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# THE CANADIAN MANUFACTURER

And Industrial World.

Vol. I.

TORONTO, ONT. JAN. 6, 1882.

No. 1.

## SALUTATORY.

The first number of the *Industrial World and National Economist* was published at Ottawa on June 24th, 1880, and its publication was continued there until the close of the year 1881. Recently the enterprise passed into the hands of THE CANADIAN MANUFACTURER PUBLISHING COMPANY, with Toronto for headquarters and place of publication, the name and style of the paper having been changed as above. A change has been made also in the form of the paper, which it is believed will be a great improvement for purposes of preservation and reference; and, instead of taking a range covering other branches of business as well as manufactures, it will devote itself to the latter exclusively. The new journal, very appropriately, as is believed, makes its appearance at the opening of the year 1882.

The name chosen for the paper indicates its object, and the special place it is intended to fill. As the title suggests, to promote the manufacturing interests of Canada will be its aim first, last, and all the time; though it has, of course, to be remembered that this purpose cannot be fulfilled without proper attention to what is going on in the manufacturing world outside. These interests are now rapidly increasing in extent and importance: industries some time established are expanding, while new ones, before untried in this country, are being started. The time seems auspicious, therefore, for the appearance of a journal which shall make the advancement

of Canada's manufacturing interests its special mission. Other interests agricultural, commercial and financial-- have their representative organs in the Press, and why not the important interest of manufactures, too? It is believed that the time has fully come when Canadian manufacturers, the Dominion over, cannot fail to extend their hearty support to a journal established for the express purpose of filling the void.

In conformity with this intention, the paper will furnish thoroughly reliable reports of the chief markets for the great staples of iron cotton, wool, leather, &c. New and important inventions and processes will from time to time receive due mention in its pages; and friends are cordially invited to send, as opportunity may permit, any new information they may have to favour us with in connection with specific improvements and the progress of manufactures generally. Authenticated items of interesting news regarding manufactures will be gladly received. The little trouble involved in sending a few lines by post card, or by letter if a longer description be necessary, may be the means of conveying information of very great interest to many readers.

In the United States industrial journalism has reached large proportions, the aggregate circulation of papers devoted to the various manufacturing specialties being now something enormous, with capital invested and advertising patronage to correspond. The Dominion having taken a fresh start in the race of manufacturing progress offers surely a fair field for just such a paper as the CANADIAN MANUFACTURER is intended to be.

A paper devoted to the manufacturing interests must of course steadily advocate such a policy of Protection as these interests imperatively require, most of all in a new country like Canada, with a powerful Protectionist neighbour on its border. But, while the great principle involved will be advocated on its merits, everything of a political character will be carefully avoided. Strictly speaking, the question of building up home manufactures by means of Protection should not be one for political parties to divide upon, any more than questions of mechanics or engineering-- that is, if it be taken for granted that the country's material prosperity is something

which all parties should hold themselves bound to promote. And one object for which this journal will strive, to the best of its ability, will be to make the trade question a purely industrial, non-political issue, to be debated only on its own intrinsic merits, as just stated.

### PERPETUAL ORGANIZATION.

It is an oft-quoted saying that eternal vigilance is the price of liberty. We may take the idea which inspires the remark give it another application, and say that perpetual organization is the price of safety to Canadian manufactures. The hope is a proper one to express, that the time may soon come when Protection to home interests will be a settled thing for Canada, and when attempts to reverse this policy will cease. But evidently that time has not yet come; in fact it appears that the fight on the trade question is still going on, and is likely to keep going on for years. Nor is this so much to be wondered at. In the United States, with Protection established for twenty years, our neighbours are only now nearing the end of the long struggle. It will not last so long in Canada, for the reason that the settlement of the question there involves very largely its settlement in Canada too. The material circumstances of the two countries are so much alike that the commercial system which gains the victory over the border will certainly carry the day in Canada as well. We take our political institutions, laws, morals and manners mostly from the Mother Country, with, however, the important difference of having the State Church and the landed aristocracy left out. In religion, in poetry, and in philosophy, we draw from transatlantic sources of inspiration; our opinions are swayed by the thoughts, written or spoken, of Macaulay, Carlyle, Disraeli, and Gladstone. On all such subjects we think very much as the great leaders of English thought, have chosen to think for us. Far otherwise, however, is it with our industrial enterprises, whether on the farm or in the factory. In their own respective domains we may follow Dickens, Reade, Huxley, or Matthew Arnold, but in our ways of mechanical working we are Americans, as much as our neighbours over the border. In certain realms of thought we may follow Oxford, or Cambridge, or Edinburgh, or Dublin, but when it comes to driving shoe pegs by machinery we follow Massachusetts. Our cotton machinery, brought from England though it be, is worked so as to produce goods like those of Lawrence and Fall River, not like those of Blackburn and Preston. Our agricultural machinery is made after Ohio and Illinois patterns, with perhaps a few Canadian improvements: our stoves are copies from Albany and Troy. We are likely from the mere force of material circumstances to go the same road as our neighbours have been and are still going on the trade question. The same material reasons which dictate their commercial and manufacturing course will dictate ours. Canada belongs industrially to the American continental system, though not perhaps in the sense implied by Mr. Goldwin Smith. The force of material circumstances is upon us, and we cannot escape from it. We must manufacture and manage and organize our manufactures as the Americans do. And from this fact, which appears to be really beyond dispute, we may draw a lesson.

In the United States each particular manufacture of any considerable importance is organized for self-protection. There the number of special trade journals is legion, each one devoted to its speciality. There are trade associations which have their regular meetings once a year at least, taking cognizance of everything appertaining to their respective lines. Now, it may be that our population and manufactures are neither of them yet large enough to warrant a considerable number of trade associations and trade journals speaking their views. But trade associations we should have, and the CANADIAN MANUFACTURER AND INDUSTRIAL WORLD offers itself as the

medium for their views. It is not as the coming of next year's summer; and, years after this, our children will wonder by what trick of legislation this natural destiny of that Province was so long delayed. That Province was marked out by nature for a manufacturing district as clearly as Clydesdale or Tyneside, and nothing but the delusion that wealth was to be found only in shipping and importing prevented that destiny from being realized long ago.

We are not without warning as to the danger of neglecting organization in connection with manufactures. In 1858 there was a movement in Old Canada, under the leadership of the Hon. ISAAC BUCHANAN, for the adoption of Protection to home manufactures. The movement succeeded, and the same year, not in 1859, as seems to be generally supposed, a 20 and 25 per cent. tariff was placed on the statute book. Then the men who had been the life of the movement rested, allowed their organization to drop, and with what result? Why, with this result, namely, that when the details of Confederation were settled, in 1865 and 1866, the figure was reduced to 15 per cent. A brave minority in Parliament, including men of both parties, fought against the change, but were powerless to prevent it. The Canadian Industrial Association of 1858 had become defunct: there was no machinery at hand for supporting out of doors the earnest protest which was made by the minority in the House. The pressure from the Maritime Provinces in favour of free trade was strong, and at the same time open and understood. The pressure from England in the same direction was stronger still, though mostly exercised in a manner of which the people of these Provinces knew little or nothing. Our public men succumbed to it, the pressure was too much for them. Let it be remembered that the change adopted in 1858, and somewhat amended in 1859, was then

working well in both Quebec and Ontario. Not a single petition in favour of changing back again to the old system was presented to Parliament. Not a single public meeting was held to demand it, nor did any deputations wait upon Ministers for that purpose. These two Provinces—Quebec and Ontario—were well satisfied with the law as it then stood. But there was no organization to give voice to the popular feeling, and a change, of which it is safe to say that not one-fourth of the people approved of it, was carried out. With the Association of 1858 in existence, and a few public meetings in Montreal, Toronto and other places, Parliament would have hesitated ere destroying the good work of eight years before. But in the public mind the importance of Confederation appeared to overshadow everything else: there was no organization capable of acting in the emergency, and the case for home manufactures was, as we may say, allowed to go by default. Through this grand mistake the country has lost millions upon millions, and its progress has been delayed. The change of 1866 was followed by a loss of confidence, which is only now in course of being regained. To recall this passage in our history is really no reflection on the Government of that day, after all, for in 1866 our statesmen did not feel behind them enough strength of Canadian public opinion to resist the enormous pressure from the Mother Country in favour of Free Trade. Since 1866 we have changed all that, and if we fail to maintain a Canadian policy for Canada it will be our own fault.

The great work of the Canadian Industrial Association in 1858, and the lamentable consequences from the want of such an organization in 1865 and 1869, carry to us a lesson which should not be forgotten. No such great internal change as Confederation is likely to occupy our attention for a long time to come, but there may be external changes that will imperatively demand it. The fishery stipulations of the Treaty of Washington will expire by effluxion of time in a year or two, and, in order to prevent dangerous complications down by the sea, it is absolutely necessary that new arrangements be made. The Imperial Government, we may be perfectly certain, will exert the very strongest pressure it can bring to bear in favour of Free Trade or Reciprocity of some kind. But even what the Imperial Government may do is not what will most urgently require watching. Pressure from high financial and commercial quarters, exercised in ways the particulars of which are not published in the newspapers or embodied in Parliamentary documents, is really the most potent influence against which we will have to guard. Now, let not Canadian manufacturers be deceived, or go to sleep on this subject: if they do fall asleep on it there is a rough and rude awakening in store for them. Here are two things to be kept in view, things that will certainly come to pass within two years. First, that another fishery treaty will have to be negotiated—this must be done. And, second, that the Americans will take occasion there and then to press for the reduction or abolition of our duties on their manufactured goods, as the condition of admitting to their markets our raw produce. This view of the proper relations of the two countries was laid down very positively by the late Mr. HATCH, of Buffalo, in his official reports to the American Government on the working of the Reciprocity Treaty; and it is still firmly held by every Board of Trade in the United States, from Boston and

New York to the Mississippi. We hold it to be the wrong view entirely, but that is not the point now; what we have to consider is that it will certainly be pressed by our neighbours. They will not lower their tariff to admit our manufactures, but they will say, "send us Canadian raw produce, and take American manufactures in exchange." That is their idea of what would be fair between the two countries. It is ominous to reflect that on this particular question the whole weight of British influence—the political influence of Downing street, and the financial influence of "the City" of London—will certainly be thrown on the side of the United States and against Canada. We need not conjecture whether this is likely to be so; we may assure ourselves beforehand that it will and must be so.

Now, to recapitulate—a great emergency is in prospect, to meet it we must have live Manufacturers' Associations, wide-awake and in running order. To have local head-quarters at Toronto and Montreal, also at Halifax or St. John, is a natural and necessary division of the work. But even without the emergency referred to, perpetual organization is the price that Canadian manufacturers must pay for safety against disturbance. The principle of our commercial legislation may be settled, but practical questions as to its application will always be turning up. Our methods of manufacture and business being the same as the American, our business men must organize themselves as they do over the border, or suffer the penalty of falling behind, and being caught at a disadvantage some of these days. We cannot afford to run the risk; let us hope that our manufacturers, both East and West, will keep themselves prepared accordingly.

#### MOTIVE POWER IN FACTORIES.

(BY G. C. BOBB, TORONTO.)

Manufacturers are not usually so careful as they should be with regard to the motive power of their factories. They can understand the sources of loss and waste in the products of their machinery, and take special pains to reduce these to a minimum, at the same time that, through defects, often unknown and unsuspected, in the motive power, much greater loss is daily incurred.

Steam and water power are the most common means of driving the machinery in factories and mills, and some argue that water power is both better and more economical than steam. It has happened that the interest on the money spent on the mill dam and water channels came to more than the cost of fuel for a steam engine of the same power as the water wheel. Sometimes a steam engine and a water wheel are coupled together to drive the same shafting, and it is not easy to adjust them so that each will take a fair share of the work. An arrangement of this kind was tested, when it was found that the water wheel was being driven by the engine, and the stoppage of the wheel reduced the coal bill.

An escape of water from the mill dam is at once recognized as a waste of power, and every effort will be made to stop it as the elevated position of the water is the source of the power of the water wheel. Heat, the source of power in the steam engine, is not so easily held in as water, but is ready to escape in all directions, and its escape is just as positive a loss of power as the flow of water from the mill dam. Steam is a

mixture of heat and water, and the power to be got out of it is proportionate, not to the amount of water it contains but to the quantity of heat, the water being but a vehicle for the transmission of the heat, and the steam boiler a machine in which to mix the water and heat.

The object aimed at in the use of the boiler is to bring the heat of the furnace into contact with the water. The loss of heat in doing this is necessarily great. A large quantity is required to produce the draught in the chimney, and heat is radiated in all directions, from the furnace front, boiler, pipes, etc. Boiler rooms are usually much hotter places than there is any need for, and it should be understood that this uncomfortable heat costs money and is a waste, some of which might be saved. Another cause of loss arises from the fact that while iron is a very good conductor of heat, mud and scale, so frequently found inside boilers, are bad conductors of heat, and where these are allowed to cover the plates and tubes they retard the passage of the heat into the water, and increase the quantity which escapes up the chimney. Leakage from boilers, pipes or valves, apart from the mischief it causes by corrosion, is a positive waste of fuel, and is worse than money thrown away.

After the steam is produced inside the boiler, how is it to be converted into power? No engine has ever yet been made which can do this without great loss, and most of the engines in actual use are much more wasteful than there is any necessity for. If the man who can make two blades of grass grow where but one grew before is to be considered a public benefactor, what shall be said of him who makes one ton of coals do as much work as two tons?

Steam engines are in use which require 10 lbs of coal per hour for each horse power given off, while others do the same work with 2 lbs. It has not yet been found practicable to reduce the consumption of fuel to 1 lb of good coal per hour for each horse power, but suppose an engine is actually doing this, how much of the heat produced by each pound of coal is converted into power? Not more than 15 per cent., while 85 per cent. goes up the chimney, heats up the boiler-room, and escapes with the exhaust.

It is not beyond the range of possibility that steam engines may yet be built, capable of working on 1 lb. of coal per H. P. per hour, and surely within the future something better will yet be discovered. But, without waiting for that, much can be done to make engines as we now have them more economical. The most common sources of loss in an engine are condensation in the pipes and cylinders, leakage at the valves and piston, improper setting of the valves, excessive back pressure, &c. How are these to be discovered and corrected? A well-conducted test of the amount of fuel consumed, quantity of water evaporated by the boilers, and amount of power given off by the engines as shown by indicator diagrams, will usually discover the real condition of the engine, &c. An engine giving off a total of 60 horse power was found by the indicator diagrams to be using 25 H. P. to get rid of the exhaust steam from the cylinders, and had been working in this condition for years, the loss of so much power never having been even suspected till the indicator diagrams revealed it. Many engines are running in this country, close beside streams of water, and exhausting the steam into the air,

when, by the addition of a condensing apparatus a large increase of power could be obtained, or a saving of fuel effected. In an engine taking steam at 60 lbs. pressure, and cutting off at half stroke, the gain of power by condensing would be about  $3\frac{1}{2}$  per cent., of which  $2\frac{1}{2}$  per cent. would be required to drive the air pumps.

Instead of adding a condensing apparatus it is sometimes more profitable to use the exhaust steam for heating purposes, either work rooms, drying rooms, or water; and the question comes up, how much heat is available from exhaust steam? More than 100 years ago it was observed that steam at the temperature of boiling water gave out a large quantity of heat while being condensed into water, which still showed the same temperature. It was also clearly established that water of  $212^\circ$  temperature could not be converted into steam of  $212^\circ$  temperature without the addition of a large amount of heat, and to this was given the name "latent heat."

More modern experiments have shown that, while the addition of 152 units of heat to a lb. of water at  $60^\circ$  will make it water of  $212^\circ$ , other 966 units must still be added to make it into steam of  $212^\circ$ . Nearly the whole of this quantity, and indeed often much more, remains in the exhaust steam, and is released from the steam while it condenses into water, and ought not to be allowed to go to waste, where it can be put to any useful purpose. Sometimes the attempt to use exhaust steam for heating purposes has proved a loss instead of a gain, owing to the unskilful manner in which it was done, the loss of power from increased back-pressure having been greater than all the gain of heating: but where the apparatus is properly constructed there need be no increase of back pressure. Another source of loss in factories arises from imperfect arrangement of shafting. It gets out of line, or the pulleys run out of balance, or the belting is defective, and power is lost or used for a useless purpose. Manufacturers should look out for all such leaks in their factories, and when found it will pay to stop them.

#### UTILIZING EXHAUST STEAM.

There is only one general method of accomplishing this efficiently. The exhaust steam can be made to give up a portion of its heat to some fluid of lower temperature which in turn utilizes it in performing some useful function. This is the principle of all binary engines. The steam of a temperature above  $212^\circ$  F. transfers a portion of its heat to some fluid of lower temperature which evaporates or expands at a lower temperature than that of the exhaust steam. The fluid is then utilized in a cylinder separate from the steam cylinder, but may form a part of the direct power system which includes the steam engine. In other words the two engines may drive the same shaft, though this is by no means a necessity. Again the exhaust steam may be made to transfer a great portion of its heat to the water fed to the boiler. This is partially accomplished by a condenser and by a feed water heater. But the only way in which the heat in the exhaust steam can be utilized is by transfer to some colder body than itself, and it is time that this be generally appreciated. Of course exhaust steam can be used to create draught in chimneys, but in this case, though the direct action results from the velocity of the escaping steam, the temperature of the steam is lowered accordingly.—*American Engineer.*

### PUBLISHERS' NOTICE.

*Copies of this issue are sent to nearly all Manufacturers in the Dominion. We would ask all receiving it, who feel interested in the advancement of Canadian Manufactures, to extend their support to our enterprise, both by subscription and advertising. The subscription price is Two Dollars per annum; advertising rates furnished on application.*

### Editorial Notes.

The article on Motive Power in Factories is by Mr. G. C. Robb, Chief Engineer of the Canada Steam Users' Insurance Association, and one of the best authorities in Canada. Similar articles on Applied Mechanics will from time to time appear in our columns.

Our wool and cotton market reports from the principal centres have not yet come to hand; a circumstance for which we beg to apologize to our readers, hoping that they will kindly take the excuse of the pressure of many matters incident to the getting out of a first number.

In our next number will appear a two-page description of one of Canada's leading manufacturing establishments, which, it is believed, will be not merely of local, but also of general interest.

A special feature of this journal will be correspondence from experts on subjects technical, mechanical, and scientific, of interest and value to manufacturers generally.

### CAN A PATENT BE SOLD BY SHERIFF FOR DEBT LIKE OTHER PROPERTY

This question is frequently asked, and heretofore, in the absence of any definite decisions of the courts, we have been accustomed, for many years, to answer that an ordinary sheriff's sale of a patent would be invalid, while an assignment of a patent by the owner would hold good and carry title against such sheriff's sale. Further, we have held that the proper way for a creditor to obtain title to a debtor's patent is to procure an order from a competent court, compelling the debtor to sign a deed of conveyance.

This subject has lately received the attention of two separate courts, and we will here present the substance of both decisions:

The first case was in the Supreme Court of Columbia, *Murray vs. Ager*, decided January, 1881. Murray, having recovered a judgment of \$2,164 against Ager, who was the patentee of certain grain-dressing inventions, represented to the court that the only means he had to realize on his judgment was from the patent. Murray accordingly asked the court for an order compelling Ager to execute such assignments of patents to the purchaser as might be necessary to carry the title, in conformity with the patent laws.

The defendant admitted the judgment and ownership of the patents, but claimed the latter were not subject to seizure and sale under the proceedings. The lower court took the same view and dismissed the bill; but on appeal the Supreme Court

of the District reversed the decision of the lower court, and, in a very interesting and exhaustive decision, held substantially as follows:

"A court of equity may direct the sale of the interest of an inventor in his patent in order to satisfy a judgment obtained against him in a court of law, the writ of execution having been returned *nulla bona*, and for that purpose will require the patentee to make an assignment of the patent, as provided in Section 4,898 of the Revised Statutes of the United States, and in default of such assignment within a limited time, will appoint a trustee, with authority to execute the same."

The second case occurred in the Supreme Court of California, *Pacific Bank vs. Robinson*, decided April 19, 1881.

The court hold that a "patent right issued under the laws of the United States may be required to be assigned to a receiver, under proceedings supplementary to execution, who may sell the same and apply the proceeds in satisfaction of judgment."

Thus, although an ordinary sheriff's sale of a debtor's patent right would be good for nothing, it appears from the foregoing case that, when proper supplementary proceedings are taken, the courts may compel the debtor to make an assignment of the patent for the benefit of his creditors, or appoint a receiver for the patent, whose conveyance to the purchaser would be good.—*Scientific American*.

### THE RIGHT TEACHING.

In his address at Atlanta, Hon. Edward Atkinson said that one of his sons, who had graduated at Harvard, had gone into the best weaving school in Germany to learn designing and weaving, and should stay there until he knew something. The young man is learning precisely what can not be learned in the United States to-day, and his ability will be measured by his work. He will be enabled to weave the fabrics of the country into finer goods, into newer designs, into desirable patterns, and in this way to compete with the older countries upon ground which has heretofore been entirely to our disadvantage. But the case need not stop with the comparison of this young man. Thousands more might follow, and the result would be a most radical improvement in the mechanical and moral tone of our young men. The young man of to-day is not, in the majority of cases, desirable. He has little ambition for anything mechanical, or anything that will soil his soft white hands. Mechanical employments are not at par, but anything which employs the hands in that direction is most decidedly, in the estimation of the average young man, out of fashion, or out of place, and not accepted. If they can fill a position in a dry goods store, some warehouse, or other place where semi gentility is the rule because their clothes and hands are kept clean, and the hours of labour are curtailed to the business hours of the day, they have more time for carousal at night, they will be found well versed in theatrical and other matters, not at all to their credit, however; they will be found avoiding all studies that have in them anything which will result in good; they avoid the useful and affect the ornamental, falling far short, however, of their standard in this respect, even; while the manufacturers and mechanics of the country, who employ hundreds and thousands of men, are troubled to obtain foremen, men who not only have ideas and theories, but who have cultivated hands and heads, with the ability to take the rough sketch, reduce it to a working drawing, and to reduce the working drawing to metal, and the working machine. Theories are too fine spun. Education in the United States, to-day, is the broadest departure from the practical or essential necessary. It partakes quite too much of the ideal and the æsthetic, and in the majority of cases these men, if thrown upon their own resources, would prove a lamentable failure.—*Boston Journal of Commerce*.

## Manufacturing Notes.

A meeting of citizens of Ottawa interested in the organization of a woollen manufacturing company was held recently. It was decided to locate the factory at Hog's Back. The company will have a capital of one hundred thousand dollars. Among the promoters of the enterprise are Messrs. G. Merrick, E. McGillivray, C. H. Mackintosh and Hon. Jas. Skead.

Mr. A. H. Ronfeuillet, agent of the Thompson William Company of Stratford, has contracted to furnish Wm. Parks & Sons, cotton mill at St. John, N. B., with one of their 500 horse power Brown pattern engines. The Company say this will be the largest engine of the kind ever made in Canada.

Mr. B. Globensky, Solicitor to the Coleraine Mining Company in the vicinity of Sherbrooke, has arranged for the working of 2,000 acres of the Company's property for 25 years by the Mineral Working and Forwarding Company, who will invest half a million dollars in the enterprise immediately. The Company is formed for the purpose of extracting asbestos and forwarding it to the European market. The contract provides that the lessees have to pay a royalty of \$15 a ton to the lessors, and bind themselves to extract not less than 8,000 tons a year. The new Company expect to realize as much as \$150,000 a year by the arrangement.

At a meeting of the Hochelaga Council held recently, it was decided to give the Canada Iron and Locomotive Company a bonus of \$500 yearly for the first ten years that the company has works in operation within the limits of the municipality, giving employment to not less than 100 men. The stock of the Company has been subscribed and the Company intend selecting a site and beginning building operations immediately. The Company, through some of its subscribers, has control of several valuable patents for applying the steam to the cylinders of locomotives and for reducing the consumption of fuel, and the promoters of the Company claim that they will be able to turn out locomotives, which, for service on Canadian railroads, will excel any at present in use.

Mr. R. T. Wilson of Dundas has disposed of his interest in the General Store and Malt House, formerly owned by him, and now devotes his entire attention to the Dundas Edge Tool Works, of which he is the proprietor. He has lately put in a set of large axe rolls, made in the most improved pattern that could be found in the United States, and it is his intention to shortly enlarge the factory. Several fine brands of axes are made in this establishment, the "Pioneer" being an especially popular one, and it is bound to win a reputation amongst lumbermen and woodcutters.

Messrs Wanser & Co., Sewing Machine manufacturers, of Hamilton, have at the present time a force of 300 men employed, most of whom are working overtime, and they have also recently made additions to their factory. The principal machines made by this firm are constructed of hardened steel, which gives them a lightness, durability and noiselessness in running not to be obtained when made of iron. The Screw Factory owned by Messrs. Wanser & Co. has been kept busy supplying screws for the Sewing Machine department of their extensive works.

The Hamilton Cotton Mills Company are erecting an addition to their factory 60 x 50 ft., 3 storeys high, being a continuance of their present building, which, when finished, will give them a frontage of 170 feet. They are also adding a new dye house, which will be of sufficient capacity not only to supply their own needs but to enable them to engage in custom dyeing. When these improvements are completed they intend running almost exclusively on cotton yarns. About 100 hands are at present employed, which number will very shortly be increased.

The Hamilton Tool Company have lately acquired an additional acre of land to the north and half an acre to the south of their works, and are now putting in a siding from the G. W. R. into the shops, and also erecting

additional buildings. They have a large amount of work on hand, both railway and highway bridges being in course of construction, as also a large rivetting machine for the Kingston Locomotive Works.

In the last number of the *Canada (official) Gazette*, notices are given of the following new manufacturing enterprises:—

The Ball Electric Company, London, Ont.; capital \$500,000  
Eureka Woollen Mill Company, Lower Hopewell, Pictou, N.S.; capital \$300,000.  
Apothecaries' Hall Company, Montreal; capital \$100,000.  
Canada Jute Company, Montreal; capital \$50,000.  
Dominion Barbed Wire Company, Montreal; capital \$60,000.  
Almonte Knitting Company, Almonte; capital \$100,000.  
Canadian Iron and Steel Company, (Limited) Montreal; capital \$1,000,000

A movement is on foot for the establishment of car-works at Peterborough. Commenting on the proposal the *Review* says: "Not only are existing establishments overcrowded with work, but the demand in Canada must rapidly increase for some years to come, thereby ensuring a steady market for all that can be made, and the question would really seem to be narrowed down to where the manufactures will be carried on." Mr. Cox, of Peterborough, has promised to subscribe one-tenth of the necessary stock provided the paid-up capital be not less than \$100,000 nor more than \$200,000.

## EFFECTS OF REMOVING FORESTS.

Attention has been given to devising means to limit the ravages of these torrents, which ruin the land, threaten estates, destroy roads, and sometimes even compromise the existence of villages. Walls have been built along the banks to protect them, or across the streams to allay the force of the waters. The most efficacious means, however, as yet discovered, has been to maintain the woods on the slopes of the mountain. The effect of cutting away the trees in promoting the formation of torrents has not been doubted by the inhabitants of mountainous regions, and is clearly set forth by M. Surrail, who says: "When we examine the tracts in the midst of which torrents of recent origin have been formed, we perceive that they have in all cases been despoiled of their trees and bushes. If, on the other hand, we examine hills whose sides have been recently stripped of wood, we observe that they are cut up by numerous torrents, which have evidently been formed very lately. Here is a remarkable double fact: wherever there are recent torrents there are no longer forests, and wherever the ground is cleared these torrents are formed; and the same eyes that see the woods fall on the declivity of a mountain, may see appear there immediately a multitude of torrents." The disastrous consequences of removing the woods from the Alps began to attract attention in the last century, and have since been discussed by many publications and official reports. In 1853 the prefect of the Department of the Lower Alps said, in a report to the Minister: "If prompt and energetic measures are not taken it will be almost possible to designate the precise moment when the French Alps will become a desert. The period from 1851 to 1853 will produce a new diminution in the number of population. In 1852 the Minister will remark a continuous and progressive reduction in the number of hectares devoted to agriculture; each year will aggravate the evil, and in a half-century France will count more ruins and one department less." The department of the Upper and Lower Alps actually lost thirty thousand inhabitants, or one-ninth of their population, between 1851 and 1876. A law for re-covering the mountains with wood, which had been prepared by M. Forcade de Rouguet, director-general of the administration of the forests, was adopted by the legislative bodies, and was put in operation shortly afterward.—*Popular Science Monthly*.

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# Jas. Robertson & Co.,

## TORONTO,

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### MANUFACTURERS

—OF—

Saws White Lead,  
Putty, Colours,  
Lead Pipe, Shot,  
Babbit Metal, &c., &c.

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### IMPORTERS

—OF—

Tin Plates,  
Canada Plates,  
Boiler Plates,  
Boiler Tubes,  
Linseed Oils,  
Agricultural  
Paints, &c.

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→\*THURBER'S BABBIT METAL,\*←

Nos. 1. 2 and 3,

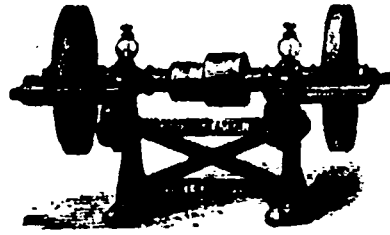
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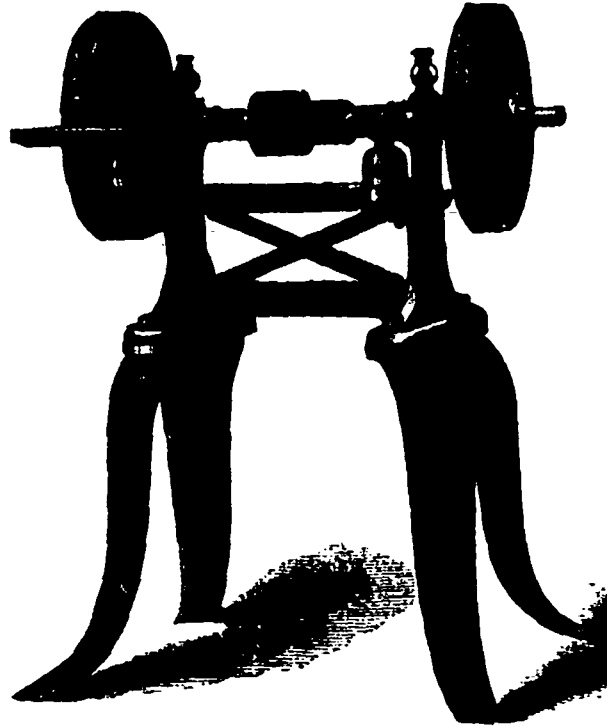
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**WIRE WEB WHEEL,**

Made of Oakley's Emery and  
North Carolina Corundum.

ALL WHEELS WARRANTED

TO GIVE SATISFACTION.



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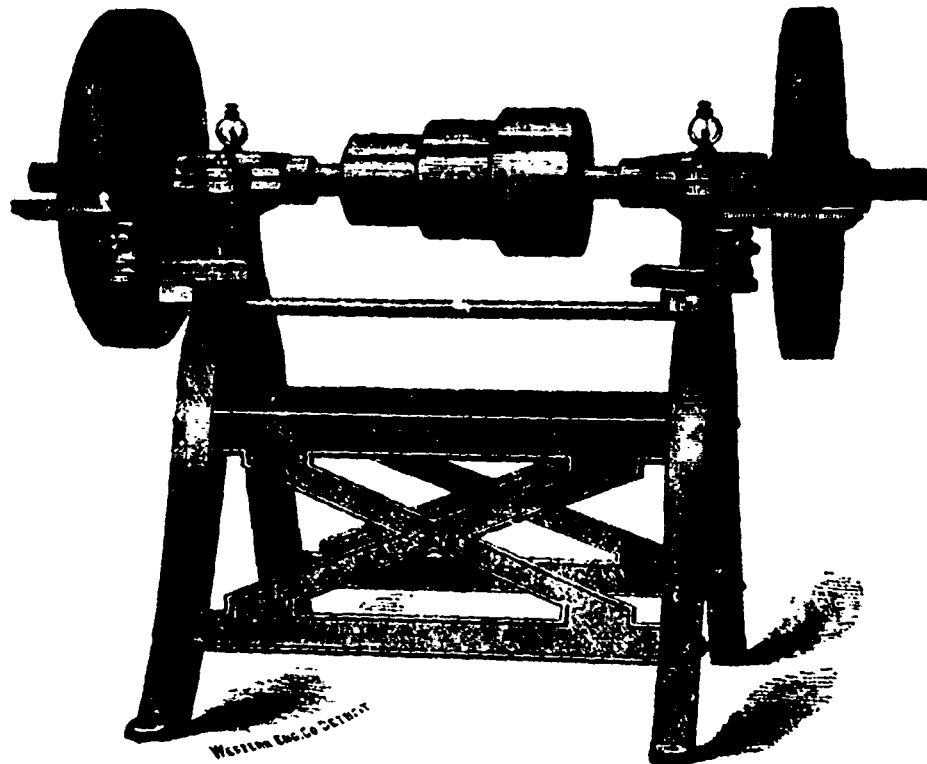
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**The Hart Wheel**

IS NOW USED BY ALL THE LARGEST MANUFACTURERS  
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Western Eng. Co. Detroit

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Are pronounced the best by

**THE HART SAW GUMMING WHEELS**

## The Iron Trade.

### MONTREAL.

LATEST QUOTATIONS—DISCOUNT AND BROKERAGE ON SALES  
—LARGE DEMAND AND LARGE PRODUCTION IN PROSPECT  
FOR 1882.

(From our own Correspondent.)

MONTREAL, Jan. 4, 1882.

A very firm feeling pervades the iron market, higher prices having been established on the crude as well as on the manufactured article, to the extent of \$1.00 per ton on the former, and 25c. per 100 lbs. on the latter. To-day sales were made of round lots of Eglinton at \$24 for February shipment, at four months, while No. 1 brands of Scotch pig were held at \$26, at four months. The price of pig iron is \$4 and \$5 per ton higher than at this date last year. In bar iron there have been transactions already at the advance which came into force at the commencement of the New Year, sales being reported of round quantities of Staffordshire Crown and equal brands at \$2.25 per 100 lbs. On Friday last a meeting of the prominent wholesale iron and hardware merchants of this city was held, besides the advance of 25 per 100 lbs. on bars being decided upon, it was agreed that the utmost cash discount to be allowed be 3 per cent. on four months, and 4 per cent. on six months. It was also decided that sellers in future would only pay ½ per cent. brokerage, and it is supposed that the brokers will be able to get another ½ per cent. from the buyers. Hitherto the brokerage has fallen exclusively upon the sellers, which was considered unfair, and hence the recent action at the meeting referred to.

It is expected that the recent rise in the price of bar iron will cause further advances in all kinds of heavy hardware. Canada plates are out of season, and there is scarcely sufficient business passing to warrant quotations. Tin plates are very firm, and we have sales to report of several hundred boxes of Charcoal at \$6, and a round lot of Coke at \$5.25. Ingot Copper is firm at \$20¼ to \$21, and ingot Tin meets with fair enquiry at \$29 to \$30, some holders asking higher figures. Advices from England are of a very firm character, makers being booked ahead at least three months for all the iron they can turn out. Altogether the outlook for the iron trade of 1882 is very promising, as the increased requirements bid fair to keep pace with the large production.

### NEW YORK.

REVIEW OF THE TRADE FOR 1881—LARGE DEMAND AND  
GOOD PROSPECTS FOR 1882.

(From our own Correspondent.)

NEW YORK, Jan. 4, 1882.

No brief review can do justice to the American Iron Trade for 1881. The industry starts into the new year under most favourable auspices. Consumptive demand has attained extraordinary proportions. Production has been expanding as rapidly as energy would allow, to overtake the demand. During the first half of the year, prices were in general uniform, and the market inclined to some sluggishness. Profits declined, and furnaces here and there went out of blast. We began the year with 700,000 tons pig iron stocks; manufactured 4,500,000 tons during the year; imported about 400,000 tons, thus using 5,600,000 tons iron, or that amount less stocks now in hand, which it is well known are very light everywhere. Prices in Eastern markets stood at \$25 No. 1 Foundry in January; \$23 for No. 2, and \$20 for mill iron. At the end of the year those prices had reached \$26 to \$27 for No. 1; \$24 to \$25 for No. 2; and \$23 to \$24 for Gray Forge. The large surplus of 700,000 tons held prices level for the first six months, until its absorption permitted an advance to present figures. The advance would have carried No. 1 Foundry up to \$30, and Forge to \$27, but for the fear of enormous importations from British markets. This fear has been the lion in the path to the American furnace-men. They wanted more, but dared not take it. It will be remembered that some months ago the Cleveland (England) and Scotch ironmasters

agreed to a restriction of production in order to arrest partly the decline of values then threatened. The restriction was 12½ per cent., and has since been faithfully observed. About the same time an unexpected demand arose, and prices have since been hardening. Surplus stocks are still very heavy—in the above two districts alone amounting to nearly 1,500,000 tons in stores and in private hands. The activity has been of such an unusual character, that in spite of the exhaustion of stocks on this side, and of advancing prices, there has been for the past six months no opportunity for British crude iron exports. The natural tendency of this condition of things was to harden American prices, and latterly to induce consumers to make larger purchases. During October and November, furnaces sold ahead very largely under hardening prices, and in December they began to decline orders except at prices current when product was delivered. This is the present situation. Furnaces east and west are as far sold ahead as they care to be, and are not caring to assume further engagements, except at buyer's risk. Buyers have entered into engagements which call for large deliveries of goods into which pig iron enters as a crude article, and hence are obliged to purchase and risk market quotations. Within two weeks just past something akin to a boom has exhibited itself in certain quarters, but all prudent people are opposed to any more booms. They mean a deluge of English and Scotch iron, if they mean anything, declining prices, and unsettled markets. Another phase of the problem is appearing. If an American demand arises, it may help to strengthen British prices instead of weakening them. The effect of the last advance has been to induce buyers contemplating large purchases to defer until the result of the present agitation appears. There are about 250 idle furnaces in the United States, that need be called furnaces, and but few of them can ever be of service in the making of iron. At present writing a slightly higher range of prices is quite probable, but the danger of imports will keep it within safe limits.

The imports of all kinds of iron for 1881 were 1,150,000 tons. Imports grew from 46,998 tons in January, to 123,629 tons in August, and declined to 84,629 tons in November, and 70,000 tons estimated in December. An increase is now probable, due to the American demand for pig iron and railway material. It does not appear that the 700,000 tons we started with a year ago can be got at home.

The Merchant iron interests are very fortunate at present. During the first six months prices ranged from 2c. to 2 4-10, and with Gray Forge at \$20 @ \$21 there was very little margin. Since then prices have advanced to 2½c. @ 2 9-10, and most manufacturers have paid very little above \$20 @ \$21 for the bulk of iron used. For this reason they will proceed slowly through the winter, lest some combination of affairs might depress finished iron and advance crude. All mills have as much iron to make as they care to accept, hence there is great probability of higher prices, should consumers become impatient. Next year's requirements will call for 8,000,000 tons rolled iron, and this will probably be produced. Large additions have been made to capacity in furnaces and rolls, several new mills have been erected, and old ones have been refurnished. Nail capacity will be thoroughly taxed this year. Stocks were completely exhausted during 1881, and since the close of the fall trade steps have been taken to increase capacity. An extraordinary amount of house construction will be undertaken in the spring, and this will create a correspondingly active demand for lumber, nails, etc.

Construction iron has been strong and active during the entire year. Bridge building by railroads has been extremely active, and the capacity of all the bridge iron works has been taxed to meet requirements. During the past three months prices have advanced slightly, and at this time the market is agitated with numerous inquiries for iron for spring and summer delivery. The projection of 80 many thousand miles of railroad, and the completion of existing undertakings, assures all structural iron makers that they will have abundant work for the year.

Ship, boat, and barge-building on the rivers and lakes has imparted great activity to iron making for such purposes. Common iron sells at from 3¼c. to 3½c. per lb., and refined from 3¾c. to 4c. The locomotive works have work extending from twelve to twenty months in advance, and contracts are usually made for three to six months for iron used. Capacity for rolling plates has been increased, and by the opening of spring there will be less occasion for delay than there has been for many months. The manufacturers will overtake demand in a few months, and then the force of competition will be greater. The establishment of new locomotive works, steel rail, and wrought steel works, car works and car wheel

works, spring and axle works, etc., has been going on at an unprecedented rate.

The production of steel rails for 1881 will amount to 1,250,000 tons; iron rails, 530,000 tons. Imports of rails, 290,000 tons; total consumption for year, 2,150,000 tons. Much of this has gone into repairs and extensions, and 8,000 into new roads, mostly west of the Mississippi. Projected and undertaken work for 1882 covers from 17,000 to 20,000 miles. In order to compensate for deficient capacity, efforts have been made to import rails, and blooms to roll into rails. This would have been much more successful but for the fact that continental and colonial requirements have been very heavy, and absorbed a portion of the British product which would otherwise come to American ports. Prices have been about \$60 per ton all the year, but within a week or two influences have depressed quotations to \$58, and lower prices are spoken of as possible. But for spring deliveries, which can be obtained abroad only, prices run from \$62 to \$64. Iron rails have hardened from \$46.50, in January, to \$48 in December, but, owing to the scarcity of old rails, orders were limited in number and amount. Some mills are running on steel blooms, and others expect to do so as soon as supplies can be obtained from abroad.

The year 1882 will prove to be one of the most prosperous, provided, of course, that no unforeseen disaster is in wait. The prime causes are the enormous railway building, immigration, earning power of the people, and a safe currency, even if there may not be enough of it in a few months.

PITTSBURG.

A PROSPEROUS CONDITION OF THE IRON TRADE. ACTUAL PRICES OF PIG IRON FOR EACH MONTH OF 1881. STATISTICS OF PRODUCTION OF IRON, STEEL AND NAILS FOR THE YEAR.

(From our own Correspondent.)

PITTSBURG, Jan. 3, 1882.—The Iron Trade of Pittsburg has seldom, if ever, been in a more healthy condition than during the year just closed. Demand was large and prices remunerative, as well as free from sudden and violent fluctuations. These remarks apply alike as to Pig Iron, Manufactured Iron, and Steel. The condition of trade was better in the latter than in the former half of the year, prices being more remunerative and demand larger, and there is not at present the least indication of a change for the worse, unless it be that prices are getting 'too near the "danger line" of heavy foreign competition. The base card price of bar iron was 2½cts. per pound all the year, but the card was undersold in the first half of the year; in the latter half, however, there was no trouble in booking all the orders the mills could execute at full card rates, indeed, many orders were turned away. The Western Iron Association, which regulates card prices west of the Alleghany Mountains, will hold its regular quarterly meeting in this city on Wednesday, Jan. 4, and it is feared by the more conservative manufacturers that the card may be advanced. So far, however, as your correspondent is able to learn, there are few, if any, who favour such a step, unless pig iron advances still further. The most, if not all of them, appear to think it best to "let well enough alone." Pig iron advanced from 50cts. to a dollar a ton during the last week or ten days of the old year, and on Saturday (a week ago) it looked somewhat as if it might go higher, but since then the market has quieted down, and now the indications are that prices will remain steady, at least for a time. The following table shows the prices of pig iron in this market during 1881. The figures given are not average prices, but are just as they were recorded in the sales-book of a leading pig iron commission firm. The initials R. S. T., mean "red-short tendency;"

January.

	Forge.	Foundry.
Coke, native ores.....	\$22 00 @	\$23 00 @ 00 00
" Eastern.....	22 50 — 00 00	23 50 — 00 00
" Lake Superior ores.....	26 00 — 00 00	27 00 — 00 00
Bessemer.....	28 00 — 00 00	26 @ 27 @ 28
Charcoal.....		38 00 @ 39 00
" Eastern cold-blast.....		40 00 — 42 00
" Western.....		

February.

Eastern coke.....	22 50 @ 00 00
White and mottled.....	21 50 — 00 00
Native ore.....	21 50 — 00 00

Lake Superior ore (close).....	27 00 — 27 50	
Charcoal.....		26 @ 27 @ 28
" Cold-blast.....		38 — 39 — 42
<i>March.</i>		
Native ore.....	22 00 @ 00 00	
Eastern coke.....	22 00 — 00 00	
Lake S. ore.....	27 50 — 00 00	
Lake S. ore, (close).....	27 00 — 00 00	
Charcoal.....		27 @ 28 @ 29
Charcoal, C. B.....		38 00 @ 42 00
L. Superior coke.....		28 00 — 00 00
<i>April.</i>		
Native ore.....	22 00 @ 00 00	
Eastern coke.....	22 50 — 00 00	
Lake S. ore.....	27 00 — 00 00	
Charcoal.....		29 @ 30 @ 31
Charcoal, C. B.....		38 00 @ 42 00
Coke.....		25 00 — 26 00
<i>May.</i>		
Native ore.....	21 50 @ 00 00	
Eastern coke.....	21 50 — 00 00	
Lake S. ore.....	26 00 — 00 00	
Charcoal.....		28 @ 29 @ 30
Charcoal, C. B.....		38 00 @ 42 00
Coke.....		24 00 — 25 00
<i>June.</i>		
Native ore.....	21 50 @ 00 00	
Eastern coke.....	21 50 — 00 00	
Lake S. ores.....	26 00 — 00 00	
Charcoal.....		28 00 @ 30 00
Charcoal, C. B.....		38 00 — 42 00
Coke.....		23 50 — 24 50
<i>July.</i>		
Coke, native ore.....	21 50 @ 00 00	23 00 @ 23 50
Eastern coke.....	22 00 — 00 00	24 00 — 24 50
Lake ore neutral, (R. S. T.).....	22 50 — 00 00	
Lake ore, R. S.....	24 50 — 00 00	
Charcoal.....		27 00 @ 29 00
Charcoal, C. B.....		37 00 — 42 00
<i>August.</i>		
Eastern coke.....	21 50 @ 00 00	
Native ores.....	21 50 — 00 00	
Lake ore, neutral (R. S. T.).....	22 50 — 00 00	
Lake ore, red-short.....	24 50 — 00 00	
Charcoal.....		28 00 @ 30 00
Coke.....		24 00 — 25 00
<i>September.</i>		
Native ore.....	22 75 @ 00 00	
Eastern coke.....	22 50 — 00 00	
White and mottled.....	22 00 — 00 00	
Lake Superior ores.....	25 50 — 27 00	
Charcoal.....		28 00 @ 31 00
Charcoal, C. B.....		38 00 — 42 00
Coke.....		23 50 — 24 25
<i>October.</i>		
Native ore.....	23 00 @ 00 00	
Eastern coke.....	23 00 — 00 00	
Lake S. ore.....	26 50 — 00 00	
Charcoal.....		30 @ 31 @ 32
Charcoal, C. B.....		38 00 @ 42 00
Coke.....		24 00 — 25 00
<i>November.</i>		
Native ore.....	24 00 @ 00 00	
Eastern coke.....	24 00 — 25 00	
Lake Superior ore.....	27 00 — 00 00	
Charcoal.....		30 00 @ 32 00
Charcoal, cold-blast.....		38 00 — 42 00
Coke.....		25 00 — 26 00
<i>December.</i>		
Native ore.....	24 00 @ 25 00	
Eastern coke.....	24 00 — 92 00	
L. S. ore, neutral (R. S. T.).....	26 00 — 00 00	
" Red-short.....	28 00 — 00 00	
" Bessemer.....	29 00 — 30 00	
Charcoal.....		30 00 @ 32 00
Charcoal, cold-blast.....		38 00 — 42 00
Coke.....		25 00 — 27 00

When the statistics of the iron trade of the city for 1881 are published they will show a larger production of pig iron, manufactured iron, and steel, than in any other year, and the same is doubtless true of nails.

The production of these leading Pittsburg products in 1879 and 1880 was as follows :

	1879	1880
	Net Tons.	Net Tons.
Total rolled iron, including nails .....	353,894	389,107
Pig iron.....	267,315	300,497
Crucible steel ingots.....	40,142	52,136
All other steel, including Bessemer ingots....	130,781	169,819
Total make of steel.....	170,923	221,955
	Kegs.	Kegs.
Nails .....	294,942	419,098
Number of rolling mills .....	32	30
“ steel works.....	18	17
“ blast furnaces.....	13	15

Long & Co., of the Vulcan Forge, are erecting a rolling mill about two miles below the city. Quite a number of puddling furnaces, roll trains, etc., were also added to the plant of existing mills during the year just closed. Several open-hearth steel furnaces were likewise built, and there was completed some three or four weeks ago, by the Siemens-Anderson Steel Company, a plant for the manufacture of steel by what is known as the “Siemens direct process.” By this process, the ore is converted into iron blooms at one operation, and these are then converted into steel in the Siemens-Martin open-hearth furnace. This is the only Company in the United States that has adopted this process, but as they have improved it and made it a great commercial success, other works of the kind will doubtless be erected before long.

VULCAN.

### MISTAKEN ECONOMY.

Proprietors of manufacturing establishments have sometimes been known to practice queer modes of economy. For instance, as his business increases, he is compelled to employ more operatives, and increase his facilities for manufacturing to meet and supply the constantly increasing demand for articles of his manufacture by the addition of new and improved machinery, the manufacturer has too often (for his own good) been known to ignore all mechanical advice of persons who have had the requisite experience to advise the proprietor profitably on such matters, and, as we might say, go it alone according to his own ideas of economy. In order to keep his own works in motion, regardless of the normal capacity of boiler and engine, he speeds his engine up to thirty or forty revolutions per minute. This may be allowable to a limited extent, but we all know that with most engines high piston speed cannot be obtained and used profitably except the engine be proportioned and designed especially for high speed.

The proprietor has also a way of his own to compel the boiler to generate steam to meet the extra demand forced upon the engine. To accomplish this purpose he perhaps enlarges the grate area and makes other alterations in and about the furnace: also attaches to the ash pit or chimney a blower, which is acknowledged by good authority to be a nuisance about the boiler room of a manufactory, as well as an expensive machine to run, and productive of great injury to the boiler. But the proprietor's object is to produce a powerful artificial draft and he does not take into consideration the inconveniences appertaining to its use. Still, with his greater facilities for increasing the intensity of the fires and generating the steam, the steam and water is not kept at a uniform height, nor is the engine run at a uniform speed, and is a constant source of annoyance, not taking into consideration the occasional delay and expense of grate bars and perhaps periodically a patch upon the fire sheets.

The proprietor is also incurring considerable risk in the high velocity of the fly wheel, and the extra duty forced upon the exhaust ports causes an excessive back pressure in the cylinder. Perhaps he also finds it necessary to load down the safety valve by the addition of extra weights upon the lever, consequently increasing the liability of an explosion. The increased velocity of the combustible gases through the

furnace and tubes also prevent the gases from igniting and consuming, causing increased expenditure for fuel. Experience has taught all engineers that any increase in the rapidity of combustion is always accompanied by a diminution in the evaporative efficiency of the fuel consumed.

I am inadequate to the task of enumerating all the disadvantages of insufficient piston area and heating surface, but I have endeavoured to state the facts as I have sometimes found them in my experience with manufacturers. I was conversing not long since with a manufacturer who was about to make some alterations and improvements upon his boiler and engine. He informed me that it was his intention to have his boiler so arranged and fortified against accident through carelessness or inattention on the part of his engineer that it would be possible for him to leave the boiler for days in charge of a boy if it became necessary to do so. I informed him, however, that the most positive antidote against accident would be to affix permanently to the pay-roll of the establishment the name of some responsible engineer, and that if he did so it would prove to be a good investment and lessen the running expenses, and perhaps at some future time prevent serious injury or perchance the utter destruction of the boiler, and perhaps the sacrifice of human life and valuable property. Also, that I considered automatic, intricate, multi-valve arrangements, such as are sometimes used in conjunction with the steam boiler, to be sources of danger and uncertainty if used and adapted to automatically perform the duties of an engineer. Perhaps these should not be condemned and their use abandoned if under the care of a competent man, as perhaps they might be of some benefit in an economical point of view, but if used by good engineers or otherwise they cannot insure safety.—*Cor. of Leffell Mechanical News.*

### DRIVING BELTS.

Prof. J. Bauschinger publishes the results of a series of tests of the tensile strength of different sorts of belting made in the mechano-technical laboratory at Munich. In making a graphic representation of the results by setting the loads per square inch on a horizontal line and erecting verticals corresponding to the elongations at the different loads, the curves thus obtained show considerable difference for leather, india-rubber, and cotton belts. All these materials stretch more at first, with light loads, than afterwards. The lines, therefore, are more curved at the beginning, and afterwards approach more to a straight line. But with leather belts the approximation to a straight line begins at once, and is more pronounced than with india rubber or cotton belts, showing that they stretch from the beginning more in proportion to the load, and possess a high degree of elasticity. The conclusion drawn from the tests by Prof. Bauschinger is that india rubber and cotton belts are inferior to leather, not only as regards elasticity, but also as regards tensile strength, for the same section, and only attain in strength that of medium or inferior sorts of leather. By cementing and sewing the ends, leather straps lose one-quarter to one-third of their strength, if the joints are made with great care. According to the experimentalist, therefore, the old saying, “There is nothing like leather,” also applies to driving belts.—*Northwestern Miller.*

TO LOCATE A “POUND” IN A STEAM ENGINE.—Mr. Joshua Rose says that an efficient method of locating a “pound” in a steam engine, is to place one end of a piece of quarter-inch wire about eight inches long, between the teeth, applying the other end to each end of the crank-shaft, bearings, cylinders, etc., the violence of the shock in the vicinity of the pound being sufficiently the greatest to indicate its whereabouts. The fault complained of may be traced to a want of truth in the crank-pin, or a want of being in line of the main parts of the engine, usually the cylinder and main shaft.

### MODERN MARINE ENGINES.

The marine engine of to-day, with its compact form and rapid piston speeds, is a vastly different machine from its congener of a quarter of a century ago, and it is so radically different in operations as to be virtually another engine. A great change has also taken place in the past ten years, as compared with that of the previous decade. The high-piston speeds and greater initial pressures have demanded a change in fittings and connections, and mechanical execution, so that the modern marine engine approaches closely the locomotive work in character. Witness the solid ends of the fork of the connecting rod, in which the wrist-pin or journal is shrunk fast; also the binder, bolts and cap on the crank-pin end of the same, in lieu of the gib and key and strap; also the short, solid cross head and wide bearing surfaces, instead of the narrow guides and brass gibs once used. The link motion is universally used everywhere on marine engines, as reverse gears chiefly, and the slide valve is almost the only one. All the work is far more thoroughly fitted up than was common in the days of ten and twelve strokes per minute, as it is evident that it should be.

It is also noticeable that "break-downs" are comparatively few where they used to be frequent; aside from the breaking of shafts on English steamers, a thing comparatively unknown in this country, marine engines are rarely disabled. Considering that the pressures carried and piston speeds obtained are great, we think this worthy of notice. What advances are yet to be made it is difficult to predict. The limit of power transmitted through a single screw has been nearly reached, and there is more disposition to accept the opinion long ago advocated by American shipbuilders that the next step will be to employ twin screws and double engines in large vessels.

### DOES MACHINERY RUN FASTER AT NIGHT?

There would seem to be an element of superstition, or at least of groundless and irrational fancy, in the theory often advanced that the speed of machinery is greater by night than by day, other things being equal. If it were simply a hypothesis, one would naturally dispose of it at once by totally rejecting the idea, and putting it in the same category with a multitude of other beliefs which have no adequate support in the laws of nature. There are certain herbs which are remedial only when gathered in the dark of the moon, and certain vegetables which must be planted in a like period. This at least is the firm conviction of large numbers of people of average intelligence; and there is just enough of remote possibility in such cases that nature may have some occult influences at work, whose effect we have not yet fully ascertained, to make the most positive scientist hesitate in delivering his verdict.

In all disputes of this kind, it is easy to explode a theory; but the man with a fact is much more troublesome to deal with. And in the matter of the relative day and night speed of machinery there appear to be veritable instances, and witnesses who speak from actual experience. The causes imagined or invented for the phenomenon are various, and many of them of such a character that they need not be seriously discussed; but the millers who do not undertake to explain the matter, but simply state what they have seen, and leave the solution of the problem to others, are entitled to a respectful hearing, even if it shall ultimately appear that they have been deceived by their own senses.

The testimony of one observer, who is very sure of his facts but entirely at a loss to account for them, is that in a flouring mill run by water power the speed of the machinery was perceptibly increased at night; while in mills run by steam he had never found any effect of the kind. The *North-western Lumberman* suggests a very simple explanation of this case in the increased head of water which may have resulted

to the mill in question from the shutting off of the water from mills farther up the stream which did not run at night. No doubt a large number of instances which have given rise to perplexity and wild conjecture are of the same character as this, and a sufficient cause may be found for each of them without imputing to Nature the possession of any new secret which can only be wrung from her by keener philosophical research. The journal to which we have referred mentions some of the theories which have been offered in explanation of the alleged increase of speed. One of these is that the cooler atmosphere at night increases the density of the water; another that the atmosphere, being also denser, exerts a greater pressure upon the water, and thus increases the flow; another, that the attraction of the sun is the disturbing cause: while still other investigators are confident that the moon is the chief disturbing cause. We may add to these a suggestion which has been advanced that the volume of water is increased at night by the condensation of moisture or vapour held in suspension by the warmer atmosphere of the day. But of all these causes it must be admitted by a candid reasoner, either that they are intrinsically absurd, or that their effect must be so slight as to be scarcely appreciable.

Of the general and well-authenticated fact that more work is performed in many mills and factories, in a given time, after dark than before, a very easy and natural explanation is that offered by the *Lumberman*, namely, that the work is more steadily, quietly and uninterruptedly followed at night than at any other time. Customers and casual visitors do not then interfere, the attention of the workman is not diverted, and if, as frequently happens, the object of running at night is to turn out a certain amount of work to meet a special demand, its execution will be more intently pursued than when only the ordinary routine is observed. As for the louder hum of the machinery at night, the fact that other sounds have ceased is sufficient to account for that change, which is doubtless more apparent than real. And we presume that more than one operative has given credit to the sun or moon, or some imagined atmospheric or electric influence, for the large production which is really due to his own unwonted diligence.—*Lefel News*.

### SECOND-HAND BOILERS.

It will, of course, be conceded that occasionally great bargains may be obtained in buying second-hand material. Such cases sometimes occur through the bankruptcy of large manufacturing companies, or from other business causes. In cases of this kind it is easy to find out who furnished the plant, the length of time it has been in service, and the manner in which it has been used, with perhaps satisfactory assurances of its present condition. Opportunities of this kind are few and far between.

Ordinarily, he who buys second-hand goods, realizes, when it is too late, he has made a bad investment, but consoles himself in the thought of having obtained a valuable experience, in some cases dearly bought. The purchaser of a second-hand boiler is peculiarly liable to be victimized, and is not only in danger of losing his money, but in most cases runs an additional risk of losing his life.

Engaged in the business of buying and selling second-hand machinery, are many honourable men, who understand their business, are careful to buy only fit and saleable articles, and thus they avoid the necessity for misrepresentation sometimes made. The average buyer of second-hand machinery is not content to buy the article for what it really is, and his evident desire to be humbugged, stimulates unscrupulous men, who in the trade are largely in the majority, to make a shrewd calculation as to the manner of man with whom they are dealing, and cook up a story most likely to serve their purpose. Many tricks are resorted to by the latter class of dealers to

sell their second-hand boilers. It is doubtful if they ever handled anything that had been used over a year, and was not built by day's work, if we may believe their story. One of these worthies sold from his stock for several years, each customer being assured that particular boiler was one of a number made by him for a large and well-known manufacturing company in a distant part of the state, who, when the boilers were nearly finished, changed their plans, had him build larger boilers, and retain those first ordered. Tubular, flue, upright and locomotive boilers were alike sold from that order, and, for aught I know to the contrary, he may be filling orders yet from the same mythical stock.

One of our assured who had just bought a *new boiler* under some such representation, notified us to make an inspection before he began using it. In the report of inspection, after describing the location of certain defects, there was a further recommendation from the inspector as to the best means to be employed in cleaning the boiler of scale. Our friend did not understand how a new boiler could have so many defects, and his astonishment and indignation were further increased when he read that part of the report concerning the removal of scale. He returned the report to our office with what he meant to have been some very caustic comments, ironically suggesting that he must have, by some mistake, received somebody else's report. It could not refer to his boiler, for it had never been used before. He was sure of that. It had to be finished after he bought it.

On investigation it transpired that the *alleged* new boiler had not only been used for a number of years, but it had been grossly abused by firing up on it without any water, and burned so badly it was thought unprofitable to repair it by the boiler-maker, who sold a new boiler in its stead. The burned boiler next passed into the hands of a second-hand dealer for about the price of old iron. He had it repaired, shortening it by cutting off the worst ring of plates. In setting it up again in the brickwork it was thought advisable to turn the boiler end for end. This, of course, left new holes to be drilled and tapped in the boiler head for gauge cocks, water gauge, etc. This was the proof relied upon by our friend to convince us, as it did him, that the boiler was a new and unfinished one at the time he purchased it. He now realizes the truth of the old adage which teaches that appearances are sometimes deceptive, and feels it has a special application to that class of boilers.

In second hand boilers the accumulation of sediment and scale on some inaccessible part during a period of years, greatly reduces the value of its heating surface. Therefore such boilers are necessarily more expensive in fuel than new ones. In some localities where fuel is abundant and cheap, the matter of economy is of little importance. As a rule, boilers are only removed for some sufficient cause affecting their economy or

safety, and they will be found on examination, when this is the case, fatally defective in some important particular. It may not be a very easy matter to make a careful examination of a boiler after it has been scraped and heavily painted. The most careful, painstaking examination under such circumstances, may be very unsatisfactory in failing to detect incipient fractures in the sheets, the first external evidences of crystallization. The paint pot imparts a freshness and bloom of youth to the jaded boiler of twenty years' service, that is well calculated to stagger one's belief in "wear and tear," and cause him to doubt if there is any such thing as "fatigue in metals."—*F. B. Allen, in American Miller.*

### WHOSE BOILERS EXPLODE.

The records kept by the Hartford Steam Boiler Inspection and Insurance Company show that 170 steam boilers exploded in the United States last year, killed 259 persons and wounding 555. The greatest number of explosions in any month was 25, in December. The number for January is 19, September and November, 16 each; the other months ranged from 10 to 14, the lowest month being in June. The classified list shows the largest number of explosions in any class to have been 47, in sawing, planing, and wood-working mills. The other principal classes were in order: Paper, flouring, pulp and grist mills, and elevators, 19; railroad locomotives and fire engines, 19; steamboats, tugboats, yachts, steam barges, dredges, and dry docks, 15; portable engines, hoisters, thrashers, pile drivers, and cotton gins; 13; iron works, rolling mills, furnaces, foundries, machine and boiler shops; 13; distilleries, breweries, malt and sugar houses, soap and chemical works, 10. It would be an interesting thing to have a statement of relative frequency of explosion—the number, that is, to each thousand boilers in use in each given class of steam-using establishments.—*Scientific American.*

**COTTON BUILDINGS.**—Even so inflammable a material as cotton can now be used for construction of fire proof buildings. It is converted into a paste by a chemical treatment—which becomes as hard as stone. It is moulded into large slabs, and designated as architectural cotton.

**WOVEN WIRE-BELTING.**—R. Muller, in Kew, Russia, has patented a belt, consisting of woven wire. The warp consists of steel-wire, and the filling of iron wire. The threads of the latter, at the edges of the belt, gather two threads of the warp, thus making the edges slightly higher than the centre. The object sought to attain thereby is the prevention of sliding.

## Industrial Directory.

### Agricultural Implements.

A. S. WHITING MANUFACTURING CO., Cedar Dale, Ont.—Manufacturers of scythes, forks, hoes, etc.

WELLAND VALE MANUFACTURING CO.—Lock No. 2, St. Catharines, Ont., Canada—Manufacturers of axes, scythes, forks, hoes, rakes and edge tools.

### Aniline Dyes.

EMIL THOURET & CO., Montreal.—Agents for K. Oehler, Offenbach O. M., Germany.

### Bridge Builders.

TORONTO BRIDGE CO., Toronto.—Builders of Steel and Iron, Railway and Highway Bridges.

### Coal and Wood.

P. BURNS, Offices cor. Front and Bathurst Sts., Yonge St. Wharf, 51 King St. East, 532 Queen St. West, Toronto.—Wholesale dealer in Coal and Wood. Telephone communication between all offices.

### Cotton Brokers.

M. WRIGHT, next Exchange Bank, Hamilton, Ont.—Sole agent in Canada for Ordway & McGuire, cotton factors, Nashville, Tenn.

### Cotton Mills.

HAMILTON COTTON MILLS CO., Hamilton.—Denims, tickings and yarns.

### Edge Tools.

R. T. WILSON, Dundas, Ont.—Manufacturer of axes, picks, mattocks, grub hoes and railway contractors' supplies.

### Engines and Boilers.

G. C. MORRISON, Hamilton.—Engines, boilers, steam hammers, etc.

THOS. WILSON, Dundas, Ont.—Manufacture of stationary and portable steam engines, boilers and machinery of every description—cotton mill calenders, hosiery steam presses and propeller wheels, all sizes.

### Files.

FILE & SPRING CO., Cote St. Paul, Montreal.—All kinds of files and springs. Files recut. Sole manufacturers of Spaulding's patent concave spring.

G. OUTRAM & SON, Dominion File Works, Montreal.—Manufacturers of every description of files and rasps.

### Glove Manufacturers.

W. H. STOREY & SON, Acton, Ont.—Manufacturers of fine gloves and mitts in every variety and style.

### Hubs, Spokes and Bent Goods.

F. W. HORE & SON, Hamilton, Ont.—Manufacturers of hubs, spokes, rims, shafts, poles, sleigh and cutter stuff, etc.



**Iron Works.**

CANADA SCREW CO., Dundas.—Manufacturers of iron and brass screws, bolts and rivets.

COWAN & CO., Galt.—Manufacturers of every description of wood working machinery.

DOMINION BOLT CO., 139 Front St. East, Toronto.—Manufacturers of every description of bolts, hot pressed nuts, railway spikes, bridge, boiler and iron rivets.

H. R. IVES & CO., Montreal.—Hardware manufacturers and founders; iron railing and ornamental iron work a specialty.

HAMILTON BRIDGE & TOOL CO., Hamilton.—Iron railway and highway bridges and iron working machinery.

McKECHNIE & BERTRAM, Dundas.—Machine tools and wood working machinery.

THE OSHAWA MALLEABLE IRON CO., Oshawa, Ont.—Manufacturers of malleable iron; also patent screw wrenches.

**Knife Works.**

THE WHITMAN & BARNES MANUFACTURING CO., St. Catharines, Ont.—Manufacturers of mowing and reaping machine knives, sections, guard plates, cutting apparatus complete, spring keys and cotters, etc.

**Knitting Mills.**

S LENNARD & SONS, Dundas.—Manufacturers of plain and fancy hosiery.

**Paper Manufacturers.**

JOHN FISHER & SONS, Dundas.—Manufacturers of printing and wrapping papers.

LINCOLN PAPER MILLS CO., Merriton, Ont.—Manufacturers of every variety of paper, paper bags and flour sacks.

WM. BARBER & BROS., Georgetown—Manufacturers of book and fine papers.

**Saw Manufacturers.**

R. H. SMITH & CO., St. Catharines.—Manufacturers of all kinds of saws, plastering trowels, straw knives, etc. Sole manufacturers for the Dominion of Canada of the celebrated "Simond's Saw."

SHURLY & DIETRICH, Galt, Ont.—Manufacturers of circular and cross cut saws, plastering trowels, etc.

**Scales**

C. WILSON & SON, 45 Esplanade Street East, Toronto.—Manufacturers of the Improved Wilson Scales. Designers to the Government. Received 29 first prizes, medal and Governor-General's grand diploma.

**Stereotypers, Engravers, &c.**

F. DIVER & CO., Toronto.—Electrotypers and stereotypers. Designers and engravers on wood.

**Wire Works.**

B. GREENING & CO., Hamilton, Ont.—Manufacturers of wire ropes, cloth and general wire workers.

MAJOR & GIBB, 646 Craig St., Montreal.—Manufacturers and importers of wire cloth and wire goods and dealers in railway and mill supplies.

TIMOTHY GREENING & SONS, Dundas, Ont.—Manufacturers of the strongest description of steel wire cloth, malt kiln floors and general wire weavers.

**Wooden Goods.**

C. T. BRANDON & CO., Toronto.—Have special facilities and machinery for the manufacture of all kinds of wooden articles. Correspondence solicited.

J. R. McLAREN, Jr., 63 College St., Montreal.—Manufacturer of Sharpe's patent safety oil cabinets; also, refrigerators, children's carts, waggons, sleighs and general woodenware.

**Woollen Manufacturers.**

J. ROUTH & CO., Cobourg.—Woollen Manufacturers.

JOHN WARDLAW, Galt, Ont.—Manufacturer of Scotch fingering, wheeling and knitting yarns.

**Wools and Cotton Warps.**

WINANS & CO., Toronto.—Dealers in wools and cotton warps.

# John Wardlaw,

## Galt, Ont.

MANUFACTURER OF

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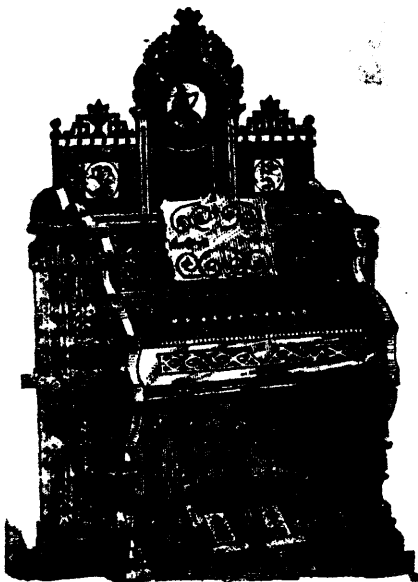
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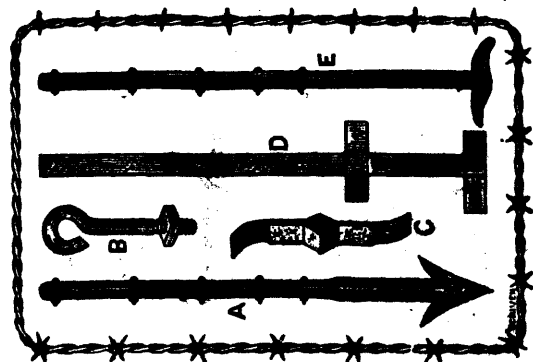
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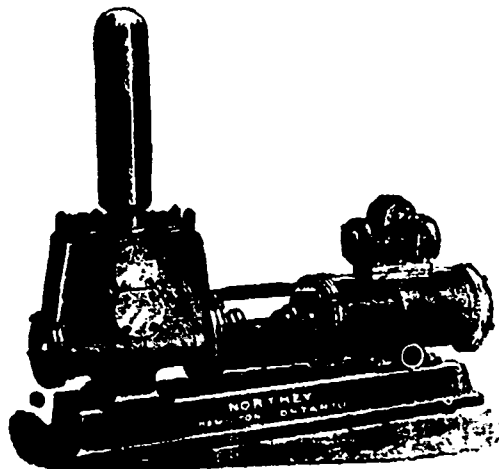
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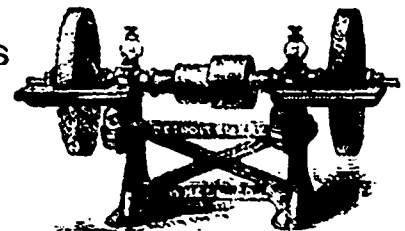
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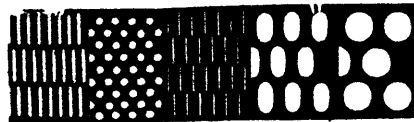
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