it ready for the next heat. The capacity cannot be placed at a fixed number of pounds, as there are many different conditions of blast, fuel, iron and management to be considered in estimating it, and not the least important of these conditions is that of management. It is surprising to note the difference in the results obtained from the same cupola under apparently the same conditions, but different management.

A very good practice in getting a cupola "shell" is to get one at least 8" larger than is actually required for the work, then, as the demand for a larger one increases, you have a large one at your disposal. It is an easy matter to make a large one small, by the use of a lining of common red brick between the fire-brick and shell, by which the diameter of the cupola may be conveniently reduced 8" or 4" at your option.

The following table will serve as a fairly reliable guide in determining the size of cupola required to melt a given quantity of iron. It is an extract from "Melting

Capacity of Cupolas," as published by the Frick Coke Co., in a circular upon the use of coke as a fuel for melting iron, in which the assertion is made that coke melts 20 per cent. more iron than coal, and 25 per cent. faster. Upon the strength of this assertion I have calculated the capacity of cupolas using coal as fuel, and have added the results thus obtained to this table :

	COKE.				COAL.		
Diameter of Cupola.	Melting Capacity pounds.	Melting Capacity, when slagged	Capacity per hour, Pounds.	Blast Pressure.	Melting Capacity, Pounds.	Capacity per hour.	Blast Pressure.
20 in.	3,000	4,500	1,715	4 oz.	2,400	1,028	5 oz.
24 "	6,000	9,000	3,430	5 "	4,800	2,056	6¼ "
28 "	9,000	13,500	5,145	6 "	7,200	3,084	7½ "
32 "	12,000	18,000	6,860	6½ "	9,600	4,112	7¾ "
36 "	15,000	22,500	8,575	7 "	12,000	5,140	8¾ "
40 "	18,000	27,000	0,290	8 "	14,400	6,168	10 "
44 "	21,000	31,500	2,005	8½ "	16,800	7,196	10½ "
48 "	24 000	36,000	3,720	9 "	19,200	8,224	11¼ "
54 "	30,000	40,000	7,150	10 "	24,000	10,280	12½ "
58 "	34,000	51,000	9,429	11 "	27,200	11,425	13½ "
62 "	40,000	60,000	2 857	12½ "	32,000	13,714	15½ "

The table below designated "Sturtevant,' is complied from Sturtevant's experiments, and represents results obtained by actual tests. The table designated "West" is an extract from the " Moulder's Text Book " by Thos. D. West, page 314.

	STURTEVANT.				WEST.		
Diameter of Cupola.	Melting Capacity, Pounds per hour.	Cubic feet of air per minute in blast.	Blast Pressure in ounces.	Diameter of Cupola.	Melting capacity, Pig, not slagged.	Melting Capacity, Slagged.
22 in.	1,200	324	5 oz.	20 in.	4,000	6,000
26 "	1,900	507	6 "	25 "	6,000	10,000
30 "	2,880	768	7 "	30 "	8.000	14,000
35 "	4,130	1,102	8 "	35 "	12,000	20,000
40 "	6,178	1,646	10 "	40 "	14,000	26,000
46 "	8,900	2,375	12 "	45 "	18,000	36,000
53 "	12,500	3.353	14 "	50 "	22,000	46,000
60 "	16,560	4,416	14 "	55 "	26,000	56,000
72 "	23,800	6,364	15 "	60 "	32,000	70,000
84 "	33,300	8,880	16 "	65 "	38,000	84,000
				70 "	46,000	100,000
				75 "	54,000	120,000

A comparison of the above tables will show a difference in the results obtained by each of the authorities quoted. In some instances this difference is considerable ; in others trifling. To the practical foundryman this difference is easily accounted for. The word *management* will account for the variations in the results in the different tables, for in the management of any cupola lies the principle cause of the good or poor results obtained. All foundrymen have seen with a change of melters, a change in the working of the cupola, sometimes for the better, sometimes for the worse.

The melting qualities in a cupola, good management, fuel and blast being guaranteed, are governed almost entirely by the tuyeres.

MECHANICAL WRINKLES.

AN experienced machinist contributes the following : Straightening fly wheels, shafting, etc. It once happened that a 12 ft. fly wheel, 14 inch face, put up by one of our prominent iron works, proved untrue laterally by a quarter of an inch, when all set up ready to run. To have taken the wheel down, bored, bushed and rebored the hub, would have been a tedious and expensive job. The defect was perfectly remedied by pening the arms on the side from which it was desired to throw the rim. The arm in the center of the distorted portion was pened the more, and those on each side of it, rather less. When the wheel was made nearly right, by blows with a heavy hammer, the perfecting touches were made with a ball-faced hammer and the trifling dents hidden with "filler" and paint.

The same mechanic used to straighten heavy cast iron shafts, used twenty years ago, in the same way, by p ing, and frequently rectifies light shafting which has sprung, by a few hammer touches on the hollow side.

A cheap boring bar, for sizihg and turning bearings in cast iron machine framing, etc., is made by taking a plain round iron bar, and *clamping* to it with a lathe dog, a cutter worked out of square steel, one side hollow to fit the bar side, and the two ends at 60° angles. This bar cuts either ended ; is quickly made and adjusted ; is quite effective and the cheapest yet brought to our attention.—*Practical Mechanic.*

The Port Arthur Council will submit a by-law to grant a bonus of $10,000 to W. & J. G. Greey, of Toronto, to aid in the erection of a flour mill. A similar amount will also probably be voted to Hastings Bros. & Co., of Winnipeg, for a similar object.

Western Letter.

NO further evidence has been secured upon which to base an estimate of the wheat crop of Manitoba for last season. The delivery of wheat at provincial points continues to grow lighter each week. Receipts at Lake Superior elevators of Manitoba wheat have ranged about 40,000 to 50,000 bushels per week, recently, or a little over one half the amount of weekly receipts a year ago. The total quantity of wheat which has gone into store up to the time of writing, is about 1,940,100 bushels, against about 3,420,000 bushels to the same date last year. This shows a heavy decline, and will give an indication of the shortage in the crop this year, as compared with last. Shipments all rail are also light. Another way of looking at the matter is to take individual markets in the province, and compare the quantity of wheat received this crop with last crop. Thus for instance, at Brandon, less than 400,000 bushels have been marketed up to the time of writing, and probably two-thirds of the wheat in the district has been brought in. Brandon will therefore receive between 500,000 and 600,000 bushels from this crop—probably not greatly in excess of the minimum estimate—against over 1,000,000 bushels from the crop of 1887. Deloraine, the second largest market in the province last year, took in about 800,000 bushels from the crop of 1887. This year it is expected that not over 250,000 bushels will be received. Of course the falling off has not been as great at all points, but at some of the smaller markets it has been proportionately greater. Of the wheat shipped eastward, about 700,000 bushels are in store at Port Arthur and Fort William elevators. There is no definite way of arriving at the amount of wheat held by farmers, but it is variously estimated at the wide range of from one to two million bushels. The mills have kept running pretty steadily, and will turn out about the same quantity of flour as last year, namely, about equal to 2,500,000 bushels of wheat, of which about 1,800,000 bushels will be available for export. A small portion of this, however, will go westward to British Columbia and the territories.

In connection with the gathering of grain statistics, it may be noted that the Winnipeg Grain Exchange recently appointed a deputation to wait upon the local Government, and urge the adoption of some system of gathering crop statistics. A very efficient system of crop reports was carried on by the late Norquay Government, but the present Government discontinued this service on the ground of economy. It is likely that the work will be resumed.

The first annual meeting of the Winnipeg Grain and Produce Exchange was held recently. The Exchange was organized on Nov. 24th, 1887, and it is therefore a little over a year old. Already it has become a flourishing and important institution. The Exchange was formally opened on Dec. 7, 1887, and daily meetings for the transaction of business, buying and selling grain, et ., have been held. At the meeting to organize the Exchange, ten leading local dealers were present. The membership has increased steadily from the beginning, and has now reached over 100, the members being mostly grain dealers. The entrance fee, which was first fixed at $15, is now $100. Many dealers in outside towns have become members. The institution has been a great assistance to the trade, not only in facilitating trade transactions, but also in disseminating information among dealers, both of a local and foreign nature. Telegrams and cables are being constantly received from the leading American, British and European markets, giving information as to prices and other features. One of the latest moves made by the Exchange is in the direction of organizing a call board. Rules governing a call board have been arranged, but so far the proposed board has not been put into operation. It is not likely that it will be put into operation during the present crop year, and for the present dealing in futures will consequently not be indulged in. It will, however, likely go into operation next fall should the crop turn out well next harvest. Financially, the Exchange has been a success. At the end of the first year the treasurer's report shows a balance on hand, after meeting all expenses, of $1,132. The first officers of the Exchange were : D. H. McMillan, president ; G. F. Galt, vice-president ; C. N. Bell, secretary ; A. Atkinson, J. A. Mitchell, N. Bawlf, S. Spink, D. G. McBean, W. A. Hastings, and K. McKenzie, committee of management. The present and recently elected officers are : S. Spink, president ; N. Bawlf, vice-president ; C. N. Bell, secretary-treasurer. Council—A. Atkinson, D. H. McMillan, W. A. Hastings, J. A. Mitchell, H. Crowe, F. W. Thompson, A. H. Plewes, Geo. McBean, D. H. McBean, S. Nairn, H. S. Patterson. Board of arbitration—S. Spink, G. F. Galt, A. McDonald, F. W. Thompson, W. A. Hastings, A. Atkinson and N. Bawlf.

Though Manitoba has now direct connection with Duluth via the Northern Pacific Railway, and trains are running daily over the road, yet so far very little grain has been shipped out via Duluth or the new railway. The C. P. R. continues to handle about the entire grain traffic of the country. The main reason for this is, that the new road does not reach any of the principal grain markets, and as yet very little grain is delivered at any of the stations on the line. The road reaches Winnipeg, but all the grain marketed in the city is required for local consumption, and there is none to ship from here. The wheat goes to the city mills, the barley to the breweries, and the oats are required for feeding in the city. Prices to farmers for grain at Winnipeg are always higher than at outside markets, and usually too high for shipment east, owing to the local demand. At present oats and barley are worth 5 to 10 cents more here than in country markets, prices to farmers being quoted.

The Northern Pacific will be obliged to extend its road throughout the province, and erect elevators on its line, before it can do much grain trade. Here the C. P. R. has a great advantage. In the towns already established, the elevators are all on the C. P. R. line. The Northern Pacific might run into these towns, but it would be at a disadvantage from not having elevators on its road, and in a good many of these towns, it would not pay to build more elevators. Another disadvantage in shipping via the new road, is the customs regulations. Cars of grain shipped to Duluth must be forwarded in bond, and the cars must be sealed by a customs officer, on Canadian territory. Then the grain must be received at Duluth by a Canadian customs officer, and stored in special bins, under his charge. From these bins it can be shipped in Canadian boats only to points in Eastern Canada. The Northern Pacific railway is obliged to pay for the cost of maintaining a Canadian customs officer at Duluth. When grain is shipped all rail via the United States, to Eastern Canada, the cars are sealed here and remain so till they arrive in the east. Some shipments were made via Duluth before the close of navigation, and a few cars have been sent through all rail by the southern roads. Grain going to Duluth from Manitoba would of course be under the charge of a United States customs officer while in store there, so that the necessity for a Canadian customs officer at Duluth does not seem to exist. The Canadian Government, however, have insisted upon the maintenance of an officer there, at the expense of the railway company, otherwise the grain would not be received back into Canada free of duty. The full value to Manitobe of a competing railway to the south will never be secured until the United States decides to admit wheat free of duty. Then Manitoba dealers would be able not only to ship via Duluth and Minneapolis, but also to sell their grain in these markets. That the United States Government will see the wisdom of admitting wheat free is not at all unlikely. Manitoba wheat is a raw material which Minneapolis millers want, and its admission into their country free of duty would materially assist their great flour industry, while it would in no way reduce prices to farmers in Minnesota and Dakota. The admission of Manitoba wheat into the United States free of duty, would therefore be a mutual benefit to both Manitoba producers and Minneapolis millers, while it could not injuriously affect any United States interest.

The rage for granting bonuses to flour mills still continues here, though it is noticeable that bonuses now offered are not as large in amount as those granted a few years ago. There are a number of points, however, where small bonuses, ranging from $1,000 to $5,000, are offered for the establishment of mills. There are several points in Manitoba and the territories which offer excellent inducements for the establishment of small mills, of say about 100 borrels capacity, and where a very large local and farmers' trade could be done. Some of the best settlements in the province are still without mills. In the past, mills have not always been established at the best points for business, bonus inducements having led to the erection of mills at less favorable points, so far as business and natural advantages were concerned.

Hastings Bros. and McGaw, late of the Winnipeg branch of the Ogilvie Company, have not yet decided where they will erect their large mill. When established this mill will be next to the Ogilvie mill here, the largest in Manitoba. The capacity will be not under 600 barrels. Port Arthur has offered them a bonus of $10,000 to build the mill at that place. Port Arthur has the advantage of cheap fuel, but its distance from the source of wheat supply is a disadvantage. Hastings Bros. & Co. intend to do a wheat-buying business in Manitoba, and should they establish their mill at Port

Arthur, they would be obliged to have offices in Winnipeg to manage their wheat-buying department. This would cause extra outlay in maintaining offices at the two points. Again, Port Arthur is at a disadvantage in the matter of railway competition. A mill there would be entirely dependent upon the C. P. R. for freight rates from the source of supply all the year round, and also for shipping flour eastward during the close of navigation. The advantages on these two points are therefore in favor of Winnipeg. The Winnipeg council has offered the firm exemption from taxation for fifteen years if they put up their mill here, but no direct bonus is offered. The Ogilvie mill was given the same exemption. Messrs. Hastings & Co. have also been considering the advisability of building their mill near Rat Portage, on account of the water-power privileges afforded there, which would of course reduce the cost of manufacturing. The chances are understood to be in favor of Winnipeg getting the mill.

A great deal of apprehension is being caused here regarding frozen wheat, as it is understood to be the intention of farmers to sow frozen wheat for seed next spring. Farmers who had their grain frozen last fall, will not pay the high prices now ruling for sound grain for seed, and will take chances on the frozen grain growing all right. It is feared that if badly frozen grain is sown largely next spring, it may have a very bad effect upon the next crop, as there are doubts as to the germinating properties of frozen grain. In 1885 wheat was frozen to some extent, and a good deal of frozen grain was sown for seed the following year, with fairly good results; but the grain was not as badly frozon in 1885 as it was last harvest. In sowing frozen wheat for seed in the spring of 1886, it was customary to sow about half a bushel per acre more than the usual quantity, as an allowance for poorer quality of the seed.

There is good reason to believe that a flour mill will be established in the far western portion of the territories next summer. The point likely to get the mill is Calgary. The residents of Macleod tried to secure a mill last year, but were unsuccessful. Regina, 350 miles west of Winnipeg, is the farthest point west having a mill. Calgary is nearly 850 miles west of Winnipeg. There is quite a settlement in the far west, extending mainly from Calgary southward to Macleod, but very little wheat has been grown, and the flour has been supplied from Manitoba mills. It has been generally reported that this western country is not adapted to wheat, owing to its proximity to the mountains, and the supposed danger of summer frosts This, however, is a good deal supposition. At any rate, the Eau Claire Company, now owning a saw mill at Calgary, has about decided to build a flour mill, and if the intention is carried out, the capabilities of the district for growing wheat will soon be tested.

STEEL FOR PIPES.

EXPERIMENTS have been progressing in England for a year or two past in the way of determining the quality and properties of steel for use in water and other pipes. *Engineering*, of London, contains the following reference to this subject:

"Mr. James Riley, one of our foremost engineers, more distinctly associated with steel constructions, has been making efforts of a more or less tentative character, to secure the adoption of this metal for the purpose, and to overcome the objections which have been raised to its use. The only technical difficulty was that of welding the tubes, and this he has overcome; but it is not so easy to fight down the prejudices against steel for tubes.

"Some time ago Messrs. A. and J. Stewart, Glasgow, and the steel company of Scotland, in conjunction, supplied tubes of steel for carrying the water over the Tay Bridge, this being the first illustration of their use in Great Britain. These pipes were welded by Messrs. Stewart, and were fitted with Riley's patent socket, and completed by the steel company. They have proved very satisfactory. Tenders have been put in recently for 1,600 tons of steel water mains of large size for the Sidney water works. Estimates and tenders have been made within the last year or two for several very large quantities, requiring from 100,000 to 250,000 tons of steel, but as was the case on the introduction of steel for ship construction, the progress is very slow. When the strength of steel is contrasted with that of cast iron, of which those large water mains are usually constructed, it will be at once apparent that a great reduction can be made in the thickness and consequent weight of the metal required for the purpose. For conveyance abroad, too, the question of freight is a consideration.

"It is under contemplation to make provision in the west of Scotland for executing contracts for steel piping at a more rapid rate than is now possible."

St. John, N. B., is agitating for the erection of a great flour mill.

There is said to be a good opening for a flour mill at Gladstone, Man.

The mill at Yorkton, in the Northwest, has recently been shut down for repairs.

It is feared that the McGregor, Man., flour mill may have to shut down for want of water.

Steps have been taken towards the building of a flour mill at Broadview, N. W. T., next spring.

Mr. Joseph Lague, West Farnham, Que., has just secured the patent for a millstone dressing machine.

D. S. Clemens & Co. have purchased Fisher's Mills, near Hespeler, Ont., and the Winterbourne Mills.

During the recent wind storm the barrel shed of the Howland Mill, at Thorold, Ont., was blown down.

Mr. D. Brown, of Forrester's Falls, Ont., contemplates erecting a roller mill on the site of the old grist mill.

The exports of wheat and flour to England from Canada, decreased in 1888 from £2,045,846 to £886,785.

Work has been commenced on the new 750,000 bushel elevator of the Grand Trunk Railway at Wiarton, Ont.

Messrs. Cochrane & Manson, millers, Crystal City, Man., have changed the style of their firm to Cochrane & Co.

It is reported that Mr. Geo. Mace, a former resident of Exeter, Ont. will return and build a flour mill in that town.

Mr. Williams' mill dam at Centerville, Ont., was swept away by floods last month, entailing a heavy loss on the owner.

Mr. Cochrane, head miller for the Portage (Man.) Milling Co., has bought a mill at Crystal City, and will go there soon.

The municipal council of Cartwright, Man., has been asked to submit a by-law to grant a bonus of $4,000 for a new flour mill.

A project is on foot to induce a Clifton (Ont.) miller to remove to Glanboro, Man. So says a correspondent of a Winnipeg paper.

An over-heated elevator shaft set fire to Howson Bros'. mill at Teeswater, on Jan. 22nd, damaging the roof to the extent of $100.

The West Toronto Elevator Company, of West Toronto Junction, Toronto, has been incorporated with $10,000 capital stock.

The Lake of the Woods Milling Co., Keewatin, is shipping eight to ten cars of flour per day to Montreal and other eastern points.

W. B. Browne, of the Simcoe Mills, Simcoe, Ont., will build elevators and purchase grain at Port Rowan, and St. Williams next spring.

Snider & Recket have put in machinery, in connection with Woodworth's elevator at Deloraine, Man., for grinding feed and Graham flour.

A flour mill is badly required at Manitou, in the Northwest. There is said to exist an excellent opening for both gristing and shipping business.

A by-law will be submitted to the municipalities of Silver Creek and Russell to raise a bonus of $5,000 for the erection of a grist mill at Russell, Man.

The employees of Neelon's flour mills and cooper shops, St. Catharines, Ont., numbering 50, had an excursion to Niagara Falls on the 28th Jan.

Mr. James Forbes, of the Hespeler Star Mills, who has been suffering from a heavy cold for some months, has gone to Bermuda for the benefit of his health.

$3,000 will be raised by private subscriptions for the erection of a flour mill at Glenboro, Man. The committee will be glad to correspond with mill builders.

Mr. S. A. McMurtry, on leaving Lindsay to assume a position with the Ogilvie Milling Co., of Montreal, was the recipient of a number of addresses and valuable presents from his admiring fellow citizens.

Messrs. J. E. Pearen, of Toronto, and J. W. Pearen, of Goderich, the latter for several years miller for Ogilvie & Hutchinson in their large mill at Goderich, are about to erect a 100 barrel mill at Brampton, Ont.

If the Government grant the application of the Eau Claire Milling Company for a water lease at Calgary, N. W. T., it will probably lead to the establishment of a roller flour mill by the company which already owns a saw mill.

An attempt is being make at Thornhill, Man., to form a joint stock company for the erection of a roller process mill. There is great need of a good mill, and Thornhill is said to be a very promising place for such an enterprise.

During the last season of navigation there was refunded on grain passing through the St. Lawrence canals tolls amounting to $30,580, the figures for the previous year being $33,412. The actual increase of revenue for 1888 from canal tolls was $13,784.

The grist mill owned by Mrs. Bonfield at Eganville, Ont., was completely destroyed by fire on Sunday morning, the 20th Jan., nothing was saved. The loss on the mill and contents, will be about $30,000. The only insurance is about $4,000 on the machinery.

Messrs. May Bros'. roller flour mill at St. Thomas, Ont., was destroyed by fire on the 19th inst. The loss will exceed the insurance which amounted to $6,700, by $5,000 or $6,000. In addition to the loss on the mill and machinery, considerable grain, etc., was destroyed by water.

The provisions of the law allowing Canadian grain to be ground in the States in cases where the farmer lives near the frontier and more than five miles from any Canadian grist mill, which have been hitherto applied only to the Eastern townships, have been made general. Manitoba and Northwest settlers will be greatly benefitted by the change.

The Austrian Consul-General in Liverpool estimates the number of mills in England at 7,000, with a total productive capacity of 36,000,000 sacks of 280 lbs. The capacity of individual mills varies from 100 to 7,000 sacks per week. He observes that although the roller system is making more and more headway, yet a great number of stone mills are left.

Mr. Maguire, an old and esteemed employee of Messrs. Wm. & J. G. Greey, mill machinery manufacturers, of this city, on resigning his position with the firm was waited upon by his fellow-workmen and presented with a complimentary address and a handsome meerschaum pipe. Mr. Thos. Mulholland, another old and much esteemed employee of the works, takes Mr. Maguire's place.

The Rev. Principal Grant, of Queen's University, Kingston, who has lately returned from a tour around the world, says that the Japanese are largely abandoning the use of rice in favor of bread, and he can see no reason why the fertile prairies of the Northwest should not largely supply Japan with the wheat she will require for her 38,000,000 of people.

The municipal council having thrown out the petition asking that a by-law be submitted to grant a bonus for the establishment of a 50 barrel roller flour mill at Catwright, in the Northwest, steps have been taken to form a joint stock company to carry out the project. The entire farming community tributary to this point are most enthusiastic in promoting the scheme, the success of which is considered beyond question.

A Port Arthur despatch of Jan. 24th, conveys the information that Messrs. Hastings & McGaw, of Winnipeg, have closed an agreement with the Port Arthur council to erect a flour mill there in consideration of receiving a bonus of $15,000 and exemption from taxes for ten years. Leading citizens will give a bond guaranteeing a bonus in case the by-law is not passed. In this way work will be at once commenced on the erection of the mill, which will be of 500 barrels capacity.

A resolution has passed the Winnipeg City Council, subject to ratification by the citizens, to grant to Messrs. Hastings & McGaw, exemption from taxation for 15 years upon all buildings and machinery erected by them in building and operating a mill and elevator in that city, the mill to have capacity of at least 600 bbls. Hastings Bros. & McGaw state that they propose investing $100,000 in buildings, etc., and will pay from $20,000 to $25,000 annually in wages. This places the proposed mill on about the same footing as the Ogilvie mill, which received a like exemption.

Mr. James Wilson's oatmeal mill at Fergus, Ont., was burned to the ground on Friday, the 18th inst., with all machinery and most of the contents. Since Mr. Wilson rebuilt this same mill, which was destroyed by fire a little over two years ago, he has put in the most improved machinery, and it was considered the most modern mill in Ontario. The mill was run to its full capacity night and day the year round, and consequently a number of men will be thrown out of employment. The insurance will not nearly cover the loss. Great sympathy is felt for Mr. Wilson in his misfortune.

It is a common expression among many of the best millers of this country, says the *Millstone*, that the millstone still has a place in all first-class reduction mills, and that gradual reduction does not in theory or practice, forbid the use of millstones. Gradual reduction has in mind the preparation of pure stock for final reduction. The middlings having been prepared and purified to the limit of possibilities, and having been reduced for that purpose, it is right and proper that the millstone be used to complete the reduction of this stock. Much of the stock which goes to the red-dog is in a condition to successfully resist the action of smooth rolls. Hence the millstone is a necessity here. Smooth rolls will go farther in the reduction of hard wheat stock without hardening or flattening it than they will on soft stock. Hence there is a greater necessity for millstone reductions on winter than on spring wheat.

If flour costs $6 a barrel, what is the value of one pound? Now to divide $6 by 196, the number of pounds in a barrel, is a tedious operation. The result may be accomplished as follows: Divide 6 by 2, calling the result cents; double this result, writing it underneath, and two places to the right of the last number; then add the results. It is evident that with most numbers the writing of the numbers alone performs the addition. For illustration, take one example given: Divide 6 by 2, then writing the results in cents, we have .03. Doubling this and carrying it two places to the right we have .006; doubling this in turn and carrying it two places to the right we have .000012. Adding these amounts we have the following: .03061224, which is the cost per pound. This rule will be found correct to a number of places of decimals. Those of our readers who desire to test its accuracy can do so by simple division.

Among the recommendations made to the Kingston Board of Trade by the Executive Council of that body, is the following: "Among the most important industries of our city is its storage and forwarding of grain, and if the St. Lawrence route is to receive and hold a large share of grain shipments from the Northwest, a large warehouse with all modern appliances for storing grain during the winter months, and handling and shipping same in the most improved manner may be a necessity, not only to companies engaged in the forwarding business but to the general community, and, as such an enterprise would give employment to a large number of men, it should receive your careful consideration and an energetic and capable committee be appointed. Closely connected with this question, and one also of great importance to us is: Building of composite steel barges for carrying grain. If there is a market for the output of such an industry, no better place can be found than this city, with its dry dock, its immense forwarding business, its locomotive works and foundries."

THE STEAM ENGINE INDICATOR.

By "Pupil."

On Wednesday evening, Jan. 23rd, under the auspices of the stationary and marine engineers, Prof. Galbraith, of the Practic School of Science, delivered a lecture in Shaftesnury Hall, Toronto, on "The Steam Engine Indicator." The lecturer provided himself with crayon sketches of many of the indicators, beginning with the Watt Indicator, the first made, in the year 1814. This indicator, as described, did not in any way represent the travel of the piston, but simply recorded the amount of vacuum in the engine cylinder, and was only of use when the pressure was at or below the atmosphere. Watt's second indicator had a motion to represent the piston movement of the engine by means of a sliding board. This indicator would record the steam pressure above the atmosphere as well as the inches of vacuum in the cylinder, and was the first known attempt to represent the movement of the engine piston.

The McKnaught Indicator was then taken up as the next development of the instrument, and the necessities for the changes, as the speed of the engines was increased, clearly shown. The Richards Indicator followed next, showing a still more perfect machine, with its short spring and light pencil motion. The Thompson, Crosby, Tabor, Darke, Kenyon, Casestilli, were each described in term. These explanations were made very lucid by reference to the crayon sketches. The lecturer explained the use of the plamometer as used for measuring up the indicator diagrams, and by the use of the black-board showed a diagram, and explained the meaning of the lines—showing the point of admission and the admission line, the point of cut-off and the expansion line ; the point of release and the exhaust line ; the point of compression and the compression line ; after which he showed clearly that the better one understands the engine he is indicating, the more is to be learned from the diagram. This was done by means of a sketch of one taken from the air pump of a flooded condenser, which really had the appearance of a diagram taken from a good working slide valve engine.

The lecturer took up the matter of producing defective diagrams, and the general causes for the same. Among the many reasons given for poor diagrams, was badly lubricated instruments, connecting pipes too small and too long. This was illustrated at some length by black-board illustrations of diagrams taken by the same indicator, on the same cylinder, and with the same pipes. In this case the indicator was placed near or at one end of a long cylinder, and piped from the other end. In taking the diagrams, one end represented over double the work that the other did, and as everything about the engine showed that the work was evenly distributed, the experts, who were very eminent English engineers, determined to hunt up the cause. The long pipe was covered with waste, but this made no difference. It was then jacketted with live steam from the boilers, when the diagram from that end of the cylinder showed nearly or exactly like the one from the end at which the indicator was placed.

The lecturer took up the various reducing motions for driving the drums of indicators, going fully into the principles of the pantograph and the pendulum motion. These were explained on the blackboard by means of chalk diagrams. He next gave a description of the trouble experienced in getting this machine, (especially when applied to modern high speed engines) to work smoothly, showing the difficulty caused by spring vibrations, such as wavy or serrated expansion lines. The points made in this connection were, that if you strike a spiral spring on end it will make just so many vibrations per second, and it will make no difference whether you strike it hard or easy, the number of vibrations will be the same. Each spring has its own number of vibrations. The heavier or stiffer springs make the most vibrations in a given time, consequently the vibrations must be shorter. In following up this line, it would be seen that if a very light spring was used in the indicator running at a very high speed; these vibrations might be represented by only 1 the expansion curve, which would distort the diagram until it would be useless. If these vibrations are made as many as possible, they would be so short that they would not make a visible effect on the shape of the diagram.

The waste of heat in connection with the steam engine cylinder was touched upon, and it was shown how it would be possible to detect this without the use of the indicator. This waste, and the work done in the cylinder, was illustrated by colored crayon diagrams, two of which were shown from the same engine, one representing the action at 20 h. p. and the other at 6 h. p. The difference was clearly shown, and was of a surprising character. First, the regular indicated diagram was shown in black ; then the heat wasted was represented by a red diagram ; and the heat utilized or converted into work by blue. These were all drawn to a scale in such a way as to illustrate the action to the eye. The lecturer explained the cooling and re-heating of the inner walls of the cylinder and piston, as they are subject alternately to the heat in the steam at atmospheric pressure or less, and the heat due to the initial pressure of the stroke, showing that before the steam does any work in pushing the piston, it must reheat this metal. So much of the lecture was illustrated by crayon drawings that this account of it cannot convey to your readers the sound knowledge and talent displayed by the lecturer. His audience were pleased to sit and listen to him for two hours, and at the close of his remarks he was tendered a hearty vote of thanks. The audience was composed of engineers and machinists, about 125 in number.

On the 13th Feb., Professor Ellis will lecture in the same place, under the auspices of the same societies, on "Combustion and its Gases." This will be a very interesting lecture, and as it is free, it is hoped there will be a large attendance of mechanics looking for knowledge.

DEVELOPMENT OF ELECTRICITY.

THE year just closed has been one of immense strides in all matters of interest to the electrical community, which, by the way, will, if present indications be correct, soon mean the whole civilized world, says a writer in the *Times*. Few looking at the electrical appliances already in use and those about drawing to perfection would imagine that the modern development of electricity which has brought it into commercial use throughout the world is included within so limited a period as a dozen years. The patents on incandescent lighting hardly go back that far, yet to-day we find 3,000,000 lamps in use in the United States and contracts already made and partially executed that swell the number to almost double that amount. The contrast with the condition of commercial electricity of only a year ago, strikes one with amazement, not surpassed indeed by the feeling of astonishment, with which at the beginning of the civil war, we heard a bell ring in one room when a door or window in some other apartment was opened. The tendency with electrical interests, like all others in which large amounts of capital are involved, is toward centralization, and if the current reports, from what are generally deemed authentic sources, can be believed, there are still more important combinations about to be consummated, in which a very large amount of foreign capital is to be introduced, so that the lighting, motor and manufacturing interests of several combinations will in the future come under one management. No more substantial proof than this willingness to invest large amounts in electrical interests could be placed before the public, showing as it does how firm a foothold electricity has obtained as good, substantial property for investment.

The two all-absorbing questions on which electricians are already taking decided stands are the Alternating and the continuous currents, the possibilities and advantages of each, and there can be but very little doubt that the fight between the two will wax hotter and hotter, especially when instalments are more general than at present and competition more keenly felt. Now, if a company loses one contract it is sure of finding several in other places, and there is not that great necessity for stopping by the wayside to dispute about particular points. What the people in general desire is electric motors, and they care very little for the special features of the system as long as their safety is not interfered with by tracks as conductor, and there are no overhead wires to mar the beauty of their city. For some years the public has waited more or less patiently for the coming motor that was to be less expensive than horseflesh, and far less a nuisance than the smoky, cinder-throwing, dripping engines of our elevated system, and the success attained by the Daft motor Ben Franklin on the elevated road, with cars run by the Julien storage battery system on the Fourth avenue surface line go really further toward convincing Gothamites that there really is a prospect of their condition being bettered than any amount of written promises of still better things to come could possibly do. If 1889 will show as much improvement in traction motors as 1888 has done we may be sure that what we at present deem a wonderful change for the better will sink into utter insignificance in comparison with what we shall then be enjoying.

A storage battery that will combine endurance and power with lightness and economy is what all are in search of at present, and so urgent a demand must produce the desired commodity in a very short time. We recently have heard of an omnibus in England, run through a crowded thoroughfare by electric motor alone, and guided the whole distance without accident or collision of any kind, being run on the pavement without tracks—perhaps not a particular performance in itself, but another point scored in favor of electrical improvements. All of these features tend towards giving us confidence in the opinion that the deficiencies which at present seriously interfere with the usefulness of the storage battery will be remedied in the near future, and that our railways will be propelled in utter disregard of ice or snow as well as all interferences which keep other systems from being quite acceptable to those who are forced to travel through the crowded streets of our metropolis. The storage battery also finds a large field for its usefulness in the lighting of houses in country towns or at a distance from any lighting station, and this promises to develop very largely the additional departments that some of the larger companies have already given considerable space to. Much has been accomplished by the instalments in the mining districts of the western portion of the United States, and the attention that the companies are bestowing in that direction bids fair to result in the supplanting of all other methods of raising and transporting material from the mines, as well as working all other machinery in connection therewith.

The discussion of improvement in matters of electrical appliances would hardly be complete without reference to the development of the writing telegraph, which promises so very much that is wonderful and useful, and which, if such promises are fully carried out, will in the course of a twelvemonth, add immensely to the ease and convenience of communication between individuals. The application of electricity to matters on shipboard has received the attention it deserves, but our marine is perhaps so far behind the rapid development of matters on shore that it will at present have to stand until the more important matters have due attention. The important first step is, however, being taken as far as naval vessels are concerned, one of our steel cruisers is to be fitted with an appliance for hoisting shell and ammunition for the use of the larger guns of her battery, and as fast as other vessels are ready they too will have some similar fittings, depending however, upon the success of those at present being introduced. The government having taken the lead and the experiment proving a success, the ship owners will not be slow in following, as efficiency can only be maintained by adopting that which is most satisfactory in the mechanical development of the day. As a very interesting writer on electricity states it : "Electricity is aggressive, and is pushing itself into many new fields. The next few years bid fair to witness new practical developments, and no wise man would venture to lay bounds to the extent to which electricity will enter into the civilization of the next decade."

UTILIZING DISTANT POWER.

HOW to utilize power some distance away from the works of a factory where it is wanted, is becoming a problem of much interest to mill men generally. This is being tried in several places, says the Boston *Commercial Bulletin*, and it is reported with general success. That in Holyoke is now so far along, that the prospects have been issued by the power and light company owning this power stating at what prices light and power will be furnished. The same idea is contemplated by Haverhill parties, and now a syndicate or company have another location in view. It seems that this party is now erecting a set of three mills in the vicinity of Minneapolis. Upon the Mississippi, about two miles below this point is a water-power which this company have bought. What they propose to do is to set up a private power station at this water point, put in three dynamos, and wire the electricity generated to the motors in their mills. The dynamos will be of 105 horse-power each. The extra five horse-power is for the loss in transmission. It is estimated that about two and one-half horse-power will be the maximum loss, as the best of copper wire will be used, but it has been thought best to have a surplus of spare power. The dynamo and apparatus will be furnished by the Eddy people.

The area of the steam piston, multiplied by the steam pressure, gives the total amount of pressure exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance to move the pistons at the required speed.

An English electrician has invented a material, which he calls alterion, for the prevention of corrosion in boilers. The interior is coated with this, and currents of electricity are passed through the boiler and from time to time reversed. The formation of the scale is prevented by a layer of hydrogen gas, which is deposited upon the inner surface of the boiler. The reversed currents reform the hydrogen into pure water, a thin layer of pure water being thus kept all around the boiler.

DOMINION MECHANICAL AND MILLING NEWS

PUBLISHED MONTHLY,

BY

CHAS. H. MORTIMER,

Office, 31 King Street West,

TORONTO, - - CANADA.

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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.

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EDITOR'S 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 Ontario Lumbermen's Association will hold its annual meeting in the Board of Trade rooms, Toronto, on Thursday, Feb. 7th, at 11 o'clock. The probable effect of the late increase in the export duty on logs and other important matters will come up for consideration.

THE Dominion Government is likely to find itself burdened with an overplus of legal business shortly, when the holders of the $50,000,000 worth of timber leases in what was until recently known as the disputed territory, present their threatened claims for damages.

THE formation of Boards of Trade in several Ontario towns during the last month, is a step in the right direction. What the Toronto Board of Trade is doing for the advancement of the interests of this city and country, may be accomplished in a proportionate degree by smaller organizations working within narrower limits.

THE *Northwestern Lumberman* thinks Canadians are real mean because they refuse to allow American mill owners to draw their supplies from Canada without paying duty. If this constitutes a mean people, what does our contemporary think of the conduct of the U. S. customs officer at Detroit, who is said to be taxing every Canadian mechanic who takes tools across the border?

ON the first page of this paper appears an illustration of the manufactory of Messrs. Goldie & McCulloch, Galt, Ont. This is the first of a series of illustrations and descriptions of leading manufacturing establishments in connection with the lines of industry represented by this journal, which are designed to appear in future numbers of the MECHANICAL AND MILLING NEWS throughout the year. It is but fair to mention that the illustration published this month does not show the additions and improvements made to Messrs. Goldie & McCulloch's works last year.

THE annual holiday edition of the *Northwestern Miller* is to hand in gorgeous attire. Its advertising pages fairly sparkle in beauty of design and color, while the literary contents of the number are as usual interesting. In spite of unkind remarks of other milling journals, our Minneapolis contemporary's push and enterprise enables it to "get there just the same."

FOLLOWING the statement that a man had part of his hand taken off by a circular saw in a London, Ont., planing mill the other day, a western contemporary gives the additional information that "it (the hand) came in contact with the saw while he (the man) had his head turned." The moral of this is that the man who undertakes to do business with a circular saw, should not attempt to keep track of what is going on behind his back. "Eyes front" should be his attitude continually who hopes to preserve his anatomy intact.

WE regret that some of our esteemed Canadian contemporaries have adopted the English practice of sending out their papers with the leaves uncut. The idea seems to prevail that this style of doing things adds tone to a publication, but for what reason we fail to perceive. We could more easily understand that it might be the means of decreasing circulation, at least among busy people—and the number in this country at least, who are not busy in this busy age, comprise but a small minority of the population. Business men especially haven't time to spend half an hour each week in cutting the leaves of a newspaper.

THE Canadian Manufacturers' Association, with the object of encouraging originality in industrial design among amateur pupils of the Provincial Art Schools, announces its intention of giving ten silver and ten bronze medals as first and second prizes respectively, for the following subjects: Figure or group modelled in clay; carved panel suitable for sideboard; model for sailing yacht; design for wall paper; design for hearth-rug; design for stained glass window for hall or library; design for gasalier suitable for public building; design for epergne; design for diploma for use by the Association; design and working drawings for workman's brick cottage, estimates for which shall not exceed $600 in value. Preference will be given to designs of a national character. The competition closes on the 1st of May next.

OUR readers will regret to learn of the sudden death, by a railway accident, of Mr. Wm. F. Cochrane, inventor of the Cochrane roller mill, and vice-president of the Cochrane Roller Mill Supply Company, of Hamilton, Ont. The sad event occurred on Jan. 19th, near Watersmeet, Mich. One of the trucks under the coach in which Mr. Cochrane was seated, broke, throwing the car off the track. Two other gentlemen, one of whom was the Lieut.-Governor of Michigan, were also killed. Mr. Valancey E. Fuller, president of the Cochrane Roller Mill Supply Co., left for Michigan immediately on receipt of the sad intelligence. We understand that Mr. Cochrane's untimely death will in no way affect the operations of the Canadian company which bears his name.

IT is very desirable that the request made to the Manitoba Minister of Agriculture by the Winnipeg Grain Exchange, for the collection and publication of reliable crop statistics, should be acceded to. In a country where it may almost be said that everything depends upon the success of the crops, such a publication is absolutely essential for the guidance of business men. Having a knowledge of the grain areas in any particular year, the business community will be able to make fairly accurate calculations as to the amount of business to be done after harvest. As the Winnipeg *Sun* remarks, grain men and millers can preface for the season's business with some certain knowledge of the quantity of grain to be handled. The railroad companies can estimate in advance on the required supply of rolling stock and motive power that will be demanded of them.

GATHERINGS such as that which assembled in this city on the occasion of the recent Board of Trade dinner, are productive of great benefit to a young country like Canada. Not only do they serve to give outsiders a correct appreciation of the commercial importance of the Dominion, but we venture to say that in many instances also they tend to enlighten Canadians themselves upon the extent of the progress which this country is making, and thus become the means of awakening that national pride and loyalty which is a prerequisite of true greatness. On the occasion referred to, loyalty to Canada was a distinctive feature of all the speeches. The hundreds of representatives of Canadian commerce from every part of the Dominion seemed to feel that they were engaged in one common cause, viz., the advancement of the country's progress. It is to be hoped that each in his own sphere will endeavor to inspire those about him with like confidence in the future greatness of Canada, and a desire to work unitedly for her interest and welfare.

THE information contained in our Western letter that many Northwest farmers are intending to use frozen wheat for seed, is sufficient to cause apprehension on the part of those interested in the development of Manitoba and our Northwest territories. The Canadian Northwest has achieved an enviable reputation as the producer of the finest wheat in the world, and it would be a sad blow to the future of that country, if a false idea of economy should induce the farmers to carry out the intention imputed to them, and thereby probably lower the standard of their wheat in the eyes of the world. We are not prepared to say that wheat of first quality cannot be grown from frozen seed, but we have very grave doubts on the subject. The failure of next season's wheat crop in the Northwest is too serious a matter, as affecting the advancement of the Dominion at large and the Northwest in particular, to admit of any experimenting by the farmers with frozen seed. If experimenting is to be done, let it be thoroughly done by the authorities of the experimental farms, and the result published before seeding begins. This method will be found to be more satisfactory and far less costly than the one proposed by the farmers.

COL AUCHMUTY, the founder of the New York Trade Schools, an illustrated description of which was published in these pages last month, writes to the editor of this journal as follows:—"I write to express my appreciation of the kind way in which you give an account of my work at the N. Y. Trade Schools, in the DOMINION MECHANICAL AND MILLING NEWS for this month. I know of no more important work for Americans, whether they live under the stars and stripes or still cling to the mother country, than training the rising generation so that they can earn a living by the labor of their hands. The opposition to industrial training here comes entirely from foreign born workmen, and I should judge from the editorial in your paper that the same opposition exists in Toronto. The plan I work on, and it would seem to be the one you approve of, is to teach a young man thoroughly how work should be done and the science on which the trade is based, then let him acquire speed of execution and experience at real work—the length of time to be passed at real work, to depend on the young man's age, ability to learn, and the nature of the trade. I believe the trade school instruction should not begin before 17 or 18, so that there would be time for a good education, the latter being fully as important as acquiring skill."

THE following despatch from Washington to the *Globe—Democrat*, of St. Louis, bears out in a very forcible manner the contention that a policy of retaliation on the part of the United States against Canada, would injuriously affect some other people besides Canadians. The despatch in question says: "Chief Switzler has completed some significant figures on 'In Transit and Transhipment Trade.' He shows that the transportation of commodities brought into the United States for immediate transit across our territory or for immediate transhipment to foreign countries now forms 'a very important and valuable branch of our carrying trade.' This brings up a phase of the relations between the United States and Canada, as much of this kind of business is across that border. It is possible to judge from Col. Switzler's figures what Mr. Cleveland's proposition of retaliatory none-intercourse would have meant to this country if it had been put into effect. Even the discussion of that policy hurts severely, it appears. The value of the merchandise which came in from British North America to be carried to our ports and shipped out to foreign countries the past year was $8,342,817, and the value of that which came from foreign countries to be carried across the United States to the border of British North America was $15,611,656. Chief Switzler gives a table showing how this carrying trade for the British provinces has fluctuated since 1860. In that year the outgoing amount received from the provinces was $14,375,419. In 1883 the outgoing amount of this international carrying trade for the provinces was $29,802,820. The ingoing amount was $39,312,568. These were the top notches. 'As will be seen from the table,' says Chief Switzler, 'the trade between the Dominion of Canada and foreign countries

across our territory forms a very important feature of our transit trade, the receipts of 'in transit' merchandise therefrom in 1883 having reached the sum of $28,000,000, and the shipments thereto to $39,000,000. There has been a large falling off in our transit trade with the Dominion of Canada since that year in consequence of the decrease of the imports and exports of the Dominion, which were considerably enhanced during the period of the construction of the Canadian Pacific Railway; also by the fact that a considerable amount of the commodities which were formerly transported across our territory between the Dominion of Canada and the Pacific Coast are now transported by the Canadian Pacific Railway without crossing our borders. The recent complications between this country and Canada in regard to the fishery question has also resulted in a temporary diversion of a portion of the in transit trade to routes of transportation wholly within the territory of the Dominion."

THE Hon. John Macdonald manifests his patriotism in a very practical, common-sense way, by the efforts he is making to promote closer commercial relations between the Dominion of Canada and the West India islands. The paper which the hon. gentleman read the other day before the members of the Toronto Board of Trade, shows that he has gone to much trouble to secure the valuable information therein set forth. No class of producers in Canada have greater cause to feel grateful for this information than the manufacturers of flour and oatmeal. Mr. Macdonald shows that the United States export of bread to British Guiana amounts to 709,630 lbs.; Trinidad, 13,673 lbs.; Barbadoes, 4,125,036. Canada exports bread to British Guiana to the amount of only 11,200 lbs.; Trinidad, none; Barbadoes, 9,850 lbs. In other words, the United States export of bread to the three islands named amounts to 4,125,036 lbs. per annum, as compared with only 21,050 lbs. exported from Canada. Our flour exports are even more insignificant as compared with those of our neighbors. The United States export of flour to British Guiana amounts to 138,941 barrels; Trinidad, 88,307; Barbadoes, 73,358, a total of 310,606 barrels, while the sum total of exports from Canadian mills consists of 100 barrels sent to Barbadoes. In addition, the United States export yearly to British Guiana 1,731,124 lbs. of corn and oatmeal, while Canada does not send a pound of either. These are figures which Canadian wheat and oatmeal millers should find instructive and valuable, in view of the fact that they are well situated to compete for this trade, and our fellow-subjects of the West Indies are said to be desirous of buying from us. If Canadian millers could secure a fair share of this West India trade, and an increase in the duty on imported flour which would give them their home market, we might reasonably look forward to a removal of the clouds which have so long darkened the Canadian millers' sky. United and wisely directed effort on the part of the millers themselves can accomplish both these objects.

THE FLOUR DUTY.

SINCE the publication of the article under the above heading in the MECHANICAL AND MILLING NEWS for January, letters of commendation have reached us, showing that the millers appreciate the efforts we are making to have justice done to them in the matter of an increase of duty on imported flour. The following is a sample of these letters:

PINKERTON MILLS, Jan. 12, 1889.

DEAR SIR,— * * * I am very glad to see that you have taken up the millers' cause, by urging the Government to increase the duty on American flour. I saw our member, Mr. H. Cargill, yesterday. He said the millers would have no trouble in gaining their point if they would unite together. I left him my January number of the MECHANICAL AND MILLING NEWS, as he wished to get from it the amount of American flour imported in 1887, before Parliament meets. Please send me if you can another copy of January number

Yours truly,

GEO. ELPHINCK, miller.

We are pleased to observe that a meeting of the Millers' Association of the Counties of Huron, Bruce, Perth, Grey and North Wellington was held at Palmerston on January 15th, at which the matter of increasing the flour duty was the principal subject of discussion. The meeting unanimously passed a resolution appointing a committee to wait on the Minister of Customs and call his attention to the present depressed state of the milling business in Ontario, asking him to remedy the long existing discrimination against Canadian millers in favor of American millers in relation to the light duty imposed upon American imported flour as compared with that on wheat. The members of this Association have shown themselves alive to their interests, and are evidently determined to do what they can to secure a remedy for the existing state of things. We fear, however, that the undertaking may prove greater than they can accomplish single-handed. In union there is strength. The words of Mr. Cargill, as given in Mr. Elphinck's letter, are significant of the course which the millers should pursue if they would hope to succeed. He said "*the millers would have no difficulty in gaining their point if they would unite together.*" We believe this opinion to be correct. There must be, however, more than the union of the millers of three or four counties. There must be united action on the part of the millers throughout the whole Province of Ontario. Without such action, success must be considered very problematical. With such action, success would be certain. What cannot be accomplished by sending to Ottawa a deputation of half a dozen representatives of the great milling industry, can be accomplished by a deputation of five hundred or a thousand, representing every portion of the Province. Justice is so manifestly on the side of the millers that no tenable ground for refusing their request can be found.

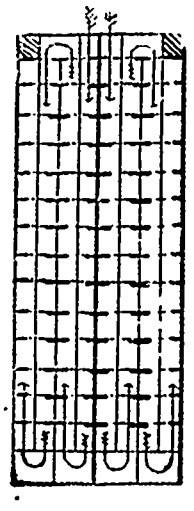
The Government and people of Canada have repeatedly declared their adherence to a policy of protection to home industries. The industries which have come under the fostering influence of the National Policy are prosperous and making rapid development. The anomaly should no longer exist of one of the largest industries of the country being deprived of the protection which the others enjoy. The interests of the men who have invested some thirty millions of dollars in milling are certainly deserving of consideration, and we have confidence to believe that this consideration will no longer be withheld from them.

To show how anomalous is the present condition of the tariff in its bearing upon the important industry of milling, it is only necessary that we should point out that corn flour, which we do not and cannot produce in Canada, is subject to a duty of 20 per cent., while flour of wheat pays but 50 cents a barrel, or about 10 per cent. The duty on corn flour, which is simply a tax on the consumer without any advantage to the miller, might very well be removed entirely, and half of it imposed on imported wheat flour, where it properly belongs.

ROTARY FLOUR DRESSING.

THE Haggenmacher bolting apparatus about which we have heard so much has lately been illustrated in the *Miller* (London) and the Italian milling journal, *Il Giornale Dei Mugnai*. The English journal gives the sections with the proper lettering and descriptive matter of the patents, but no plan showing the arrangement of the sieves. When viewed in a horizontal direction, the Italian journal gives elevations of the machinery, but does not give the lettering corresponding to that of the patents or plans which may be referred to in connection with the patent text.

A complete description that will show all of the details of the machine is hardly possible at this time. We will give a general description of the device which we trust will satisfy the interest and curiosity of those who will care to investigate. In the first place we may say, that the sieve has an oscillating motion so as to



give it the hand sieve swing. The sieve is driven from the center. There is no excentric at the end as in an ordinary sieve. The frame is suspended at the four corners with hangers which have ball and socket joints which allow the machine to oscillate. The oscillating motion is given it from the point of suspension over the top, where there is a pulley into which is let a crank pin, the revolving of which causes the oscillating, circulating motion of the sieve, Thus the frame has an up and down and an oscillating motion. The former being contributed to it by the suspending hangers. In one of the sieves shown the frame is divided into two vertical sections; there are two or more layers of bolting surfaces which surface is again divided by slats which divide the surface into transverse and longitudinal sections. The illustration indicates the movement of the material and the arrangement of the sieve. The arrangement of the openings in the slats horizontally and otherwise facilitates the movement of the stock according to the general direction given it by the slats themselves and the movement of the sieve. This machine is evidentally attracting a great deal of attention. We have said before that we believe that theoretically the sieve motion is at the foundation of the true bolting principle. We have fortified this idea in a negative way. Starting as we did that there were conditions connected with reel bolting which must eventually be superceded. The reasons leading to this thought were that reels and wheat scouring machinery are constructed on practically the same principles. Our idea is that a device that will scour wheat is not the best bolting machine to be thought of. We do not want a bolting machine that will pulverize and mash the stock; one which will intermingle and pulverize the impurities of the wheat; or one which will make dust of the middlings. The ideal bolting machine will separate one grade of material from another without pulverizing either. The reel is in the extreme as representative of a bolting machine which has the pulverizing quality. The sieve is the best known device which makes the separations without the pulverizing action. Hence its superiority in theory. In practice it has not been made generally satisfactory. Recent statements have been made which lead to the belief that the sieve bolting methods have been experimentally successful; this being true it remains for that fact to be generally approved by the milling public before the general introduction of the sieve bolting machinery. The millers of the country have spent too much of their own money in experimenting. The experimental work should be done by those who profit most largely from the introduction of new machinery. The miller does not profit from the use of improved devices. If any large number of millers take up with a device which is largely successful they can only hope to profit from its use during a period that is required for competing neighbors to adopt a similar arrangement. The expenditure in the improved devices can hardly be so slight that the time of exclusive use during the period when competition is not excessive will pay for the introduction of the new machine. The introduction of such devices is more a matter of necessity than of cost, thus it is that we say that the millers should not experiment in this matter. The manufacturers of mill machines are the ones who profit by it, and they should be compelled to carry forward all practical demonstrations. Then the miller can exercise his own discretion as to the desirability or necessity for the introduction of the new and improved devices.—*The Millstone.*

TRADE NOTES

The seventh annual banquet of the Geo. T. Smith Middlings Purifier Co., was held at Jackson, Mich., on New Years eve, and as usual, was a very enjoyable affair. Mr. S. S. Heywood, of Stratford, was present and responded to the toast, "Our Canadian Branch."

It will be seen by reference to our advertising columns that the well known firm of Inglis & Hunter, founders and machinists, Toronto, has been dissolved. Mr. Hunter, whose health we regret to learn has for some time been failing, retires. Mr. Inglis, with the assistance of his sons, will continue the business. The new firm will be known as John Inglis & Sons, and will without doubt maintain the excellent reputation already achieved by this establishment.

To find the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of the pipe in inches.

An iron manufacturer of Worcester, Mass., gives the following interesting particulars of the successful adoption of wrought-iron belting: "A lathe used for turning rolling mill rolls, compound gear, has a 48-inch pulley. This is driven by an 18-inch pulley on the counter-shaft, which makes 120 revolutions per minute, and is 8 feet from the 48-inch pulley, measured from centre to centre; both pulleys are of iron, smoothly turned on the faces. A 7-inch double leather belt was on these pulleys, but would slip when the turning tool became dull. The belt was replaced by one made of Russian sheet iron, the same as that used for stove pipes and parlor stoves, and was riveted together in the ordinary way. It was seven inches wide and two inches longer than the leather belt, the extra length making up for the want of elasticity in iron. During one year's steady run this iron belt could not be slipped even when a heavy cut on a 25 inch roll was taken, which broke a Sanderson steel tool, having a section of 12 by 2½ inches, a cutting surface of 2½ inches, a feed of ¼ inch per revolution, and an overhang of 4 inches."

The shingle mill recently burned in Washago is to be rebuilt at once.

The Brunette saw mill, Westminster, B. C., is putting in a quantity of new machinery.

Mr. Daniel Campbell, formerly of Orr Lake, Ont., has erected a new shingle mill at Vasey, Ont.

An order for $10,000 worth of new machinery has been placed by the Moodyville Saw Mill Co., B. C.

The exports of lumber from Canada to England last year increased from £2,545,883 to £3,012,581.

Mr. Eliot Thompson, of Meaford, Ont., has sold the Train Steam Saw Mills to Messrs. Chambers Bros.

Mr. A. G. Henderson, of Huntingdon, Que., is making extensions to his furniture and planing mill business.

During the recent great wind storm, the large brick chimney of Round's saw mill at Thorold, Ont., was demolished.

Mr. D. Brown's new saw mill at Forrester's Falls, Ont., to take the place of one burned last August, is almost completed.

Eighty-five million feet of lumber were shipped from Nova Scotia last year, an increase of two millions over the previous year.

The bonus by-law granting $15,000 to Messrs. Ross, Hall & Hall for a saw and planing mill, has been carried at Rat Portage.

Mr. Robert Simpson, of Collingwood, has just completed a new saw mill at Thessalon, Algoma District, for Mr. Dyment, of Barrie.

The Vancouver, B. C., saw mills cut annually 70,000,000 feet of lumber and give employment, directly and indirectly, to about 1,500 men.

The Alberta Lumber Co. at Red Deer River, N. W. T., has let a contract to take half a million of logs this winter, for sawing next summer.

The Ontario Sawmillers' Association, at a meeting held recently at Palmerston, took steps to obtain equitable freight rates from the two railways.

Application has been made for letters patent incorporating the McLaren Rose Lumber Company with a capital of half a million and headquarters at Ottawa.

A Piggott's planing mill at Chatham, Ont., had a narrow escape from fire the other day, the cause being an intoxicated individual formerly employed in the mill.

Mr. H. C. Robertson, of St. John, N. B., the patentee, builder and owner of the famous Joggins raft, has been in Boston, making arrangements for a big raft syndicate.

While the employees in connection with Robert Cartes's saw mill at Florence, Ont., were away for breakfast, the boiler exploded, totally destroying building and machinery. Loss about $2,500.

Hon. T. B. Pardee has been compelled by ill-health to resign his position as Minister of Crown Lands in the Ontario Government. His successor is the Hon. A. S. Hardy, formerly Provincial Secretary.

Mr. Little, manager of the new Ross McLaren Lumber Co., which intends to operate limits and cut 80,000,000 feet of lumber on the Chilliwhack river, British Columbia, next season, left Ottawa recently for the scene of his duties.

Octave Cossete, an extensive lumber dealer at Valleyfield, P. Q., has assigned, with $47,000 liabilities. Mr. Cossette was burned out in the spring of 1886, when the town voted him a $2,500 bonus and a loan of $5,000 to assist him in rebuilding his mill.

A change has been made in the recent Order-in-Council, which increased the export duty on logs from $2 to $3 per 1,000 feet, providing that logs cut and ready for shipment at the date of the passage of the order may be shipped at the old rate, viz., $2.

It is not surprising to hear that United States Consul Hotchkiss, of Ottawa, concurs in the opinion that there is ground for doubting the legality of the export duty imposed on saw logs by the Dominion. This is doubtless a case in which the wish is father to the thought.

The Vancouver *News-Advertiser*, says that a Wisconsin lumber firm is applying for extensive timber leases from the Government and are also purchasing large tracts of timber lands. It is understood that mills on a large scale will be erected on the Island about 50 miles north of Victoria.

A new saw mill will be in operation next spring at Nelson, a new mining town situated at the junction of the Ainsworth Knotenaw railway and steamboat navigation on the Columbia and Arrow Lake, British Columbia. Mr. G. A. Buchanan, of Revelstoke, B. C., is the proprietor of the enterprise.

The Chemainus saw mills, Chemainus, B. C., owned by Messrs. Croft & Angus, have been sold to a syndicate composed of Wisconsin and British Columbia Lumber kings. The price paid for the mills, and a large acreage of timber land is said to be in the neighborhood of $700,000. It is also stated that the new proprietors will rebuild the mills and add largely to their capacity.

The aggregate shipments of lumber from Montreal and Pierreville during 1888 are as follows:

	Quebec Stds.	Feet.
Montreal to U. K. and Continent	3,857,824	106,090,160
Montreal to Australia	25,693	704,907
Montreal to River Platte	615,811	14,184,814
	4,399,268	120,979,881
Pierreville to U. K. and Continent	116,213	3,195,857
Total shipments	4,515,481	124,175,738

Messrs. Eby Bros., who recently purchased Moyer's foundry at Berlin, Ont., are reported to have failed.

Tin and zinc of equal parts melted together form an alloy almost as tenacious as brass. It melts at about 900° F.

By the retirement of Mr. Adam Warnock, Mr. James Warnock becomes sole proprietor of the Galt Edge Tool Works.

Robertson's saw works, at Montreal, were damaged by fire to the extent of $6,000 last month. Loss fully covered by insurance.

It is reported that an Ohio tubing company will probably establish a branch factory at Ottawa for the manufacture of boiler tubing.

The Nova Scotia Steel works, New Glasgow, N. S., are said to have received applications for $80,000 of stock for the $25,000 offered to the public.

Certain Winnipegers are seeking incorporation as the Manitoba Water Power Company, with full privileges to build dams, locks, etc., on the Assiniboine at Winnipeg.

$15,000 worth of additional machinery has been ordered to complete the plant for the machine shop recently started by the Royal City Planing Mills Company, at Westminster, B. C.

The Barnum Wire and Iron Works, of Walkerville, report that they are flooded with orders from hotel-keepers, since the Act which compels hotels to have sufficient fire escapes went into force.

While all hands were working recently at Gillis & Martin's foundry, Teeswater, Ont., a pot of red hot iron toppled over, the iron flying in all directions. The men all escaped miraculously, a few slight burns being the only damage done.

Mr. Boyer, formerly of the firm of Smallwood & Boyer, Charlottetown, P. E. I., is about to start another foundry in Summerside, P. E. I. Mr. Boyer and his partner, Mr. Gillis, are buying out Mr. Thornton's business and plant.

Rev. Mr. Bottwood, of St. John's, Newfoundland, who is interested in between 200 and 300 square miles of timber limits, is arranging with the Waterous Company of Brantford, Ont., to supply a mill with a capacity of 100,000 feet per day.

A Parliamentary return, just issued, shows that in the year ended 30th June last, 61 boiler explosions occurred in England, causing the loss of 31 lives. As in former years, the using of worn-out boilers was the chief cause of the explosions, 31 out of the 61 cases arising from this cause.

In commenting upon the burning of a large manufacturing plant, which had been thoroughly equipped with automatic sprinklers, a New York journal asks: "Are sprinklers in the soup?" To which the *Manufacturer's Gazette* responds: "That expresses it; and so are hand grenades."

The axe, edge-tool and carriage spring factory at Galt, Ont., owned by James Warnock, was burnt on the 13th Jan. About 80 men will be thrown out of employment. Workmen's tools to the value of $1,000 were burned. Mr. Warnock's total loss is about $20,000, with $15,900 insurance.

The Port Arthur *Sentinel* says:—We understand that a number of gentlemen with capital intend starting a foundry on a large scale to manufacture mining machinery and do general casting in the town of Port Arthur. They will also do the Canadian Pacific Railway Company's work at this end of the line.

Vulcanized fibre for mechanical purposes has for some time attracted attention. As a material for cogs, it has, according to all accounts, given very satisfactory results. In one case gutta percha cogs are known to have been used for twenty years. When the wheels became worn, the material was utilized for casting fresh ones.

The Canadian Marine Engineers' Association have elected the following officers for the ensuing year: S. S. Malcolmson, president, re-elected by acclamation; A. W. Fox, first vice-president; S. A. Mills, second vice-president; P. Quin, J. J. Kenney, P. J. Kenney, D. Foley and T. Jackman, members of council; J. H. Ellis, treasurer, re-elected by acclamation; H. E. Smith, secretary, re-elected by acclamation; J. Patterson and R. Childs, auditors.

The Minister of Customs has been waited on by Messrs. T. Fairman and R. McGregor of Montreal, asking that wires which are now on the free list should be placed on the dutiable list, on the ground that they are manufactured in this country. The delegation represented that they were about introducing machinery for the drawing of the finer qualities of wire not now being made in this country. The Minister promised to give the matter his consideration.

The Maritime stove founders held a conference lately in Amherst to agree upon living prices. They represented an output of $300,000. It appears that many Nova Scotia foundries have been doing business at a loss, though the New Brunswick foundries, which have more generally maintained prices, have made fair profits. In view of the increase in the cost of iron an advance in present prices will be necessary, and an adjourned meeting will be held in Halifax to consider the list.

Plans for utilizing the Lachine Rapids, Montreal, for water power to drive electric machinery, as well as to eventually use the water to supply the city, are going ahead. Plans and descriptions of the locality and water power are being prepared and will be transmitted to England, France and Germany, to obtain the very highest advice as to the best means of transmitting the enormous power, which is calculated at from 750,000 to a million horse-power. The company can furnish 5,000 horse-power in a very short time, by putting a dam across the natural channel to the Island. The company expects shortly to be able to furnish power to the whole city, from an eighth of a horse-power upwards.

A tack-machine will make from 250 to 275 tacks per minute. The work does not end here, as the tacks are galvanized, tinned, polished, leathered and put through a variety of processes before the tack reaches the packing room. The total output of tacks is the United States is 300 tons per day, all of which are readily consumed. The largest plant in America is that of A. Fields, of Taunton, Mass., who operates 300 machines. There are forty or fifty different other manufacturer and the trade amounts to more than $50,000,000 annually. It is a remarkable fact that there are only about 350 skilled tack operators in America, and the wages paid to them range from $150 to $250 per month. No regular salary is paid in any department of the works, the operators being paid in proportion to the amount of work actually done.

The other day in front of the London Machine Tool Co.'s Works, a wagon loaded with a ponderous machine was noticed by a *Free Press* representative, and upon enquiry he found it was termed a Radial Drilling Machine, capable of drilling a hole in the centre of twelve feet radii, and of boring at any angle in any position. The machine was being despatched to the Waterous Engine Works Co., of Brantford, and in a few days a second will be shipped to the Messrs. Warring's Marine Works, of St. John, N. B. John Doty and Sons, of Toronto, have also contracted for a third. The Tool Company are putting in one for themselves, as they find it a requisite in every well-ordered machine shop. The machine is a novelty in this—that it is able to drill at any angle or in any position within a given radii.—London *Free Press*.

ADVICE TO YOUNG MILLERS.

A WRITER in the London *Miller*, gives the following useful bit of advice to young millers: "As to the general elements which go to ensure success, one of the most important is that of taking pains and not sparing oneself. A celebrated man gave his definition of genius as an infinite capacity for taking pains. We do not aspire to be geniuses, but we all have some capacity for painstaking; then let us take pains to the extent of our capacity, and, if needs be, cultivate that useful virtue, for nothing worth having was ever gained without it. Never allow a fault in the mill to "slide," it is sure to cause further trouble. If you know the material coming to a certain machine is not what it should be, see to it at once. You may forget it if you do not. Do not think it too much trouble to take a journey up or down stairs for the sake of remedying it, but go at once, before further trouble ensues. I have known serious results to spring from the neglect of little causes, sometimes even causing the stoppage of the mill. Try always to find the cause of a trouble. I have seen men trying their utmost to start an elevator with the delivery spout choked. In like manner I have seen a belt tightened because it would not drive a certain worm or machine, when all that time that worm or machine has been effectually choked. I, too, have seen a centrifugal give an endless amount of trouble, which has resulted from a fault in another part of the mill, probably the bursting of the silk on a sizing reel. These are merely instances of things which happen as a matter of course in a mill every day; but the trouble is intensified by the neglect of first ascertaining the cause. Find the cause and apply the remedy. While here I will just mention a simple matter about belts. It may be taken as almost a certain rule that when a belt breaks there is something wrong with the machine. Unless it is manifestly too weak for its work a belt very rarely breaks. It will slip on or off the pulley if too slack, and also if the machine gets choked, but it will not break. The breaking of belts is generally caused solely through being too tight, and is caused more often while being put on, being unable to resist the excessive strain. More power is wasted and more mischief done by injudicious tightening of belts than from almost any other cause. I have seen 6 in. taken out of a main driving belt, when 2 in. would have sufficed, with the result of bending the shaft and almost breaking it. I have also seen main driving ropes and belts made so tight that the engine was unable to drive the mill up to speed. All these faults are through indiscretion and want of thought, and should certainly be avoided by the young, thinking miller.

Do not air your superior wisdom in the mill. The more a man knows the less he is inclined to boast, and the more humble he becomes. Boasting is almost a sure sign of ignorance and emptiness. Think no position too humble. A lad or man who has his eyes open can always learn something in any position; and it is only by variety of employment that a thorough mastery of the details of every department of the business can be obtained. A sweeper with open eyes and ready, willing hands is in a good way of becoming an accomplished miller, if he will. The screenman's work may be despised and treated with contempt, but really it is one of the most instrutive occupations in the mill; for there, and there only, can a correct knowledge of wheat be obtained; and without this special knowledge no one, whatever his other qualifications may be, can ever hope to reach the top of the tree."

ELECTRIC WELDING OF METALS.

OUR illustrations this month show one of the most remarkable results arising from the recent development in and application of electricity. Its influence upon the working of metals will be so great that it is difficult at the present time to comprehend it. We refer to the electric welding of metals by the process invented by Prof. Elihu Thomson, of the Thomson-Houston Electric Company.

Hitherto welding has been confined to wrought iron

FIG. 1.

and steel, and the most perfect welds had only about seventy-five per cent. at their best of the strength of the solid bar. Other metals than these could not be welded by any means whatever. The process of welding iron by the blacksmith is at the best crude and imperfect.

Now all this seems destined to be suddenly changed in all industrial works. Not only iron is perfectly welded in a very short period of time, but all kinds of metals can be welded with equal facility not only to each other but to any other kind of metal. Moreover the line of junction of the welded pieces—in the case of iron at least- is stronger for an equal sectional area than the original bar, this being due apparently to the fact that the fusion of the metal by the electric current eliminates the

FIG. 2.

cinder present in all wrought iron bars, so that the line of junction of the welded surfaces is more homogeneous and consequently stronger than the original section of the bar.

The principle involved in this new art is that of causing currents of electricity to pass through the abutting ends of the pieces of metal which are to be welded, thereby generating heat at the point of contact, which also becomes the point of greatest resistance, while at the same time mechanical pressure is applied to force the parts together. As the currents heat the metals at their point of junction to the welding temperature, the pressure follows up the softening surface until a complete union or weld is effected, and as the heat is first developed in the interior of the parts that are to be welded, the interior of the joint is as united as the efficiently visible exterior. This is the weak point about an ordinary weld, as may be seen by reference to the accompanying figures. Figure 1 shows full size a piece of half-inch iron welded by electricity, the electrotype being made directly from the specimen, which was filed down to the center line to obtain a section through the center, and then etched with acid, the engraver's services not being brought into requisition at all. The difference between the character of the weld and that done at the ordinary forge is well shown by comparing Fig. 1 with Figs. 3, 4. 5, and 6, which show ordinary welds, the electrotypes being made in the same manner as in the case of Fig. 1, and first appeared in the *Locomotive* in April, 1884, the object being at that time to show the imperfections of the the ordinary weld, 5 and 6 showing the result when the attempt was made to weld iron and steel together. We regret that we have no specimen of iron and steel electrically welded, but the welds of dissimilar metals by the electrical process are, we are informed, just as perfect as between two pieces of iron.

Fig. 2 shows the external appearance of the electrically welded bar; it shows the upsetting of the ends of the bars as they are brought together. Removing this projecting portion with a file or in the lathe so that the bar has a uniform diameter, and pulling apart in a testing machine, the break nearly always takes place outside of the weld.

The machines built by the Thomson Electric Welding Company are generators of electricity so constructed as to produce in the most economical manner the low-pressure current needed to do the work. They are of sizes and types suited to the kind of work to be done. They are built to be driven by a belt in shops where there is no dynamo used; where a dynamo is used for any purpose whatever its current can be used for welding by utilizing it in a properly designed machine of what is called the indirect type.

The amount of power required to do this welding is used for so short a time that its cost is really nothing, a few seconds only being required to weld the largest bars. Twenty horse power is the amount actually consumed in welding a half-inch bar, as shown in our cuts, the actual time consumed in welding being not over three to four seconds, as was witnessed by the writer recently.

In Fig. 7 an attempt has been made to show on an enlarged scale the section in Fig. 1. This is a difficult matter to do; but under a power of about 40 to 50 diameters on a compound microscope, the denser and more homogeneous structure of the iron through the line of the weld is beautifully shown. With an ordinary weld the microscope is not as a rule needed to show actual separation of the surface supposed to be welded.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FACTORY CHIMNEY CONSTRUCTION.

BY WM. KNOX, ARCHITECT AND C. E.

A TALL chimney is seldom a very pleasing architectural feature, yet it is an important part of factory construction, requiring special architectural skill, a point not often acknowledged by either architects or owners. A manufacturer contracts with a boiler-maker for a certain amount of power from a given quantity of coal, and if he fails to perform his contract there is trouble, when the chimney may be the whole cause of the failure.

FIG. 7.

If a chimney is required to take away gases or fumes from retorts and furnaces, then it must be built to a height sufficient to carry these clear off the surrounding premises. This height can only be determined by a knowledge of the nature of the gases, etc., and the situation of the factory.

In the following paper it is only intended to deal with a chimney necessary for ordinary factory purposes.

In order to give the required draught to the common steam-boiler, the chimney should be not less in height than 80 feet above ground surface at its base, and not exceed 150 feet unless there is higher land in the immediate neighborhood.

To find the necessary area of a chimney, first ascertain as nearly as possible the area of the grate bar surface of the various furnaces; then if the chimney is to be 80 feet in height above the ground surface, multiply the area of the grate surface in square feet by 14; for a chimney 100 feet high, multiply by 12, for a chimney 120 feet high, multiply by 11, and for a chimney 150 feet high multiply by 9.8, and the quotient in each case will be the area of the chimney in square inches at its narrowest point. The area at the top of a chimney should never be less than at the base; some engineers say that it should be greater, because the smoke and air entering the chimney at a very high temperature, ascends rapidly, but as it cools in its passage through the flue its progress gradually becomes slower. A square chimney was erected by us last year, in Hamilton, for the Canadian Screw Company. It is 100 feet from floor of boiler house to top of cope. The flue has an equal area at top and bottom of 2,116 square inches. It was designed to give draught to three boilers of 100 h. p. each, two drying ovens and four annealing furnaces. To it also was connected an 8 inch pipe from the drains. It is now working and giving perfect satisfaction. The foundations ought to be deep enough to take all the footings below the reach of the frost, each course projecting beyond the one above not more than two-thirds of its own depth—thus increasing until a projection of foundation is gained beyond the line of the base of the chimney, equal to one twenty-fifth of the height of the chimney above the ground surface. This is necessary for the stability of the chimney upon a good hard bottom. On soft land or bad bottom, the area of the foundatain must be increased so as to spread the weight over a surfacesufficient for its support.

The strongest chimney is one built entirely with brick above a stone foundation, and the best form of plan is the octagon, the draught of which is almost as good as the circular, and the cost of building is considerably less.

In setting out the brick work, start at the top and figure downwards. If the width of the flue is less than 5 feet, then the walls of the chimney will only require to be one brick for 25 feet below the cope, and if the outside of the chimney has a batten of ¼ inch in every foot, the thickness of the walls at the base will be what they measure.

The inside face of brick work above foundation ought to be of fire-brick, carried about ¼ the height of the chimney, and air space is not necessary, unless where a strong flame (as from wood fuel) would be constantly striking.

Finally have as few openings as possible into the chimney, and upon no consideration allow waste or exhaust steam to enter it.

CLAIMING TOO MUCH.

IN their zeal to find purchasers, manufacturers of special machines frequently claim so much for their devices that millers, who might otherwise have been favorably disposed toward them, reject the millfurnishers' ideas with scorn and will have none of them. There is always room for improvement in the milling machinery line; but it is quite as well to make the claim for a new machine modest and reasonable—indeed, it is far better. It is comparatively seldom that a miller finds that the machinery he has purchased does better work than the maker claimed for it, but that the number which have fallen far short of the merits claimed for them by their manufacturers is large enough is abundantly shown by the continuous changing which is forever going on in our mills. It has come to pass, that millers attach but slight importance to the claims made by over-sanguine machinery manufacturers regarding the merits of their special machines. A device which will "add ten cents a barrel" to the mill's product is generally looked upon with coldness. At the same time, there is always a good demand for well built machines which do reasonable work and possess natural, commonsense advantages. The phenomenal in mill machinery has to be thoroughly proven before it is accepted. It takes but slight calculation to see that A's machine makes eighty-five per cent. of patent, B's adds fifteen per cent. patent to any mill's output, and C's can increase the yield of patent 20 per cent, as he says it can, then by using the machines of Messrs. A, B and C a miller can make 120 per cent. of patent, or else these gentlemen are guilty of an absurd exaggeration. It is easier to believe the latter than the former, and therefore the miller rejects the claims of A, B and C, and puts the whole thing down as rank foolishness. Had these gentlemen been a little more moderate in their statements, and a little less reckless in their claims, they would have had a fair chance of proving the merits of what might be very excellent machinery.—*Northwestern Miller.*

A petition is said to be in circulation among millers and grain men, asking the Government to increase the import duty on American flour.

The *Milling Engineer* is of the opinion that if millers would follow the rule to pay no more for their raw material than it is really worth, they would not find it so difficult to dispose of their product at a small margin of profit.

PAGE

MISSING

PAGE

MISSING

LUMBER PRICES.

CAR OR CARGO LOTS.

1¼ and thicker clear picks, Am. ins.	$30 00@32 00
1¼ and thicker, three uppers, Am ins.	37 00
1¼ and thicker, pickings, Am ins.	27 00
1 x 11 and 12 dressing and better	20 00 22 00
1 x 10 and 12 mill run	15 00 16 00
1 x 10 and 12 dressing	15 00 16 00
1 x 10 and 12 common	12 00 13 00
1 x 10 and 12 spruce culls	10 00 11 00
1 x 10 and 12 maple culls	9 00
1 inch clear and picks	23 00 25 00
1 inch dressing and better	18 00 20 00
1 inch siding, mill run	13 00 15 00
1 inch siding, common	12 00 13 00
1 inch siding, ship culls	10 00 11 00
1 inch siding, mill culls	8 00 9 00
Cull scantling	8 00 9 00
1¼ and thicker cutting up plank	22 00 25 00
1 inch strips, 4 in. to 8 in. mill run	14 00 16 00
1 inch strips, common	11 00 12 00
1¼ inch flooring	15 00
1½ inch flooring	16 00
XXX shingles, sawn	$2 40 @ 2 50
XX shingles, sawn	1 30 1 50
Eastlake painted iron shingles, per square, (10 feet)	4 50
Eastlake painted tin shingles, per square	4 50
Eastlake genuine galvanized iron shingles, per square	7 00
Imitation brick siding, per square	3 50
Special siding, per square	3 50
Lath, sawn	1 80

YARD QUOTATIONS.

Mill cull boards and scantling	10 00
Shipping cull boards, promiscuous widths	12 00
Shipping cull boards, stocks	13 00
Scantling and joist, up to 16 ft	14 00
" " 18 ft	15 00
" " 20 ft	16 00
" " 22 ft	17 00
" " 24 ft	19 00
" " 26 ft	20 00
" " 28 ft	22 00
" " 30 ft	24 00
" " 32 ft	26 00
" " 34 ft	28 50
" " 36 ft	30 00
" " 38 ft	32 00
" " 40 to 44 ft	35 00
Cutting up planks, 1¼ and thicker, dry	25 00 26 00
" " board,	18 00 20 00
Dressing stocks	16 00 18 00
Picks, American inspection	40 00
Three uppers, American inspection	50 00
Cedar for block paving, per cord	5 00
Cedar for Kerbing, 4 x 14, per M	12 00

B. M.

1¼ inch flooring, dressed	25 00 30 00
1½ inch flooring rough	14 00 15 00
1¼ " dressed	23 00 25 00
" undressed	14 00
" dressed	16 00 20 00
" undressed	12 00 14 00
Beaded sheeting, dressed	18 00 20 00
Clapboarding, dressed	12 00
XXX sawn shingles, per M	2 75 3 00
Sawn lath	2 25
Red oak	30 00 35 00
White	25 00 30 00
Basswood, No. 1 and 2	18 00 20 00
Cherry, No. 1 and 2	50 00 60 00
White ash, No. 1 and 2	25 00 25 00
Black ash, No. 1 and 2	30 00 30 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M	$13 00@25 00
Birch, 1 to 4 inch, M	16 00 25 00
Basswood	13 00 18 00
Walnut, per M	55 00 95 00
Butternut, per M	25 00 40 00
Cedar, flat	00 06 00 10
Cherry, per M	65 00 90 00
Elm, Soft, 1st	15 00 17 00
Elm, Rock	25 00 30 00
Maple, hard, M	22 00 30 00
Maple, Soft	16 00 18 00
Oak, M	40 00 90 00
Pine, select, M	35 00 40 00
Pine, 2nd quality, M	21 00 23 00
Shipping Culls	13 00 15 00
Mill Culls	8 00 10 00
Lath, M	1 80 1 90
Spruce, 1 to 2 inch, M	10 00 11 00
Spruce Culls	4 50 6 00
Shingles, 1st quality	2 00 3 00
" 2nd "	1 25 2 00

Cement, etc.

Portland Cement, per barrel	$ 2 75@ 3 00
Roman " "	2 75 3 00
Fire Bricks, per M	22 00 30 00

NEW YORK PRICES.

WHITE PINE.

Uppers	$46 00@62 00
Selects	40 00 53 00
Fine common	35 00 48 00
Cutting up	21 00 30 00
Common	17 00 25 00
Norway	19 50 26 50
Pickets	14 00 23 00
Shippers, according to quality, for different ports	17 50 52 00
Coffin boards	21 00 23 00
Box	15 50 17 00
Ceiling	24 00 42 00
Shelving	25 00 32 00
Moulding	34 00 37 00
Bevel siding	16 00 23 00
Bridge timber	38 00 50 00

EASTERN SPRUCE.

9 to 12 in	16 00 16 50
8 to 12 in	15 00 16 00
6 to 12 in	15 50 15 00
6 to 9 in	14 50 15 00
Special lengths	16 50 18 00
Lath	2 10 2 15
Piling, per lineal feet	5 06

SHINGLES.

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

HEMLOCK.

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

DRESSED LUMBER, CAR LOAD LOTS.

No 1 flooring, ⅞in	23 00 24 00
No 1 ceiling, ⅞in	25 00 26 00
No. 1 ceiling, ⅝in	18 00 19 00
Timber	14 00 15 00

ALBANY, N. Y. PRICES

SHINGLES AND LATH.

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

HEMLOCK.

Boards, 10 in., each	13
Joist, 4x6	32
Joist, 2½x4, each	12
Wall strips, 2x4	09

PINE.

2½ in. and up, good	55 00 60 00
4ths	50 00 55 00
Selects	45 00 50 00
Pickings	40 00 45 00
⅞ to 2 in., good	50 00 55 00
4ths	45 00 50 00
Selects	40 00 45 00
Pickings	35 00 40 00
1 in., good	50 00 52 00
4ths	45 00 47 00
Select	40 00 42 00
Pickings	35 00 38 00
Cutting up, 1 to 2 in	25 00 35 00
Bracket plank	30 00 35 00
Shelving boards, 12 in. and up	25 00 32 00
Dressing bds., narrow	18 00 22 00
Shipping boards	16 00 18 00
Box boards	14 00 16 00
10 in. boards and better	28 00 34 00
Common	15 00 20 00
12 in. boards dressing and better	29 00 36 00
Common	15 00 22 00
¼in. siding selected 13 ft	40 00 45 00
Common	15 00 20 00
in. siding selected	8 00 42 00
Common	14 00 18 00
Norway, selected	22 00 25 00
Common	12 00 15 00
10 in. p k. 13 ft. dressing and better, each	42 00 45 00
Culls	22 00 25 00
10 in. boards, 13 ft., dress, and better each	28 00 33 00
Culls	17 00 21 00

BUFFALO AND TONAWANDA PRICES.

NORWAY PINE—ROUGH.

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

WHITE PINE—ROUGH.

Uppers, 1 and 1¼ in	44 00 45 00
1½ and 2 in	44 00 46 00
2½, 3 and 4 in	54 00 56 00
Selects, 1 inch	36 00 39 00
1¼, 1½ and 2 in	37 00 38 00
2½, 3 and 4 inch	44 00 49 00
Culls, No. 1, 1 inch	26 00 28 00
1¼, 1½ and 2 inch	31 00 34 00
2½, 3 and 4 inch	37 00 40 00
No. 2, 1 inch	16 00 19 00
1¼, 1½ and 2 inch	21 00 23 00
Moulding, 1 inch	30 00 32 00

SHORT SYSTEM MILLING.

By "Ray."

WITH the advent of the short system, the subject of wheat heating has come into prominence once more. This subject was pretty well understood by millers of the old school, but was tossed aside with the stones and has lain dormant till within the last year or so.

It will easily be seen that when we propose to reduce the wheat abruptly to flour, the tougher we can have the bran, within certain limits, of course, the better. If there is one thing more than another that vexes the soul of the good miller, it is brittle bran. It pulverizes into the flour making it dark, and it breaks up into little chips, each with a nice large piece of gluten adhering firmly to it, which it taxes his ingenuity to the utmost to separate.

The exact kind of tempering which wheat requires will of course vary with the locality in which it is raised and also with the seasons. It will also depend largely on the variety of the wheat. Some varieties, and wheats from some localities, have sufficient moisture within themselves for all toughening purposes, and only require this to be drawn to the surface by the aid of the heater; while others will require to be steamed or damped. All these conditions will be met with, and if exact milling is to be done they must not be overlooked

* * * * * *

Regarding the number of breaks and the manner of using them, there is as great a diversity of opinion amongst short system advocates as there ever was amongst long, of course within the more circumscribed field. It is looked upon now as a rule that any mill using more than three breaks can not be classed as short system. Over that number they are either long system, or, as Mr. Abernathy euphoniously terms them, "mongrels." In the short system, the number of breaks range from three to one, but by far the majority bank their hopes on either three or two, the one break millers being as yet far in the minority. I say "as yet" advisedly, for I consider it decidedly unsafe to condemn anything which tends towards simpler methods. It was this desire for something simpler, which produced our perfected three and two break systems, and there is no telling what it may yet produce, following on the same line of investigation.

In milling with two breaks there can only be one way of handing the rolls. Nearly all the work must be done on the first roll, or the bran roll will not make a satisfactory finish. There is no doubt but that excellent work can be done in this manner. In fact the advocates of this method claim that it is better than using three breaks, because in this way more break flour is produced, and one abrasion less of the bran is made. I must say that so far, I have not found two breaks quite as satisfactory as three. Perhaps there was a reason for this which I did not happen to discover; at all events the flour did not suit the trade to which we cater, and I therefore dropped back to the three breaks.

Amongst three break practitioners, some use the first break as a continuation of the cleaning operation, merely splitting the kernels open and then brushing the broken pieces. Others make the first their main break, using the following two rolls as bran finishers, while others again divide the work about equally between the two first breaks, just leaving the bran rich enough to be easily finished by the bran roll.

On the merits of the other methods named, it would be somewhat difficult to pass, as the friends of each have their peculiar reasons for its use. The advocates of the first style claim that by the splitting and brushing operation they get rid of a large amount of impurities which it is impossible to reach in any other way. They base their claims on the existence of the "chesnut," "crease dirt." The aim in this operation is to make as little flour as possible which is sent to feed, so that in reality this can not be looked upon as a reduction, the whole of the flouring operation being left to the following two breaks. The result would therefore be precisely the same as if only two breaks had been used, with only what little improvement the scouring of the broken grain might effect, which, in the minds of a great many is, to say the least, a very doubtful quantity. With the second style, the aim is to remove between 85 and 90 % of the flour-making part of the berry with the first operation, leaving the remaining 10 or 15 % to be removed by the 2nd break and bran roll. In this style, as in the first mentioned, the result is almost the same as if only two breaks had been used, the 2nd break only playing the part of an additional bran cleaner, which I have not yet found necessary. The third plan I prefer to either of the others. I break low enough on the first break to free all of the grain. That means just about a fair division of the work between the 1st and 2nd breaks, leaving the bran just in good shape to be finished by the bran roll. By this method we get a break flour beautifully clear and sharp. At no point does the material get squeezed enough to make the flour soft, which has been the great objection to short-system flour. The break flour made by this method, if the wheat used be well cleaned, is as white as it is possible to make wheat flour, and will stand the baking or any other test with any purified middlings flour.

For first break I use a Jonathan Mills reduction machine, which I consider as good a machine as can be made for the purpose. It releases all the germ and leaves the product in excellent shape for the next reduction. These machines are not now manufactured I believe—a mistake in my estimation.

About the bran reduction very little is to be said, as it is substantially the same in all cases where rolls are used. Perhaps I might add, however, that it is not necessary to cut bran in order to clean it, as it will be cut into strips just the width of the corrugations, each strip carrying its full complement of flour to the bran bin. On the other hand, don't be afraid to go close enough to give it a good scraping, or you will then be in the same fix as a friend of mine, who is always complaining that his bran duster doesn't work right—it leaves too much on the bran.

VALUABLE INSTRUCTIONS FOR ENGINEERS.

THE Eclipse Pump Manfacturing Co., Cincinnati, have published the following valuable instructions to engineers:

1. The first duty of an engineer, when he enters his boiler room in the morning, is to ascertain how many gauges of water there are in his boilers. Never unbank or replenish the fires until this is done. Accidents have occurred, and many boilers have been entirely ruined, from neglect of this precaution.

2. In case of low water, immediately cover the fire with ashes, or, if no ashes are at hand, use fresh coal. Do not turn on the feed under the circumstances, nor tamper with or open the safety valve. Let the steam outlets remain as they are.

3. In case of foaming, close the throttle and keep closed long enough to show true level of water. If that level is sufficiently high, feeding and blowing will usually suffice to correct the evil. In case of violent foaming, caused by dirty water, or change from salt to fresh, or vice versa, in addition to the action above stated, check draft and cover fires with fresh coal.

4. When leaks are discovered they should be repaired as soon as possible.

5. Blow down under a pressure not exceeding 20 pounds, at least once in two weeks—every Saturday night would be better. In case the feed becomes muddy, blow out six or eight inches every day. When surface blow cocks are used, they should be often opened for a few minutes at a time.

6. After blowing down, allow the boiler to become cool before filling again. Cold water pumped into hot boilers, is very injurious from sudden contraction.

7. Care should be taken that no water comes in contact with the exterior of the boiler, either from leaky joints or other causes.

8. In tubular boilers the hand-holes should be often opened, and all collections removed from over the fire. Also, when boilers are fed in front and blow off through the same pipe, the collection of mud or sediment in the rear end should be often removed.

9. Raise the safety-valve cautiously and frequently, as they are liable to become fast in their seats and useless for the purpose intended.

10. Should the gauge at any time indicate the limit of pressure allowed by the inspector, see that the safety-valves are blowing off. In case of difference, notify the inspector.

11. Keep gauge cocks clear and in constant use. Glass gauges should not be relied on altogether.

12. When a blister appears, there must be no delay in having it carefully examined and trimmed, or patched, as the case may require.

13. Particular care should be taken to keep sheets and parts of boilers exposed to the fire perfectly clean, also all tubes, flues and connections well swept. This is particularly necessary where wood or soft coal is used as fuel.

14. Under all circumstances keep the gauges, cocks, etc., clean and in good order, and things generally in and about the engine and boiler room in a neat condition.

A farmer named Dufour, accidentally hanged himself in his mill recently at Isle Aux Coudres. He was passing near one of the wheels when his clothes caught in the machinery and he was killed before assistance could be obtained.

USEFUL INFORMATION

The new alloy of copper and silicum is malleable both when heated and at ordinary temperatures, according to the proportion of silicum in the mixture.

A technical exchange says: The number of gallons of water required for a boiler per horse power per hour may be safely estimated by adding 15 to the pressure per square inch in pounds; divide the sum by 18, and multiply the quotient by 24.

Several explosions recently, of substances that have never before been known to cause an explosion, emphasize what appears to be a fact, viz., that when almost any matter is brought, by division and subdivision, to a condition approximating the gaseous state, it is, under favorable circumstances, likely to result in a disastrous explosion.—*American Machinist.*

In England the term "corn" does not mean wheat any more than the word "grain" in Ameriea means wheat. "Corn" in that country is a general term, applied very much as we in this country do the term grain—including cereals used for food purposes. In some applications of the term, English writers include flour with the other food producing supply, of a farinaceous class. —Cincinnati *Price Current.*

Our Boston contemporary, *Practical Electricity*, says that files can be recut by cleaning them and placing them in acidulated water between two plates of carbon and closing the circuit so as to form a real voltaic cell The hydrogen liberated clings to the points of the teeth of the file, protectiug them from further action, but the cutting action proceeds freely over the remainder of the file, This process speedily brings back the teeth of an old file to the original shape and dimensions and does not merely sharpen them but practically recuts the file, without necessitating either softening or retempering the metal.

ELECTRIC POWER TRANSMISSION IN AUSTRIA.—The Oerlikon works propose, at Steyrermuhl, to transmit by dynamos 400-horse power over a distance of 650 yards. A 100-horse power plant is already at work in this locality. At Innsbruck there is now at work an Oerlikon plant transmitting 50 horse power over a distance of 500 yards; and other projects are in preparation. Messrs. Ganz & Co., of Buda-Pesth, are now bringing out an alternate current motor, which has the great advantage over the Tesla motor of requiring only one circuit. This motor can therefore be worked on any existing alternate current electric light circuit, and from experiments made with a ½-horse power and a 2-horse power motor, it appears that an efficiency of 60 per cent. is attainable.

A method of producing fire by compressed air, as practised by the natives of Thibet, is described by a gentleman who has visited that country. The apparatus used consists of a wooden cylinder, two and one-half inches long by three-fourths of an inch diameter. This is closed at one end; the base being about the size of a quill pen, an air tight piston fits into this with a large, flat knob at the top. The other end of the piston is slightly hollowed-out, and a very small piece of tinder is placed in the cup thus formed. To use this the cylinder is held in one hand, the piston inserted, and pushed about half way down. A sharp blow is then given with the palm of the hand on top of the knob. The hand must at the same time close on the knob, and instantly withdraw the piston, when the tinder will be found alight.

We all know what a bother it is to take grain from a bin in the usual way, especially if the bin be a high one, or if it be one-half emptied of its contents in which case one must hang across the sharp edge of a board, with his head down and heels up, in immediate danger of an attack of vertigo or something like it. If bags are to be filled, one must get into the grain with a scoop, and another hold the bag outside. Now, if the front bottom board be made to slide, or be hung on hinges, the work is much easier of accomplishment. This may be opened, the scoop used on the floor reaching into the bin under the second board and much awkward work avoided. It is better yet to have a long box—the length of the bin front—attached to the foot of the bin on the outside, and open into the bin its full size. The front board of this box, which also serves as a step when emptying grain into the bin, should be hung on hinges as before described, and opened, used and closed in the same way. No matter how full the bin the pressure will never be so great into the box as to prevent closing the front.—*Northwest Farmer.*

A new preservative of iron and steel has been found in a modification of the well known Japanese gum lacquer. After many experiments the preparation has been finally adopted for the imperial Japanese navy. There is a certain difference between the compound prepared for painting iron and steel and the ordinary lacquer employed for wood, but its principle element is still the gum lacquer. The inventor of the new composition had great difficulty in conquering the tendency of this material to get very hard and then to crack, but according to the reports he has succeeded at last. Experience has shown that a ship protected with this variety of lacquer has been able to keep afloat in tropical seas for three years, going into dry-dock only once instead of six times during that time, as usual. A ship of the Russian Pacific squadron has tried the new coating, and the result has been very satisfactory. It is consequently thought that at last a nearly perfect anti-corrosive coating for iron and steel structures has been discovered, which may render substantial service in the preservation of all descriptions of erections in these materials. The first cost of the preparation is rather high, but it is claimed that the excess of cost is more than compensated by the protection obtained. For ship use it is also asserted that great advantage accrues from the high polish which this lacquer retains while the coatings remain perfect, but, on the other hand, fears are expressed that the supply of gum lacquer will be unequal to the demand, if the requirements for these engineering purposes are added to the regular consumption of the article for ornamental joinery and cabinet-work.

THE DETERIORATION OF STEAM BOILERS.

DETERIORATION of steam-boilers was the subject of a lecture recently in Sibley College, Cornell University, by Mr. J. M. Allen, of Hartford Conn., an abstract from which is given below: When a boiler is completed and set to work, destructive forces more or less severe become active, and they must be carefully watched, or the working age of the boiler will be materially shortened. The forces may be mechanical or chemical, or both. The mechanical forces are those usually arising from bad design or workmanship in construction, with the exercise of little judgment in the matter of setting. A boiler should be so designed, constructed and supported that under the conditions of use the strains will be as uniformly distributed as the conditions will allow. In externally fired boilers it is well known that the bottom or fire-sheets are more expanded than the top sheets. Hence it becomes necessary to have such arrangements made in the setting or support that the boiler shall rest easy and have opportunity to adjust itself to these conditions. In long cylinder boilers this strain often becomes quite severe, and if the boiler is tightly bound up in brick-work, fractures are very liable to occur. To compensate for this, various plans for supporting long boilers have been devised. In some cases the brackets or beams supporting the boilers have rested on volute springs, in other cases equalizing beams or bars are used. In some cases quite elaborate apparatus has been devised. The point to be attained is so to support the boiler that the load will be properly distributed under the changes of form to which the boiler may be liable under heat. Were it not for the elasticity of the metal, these long boilers could not adjust themselves to this severe strain, but when well constructed and properly set they have stood the test for many years. Usually these long boilers, from 40 to 60 feet in length, are used in iron-works and are heated by the waste gases from the smelting furnaces. The gas enters the boiler furnace under more or less pressure, and when ignited will present one continuous sheet of flame from the furnace to the rear end of the boiler. In order fully to utilize these gases, the long boilers are used. It is a question whether shorter boilers of a different type may not be used with safety and equal economy. Another form of cylinder boiler from 28 to 30 feet long is used in connection with reheating furnaces in iron-works, the gases being utilized for fuel. These boilers are often supported by resting simply on walls at each end. When the metal is being run off, the furnace doors are thrown wide open and a current of cold air is allowed to flow into the furnace and along the bottom of the boiler. The walls are very hot, and the temperature of the steam and water in the boiler is that due to the pressure. The

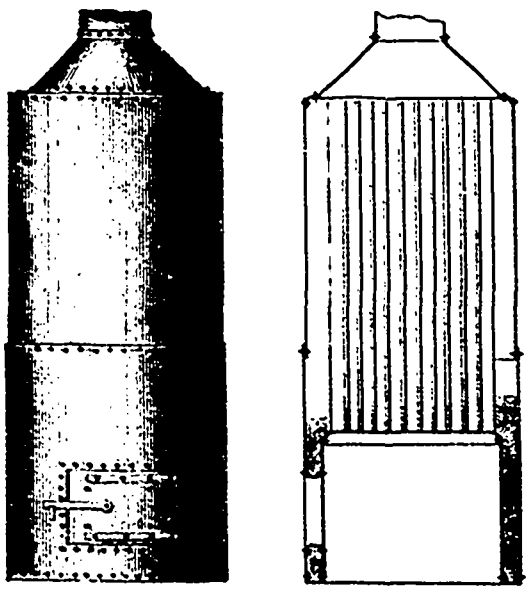


FIG. 2.—AS BOILERS ARE OFTEN BUILT.

sudden cooling of the fire-sheets causes contraction, and a severe strain is brought, especially on the girth seams. These not unfrequently crack from rivet-hole to rivet-hole, and in a number of cases I have known the boiler to break into two parts, each part flying off in opposite directions, Fig. 1.

A current of cold air should never be allowed to strike for any length of time the fire-sheets of a hot boiler, and such boilers should always have rods, not less than one inch sectional area, running from head to head, sufficient in number to hold the boiler together under such circumstances. With this provision for safety, if a leak was noticed at any girth seam, the boiler could be put out of use and the extent of the fracture ascertained and suitable repairs made, thus preventing what otherwise might cause a serious accident. Internally fired and fire-box boilers have their weak points as well. There are narrow passages for the collection of sediment and formation of scale, and in these narrow passages the circulation is very imperfect, and wasting and corrosion are very liable to take place. I will say that this type of boiler is very much used, and with economical results. There is economy of space also, which is often an important consideration. But boilers with water-legs and narrow water passages should be frequently examined, so that the difficulty, if such exists, can be discovered and remedied before the progress of deterioration has gone to a dangerous extent. Boilers with narrow water passages, whether vertical or of the horizontal type, should be supplied with a sufficient number of hand-holes to make the work of cleaning out sediment comparatively easy. The following illustrations (Figs. 2 and 3) will show how vertical boilers are

FIG. 1.

often constructed, also how they should be constructed to overcome the difficulties mentioned.

Another important matter is good workmanship in construction. If a boiler is bunglingly put together there will be several local strains that under the conditions of use will be greatly aggravated. If the parts of the boiler do not fit well and are brought into place by severe hammering and wrenching, what can we expect of such a boiler when put into use under a pressure of eighty or ninety pounds to the square inch? It will leak and give any amount of trouble to the user, and it will be fortunate if it does not burst or explode, carrying death and destruction in its flight. The "drift pin" seems to be one of the great evils in a boiler-shop, although few boiler-makers will admit that they use it, except to keep the plates in place while they are being riveted together. But I sometimes step into a boiler-shop, unknown and unannounced, and I have seen the cruel use of the drift-pin. Another potent cause of the deterioration of boilers is the water which is used, causing deposits of sediment and formation of scale, and often having corrosive tendencies. We have a great variety of waters in this country, chemically speaking. In many sections of this country we find the underlying strata to be largely sulphate and carbonate of lime. This foundation is of wider extent than any other. Then there are also chalybeate waters, magnesia, alumina, silicate, and waters carrying more or less organic matter. All of these waters give more or less trouble. In carbonate waters, the carbonate of lime and magnesia are frequently thrown down in the form of a fine powder, which settles along the joints at the lap; this often causes leaks. Another practice which aggravates these cases is returning the exhaust from the engine to the boiler. The oil thus carried into the boiler in combination with the impurities in the water makes a pasty substance that adheres to the plate and keeps the water from contact, causing over-heating and often rupture. In fire-box boilers where there are water-legs and narrow water passages, this deposit often becomes a serious matter. Open heaters should not be used for collecting drips, if there is any oil used, but where the drips come from slashers or drying-rooms, there will be no trouble. To utilize the heat in the exhaust from the engine, a pipe or coil heater should always be used. By such an apparatus all danger is avoided.

In many cases the water is so bad that it is not fit to be used in boilers, and would not be used if a better supply could be found. Our rule is first to analyze the water and then, knowing what impurities are carried in solution, we are better able to decide what the remedy must be. If the impurity is mainly carbonate of lime or magnesia, it is usually thrown down in the form of small, fine powder. Frequent blowing is necessary, that is, blow down two gauges of water, two or three times a day. But in addition to this there should be a good pipe or a coil heater, and the sediment from that should be blown out often. It sometimes occurs that the impurities do not readily settle on the bottom of the boilers, especially if the boilers are hard worked and circulation is rapid. In such cases a surface-blow is desirable and important, the object being to remove as far as possible the impurities from the water. To give you a correct impression of the character of some water used in boilers, I copied the following from our laboratory records: In spring water from Nashville, Tenn., we found in 100,000 parts, insoluble and sparingly soluble solids 17.6 parts, readily soluble solid matter 35.2, or a total of 52.8 parts, or 30.82 grains to a United States gallon. In another case in water from a well at a chemical works we found in 100,000 parts, insoluble and sparingly soluble solids 25.6, readily soluble solids 71.2, total 96.8 parts, or 56.52 grains in a United States gallon.

You will very naturally inquire, "What do you advise to be done in these cases of bad water?" It is often a very puzzling question. If carbonate or sulphate of lime predominate, a very good antidote is carbonate of soda. Especially is this good in case of carbonate of lime. It prevents it from readily forming a scale, and if attention is given to blowing and cleaning, the difficulty can be easily overcome. We usually recommend from eight to ten pounds of soda-ash dissolved in warm water to be introduced into the boiler about once or twice a week. This can be done by putting a branch into the suction pipe of the pump and connecting this branch by a hose to the pail or vessel containing the solution. In some cases we use one part, by weight, of catechu to two parts of soda-ash. Tannin works well in some cases, and a solution made from boiling the leaves of the eucalyptus tree has found much favor on the Pacific coast and is being introduced in this part of the country. There is no grand panacea that will cure all these maladies. We must know something about the case before we can remove the disturbing cause. It will be readily seen that if attention is not given to these cases, the result will be not only annoying, but dangerous. Hard scale will accumulate on the fire-plates of the boiler, resulting in overheating and greatly weakening the boiler. The question of the waste of fuel is also an important one, for steam can not be economically generated in a boiler where the plates are covered with scale. We all know that scale is a very slow conductor of heat, hence in addition to loss here the plates are worn away and become greatly weakened. The question of corrosion is a serious one in some cases and is difficult to manage.

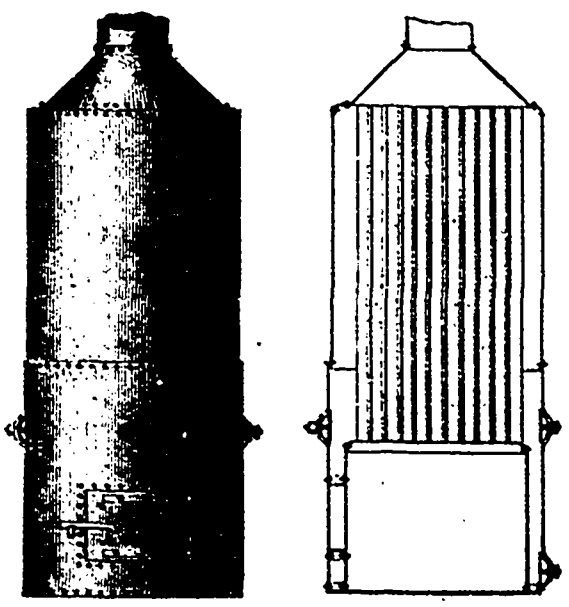


FIG. 3.—AS THEY SHOULD BE BUILT.

Water from swamp lands often has corrosive tendencies (Fig. 6), and on rivers and streams on which a number of manufactories are located, discharging their spent dyes and refuse, water becomes very much contaminated and gives serious trouble to the mills located down the stream. Our advice has always been for the parties to combine and lay a water main from the pond of the upper dam to the mill lowest down, sufficient capacity to supply them all with good water. Another difficulty which is often encountered and which at first seems paradoxical is corrosion or pitting from pure water. Corro-

sion in boilers in the absence of free mineral acids can proceed from three principal causes:

1. The purity of the water. Water is an almost universal solvent and dissolves most substances to some extent. In the absence of substances in solution to prevent that action, even pure water would attack iron and corrode it, but except in the case of distilled (condensed) water returned to a boiler with the return-pipe coming near the shell, this condition can hardly be said to exist, as even rain water contains from one to three parts per 100,000 of impurities.

2. The presence of air and dissolved gases in the water. This is in all probability the most fruitful source of corrosion, except the acid decomposition of grease, oil, etc. Water, unless recently boiled, contains varying amounts of dissolved gases, which are expelled at boiling temperatures. It has the peculiarity of holding a larger proportion of oxygen in solution than air has, usually about 33 per cent. more in water free from oxidizable matter. This under proper conditions would combine with the iron, rusting it rapidly, and when oxidation had once begun forming a rust spot, heat and moisture would rapidly continue the work. Water also contains varying and sometimes large amounts of carbonic acid gas. This by some authorities is equally injurious with the oxygen, but as when existing in large amounts it is almost invariably associated with lime and alkilies, which have been found to prevent corrosive action in practice, it is probably not especially harmful. Oxygen and nitric acid occur in rain water and newly fallen snow, and the purer and aerated a water is, as for example rain water, snow water and water from uncultivated upland and quick slopes, the more dissolved oxygen it is likely to contain.

3. Substances in the water causing corrosion. A water containing more than ten parts per 100,000 of solid matter usually contains considerable lime as carbonates, some soda and potash salts, and is alkaline. Such a water is not likely to corrode a boiler. A water with only four or five parts of solid matter (though it may contain also considerable dissolved oxygen, etc.) may be almost if not quite neutral, or even slightly acid. This acidity may come from dissolved organic matter, which, if from fields or woody districts, the water is likely to carry in considerable amount. This woody extractive matter is easily decomposable, and some of the complex acids, so called humic, crenic, apoorenic, oxalic, etc., present or formed under the action of decomposition, act very unfavorably on the iron of the boiler. This woody or especially peaty matter also contains tannic acid and gums in many cases and has been observed to varnish the inside of boilers, in some places so as effectually to prevent corrosion where otherwise it would be expected. The presence of certain salts in solution has a very injurious effect on boilers, even in small amounts. Waters containing nitrates and especially ammonia salts, as ammonia chloride, seems to be especially bad. Water exposed to the leaching from vaults is especially undesirable, even though a water strong in salt and alkalies from a common sewer might not be harmful to the boiler. The action of oil and tallow decomposing to oleic and margaric acid in the boiler, in the absence of alkalies, and especially with a coating of sulphate scale to prevent free circulation of the water at the corroding points, is well established. It occurs that a water at some seasons of the year making quite a scale is at others quite soft and charged with air and gases and partly dissolves that scale. This may go on indefinitely, until an unusually wet season, or a very clean or new boiler with the water quite pure, may suddenly develop injurious pitting from the absence of matter to counteract the effect.—*The Locomotive.*

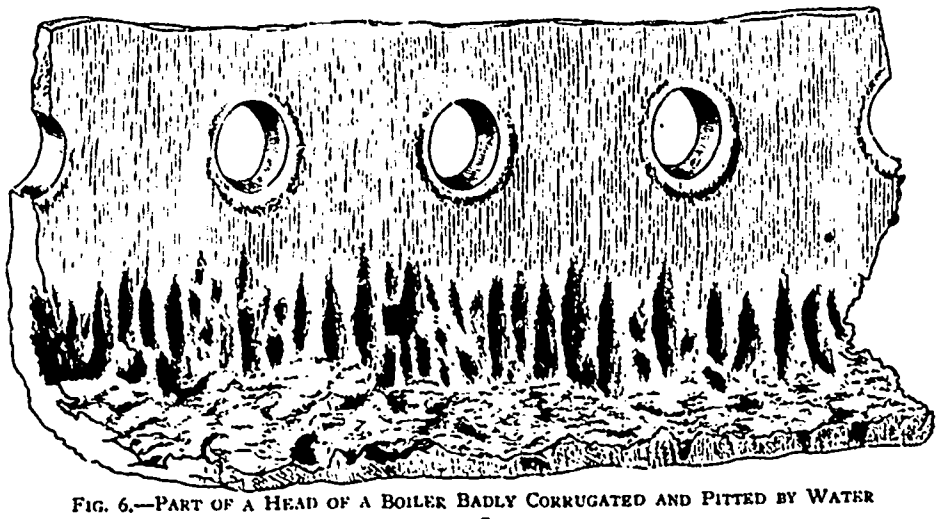


FIG. 6.—PART OF A HEAD OF A BOILER BADLY CORRUGATED AND PITTED BY WATER FROM A SWAMP.

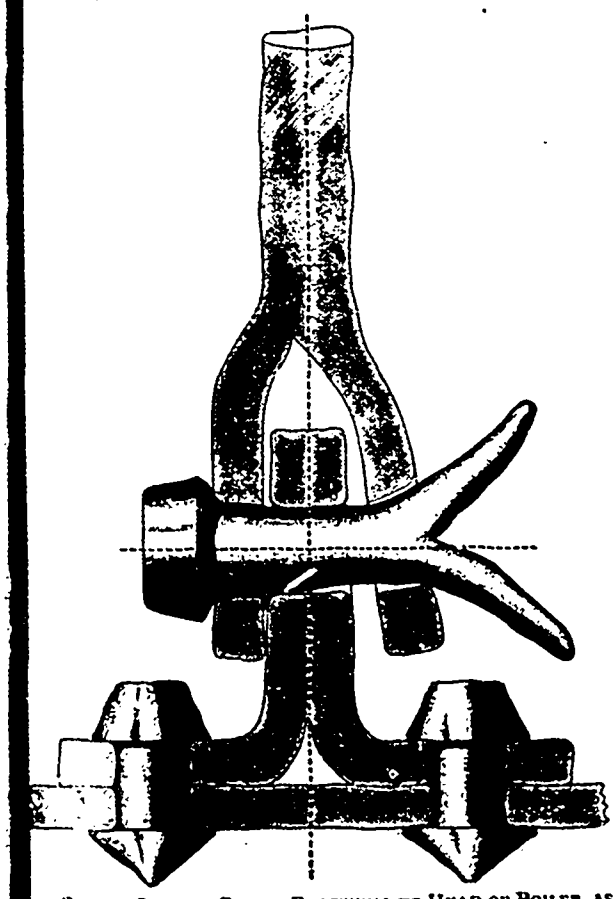


FIG. 4.—SHOWS A BRACE FASTENING TO HEAD OF BOILER AS THEY ARE SOMETIMES MADE. (This is no exaggeration.)

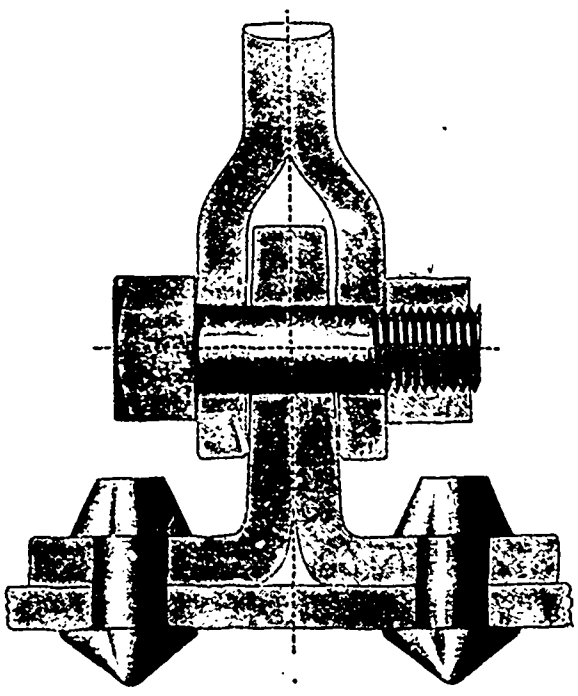


FIG. 5.—BRACE FASTENING AS IT SHOULD BE.

IS OATMEAL EXPLOSIVE?

It is important that the cause of the recent explosion in Chicago should be definitely ascertained. It is a matter full of possibilities. If it was an explosion of oatmeal, the country should know it. This is the first time it has been suggested that oatmeal has volcanic properties, its worst characteristic, in the popular mind, being its disposition to irritate the skin and set a man to rubbing his back against the door jamb.

If oatmeal is explosive, then a good many mysterious disappearances may be accounted for. Of an Ohio town treasurer who disappeared last week, a telegram said: "He was last seen on his way to the village through an open field, soon after breakfast. It is supposed that he took the cars at another station and has fled to Canada." The words "soon after breakfast" may be full of significance, and the suspicion of the honesty of the man may be cruelly unjust. Every body in Ohio eats oatmeal for breakfast, and it is among the possibilities that this town treasurer exploded on his way to town, and that he did not go to Canada, excepting, perhaps, a few pieces of him.

Until the question is definitely settled whether oatmeal is explosive, people should be a little cautious about riding down town in a morning street car with a Scotch fellow citizen. No man can tell how many bombs are walking about the streets filled with the dynamic force of an oatmeal breakfast. While we are feeling gay in fancied security, we may at any moment be blown higher than Gildroy's kite by a bowl of oatmeal mush.—*Milwaukee Sentinel.*

CONVERTING COAL INTO ELECTRIC ENERGY

THE Chicago *Tribune*, in commenting on the report that Mr. Edison is workin on an invention by which he hopes to convert coal into electric energy without resorting to any intermediate process, says, "If he is able to convert into electric energy the power that lies in the carbon and hydrogen of coal, he will have given to man the greatest gift that man can ask of nature, unless it be the control of the winds and rains. He will have multiplied by ten the present capacity for work of every ton of coal in the world. He will have revolutionized the world of machinery. What the Corliss engine is to the primitive water wheel of the Egyptian of the days of Pharaoh, that will Edison's device be to the present steam engine. Steam engines and gas engines will all go to the junk shops, and new plants —what we cannot yet tell—will take their place. Should Edison make such a discovery, all we ask of him is that he will be moderate, and that he will not charge so high a royalty as to heap up for himself a fortune of more than a thousand million dollars during the life of the patent."

MEASURED BUSHELS.

THE report of the wheat harvest, says the U. S. Government Statistician, is made in measured bushels. The Winchester bushel, the unit measure of the United States, is 2,150.12 cubic inches. The imperial bushel of great Britain, the standard for measure of cereals and other products, is 2,218,192 cubic inches. The French cereal-measure is the hectoliter (100 liters), or 2.8378 Winchester bushels. The Russian unit of measure is the chetvert, equal to 5,956 Winchester bushels. The German measure is the sheffel. Every country has its dry measure for cereals, having a specified depth and thickness or diameter. The harvests of all countries are first reported in dry measure, and not by weight. After the record of quantity is made there is a question of quality. There are various elements representing quality, but weight is probably the easiest and most practical test. It is pre-eminently a commercial test, though plumpness, color and cleanness are also elements. Value is governed by these physical peculiarities, which divide the harvest into grades representing quality ; and it is also affected by chemical constituents and hydroscopic condition. These elements of quality are only to be determined after harvest, and after distribution of a sufficient portion of the harvest to be fairly representative of the character of the whole. This is so obvious that it needs only to be stated to be established. These are reasons why the first statement of the harvest is in units of measure in bushels in this country. The light bushel is worth really more to thresh than the heavy one, but threshers can not make nice distinctions and therefore make a uniform charge per bushel. Therefore the thresher's bushel is a measured bushel, and estimates are based, as far as possible, on the records of threshing. This is an additional showing of the necessity that estimates should be measured in bushels. This estimate is perfected and published at the end of the year. The March report, the cereal report next following, shows the quality and estimates the weight of the grain from records of such portion of the crop as has been distributed, from special investigation through regular correspondence, aided by a parallel inquiry on the part of State agents, by local estimates of millers, and records of official inspection at trade centers. There is in every year a great difference in the weight of wheat of different varieties, in different sections and soils, and under diverse cultivation. The extreme variation is very great, ranging at least from 50 to 68 pounds, and the average less than 60 pounds, as a rule. For instance, the average of estimates of last year was 58.5 pounds ; for 1886, 58.4 pounds ; for 1885, 57 pounds ; for 1884, 53.3 pounds ; for 1883, 55.9 pounds. The effect in modifying the potential value of production, at least so far as indicated by weight, is as follows :

Year.	Weight per bush.	Measured bush.	Bush. of 60 lbs.
1883	56.9	420,154,500	398,435,481
1884	58.3	512,763,900	498,545,863
1885	57	357,112,000	339,496,449
1886	58.4	457,218,000	444,777,202
1887	58 5	456,329,000	445,047,538

It would seem that the average weight of wheat in the United States- not high-grade commercial wheat, but grain of all grades and conditions—is about 58 pounds per measured Winchester bushel (exactly for this five years' average, 57.9 pounds). Records of a Minnesota wheat dealer for 12 years, from 1872 to 1883 inclusive, made an average very close to 58 pounds per bushel for wheat of all grades. France, the nation of second rank in wheat production, has an equally wide range of quality, according to commercial estimates, that of *L'Echo Agricole* being equivalent to 61.2 per bushel for 1887, and 57.3 for 1888, and 59 pounds as an average of ten years. The primitive culture of Russia, South America, and India, undoubtedly produces averages lower rather than higher, though in dry countries good wheat is heavy. It is doubtful if any nation in the world produces a ten year's average of 60 pounds per bushel including every grade and all wheat grown. Commercial estimates are liable to be confined to commercial grades, thus failing to make a true average, with the effect of exaggerating it. These estimates are a sufficient explanation of our practice of estimating quantity first and quality afterwards, from sufficient data, in preference to guess-work at the time of harvest, as some inconsistent and thoughtless brokers and minor commercial editors have insisted on. Some such persons have demanded, while the grain is in the field or in the shock, an authoritative statement of the number of bushels of 60 pounds which will ultimately be weighed out (in part at least) from the farmer's granaries ; and some of them have either ignorantly or deliberately misrepresented and distorted our previous record of quantity and quality of wheat. Such perversion, however, is a part of the speculator's trade capital, and always to be expected.

THE FIRE RECORD FOR 1888.

FOLLOWING is a complete list of fires in flour mills, saw mills, planing mills and iron working establishments throughout Canada during the year 1888, as reported to Bradstreet's Mercantile Agency :

FLOUR MILLS.

D. E. McKay & Co., Broad Cove, N. S.
Summerfeldt & Co., Port Ryerse, Ont.
S. P. Chute, Berwick, N. S.
Silas Newcombe, Parrsboro, N. S.
Hutton & Carr, Wingham, Ont.
Moir, Son & Co., Halifax, N. S.
Eidt & Schmidt, Mildmay, Ont.
Albert A. Webster, Cambridge, N. S.
Wm. Henderson, Iona Station, Ont.
Wm. Helson. Sebringville, Ont.
John Ackland, Delaware, Ont.
J. R. Hoover, Pickering, Ont.

SAW AND PLANING MILLS.

Thompson, Fessant & Co., Teeswater, Ont.
Jos. Paquette, Montreal.
French, Wells & Burini, Dresden, Ont.
Isaac Cockburn, Gravenhurst, Ont.
Robt. McFarlane, Montreal.
Chas. Heise, Neustadt, Ont.
Graves & Co., Mount Brydges, Ont.
Buswell & Co., Spanish River.
Geo. Godby, Glenmeyer, Ont.
J. & J. Kerr, Petrolea, Ont.
Wm. Flater, Eherts, Ont.
McNair Bros., Elb River, N. B.
A. L. Bisnett, Blenheim, Ont.
E. B. Eddy Mf'g Co., Hull, P. Q.
Eidt & Schmidt, Mildmay, Ont.
Jos. LaFreniere, Louisville, P. Q.
J. M. Smith, Elba, Ont.
Thos. Tait, Gravenhurst, Ont.
R. & G. Strickland, Lakefield Ont.
Jos. Biette, Chesley, Ont.
Geo. Augustine, Port Colborne, Ont.
D. J. McLaughlin, jr., Petitcodiac, N. B.
Felix Baril, Warwick, P. Q.
Lewis Hahn, New Hamburg, Ont.
Wm. Wylie, Midland.

MACHINISTS AND FOUNDERS.

Roberge & Shepherd, Montreal.
Henderson Bros., Wardsville, Ont.
R. McDougall & Co., Galt. Ont.
Thos. Hendry, Seaforth.
McKeough & Trotter, Chatham, Ont.
Osborne Killey Co., Hamilton, Ont.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

MR. Chas. E. Robertson, opened the winter course of lectures in connection with the above society in the Mechanics' Institute building at Montreal, a few evenings since. The subject of the lecture was : "What the engineering world is doing and how our stationary engineers stand with regard to the progress that has been made since 1788." After acknowledging the honor he felt it to be to open the lecture course of the association, he thought his subject timely at the close of the centennial year of the marine engine. His subject was treated under the heads—the locomotive, the steamship, boiler making, electric machinery, bridge building. The progress of improvement in the locomotive from 1802, when Trevethick made and worked the first locomotive with cylinder standing vertically within the cylindrical boiler having a large fly wheel to carry the crank over the head centre, and after it in 1829 when Stephenson was awarded the £500 prize of the Liverpool and Manchester Railway for his Rocket, down to the latest improvement, was traced in an exhaustive and instructive manner. Illustrative of the advance made in the steamships, Mr. Robertson described the two great Inman liners, the City of New York and its sister ship the City of Paris, launched last year. Greater improvements will be effected, said Mr. Robertson, in boiler making, when all the practical heat in coal will be utilized instead of losing as now some 35 per cent. of the heating properties. Mr. Edison was quoted in the third head, electricity, to the effect that its experimental part was passed and finished, and that now it is as well trained a servant as steam itself. A description of the Forth bridge made evident the position of bridge building. Mr. Robertson concluded his lecture, which was frequently applauded, with an expression of the necessity of all machinists keeping up with the times and progress continually working in the science of engineering.

The lecture was profusely illustrated, the views including the City of New York and her engines, the Lachine bridge, the proposed Quebec bridge, the Forth bridge, American bridge failures, the Steamship Re Umberto, boilers of Her Majesty's ships fifty years ago, and boilers of the latest construction, etc. In the absence of the president of the association, Mr. Ryan, through sickness in his family, the chair was occupied by the vice-president, Mr. Allan.

SIZE OF MILL BUILDINGS.

THE substitution of centrifugal and round reels and kindred flour dressing machinery for the old style bolting chest, says the *Milling Engineer*, permits a corresponding change in the size and shape of mill buildings. The following table, complied from the latest practice, will be of value to parties about to erect new mills :

DIMENSIONS OF MILL BUILDINGS.

Capacity per 24 hours.	Size of Building.	Height of Stories. Basement.	1st Story.	2nd Story.	Attic.	Storage.	Engine and Boiler Room, 1 Story at end of Mill.
50 Barrels	30'x40'	10'	12'	12'	9' at plates, 17' at peak, or 16' flat roof.	2000 bu.	30'x20'
75	36'x44'	10'	12'	12'	10'6" at plates, 19' at peak, or 16' flat roof.	2500 "	36'x20'
100	36'x50'	12'	12'	13'	10'6" at plates, 19' at peak, or 18' flat roof.	3000 "	36'x22'
150	40'x55'	12'	12'	13'	13' at plates, 23' at peak, or 18' flat roof.	3600 "	40'x24'
200	40'x66'	12'	12'	13'	13' at plates, 23' at peak, or 18' flat roof.	4600 "	40'x24'
300	40'x70'	12'	12'	14'	13' at plates, 23' at peak, or 18' flat roof.	5000 "	40'x30'

BEHAVIOR OF TEMPERED STEEL.

B. PENSKY, after experimenting with two steel rods 100mm. in length, observed that they exhibited an increase in volume after they had been tempered by *heating to redness and plunging in water. This he* attributes to the fact that the external layers solidify first, and consequently prevent, to a certain extent, the contraction of the interior mass during cooling. The length of the rods under these circumstances showed a variable behavior, inasmuch as one of the rods, 27mm. thick, increased in length 0.083mm. ; whilstthe other, 13.5mm. thick decreased in length 0.030mm. It would thus seem that a rod, when tempered *becomes longer or shorter according as the proportion* of surface to volume is either below or above a certain limit. Subsequent to the tempering, both rods became gradually shorter at the ordinary temperature, the decrease in length amounting to 0.032mm. and 0.021mm. respectively. When they were now heated to 120°, they underwent a further diminution in length amounting to 0.015mm. and 0.021mm. ; but further exposure to the same temperature produced no alteration *in the length. On the other hand, by subjecting* the rods to successively rising temperatures, continued shortening was observed. Very hard steel disks suffered similar decrease in the length of their diameter, gradually at ordinary temperature, but more rapidly after being heated.

The Fort William *Journal* says : It is more than probable that Howland & Co. will erect a large flour mill here in the spring. They require considerable room, as the building they intend erecting will be a massive structure. The company owns a large steam flour mill in Thorold, Ont.

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Do you want a **Catalogue Printed**

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The Boiler Inspection & Insurance Company of Canada.

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HAVE YOU SEEN THAT FLOUR BARREL?

NO HOOPS TO FALL OFF! NO STAVES TO DROP OUT!

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Finest and strongest barrel for shipping purposes ever made.

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BRANTFORD, - - ONTARIO.

Write for information and price

TO ADVERTISERS!

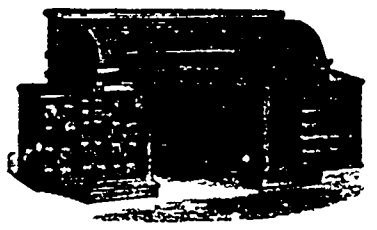
For a check for $20 we will print a ten-line advertisement in One Million issues of leading American Newspapers and complete the work within ten days. This is at the rate of only one-fifth of a cent a line, for 1,000 Circulation! The advertisement will appear in but a single issue of any paper, and consequently will be placed before One Million different newspaper purchasers; or FIVE MILLION READERS, if it is true, as is sometimes stated, that every newspaper is looked at by five persons on an average. Ten lines will accommodate about 75 words. Address with copy of Adv. and check, or send 30 cents for Book of 256 pages.
GEO. P. ROWELL & CO., 10 SPRUCE ST., NEW YORK.

We have just issued a new edition of our Book called "Newspaper Advertising." It has 256 pages, and among its contents may be named the following Lists and Catalogues of Newspapers:—
DAILY NEWSPAPERS IN NEW YORK CITY, with their Advertising Rates.
DAILY NEWSPAPERS IN CITIES HAVING more than 150,000 population, omitting all but the best.
DAILY NEWSPAPERS IN CITIES HAVING more than 20,000 population, omitting all but the best.
A SMALL LIST OF NEWSPAPERS IN which to advertise every section of the country: being a choice selection made up with great care, guided by long experience.
ONE NEWSPAPER IN A STATE. The best one for an advertiser to use if he will use but one.
BARGAINS IN ADVERTISING IN DAILY Newspapers in many principal cities and towns, a List which offers peculiar inducements to some advertisers.
LARGEST CIRCULATIONS. A complete list of all American papers issuing regularly more than 25,000 copies.
THE BEST LIST OF LOCAL NEWSPAPERS, covering every town of over 5,000 population and every important county seat.
SELECT LIST OF LOCAL NEWSPAPERS, in which advertisements are inserted at half price.
5,472 VILLAGE NEWSPAPERS, in which advertisements are inserted for $42.15 a line and appear in the whole lot—one half of all the American Weeklies
Book sent to any address for THIRTY CENTS.

W. Stahlschmidt & Co.

MANUFACTURERS OF

Office, § School,



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Representative,

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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.

THE MILLERS' VERDICT!

A REVOLUTION IN MILLING!

THE "COCHRANE" ONE BELT DRIVE CONTINUOUS TRAIN OF ROLLS

AN UNPARALLELED SUCCESS!

Less Power, with

Increased Output,

Less Attention,

More Middlings.

NO SLIPPING BELTS •• STOCK IS MORE GRANULAR •• LESS EXPENSIVE TO KEEP UP

READ

WHAT ONE OF THE BEST MILLING FIRMS IN EASTERN ONTARIO SAYS,

AFTER

FIFTEEN MONTHS

TRIAL

PETERBOROUGH MILLS. ROLLER PROCESS.
—OFFICE OF—
Meldrum, Davidson & Co.,
Merchant Millers.

VALANCEY E. FULLER, ESQ.,
President COCHRANE MANUFACTURING CO.
HAMILTON, ONT.

PETERBOROUGH, Sept. 20th, 1888.

Dear Sir,—In reply to yours asking a report of how we were satisfied with the Cochrane Rolls placed in our mill by your firm, we would say that, after fifteen months' trial, running night and day, we feel that we cannot speak too highly of them, either for light driving or in their operating on the grain in such a way as to get the very best results, financially or otherwise.

As you are aware, we have same roll surface and number of rolls as our former belted mill. Saving in power in Cochrane Mill, fully ONE-THIRD, or an INCREASE IN OUTPUT, using same power, of FROM FORTY TO FIFTY BARRELS PER DAY. This has been clearly substantiated. Its advantage does not stop here, but through the uniformity in speed of both grinding rolls and feed rolls, together with the fact that there are no belts or anything else to put the rolls out of train, the WHOLE STOCK IS MORE GRANULAR and a much LARGER PERCENTAGE OF "MIDDS" is the result, which means a LARGER PERCENTAGE OF FIRST PATENT FLOUR. Any practical miller cannot help but be satisfied of this by examining into the merits of the two mills.

It is a MUCH LESS EXPENSIVE mill to keep up, from the fact that there are neither belts nor gears to keep up and repair, except the main driving belt and a pair of gears at the head end.

We are satisfied the mill HAS ADDED LARGELY TO OUR PROFITS since putting it in—which is the best recommendation we can offer—and consider that Mr. W. F. Cochrane deserves the thanks of the milling public for giving a new idea of such practical value to millers. Hoping you may be as successful as you deserve,

We are, yours truly, MELDRUM, DAVIDSON & CO.

READ what one of the most successful millers of Western Ontario repeats:

The W. F. COCHRANE ROLLER MILL SUPPLY CO. [Limited].
DUNDAS ONT.

INGERSOLL, Ont., 30th Sept., 1888.

Dear Sirs,—Yours to hand and noted. You ask what I think of my W. F. Cochrane Mill. I beg to say I know it is a grand success as to power, and also to uniformity of grind, fully all you claim for it. My millers think they have a mill about fifty years ahead of the best. I cannot see how it could be any better. You can invite any one to come here and see a seven inch belt driving fourteen pairs of 9 x 24 inch Rolls, and as loose as a belt can be and stay on the pulleys. I am satisfied I could drive it with a four-inch belt and make two hundred barrels of flour in twenty-four hours. We will take great pleasure in showing any one the mill that would like to see it at any time.

Yours respectfully, WM. PARTLO.

Their verdict is supported by that of* V. Denne, Newmarket, *as it will be by all Millers who keep up with the times and* order a Train of Cochrane Rolls *from the sole licensees and manufacturers,

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

ALSO MAKERS OF ALL CLASSES OF CHILLED ROLLS AND CALLENDERS USED IN GRAIN MILLS, RUBBER FACTORIES, PAPER MILLS, ROLLING MILLS.

VALANCEY E. FULLER, President; C. M. COUNSELL, Vice-President; Directors: W. F. COCHRANE, ROBERT THOMPSON, J. M. GIBSON, M.P.P., F. S. MALLOCH, of Hamilton; CHARLES RIORDAN, of Toronto.