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CANADIAN MANUFACTURER AND INDUSTRIAL WORLD

DEVOTED TO THE MANUFACTURING INTEREST OF THE DOMINION

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THE ETHICS OF PROTECTION.

THE sugar that is now consumed in Canada is all produced in foreign countries. But it is refined in Canada, and it has been estimated that those employed directly in the industry, and in the handling and distribution of it, number less than 1,000 persons. If the beet sugar industry were established in Canada as it should be, and supplied all the raw sugar we required, as it could do, in all its ramifications it would give employment to at least 50,000 persons or more. That is, where the refining industry as now operated gives employment to one person, the beet sugar industry would give employment to fifty persons. If we had a beet sugar industry it would be engaged in the production of raw sugar which would have to be refined in existing or similar refineries, and it would not necessarily destroy the existing refining industry. The sugar we now consume being produced in foreign countries, the money we pay for it goes to compensate labor in those countries—labor in which we are not specially interested. It would be very different if we had our own established beet sugar industry. With it the money we pay for sugar would go to compensate labor in Canada. Lands that are now not very profitably employed in producing other crops would be used for growing sugar beets, and this would afford a diversification of crops so essential in all well regulated farming communities. It would afford much business in hauling the beets to the factories, in hauling the products away from the factories, it would supply large quantities of food for cattle, it would create a large demand for sugar making machinery, and in a hundred different ways it would create demands for Canadian labor. Then why not have the beet sugar industry? There is no possible doubt about the feasibility of growing the sugar beet and the manufacture of it into sugar in Canada. All that is necessary to establish the industry here, and to make it of importance second to none in the country, is to afford it such encouragement as is bestowed upon it elsewhere. Mr. Foster touched upon this subject in a very timid manner in his budget speech He seemed to think that he was doing the Quebec people who have invested their time and money in the industry quite a favor when he proposed allowing them a bounty "for one year only" upon whatever sugar they might produce this year, forgetting, seemingly, that they had been induced to go into it because of the promises of the national policy that the industry should receive sufficient tariff protection. Mr. Foster certainly did not take into his serious consideration that the situation is more far reaching than is involved in giving a bonus upon whatever sugar may be produced there this season and the next As the matter now stands these Quebec investors have nothing, whatever, to hope for in the way of protection to their industry after this season and next. Factories have been built and valuable machinery and appliances introduced into them at a cost of thousands of dollars, which, after this, will be utterly useless. What compensation does Mr. Foster offer these investors for the destruction of their industry? They will consider themselves the dupes and victims of misplaced confidence, and they will consider Mr. Foster's definition of the National Policy as a delusion and a snare. Mr. Foster proposes giving the proprietors of a few Canadian refineries a bonus of $720,000 per year over and above what American refiners are allowed to charge for performing a similar service, and yet he is very emphatic in declaring that in giving a bonus to the Quebec beet sugar industry, equivalent to the protection they would have enjoyed if the duty upon raw sugar had not been removed, his proposition does not commit him or the government to the principle of bounty with reference to the beet sugar industry—that he does not propose to commit the government to that principle. Why not commit the government to that principle? The government is already committed to it in that the principle is a part and parcel of the National Policy upon which Mr. Foster and the government acceded to office. There is nothing more terrible in offering a bonus for the production of beet sugar in Canada than there is in protecting the sugar refining industry in Canada, and not as much of it as in allowing the sugar refiners $720,000 per year in the way of excessive protection over and beyond what American refiners are allowed. This is not according to the ethics of protection. During the campaign, previous to the parliamentary elections in March, the announcement was made from every rural hustings in Canada that the government were particularly solicitous regarding the farmers, and that the National Policy was for their benefit as well as for that of the manufacturers. The beet sugar industry, if established, would benefit the farmers quite as much or more than any other class in the community, and here we have the Finance Minister, most solemnly asservating, protesting and declaring that in

doing but very meagre and partial justice to the beet sugar industry in Quebec it was not to be considered that the National Policy Government of Canada was in any way committed to the principle of bounty to that industry. This is not in accordance with the ethics of the National Policy. Mr. Foster should retrace his steps. He should avow it as a principle of his government that bounty should be given to the beet sugar industry. His party's pledges to the farmers require this.

SUGAR.

UNDER the Customs tariff which went into force on March 28, 1890, sugar, when imported direct from the country of growth and production, for refining purposes only, not over number 14 Dutch standard in color, and not testing over 70 degrees by the polariscope test, is liable to pay a duty of one cent per pound, and for every additional degree, shown by the polariscope test, three and one-third cents per one hundred pounds additional. All sugars above number 14 Dutch standard in color, and refined sugars of all grades and standards, are liable to pay a duty of one and one-half cents per pound and thirty-five per cent. ad valorem. During the fiscal year ended June 30, 1890, the quantity of sugar not over number 14 Dutch standard imported direct for refining purposes only, was 138,675,236 pounds, valued at $4,155,956, the duty paid upon which was $2,245,753, and that not imported direct for refining purposes, was 23,794,114 pounds, valued at $716,209, the duty paid upon which was $377,511. The importations of sugar above number 14 Dutch standard, and refined sugar of all kinds, grades and standards, was 1,035,868 pounds, valued at $36,234, upon which $30,337 duty was paid. The total quantity of sugar imported for refining purposes, was 162,469,350 pounds, valued at $4,872,165, upon which $2,623,265 duties were paid. This latter sum represents the sacrifice made by the Government by the removal of the duty upon sugar imported for refining purposes. The average valuation of this refining sugar was three cents per pound; and the difference between a fair allowance for cost of refining and waste in refining, and the refiner's price for the refined sugar represents the amount of protection afforded this industry. Under this new sugar tariff, whereby refining sugar not above 14 Dutch standard is admitted free of duty, and all other sugar pays a duty of eight-tenths of a cent per pound, the Canadian refiners demand about $4.62½ cents per hundred pounds for their product. In the United States, under the McKinley tariff, all sugar not above 16 Dutch standard is admitted free of duty, and the duty upon refined sugar is only one-half cent per pound. It is probably true that refined sugar in the United States cannot be bought for less than $4.25 @ $4.50 per hundred pounds, but it is also true that the American refiners are sending large quantities of their refined sugar to Great Britain, where it is sold for $3.70 per hundred pounds, the quantity of American refined sugar received in Great Britain in the first six months of this year, amounting to 58,828,000 pounds. It must have cost at least twenty cents per hundred pounds to transfer this sugar across the ocean, and this would make the price of it at American port of shipment not exceeding $3.50 per hundred pounds; and when the American refiners force American consumers to pay $4.50 per hundred pounds, it is evident they force their countrymen to pay $1 per hundred pounds more for it than what they sell it for in Great Britain. If, then, American refiners can sell refined sugar at $3.50, why could not Canadian refiners produce it at the same price? But if this cannot be done, and if they require protection, surely a less rate of duty than eighty cents per hundred pounds ought to suffice. If Canadian refiners cannot refine as cheaply as American refiners, it is because their facilities are not as good; and if they are not as good, it is not because they have not been making very large profits in their business If American refiners can sell sugar to Great Britain at $3.50 per hundred pounds, they could also afford to sell it to Canada at the same price; and if Canadian merchants could buy sugar in the United States at $3.50, it would pay them to do so, even if they had to pay eighty cents duty thereon, rather than buy from Canadian refiners at $4.62½. Under the new Canadian tariff the domestic consumption of sugar is restricted to refined sugar, for no sugar not higher than number 14 Dutch standard is suitable for domestic use. In the United States, under the McKinley tariff, all sugar not higher than number 16 Dutch standard is admitted duty free, and this includes centrifugal and similar sugars which are well suited for domestic use, and which is largely used there, because they are about $1.50 per hundred pounds cheaper than refined sugar. If the Canadian tariff had placed the limit of free sugar at number 16 Dutch standard, so that the masses of the people could obtain sugar that they could use for domestic purposes, and costing them a cent and a half less than refined sugar, the per capita consumption of sugar in Canada would be greatly increased, and at the same time this consumption would probably be twenty-five per cent. or more of all the sugar used in this country.

Another view of this sugar question is this: If the consumers of sugar in Canada were to receive the benefit arising from the removal of the duty upon refining sugar, or even a considerable portion of it, no objection could be raised to that removal; but as we have before shown, while the Government stands to lose the whole duty, the refiners are the only ones who are benefited, for this so-called free sugar is not suitable for domestic use; and the duty upon such sugars as are suitable, afford the refiners the opportunity to force consumers to pay very much more for their product than was ever intended by the upholders of the National Policy. As we have shown, American refiners can compete with European refiners in the British market, and while operating under almost precisely and quite as favorable circumstances, one-half the protection now offered by Mr. Foster would enable Canadian refiners to continue to heap up riches. But if the duty must be kept at eight-tenths of a cent per pound, where Mr. Foster thinks it should be kept, he should have allowed the Government to divide profits with the refiners by imposing a light duty upon refining sugars. This would not have closed the refineries nor yet have advanced the price of refined sugar, but it would have afforded a revenue of a million dollars or more to the Government. If the Government could find no other use for so large an amount of money, it could have been applied to the payment of the public debt.

A portion of this revenue, however, could, with propriety, have been appropriated to the payment of a bounty upon the production of beet sugar; and there can be no doubt that if a

discreet and liberal system of bounty to that industry were adopted, it would in a few years develop the production of home-made sugar, which would, to a very large extent, or entirely obviate the necessity of importing sugar from abroad. As it is now we pay several millions of dollars annually to sustain the sugar industry in foreign countries, while if we made our own sugar that money would be distributed at home, and to more numerous classes of labor than is done by any other industry in the country.

DISCRIMINATION.

In 1890 the commerce of Britain with foreign countries and with her own possessions amounted to £685,000,000, of which that with British North America (Canada and Newfoundland) came to only £19,000,000. Britain herself finds it necessary at times, in her treaty arrangements with foreign nations, to discriminate against us, that is, we are not included in some of her trade conventions. She sacrifices our interests to her own, which are of vastly more importance. This rule ought to work both ways. If our welfare would be greatly promoted by free trade between us and the States, and Britain's but very slightly injured, why should we be denied the boon? What are we here for if not to do the very best we can for Canada? The N.P. discriminates against British trade by taxing manufactures at a higher rate than natural products, and thus letting the American off more lightly than the British exporter. Last year we imported for home consumption British goods of the value of $43,400,000. Of these $10,120,000 were admitted free, the remainder paying duty to the extent of $9,600,000. Our imports from the States amounted to $52,300,000 of which $21,700,000 were admitted free the rest paying a tax of $8,130,000. If a Canadian Tory is asked how he defends this manifest discrimination against British commerce he answers that Canada is entitled to regulate her tariff in the way she deems best for herself. Liberals have no confidence in the N.P., but assent with one accord to the principle of Canadian interests first, and find in it full justification for the more open-handed discrimination which complete free trade with our neighbors would entail.—*Toronto Globe.*

This quotation from the *Globe* is taken from a long article in which it seeks to justify a discrimination which it would like Canada to make against Great Britain and in favor of the United States. It makes the point that Britain herself finds it necessary, at times, in her treaty arrangements with foreign nations, to discriminate against Canada, therefore, the working of the rule the other way would justify Canada in discriminating against her. It would have been but fair if the *Globe* had shown that Canada had been injured in any way in any so-called discrimination by Britain against us, and until this is shown its proposition may be doubted. Its postulate that Britain sacrifices our interests to her own is untenable; nor can it be proven that our welfare would be greatly promoted by free trade with the United States, while our trade with Britain, under such circumstances, would be but very slightly injured. If the N.P. discriminates against British trade by taxing manufactures at a higher rate than natural products, it discriminates in the same way against American trade by taxing American manufactures at precisely the same rate; and if the rate of duty under the N.P. is lower upon "natural products" whatever that may mean, and if under this lower rate American trade is favored, it is because the United States produces such products, they being in demand in Canada, while Britain does not produce them. For instance, Canada consumes large quantities of hog products, but how can it be said that the Canadian duty upon hog products discriminates against Britain since Britain is not an exporter of hog products? Reference is made to the value of imports into Canada from Great Britain and from the United States, and that more revenue is derived from duties upon British than upon American merchandise. This reference is made to deceive. The reason why we collect more revenue from British merchandise is because we buy more of such merchandise from Britain than from the United States. This merchandise is of a character that is not produced in Canada and the production of it in Britain is cheaper than in the United States. On the other hand the revenue collected upon merchandise from the United States is comparatively small because a very large proportion of it is what the *Globe* calls "natural products," the same being essential to greater or less extent in the manufacturing industries of this country. Britain does not produce these articles, therefore, in admitting them at the low rate of duty, no discrimination whatever is made against Britain.

The *Globe* should remember this: many of the manufactured products of both Britain and the United States imported into Canada are of very similar character; and the reason why such large quantities of them are imported from the United States is because they are quite as cheap, or cheaper there than in Britain, and this incident clearly demonstrates the value of protection as practiced in the United States, seeing that under it manufacturing industries have expanded, and the cost of production lowered to a point where that country can successfully compete with free trade Britain in the markets of the world.

There is another view to be taken of this question of discrimination. It is evident that Canada is in no mood to enter into any arrangements with the United States whereby there will be any discrimination against Britain. Britain does not discriminate against Canada, but that is just what the United States does, as exemplified by a duty of five cents per dozen upon Canadian eggs. For years and years Canada has maintained a standing offer to the United States to have a free exchange of certain natural products, but the invitation has not only not been accepted, but has been replied to by excessive duties levied upon most Canadian agricultural products. But Canada admits American manufactures on the same terms that British manufactures are admitted, and under this arrangement many millions of Canadian money goes into the pockets of commercial enemies instead of British friends.

The *Globe's* plan for overcoming this commercial discrimination on the part of the United States against Canada is for Canada to crouch at the feet of the American Government and beg to be taken under its protecting wing. It wants to sacrifice those things that Canada holds dear—its self respect, its autonomy and its British connection; and these sacrifices mean the same measure of discrimination against Britain than now characterizes the McKinley tariff. We, too, are in favor of discrimination, but not of that character. The discrimination we would suggest would be for Canada to adopt the McKinley tariff as against all importations of manufactures from the United States, while maintaining our present tariff as against the rest of the world. Surely the

Globe nor its American friends should not object to this; for if the McKinley tariff is a good thing for the United States, seeing that under it Canadian products of all descriptions have to pay such heavy duties, it would be equally good for Canada, governing in importations of American goods If this were done we would soon see the effects of it in increased importations of merchandise from Britain and a great strengthening of the ties that now bind that country and this; and another effect would be to cause hundreds of American manufacturers to transfer their plants, their capital and their workmen to Canadian soil.

Surely any discrimination that would produce such results is worth trying.

AS TO IRON.

SPEAKING of the repressive legislation enacted at the recent session of the Ontario Legislature, the Toronto *Mail* says:

As for the iron-mining industry, on which additional fetters were imposed, it may be said that, broadly speaking, when the Ontario Government determined to lay an embargo on the interest, there was not a single mine at work in the province. Ore there is in plenty, and of good quality, but the question is what to do with it. An instance may be adduced which has several instructive features. There is a mine near Peterborough of exceptionally good ironstone, the owner of which, a man of ability and business tact, tried for twelve years with unremitting industry and perseverance to place upon the market. Here was a store of wealth placed in the province by nature which needed but to be worked to add to the prosperity of the country. Such a mine, if well worked, would produce 250,000 tons of ore a year and employ 500 men. Of course the only outlet for the output was across the line, and the duty of seventy-five cents a ton would amount on that output, to $187,500.

The idea the *Mail* desires to convey is that there are no iron furnaces in Ontario, and that whatever iron ore may be mined in Ontario must be exported to the United States, paying a duty there of 75 cents per ton. The *Mail* is in favor of unrestricted reciprocity between Canada and the United States.

Recently, in discussing the iron duties, the Toronto *Globe* said:

The cost to the consumer of iron and steel (in Canada) is augmented to the extent of the duty, whilst our competitors in the States are enjoying extraordinary cheapness—such is the serious debit side; whilst on the other we have the presence of four or five furnaces whose output of pig amounts to only 25,000 tons a year in a total consumption within Canada of 400,000 tons.

The *Globe* is also in favor of unrestricted reciprocity with the United States, and while it deprecates the importance of our present iron manufacturing industry, and desires us to sacrifice it in favor of American competitors, it anticipates the question that would naturally arise as to why and how the United States acquires its present large iron industry, and why Canada's industry might not become correspondingly large through similar causes. It knows that until last year Great Britain was always the greatest iron producing country in the world; and that even now, when she has been compelled to take place second to that of the United States, the most strenuous and persistent efforts are being made by such free-traders as the *Globe* to induce the United States to abandon that policy by which it acquired this great pre-eminence in favor of Britain not for any love of Britain, but that there may be some realization of the chimerical idea of free trade. It is queer, however, that these Canadian free-traders seek to establish free trade in Canada by identifying our fiscal policy, not with that of free trade Britain, but with the United States, the most pronounced protectionist country in the world. And therefore in desiring to assimilate the fiscal policies of the two countries, and to extend the ultra protection of the United States entirely around Canada, the *Globe* endeavors to show that the success of the iron industry in the United States is not at all due to any influence of protection. Hear what it says:

The American (iron) industry owes nothing to the protective policy. In his work on the United States tariff Mr. Taussig sums up the case by saying that the high duties which prevailed for many years impeded importation and therefore retarded that cheapening of iron which has been one of the most important factors in the march of improvement during the present century. The duties certainly maintained in existence costly charcoal furnaces long after that method had ceased in Great Britain to be in general use. But "the first step towards a vigorous and healthy growth of the iron industry was in the employment of anthracite in 1840." That step, so far from being promoted by the duties, was taken at a time when the duties were being lowered in obedience to the popular demand for cheaper iron. The industry has grown to its present dimensions simply because no other country in the world has larger resources of coal and iron, or resources more easily developed. The home demand has increased with the increase of population—which now amounts to 1,200,000 persons a year. Aside from these facts, no American protectionist would pretend that Pennsylvania or Ohio or Alabama could have reached their present eminence as iron producing communities had they been cut off from the rest of the continent by a double tariff wall and left without a market for the surplus remaining after the local consumption had been satisfied.

The fact is the United States never enforced high duties upon iron until the Morrill tarriff effected it. In the early days of that country, before the Revolution, and while British colonies, the policy of Britain was to repress the manufacture of iron there, and this spirit was carried so far by the mother country as to make it a high misdemeanor under some circumstances to manufacture iron or even to import machinery for that purpose. And for many long years after the separation from Britain did this repressive spirit exist in the United States, and to such an extent as to retard and almost entirely prevent the manufacture of iron there; and it is quite correct to assert that if the idea of tariff protection had not taken root and developed to the extent it did, so as to demand that a high duty should be imposed upon iron, the industry there would not be in the flourishing condition it is now in.

The *Globe* attributes the growth of the American iron industry to the large resources of the country of coal and iron. This is true, of course, for without these no possible tariff protection could have produced the industry; but it must be remembered that, the iron resources of Canada are quite as great as those of the United States, and that if blast furnaces were established in Ontario, contiguous to some of our immense iron ore deposits, they would be quite as near to unlimited supplies of fuel as many of the most successful American furnaces, and considerably nearer than many others. If then to the presence of these elements in the United States is to be attributed the establishment of the iron industry there,

why, pray, should not the industry be established in Canada. It is evident that the only thing lacking is just such a measure of tariff protection in Canada as existed in the United States—a protection that protects. There is no tariff protection to the iron manufacturing industry in Canada. There is a duty, it is true, upon iron, but it is for revenue only—not for protection.

The annual consumption of iron in Canada is the equivalent of about 400,000 tons, while the production is only about 30,000 tons. According to the showing of the *Mail* the one mine near Peterborough has capacity to produce ore enough to make at least a third part of all the iron we consume, and this is only one of a large number of mines in Ontario alone, of equal value. If furnaces were established at any convenient point—say at Toronto or Hamilton—it would be necessary to haul the ore less than a hundred miles, and as to the fuel, the distance from the Connellsville coke ovens in Pennsylvania to either of these points is less than to Chicago, where, probably, the most extensive iron plants in the United States are located. Why, then, should not Canada manufacture her own iron? The *Mail* points out that 500 men would be employed in one mine alone; and if so many in one mine, how many would there be employed in all branches of the industry? Under the high duty of the McKinley tariff iron can be imported into Canada much cheaper from the United States than from Britain; and if Canada had a tariff that protected its iron industry similar to the protection afforded in the United States, we would soon be independent of the world for our iron, and it would be much cheaper than it now is.

THE VALUE OF PROTECTION.

THE value of protection in the United States is exemplified in the cotton tie industry. Cotton ties are strips of thin hoop or band iron an inch wide and of suitable length to be used in securing bales of cotton, the tying being done by means of a simple buckle very easily adjusted. A fine quality of iron is required in the manufacture of cotton ties, and the machinery used is peculiar and different in many respects from what is used for the production of other sorts of thin iron. Owing to the costliness of the process and the low rate of duty, the manufacture of cotton ties has never been an established and successful industry in the United States, although very nearly all the ties used in the world are required there. Nearly all the ties used in preparing the American cotton crop for market have been made in Great Britain, and about three-fifths of all produced there were manufactured by the Wheelock Iron Company at their works at Wheelock, a village contiguous to Tunstall, England. The average annual export of cotton ties from Britain has been 25,000 tons of which about 15,000 tons were made at the Wheelock Works. In the manufacture of cotton ties the iron is rolled down to No. 18 guage, one inch wide, cut into lengths of eleven feet each and the buckle attached, thirty ties constituting a bundle and forty-four bundles weighing just one ton. In the case of the Wheelock Works, the entire plant was built and the machinery designed and constructed especially for this particular industry, and it would be very expensive to change it so that it might be used in the manufacture of other forms of iron.

The McKinley tariff imposes a duty of 1.1 cent per pound on such band or hoop iron as cotton ties are made of, and an additional two-tenths of a cent per pound on such iron manufactured into finished ties, the manufacture including the cutting to the given lengths and the attaching the buckles thereto. Under the previous tariff the duty upon cotton ties was thirty-five per cent. *ad valorem*, and, as we have stated, with this protection of thirty-five per cent. the manufacture of cotton ties in the United States was never a success. The average value of a ton of English cotton ties in the United States, duty free, is about £7 or $34.06, and the previous duty of thirty-five per cent. amounted to $11.92, while under the McKinley tariff, at the specific rate of 1.3 cents per pound, the duty amounts to $26 00 an increase of $14.08 per ton. Under the previous tariff England supplied the United States with nearly every ton of cotton ties used there, while under the McKinley tariff the industry of manufacturing ties is ceasing to exist in England and is assuming large importance in the United States.

The Wheelock Works are valued at $250,000, but they have been closed and the employees are idle. The proprietors at first thought of investing additional capital and re-arranging the plant for the production of some other line of goods, but this idea has been abandoned, and it has been determined to wait and see whether the next Congress will not so modify the tariff as to admit of the works being again put in operation manufacturing ties. The consumption of coal in these works was from 600 to 700 tons per day, so that, in addition to the distress caused by the enforced idleness of the employes of the works there is also that caused by the enforced idleness of the coal miners.

This is a gloomy picture for British capital and British labor, but it is just what might have been expected as a result of the McKinley tariff. The United States Government were not working against these elements in the passage of the McKinley tariff, but in favor of American capital and labor; and how well this object is being attained is seen in the establishment of the industry particularly in the south and in the cotton region itself. A cotton tie mill recently established at Rome, Georgia, is now turning out over 800 bundles of ties per day, of itself enough ties to bale half the cotton crop of two states, and this is but one of many such concerns. The impetus thus given to the industry is resulting in the establishment of enough works to supply the full demand of the country, and the competition that will very soon exist among these works may be depended upon to keep the price of ties down close to the actual cost of production.

Canada may learn a valuable lesson from this incident. The American tariffs have always imposed duties upon cotton ties, but never until the McKinley bill came into force were these duties high enough to keep foreign ties out of the Americ market, or to induce the establishment of the industry there. In Canada we have an unmeasured and inexhaustible wealth of all the materials necessary in the manufacture of steel rails, but although we have nearly twenty thousand miles of railways not one rail of either iron or steel in use upon them was manufactured in Canada. It is exceedingly desirable that we manufacture steel rails in Canada, but this will never be done until a duty is laid upon the article high enough to insure its success.

The nation that manufactures for its itself prospers.

RECIPROCITY.

THE United States and Spain have made a reciprocal trade arrangement as regards the Island of Cuba which will give the Americans, on and after September 1st, a free market in Cuba for their bacon, hams, lard, tallow, oats, barley, hay, rye, straw, fruits, vegetables and farm produce generally, and fish; and on January 1st, the Cuban duty upon flour will be but $1 per barrel, this latter arrangement giving the entire trade of the island in flour of the United States to the exclusion of all Spanish flour; and on July 1st, of next year, large discrimination in duties will be made in favor of many other articles of American manufacture.

As a matter of course the Grit orators and newspapers point to the fact that the only way Canada can escape the unfavorable effect of this treaty is by unrestricted reciprocity with the United States. Among the American articles which will be allowed to enter Cuban ports free after September 1st, are lumber and fish, and as regards these, Canada will be struck pretty hard. The Cuban lumber duties run from $4.80 to $12 per thousand feet, and fish pays about a cent per pound, but it is difficult to see how Canadian fish and lumber can be admitted into Cuba, and receive the benefit of the American treaty, even if they are shipped, not from Canadian but from American ports If the Cubans were pleased to blind themselves to the fact that the spirit of the treaty was thus being evaded, and if the Americans would also wink at the deception, Canada might continue to do some business with Cuba in this way; but it is not likely that either country would be willing to the arrangement, and, therefore, Canada would be shut out, receiving no benefit whatever through alliance with the United States in that country's arrangement with Cuba. But if such an arrangement were possible, and that Canadian produce could be sent to Cuba under the Spanish treaty, through ports of the United States, it is certain that no shipments could be made direct; and in this fact it is seen that under the most favorable conditions of reciprocity with the United States Canada would be forced to sacrifice and surrender her export trade to Cuba from her own ports to the aggrandisement of American foreign commerce and American ports. Is it worth our while to make the sacrifice?

We are told that Great Britain considered this treaty between Spain and the United States would be of great disadvantage to her. Of course it will be, even as the American treaty with Brazil is a great disadvantage, but what is she going to do about it? The Americans are felicitating themselves that ere long even the British West Indian Islands will be asking to have reciprocity with them, and if they do ask it they will probably get it, and then what will Britain do about that? What can she do? Absolutely nothing; that is to say she can do nothing but hold her hands and look despairingly and helplessly on and see the trade of her own possessions drift away from her, going to enrich her most formidable competitor, the United States, unless she abandons her present fiscal policy and makes arrangements whereby the products of all her possessions shall receive discriminating favors in British ports as against the products of other nations. If this were done Britain would certainly retain the trade of all her possessions, and prevent its being diverted to the United States; and she would then be in the position to do just what the United States is doing—forcing other countries to show her tariff favors in return for like favors shown them. Mr. Blaine finds the McKinley tariff a powerful and effective lever to force open the doors in the tariff walls of other countries for the favored admission of American products—Lord Salisbury has no such lever, and can only hope against hope that at sometime in the sweet by and bye the Cobden millenium will come.

We are pleased to observe, however, that a strong feeling is being rapidly developed in Great Britain which demands that a protective tariff be adopted, and tariff discrimination be made in favor of British possessions and of such nations as do not unfairly discriminate against her.

FOR HUMANITY'S SAKE.

A FEW days ago a correspondent of one of the city papers made an appeal in behalf of the female workers in the factories. He alluded to the "flinty-hearted" employers who compelled their help to work for starvation wages; how girls, who are doing piece work and able thereby to earn only about sixty-five cents per day, find themselves hedged around with shop rules, regulations, fines, etc., which reduces the small remuneration, and says:—"The goods are selling at the old prices and trade is brisk, still the employer gives another turn to the screw and grinds his poor work people a little closer. Yet we read and hear so much about the enlightened age in which we live—the advanced state of civilization! But there is nothing in all this that seems to soften men's hearts and make them more considerate of their fellow-creatures, who are compelled to toil from morn till night for bread to eat." This correspondent asks why the City Council should not try their hand at framing a by law which would remedy the evil of inadequate wages, and calls upon the pastors of the city churches to exhort the masters, who are professing Christians, to "remember their servants" and employees.

Of course, if this correspondent possessed any correct conception of the constitution of society he would not suppose that there was any possible power residing in the City Council, or in any other government, to regulate this matter, or that appeals from the pulpit could have any influence in this direction. But this communication is in strong contrast with many of the advertisements of business houses published in the same paper, and which throw considerable light upon the question. One concern offers to sell household furniture at twenty per cent. discount from previous prices. Another, also offering furniture, says: "We can quote some figures that will stagger you. The truth is, there has been a break in prices—that they have been shattered all to pieces." Another offers lines of hats for men, boys, girls and children, "all reduced about one half." Another offers ladies capes in many styles, the prices of which have been reduced to half price. Another advertises a "sensational sale" of dress goods at which "panic prices" will be only nominal when the quality of the goods and their real value are reckoned up. Another, offering "a large assortment of morning wrappers for ladies, made up in prints, sateens and cashmerettes, says: "The stock is all of our own make, and shoppers can rely on the workmanship of each

individual garment. These wrappers, complete and perfectly made, start in price at ninety cents. Of course, this is no price. The seamstress' bill would mean more to you." Another offers ladies' under garments "twenty-five per cent under regulation price." Another offers blankets "at less than the cost of manufacture;" and lines of ginghamsare offered at from forty to sixty per cent. below regular price. Another, inviting custom, offering hosiery, napery, dress goods, etc., says: "There's no gainsaying the fact that a dollar goes here as far as a dollar and a-half in most stores." Another offers what he calls "the stock of a bankrupt underwear manufacturer" at fifty-five cents on the dollar. Another, who proclaims himself as a "wholesale" grocer, offers to sell at retail, "groceries of all kinds, and household goods in general, at an average of twenty per cent. under ordinary retail prices; and another offers fine underwear, flannel suits neckties, collars, cuffs and shirts from the best makers, at twenty per cent. discount.

Now these remarkable offers of "cheap" goods are bona fide or they are not. If they are not made in good faith, but are intended to deceive and entrap unwary customers it would indicate a low condition of morals on the part of the merchants. If the goods can be bought at the prices indicated it shows that the merchants themselves are on the verge of bankruptcy and are sacrificing their goods for the sake of obtaining ready money at any cost; or that they are purchasing their supplies from manufacturers who are probably in similar condition; or that the consuming public have been paying very much more than a fair profit to the merchants. Which is it? In the production or all these lines of goods named labor imparts to them their chief value. Without such labor furniture could not be manufactured from the rough lumber, and when furniture is offered at a discount of twenty per cent. below previous prices, either the makers or the sellers are in a hot box, and are compelled to raise money at any sacrifice, or the purchasing public have been paying twenty per cent. or more above the intrinsic value of the goods. The same facts apply to the other articles, particularly to such as ladies' wrappers, which are "sacrificed" at ninety cents a-piece. It is a very skrimp wrapper that contains only nine yards of goods, and it is a very cheap article of prints that can be bought at five cents per yard, therefore, in a ninety cent wrapper, one half the price, or forty-five cents, represents the cost of thread, buttons, trimming, the labor of making and the profit to the manufacturer and the retail merchant. How much, pray, can it be possible for the poor working girl to earn on such a job? It would require exceeding nimbleness on the part of the average working girl to make a half dozen such garments within the ordinary working hours of a day; and when the wearers of these "cheap" goods buy them at the prices indicated they should bear in mind that this cheapness is exceedingly costly to the poor girls—perhaps it is at the expense of that which should be more precious to them than even life itself. Alluding to these "cheap" wrappers the merchant proclaims to his prospective purchaser: "Of course, this is no price; the seamstress' bill would mean more" than his price if the garment were made at home. And so it would; and the seamstress would undoubtedly obtain much better pay for doing such work if it were not that such an insane and silly stress is not always laid on "cheap goods," as though cheap labor was not the curse of any land. Hood's "Song of the Shirt" very truthfully depicts the condition of these unfortunate working girls.

This journal has always combatted and opposed all policies and influences that would tend to encourage or produce such "cheapness" as is here alluded to. No country can enjoy its fullest measure of prosperity where the laboring classes are insufficiently paid. Through them, with the assistance of capital, wealth is created, and any policy that tends to enrich the few at the cost of the degradation and distress and impoverishment of the laboring classes is inherently wrong and should be remedied. The chief reason why such articles as are manufactured by girls and women are so cheap in Toronto is because the duty imposed by the tariff upon such goods is not high enough to keep out foreign made goods; and these, the product of the blood and sweat labor of other countries are brought into Canada and sold in such strong competition with the products of home labor as to produce the situation here described. It is silly for people to make appeals "for humanity's sake" in behalf of poor ill-paid working girls, unless it be to correct the evil by shutting out the pauper made goods of foreign countries by a tariff wall which would give the home market to our own people. True humanity lies in this direction.

EDITORIAL NOTES.

THE total output of beet sugar in the United States this year is estimated at 20,000,000 pounds and over.

ACCORDING to the New Orleans *Picayune*, Louisiana produces more than eleven-twelfths of all the sugar raised in the United States.

THE Chicago *Tribune* thinks it safe to say that in a year or two a dozen States will contain beet sugar refineries which will manufacture all the sugar required for consumption in those States.

PROFESSOR SAUNDERS, of the Dominion Experimental Farm at Ottawa, has been instructed by the Government to make investigations into the whole question of the sugar beet and beet sugar industry in Canada.

IT is not likely that the retail price of refined sugar will ever again be above five cents per pound in the United States; and American agriculturalists will never rest satisfied until they produce all the sugar required for that country.

ACCORDING to results already arrived at, it is a fore gone conclusion that Professor Saunders' report to the Government, anent the sugar beet question, will be of such a character as to induce the Government to give the industry such encouragement as is accorded to it in other countries.

ONE of the great needs of Canada at this time is to have a

liberal bounty offered for the production of Canadian-made beet sugar—say two cents per pound—to be continued, say for fifteen years, and to admit sugar-making machinery free of duty for the next three or four years. Here is an opportunity for our Finance Minister to prove himself a great statesman.

At a public meeting held in London a few days ago resolutions were adopted protesting against the unrestricted influx of destitute aliens into England and demanding that the government take measures to prevent the entrance into the country of undesirable persons. The resolutions were supported by a number of members of the House of Commons who were present.

There will be an exhibition of pigmies at the World's Fair in Chicago. It will be hard to decide who is the smallest man in Canada, but the final contest for the entry will lie likely between Mr. Foster and Mr. Dewdney, of Ottawa fame.—*London Advertiser.*

This is timid modesty on the part of the editor of the *Advertiser*, intending, as he does, to visit Chicago next year himself. He is already awarded the premium in Canada.

It is noticeable that none of the leading daily papers of Canada on either side of politics have ever yet taken a decided stand on the nickel question, and declared whether they were in favor of imposing an export duty upon nickel ore and matte or not. One set seems to be afraid and the other "dassent." Meantime thousands of tons of this mineral wealth is being taken out of the country, and Canada has nothing to show for it but the hole in the ground from which it is taken. Impose the duty.

According to a report received from Consul Wildman, of Singapore, the new tariff law of the United States has had a beneficial effect on the tin mining of the Malay peninsula. Pig tin is now sent direct to the United States, whereas it was formerly shipped to England and there used in the manufac ture of tinplate, in which form it was exported to the United States. The Malay peninsula furnishes about one-half the tin of the world, the exports from the Straits settlements to all countries in 1889, amounting in value to $23,254,023.

Berlin used formerly to export immense quantities of fine ladies' cloaks, etc., to the United States. Since a high tariff was placed upon these goods American buyers go there and simply buy the models. The cloaks are then manufactured after these in the United States. Only the cheapest grades of goods are exported in large quantities, and so great has been the decrease that the *Confectionaire*, the organ of the cloak-makers, protests against the "attentions paid to American buyers who inspected everything a dozen times and in the end bought only a few models."

A press dispatch from San Francisco states that warning had been sent to the farmers in that section to ship no more potatoes to that city, as that market was glutted with them and they were rotting, there being no purchasers. It was that they do not protest against this criminal neglect? Of estimated that California farmers would lose over a million dollars on their potato crop alone this year. This, too, in one of the finest markets in a country of over sixty million people. Of course those who shriek for unrestricted reciprocity want Canadian farmers to have an opportunity to send their potatoes to this sixty million market.

Recently the Ottawa correspondent of the Toronto *Globe*, in alluding to the discussion in the House of Commons on the changes in the sugar duty, said:—"Mr. Patterson quoted from the Canadian Manufacturer * * * that the effect of the tariff resolutions would be to give Canadian refiners seven times as much protection as American refiners." This journal never made any such ridiculous statement, and Mr. Patterson never quoted any such language from our pages. When garbling, blundering and misrepresentation are resorted to, as in this instance, the *Globe* takes the cake.

United States Consul Jarrett, at Birmingham, Eng., makes a report upon the carpet industries of that city, in which he states that the number of looms in operation are 1,993, of which 1,443 are power and 550 hand looms. These give employment to 1,993 men and 994 boys. Weavers are paid for weaving Brussels three fourths five-eighths and one-half of a yard wide, 5 cents per yard; creeles or assistants, 4 cents in every 24 cents earned by the two weavers on whom they attend, or about $2.19 per week. In some establishments weavers are paid by the week, when their wages are $6.81 per week.

A Western paper says:

If you are a kicker, and see the shadow of a failure in everything that is proposed to help the town, for Heaven's sake go into some canon and kick your own shadow on the clay bank, and thus give the men who are working to build up the town a chance. One long-faced, hollow-eyed, whining kicker can do more to keep away business than all droughts, short crops, chinch bugs, cyclones and blizzards combined.

We commend this to those people here in Canada who can neversee any good in this country, and who think it is going to everlasting smash unless we get the Yankees to run it for us.

One of the pernicious effects of the removal of the export duty upon pine logs is shown up in an Owen Sound newspaper, which says that manufacturers and shippers of lumber in that section report the bottom as having tumbled clean out of the trade. Lumbermen along the North Shore are selling their logs rather than go to the expense of sawing and shipping. At Tobermoray hardly a day passes but a large raft of logs can be seen in tow of a couple of tugs for American sawmills. The tug *Seagull* has a contract for towing fifty million feet, while the *Gladiator* and *Avery* have sixty million feet to tow to American mills.

Some of the Toronto papers have discovered that there are no fire engines in the city with capicity to throw water to the tops of the many high buildings recently erected and now being erected here, and that there is no proper apparatus for fighting fire in such buildings. Are the insurance companies asleep

course it will be in order by and bye for some junketing committee to take a tour of American cities to see how things are done there, but it might as well be understood right now that as good and efficient fire engines can be built in Canada as anywhere in the world.

ATTENTION is directed to an article in another column regarding "Forest Preservation," based upon the report of Mr. B. E. Fernow, chief of the Division of Forestry of the United States Government, prepared for the forthcoming census report. It shows the importance of putting a stop to the indiscriminate denudation of the forests of that country, and suggests that the Government take the matter in hand even to the extent of controlling the cutting of timber on private lands. The facts apply also to Canada, and in them we see the importance of restricting ahe output of logs by the re-imposition of an export duty. There should be an export duty on saw logs.

IT is understood that the terms of a commercial alliance have been practically agreed upon between France and Russia, whereby each country will give preference to the products of the other. As Russia, in years of favorable harvests, is largely a food-exporting country, this arrangement will militate against the United States rather than England, although British manufacturers receive a severe blow from the new French tariff, as in return for French concessions, Russia will, it is said, give a preference to French manufacturers, while maintaining a stringent tariff for imports from other countries. The advantage thus given to France enhances enormously the value of the Russian alliance, irrespective of any motive of hostility towards Germany.

IT is stated that there are now in operation in the United States no less than 310 electric railways, operating over 2,400 miles of track, with 4,000 cars, equipped with about 7,000 motors, representing no less than 175,000 horse-power in dynamos and motors. Not less than 400,000 miles are run a day, and three-quarters of a billion passengers carried annually. Although only three years have passed since the introduction of electricity on tramways in the United States, one-third of the entire mileage of street railways is electrical, and there is scarcely a road in the United States that is not considering the application of electricity. Horse railroads, which have been in use for over fifty years, represent an investment of about $58,000,000, electric railways over $50,000,000, while the cable roads, which have had a commercial existence four times that of the electric system, have less investment than electric railways, or about $49,000,000.

UNDER the reciprocity treaty with the Hawaian Islands that country has, for a dozen years, had free access for its raw sugars in the United States, all the other foreign nations of the world paying tribute at an average rate of two and a-half cents per pound. All this Hawaian sugar went to San Francisco, where it was refined by Claus Spreckles, but no one ever knew of any sugar being sold on the Pacific Coast for less than New York prices, as established by the American Sugar Trust, with freight and expenses added and now that raw sugars are on the free list in the United States, and the prices of all sugars correspondingly reduced elsewhere, the prices in San Francisco are higher than in any other city in that country. In this case of reciprocity the price of sugar was not lowered through the removal of the duty, and therefore the people receive no benefit, and the Government sacrificed the revenue it would otherwise have received. Is there a lesson in this for Canada?

THE Opposition in Parliament always urge the point against the N P. that the farmer is not benefited by it—that in its operation, while other interests may be benefited, the farmer is always injured by it. As regards the beet root sugar industry, the fact being established that it is feasible in Canada, as it is in the United States, France, Germany and other countries, the farmer is the one who is to be more benefited than any other class in the community: and it is rather remarkable that when the Finance Minister proposed to offer a bounty, as is done in other countries, for the production of beet sugar, every speech made by Opposition members was against the measure. This shows the measure of their regard for the interests of the farmer; for, as against any proposition of the Government the Opposition are always solidly arrayed, even if the farmer is to be the sufferer thereby.

A PRESS telegram from New York a few days ago announced that a bitter fight had been begun by the American Sugar Trust against Claus Spreckles, the well known sugar refiner, who had been selling sugar below Trust prices. It was though that the fight would hold the price of granulated down to $3.92 per 100 pounds, net cash, which would, it was claimed, be the lowest on record in that country. In August 1889, after the formation of the Trust, sugar was sold wholesale in New York at eight and three-fourth cents per pound. No doubt $3.92 might be a rock bottom price in the United States to American consumers, but it is a fact that American granulated sugar was being sold recently in London at the equivalent of $3.70 per 100 pounds—thousands of tons of it. It is not to be supposed that either Mr. Spreckels or any others of the American refiners are selling sugar at a loss, and if $3.92 should become the established price there to home consumers, even that would be considerably in excess of what it is being sold at for shipment abroad. A sugar trust is a great institution.

UNDER the caption "Fools and Cowards," the Toronto *Labor Advocate* gives vent to the following elegant and refined morceau:

The stupidity and childishness of Canadian "loyalists" were never more strongly brought out than in the action of a pack of fools at Windsor, Ont., who, when a number of citizens decorated their places of business in honor of the Grand Army of the Republic celebration at Detroit, grew indignant and telegraphed to the Government, asking that the offending parties be compelled to remove the decorations. The brainless dude at the head of our Militia Department, glad, like most jacks in office, to have a chance to display his authority, ordered out the local militia to enforce the removal of the flags. Such an arbitrary interference with the rights of the people would not be tolerated in a really free country. What law gives this consequential snob Caron the power to say that a man shall not hoist any flag he chooses? The Essex County Fusiliers, who did the dirty work of bull-dozing peaceful merchants, are a set of potvaliant swaggerers, who, in case of real

trouble, would run like cowards at the sight of the Stars and Stripes if confronted by a force of half their number. By their petty malignity the Windsor loyalists drove a number of good customers from their town, as all the G.A.R. men stopping there, sought quarters on the other side of the river.

Regarding the incident here so vigorously denounced the fact is it never occurred. It is entirely imaginary and so silly in its conception not the least credence was ever accorded to it.

According to Poor's Railroad Manual, which is just ready for publication, the total number of miles of railroad in the United States at the close of 1890 was 166,817, of which 5,739, miles were constructed during the year. The total share capital and indebtedness of all kinds of all the roads making returns equalled the enormous sum of $10,122,635,900, an increase of about 4.5 per cent. during the year. The total railroad mileage of the world at the close of 1889 was 595,767 miles.—*Mail.*

The net federal debt is now $240,000,000, or three times larger per head than that of the United States.—*Globe.*

Included in the federal debt of Canada are all the sums that the Dominion have appropriated in building the Canadian Pacific, the Intercolonial and other railways, in building and enlarging our canals, in erecting our public buildings, etc. The money expended in creating this debt has placed Canada in a position of prosperity which she would never have otherwise attained; and it is because our debt, thus originated, is three times larger per capita than the per capita debt of the United States, the *Globe* is constantly holding up Canada in as unfavorable a light as possible. If the cost of American railways were added to the federal debt of the United States, as it is in Canada, the per capita burden of it would be enormous. According to *Poor's Manual* the total share capital and indebtedness of the railways in the United States amounts to the enormous sum of $10,122,635,900, which, if distributed per capita, there would be $155,733 to each man, woman and child.

Messrs. Moorhead, Brother & Co., proprietors of the Vesuvius Iron Works, near Pittsburgh, having refused to sign the plate mill scale of the Amalgamated Association, have addressed a circular letter to their employees, in which they give the following table of wages which they have heretofore paid *per day* in their various mills.

Plate mill. — Roller, $24.88; first rougher, $8.83; second rougher, $6.21; first catcher, $7 03; second catcher, $5.51.

Nail mill.—Roller, $7.73; rougher, $3.78; first catcher $4.73; second catcher, $3.15.

Bar mill. — Roller, $7.59; rougher, $4.22; first catcher, $5.27; second catcher, $3.51.

Guide mill.—Roller, $10.88; rougher, $4.04; catcher, $4.04.

Muck mill. — Roller, $4.39; rougher, $2.61; first catcher, $2.51; second catcher, $1.92.

Plate mill crew.—Roller, $24.88; shearman, $10.35; first rougher, $8 83; second rougher, $6.21; first catcher, $7.03; second catcher, $5.51; hoister, $5 51; screwman, $5.51; buggyman, $4.14; scrap-boy, $3.03; heater's helper, $2 84; puddler, $3.62; and helper, $2.50.

The Vesuvius works have been started up with non union men, and the striking workmen have lost their fight for the Amalgamated scale. There is no good reason why Canada should not have several just such works as these, in which Canadian workmen were paid just such wages, and she would have if our tariff imposed a sufficiently high duty. As it is, good Canadian money goes to buy iron from this and other similar concerns — and there is no occupation for Canadian ironworkers.

SPECIAL ADVERTISEMENTS.

Advertisements will be accepted for this location at the rate of two cents a word for the first insertion, and one cent for each subsequent insertion. Subscription $1.

West Toronto Junction Enterprises.—The ten large factories which have located at West Toronto Junction during the past three years are all doing large trades. The "Barnum Iron and Wire Works," the "Toronto Rolling Mills and Forging Company," and others about to locate will swell the paying industries of the town and augment its population. A large number of fine residences and business blocks have added to its appearance and to its facilities for supplying the peoples' wants. A perfect fire alarm system (the "Gaynor"), and an efficient system of water-works, both now in operation, with sewers, electric lights and improved streets now contemplated, will add to the protection and the comfort of the people and their houses. Free sites, free water and exemption from taxes are inducements offered to first-class manufacturers, and it is now acknowledged by all that Toronto's western suburb, with its great continental railway connections, is destined to be among the most prosperous cities of Canada. Dr. Carleton is Chairman of the Factory Committee.

The British Columbia Commerce and Maritime Register, of Vancouver, has changed hands, and the journal will now be published by J. A. Fulton & Co.

In our last issue, in alluding to a sample book of photo-gravures and fine printing sent to us by the publishers, Messrs. Desbarats & Co., Montreal, we mentioned that firm as being the publishers of *The Dominion Illustrated*. Of course this was wrong, for the publishers of this most excellent and enterprising Canadian journal are the Sabiston Lithographing and Publishing Company, Montreal.

The engravings in the last issue of the *Dominion Illustrated* include two pages of views at Joliette, P.Q., and one showing the Coliseum at Rome. Bishop's Rock, Grand Manan, N.B., and a fishing beach on the same picturesque island, the Quebec dry dock, the cathedral at Iona and views of the old Berthier, P.Q., manor house are also shown besides several military and other views. The fine historical sketch of the Cuthberts of Berthier is concluded in this number. Mrs. Curzon describes the late celebration of the battle of Lundy's Lane. "The Belle of the Settlement," a North-West story, is a bright and readable sketch. The Sagamore talks of boodle and boodlers, and there are many other interesting features in this charming number.

The frontispiece of the *Illustrated American* for the week ending August 15th is a pencil sketch of the pretty face and figure of a Narragansett belle, which is accompanied by a fully-illustrated sketch on the social life of that famous resort. The number as usual is full of interesting matter. An article on the Wagner festival at Bayreuth is most timely and gives an interesting account of the production of "Parcifal," which is a story of the search for the "Holy Grail," a subject that Tennyson loved to deal with. The article is fully illustrated, one of the pictures being the uncovering of the Holy Grail. The first of two interesting articles on the naval reserve operations at Fisher's Island is accompanied by a full-page picture of the firing of a big gun on the *Chicago*, and interesting story about the Baby King of Spain, and the use of Mortars in coast defence are some of the many subjects treated. The result of the Hidden Words Competition, with a list of the successful candidates, and an account of the working of the New International Copyright Bill prove also interesting articles. Governor James E. Campbell, of Ohio, is the Presidential possibility, and Miss Laura Moore is the footlight favorite. "Twenty Minutes Before Time" is the title of a short story.

The list of contributors to the *Popular Science Monthly* for September contains a goodly number of strong names. The opening article, by Prof. John Fiske, is on "The Doctrine of Evolution: its Scope and Influence," and cannot fail to give the general reader a better understanding of this great process. There is an essay by Herbert Spencer on "The Limits of State-Duties," which embodies a strong argument against attempts by governments to mould artificially the characters of citizens. Dr. Andrew D. White continues his Warfare of Science series, describing the displacement of fetichism by hygiene. A fifth paper paper is contributed by Prof. C. Hanford Henderson to his illustrated series on "Glass making." It describes the making of thermometers, hydrometers, telescope lenses, and other instruments of glass. Dr. Charles W. Pilgrim, of the Utica Asylum, tells what beneficial results have come from Schools for the Insane. A decidedly novel subject is presented in "Views of Running Water," by J. Piccard, which describes and pictures the appearance of running and falling water. The sun-spot period now nearing its maximum, gives occasion for a discussion of the question, "Can we always count upon the Sun?" by Garrett P. Serviss. Under the title "A Classification of Mountain Ranges," Warren Upham tells how various kinds of mountains are formed. R. Francheshcini writes about "Musical Insects," describing the mechanisms by which insects produce sounds, with illustrations. John Murdoch contributes an interesting account of "Eskimo Boats in the North West." Dr. Karl Russ pleads for the lives of our feathered creatures under the title "Take care of the Birds!" A sketch is given, with a portrait, of the retiring President of the American Association, Prof. George Lincoln Goodale. The editor writes on "The Warfare of Science" and "Individuality for Woman." New York: D. Appleton & Company. Fifty cents a number, $5 a year.

A LESSON IN AMERICAN TRADE METHODS.

Our esteemed friends, the Grits, are very anxious to establish unlimited reciprocity with the United States, under which American manufactures would be admitted to this country free of duty, while British goods would be heavily taxed. We have always maintained that if this were done it would not be merely ungrateful to the mother country, though that were bad enough; it would be much worse; it would be ruin to Canadian manufactures. Our Grit friends say no, it would not be ruin to Canadian manufactures, and what does it matter about the mother country? Those who say so do not, we think, properly appreciate American methods of trade. What do the advocates of unrestricted reciprocity say of traders who are capable of keeping two price lists for their goods, one showing the price in the home market, the other the price at which they are prepared to sell to foreigners? Do they approve of that, and do they further approve of selling to foreigners about 25 per cent. cheaper than to home consumers? But that is what the American implement makers do. Here is a table taken from a respectable American exchange, showing how it is. The first column shows the price charged to purchasers in the United States, the second the prices charged by the same firms to purchasers living in foreign countries.

	Home Market.	To Foreigners.
Wheel hoe, cultivator rake and plough..	$11 00	$8 40
All steel horse-shoe and cultivator.....	8 00	6 75
Two-horse ploughs.....	5 60	5 04
Three-horse ploughs.....	14 60	12 60
Shovels, No. 1, per dozen.....	9 20	7 86
Advance ploughs.....	18 00	9 00
Cumming feed cutter No. 3.....	90 60	60 00
Round hammers, per doz.....	4 37	4 05
Bronzed axes, first quality.....	7 76	6 75
Hatchets, No. 1.....	4 60	3 80
Horse nails.....	17	10
Flat-bottomed kettles.....	1 40	85
Spider, 12-inch.....	91	55
Apple-parers, per doz.....	4 50	3 50
Wringers, per doz.....	40 00	36 00
Hollow ware (plates).....	5 40	4 61
Knives, forks, etc.....	4 36	3 73
	$229 87	$173 59

"This list," says the Tacoma *Daily News*, from which the above is taken, "might be extended indefinitely, but this will be enough for one lesson. The prices are taken from the published price-lists of the various firms." We invite attention to this list. The makers of the goods mentioned in the foregoing table offer their goods to foreigners on the average 24½ per cent. lower than they will sell them to the home consumer. Is that right? Are the men who do so just traders, with whom it would be proper to place Canadian manufacturers in free competition? Would not these American implement-makers, if afforded the opportunity, apply the same method to Canada with even increased energy for a time, till they got rid of the overstock of goods which they seem to have on hand at present, and had ruined all or most of the Canadian establishments in competition with them? and would they not afterwards put up their prices to the home standard, and make the Canadian farmers and others using their goods pay just what prices they thought fit to ask when once they had secured the Canadian

market to themselves? Would not other classes of American manufacturers do the same? There is no doubt of it, we think. They would extend the American system of combines over all the continent, from the Atlantic to the Pacific, and from the Rio Grande to Hudson's Bay, and there would be nothing for it but to submit to their exactions, for competition or the possibility of it would be destroyed. If the Canadians are wise they will keep their country and its markets, and refuse to place themselves at the mercy of the Americans. The way to do so is to maintain the National Policy and the British connection, and refuse annexation and its forerunner, unrestricted reciprocity. Under the existing system the country is prosperous and safe, and is advancing fast enough. The Canadian people will be wise to let well alone. If they do otherwise they will have reason to regret it when too late to mend it.—Vancouver, B.C., *Telegram*.

THE DYNAMO AND ITS WORK.

THE first dynamo-electric machine ever constructed was that made by Faraday, says *Knowledge*. This great physicist, the prince of experimenters, as he has been called, discovered that when a disk or flat plate of copper was made to rotate between the poles of a powerful magnet, currents were produced in the plate from the centre outward. By making a wire touch the revolving plate with one of its ends, and bringing the other one in contact with the rim, he found that a current of electricity passed along the wire and could be made to indicate its existence by deflecting the needle of a galvanometer, decomposing a chemical solution, or by any of the well-known effects produced by electricity in motion.

Faraday saw the importance of this discovery, and the great uses in the way of practical application to which it might be put, but he did not himself stay to develop it; he left that to others, and with it the wealth which might thus be acquired, and himself went on to investigate other obscure and little known phenomena connected with physics and electricity, regarding this as his proper work, and exhibiting in his conduct the true scientific spirit. When many years afterward, he went to see the first application of this discovery of his to the production of the illumination of the North Foreland Lighthouse he said, after looking at the large magneto-electric machines there: "I gave it to you an infant; you have made it a giant."

Dynamo and magneto-electric machines consist essentially of a coil of wire—"the armature," as it is called—rotating between the poles of a large magnet, the poles being bent round so as to approach each other and have the armature between them. This magnet may be either a permanent magnet of hard steel or an electro-magnet, consisting of wire coiled round a soft iron core, a current of electricity being made to circle round the wire coil, and thus magnetizing the iron core while it lasts. It is the latter arrangement which is almost universally used now, though the magneto machines with permanent magnets were the earliest form.

A magnet produces an influence in the neighborhood around it, and this surrounding neighborhood is known as the "field of force" of the magnet—*i.e.*, the sphere in which its influence can be felt. A magnetic needle or a bit of iron-filing placed in this field sets itself to point along the "lines of force" of this field—that is, the lines along which the magnetic force acts, and which form curves round the magnet, running out, as it were, from pole to pole, and curving round to the other. Any one may see the form of these lines of force for himself, by placing a bar-magnet underneath a sheet of paper, and then sprinkling iron-filings on the paper.

On tapping this the filings will set themselves along the lines of force in beautiful, regular curves. Here the small fragments of iron are themselves made magnets while under the influence of the powerful magnet in whose "field" they are, and therefore place themselves lengthwise along the lines of force, that is, along the line of action of the resultant magnetic force at the place where each one is.

When a coil of wire or armature is made to revolve rapidly in the strong field of force which occupies the space between the poles of a powerful electro-magnet, currents are produced in the coil. These currents alter their direction through the coil every time the latter changes its position with reference to the poles of the magnet. The side of the coil which was opposite the north pole is after half a revolution opposite the south pole, and the influence of the south pole tends to produce an opposite current to that of the north pole. Here we have an "alternate current" dynamo machine.

As the coil or armature rotates with great speed, some hundreds of revolutions per minute, these currents, in alternating directions, succeed each other very rapidly, and if an electric arc-lamp is placed on the circuit it will be lit up. In this case it is not necessary that the current be sent round the circuit in one direction only, but although the terminals of the lamp are constantly changing their polarity, that is, the north pole where the current enters the next instant becomes the south pole where current leaves, yet, as this occurs many times in one second, the effect produced is the same as if the current were in one uniform direction.

The lamp has no time to get cool; it does not go out before the oppositely directed current passes through it and produces the same effect as the previous one. No flickering is observable. The impression produced by the glowing carbon on the human eye is retained by the retina for a far longer period than the duration of one surge of electricity through the lamp, and is not gone before the effect produced by the succeeding opposite wave makes its impression on our nerves. The Jablochkoff lamps used lately on the Thames embankment are meant for this system of electric lighting with alternating currents.

In a "continuous current" dynamo, which is necessary for some purposes, such as electroplating, where the effect desired could not be produced if the direction of the current were continually altering, the electric current is made to pass one always one way round the external circuit. This result is got by using the ingenious device of a commutator, which automatically deflects the current so as always to send it in an unvarying direction through the plating bath or the electric lamp, as the case may be.

This commutator consists simply of a split tube, which is attached to the revolving armature, and may be seen in any dynamo working on the continuous system. This tube revolves with the revolving-armature, and it is divided by an insulating substance into two parts; each half is alternately on the left and right of the space between the poles of the magnet and the "brushes" which collect the current from the armature, *i.e.*, the bundle of copper wire spread out like a brush, which form each end of the outer circuit, are fixed in position, and the revolving commutator attached to the armature brings alternately one of its half-tubes into contact with a brush. Thus the half of the commutator which receives the current changes at the same time that the direction of the current through the coils of the armature is reversed; in this way the current sent out to the brush which receives the electric current from the armature is always in the same direction.

FOREST PRESERVATION.

THE rapidly increasing demand for and consumption of lumber constitute a heavy drain on our resources, which are not being replenished in equal amount by natural reproduction. It is not only a question of preservation, but of restocking denuded lands. Our future supply demands such a course, and present climatic conditions demonstrate the necessity of artificial cultivation of timber lands. As a profitable investment for capital it has been shown to yield large returns. It is said that the annual consumption of the United States amounts to 25,000,000 cubic feet of wood, the value of which is placed at $1,000,000,000, representing a yearly growth of 500,000,000 acres of forest. It is ten times greater than the value of our gold and silver output, and three times the value of our wheat crop. Our railroads alone use 500,000,000 cubic feet of timber annually, and in the production of 600,000 tons of our iron product the use of charcoal is the only means of bringing it to perfection.

The report of B. E. Fernow, chief of the Division of Forestry, contains the following: "The value of our annual forest product exceeds the gross income of all the railroad and transportation companies. It would suffice to pay the indebtedness of all the States, if we leave out New York and Pennsylvania, and it would more than wipe out the remaining public debt of the United States. In fact, ranking manufactures of all kinds and agriculture as respectively first and second in importance, as far as the production of values goes, the forest product occupies the third place."

The frequent overflow of rivers in this country is in large measure due to the clearing of forest lands at the sources and along the bank. The oversupply at one season, and the limited amount of water carried by the rivers at another, is a natural sequence of this unnecessary removal of this protector of the soil. Not only are the rivers overstocked with water in the spring beyond their capacity, but their beds are filled with the rich soil of the cleared lands. It is estimated that in the hill lands of Mississippi alone the loss of agricultural lands from this cause amounts to 10 per cent. yearly.

In order to change the climatic conditions in many western states and increase and maintain the amount of moisture in the atmosphere, thus facilitating the cultivation of agricultural

products, large areas must be devoted to forests, the planting and care of which can best be done under state or national supervision, as the cost is thereby reduced and proper methods are more likely to be employed. The necessity of devoting large tracts to forest cultivation in the west is thus set forth by Mr. Fernow: "If we compare the rainfall during the season of vegetation in eastern and western stations it appears that there is not much deficiency, if any, during that season on our western plains, and quite sufficient, if evaporation were not such a rapacious robber. This enormous amount of evaporation is not alone due to heat and direct insolation, but mainly to the constant movement of the air, the incessant winds which take up and disperse the moisture. As the average velocity of the wind on the plains may be set down as twelve miles an hour, there is probably at least four times as much water evaporated and dissipated as where the winds are checked. Hence the value of the windbreak which reduces both the evaporation from the soil and the transpiration from the plant, for transpiration is also accelerated by the motion of the plant under the influence of wind."

The last Congress provided in part for assisting forest cultivation in the west, in that it repealed the timber-culture laws, which, although in spirit correct, nevertheless furnished means for the disposal on the part of the government of vast areas of valuable land without any equivalent, while the desired promotion of the forest growth was almost an utter failure. Furthermore, Congress gave the President power to declare by proclamation certain tracts of public land to be reserved for forest cultivation. Steps have already been taken by the government land office to set aside under this provision of the law timber lands at the heads and along the courses of western rivers which are still owned by the government.

Although European governments own but a small part of the timber lands within their domains, they have been forced to assume a partial supervision over those owned by individuals and corporations. It is said that Germany owns but a third of its forest area, Austria 13 per cent., Italy 1.6 per cent., France 10 per cent., Spain 4.5 per cent., Sweden and Norway from 15 to 20 per cent., Russia about two-thirds of its timber lands, and England 3 to 6 per cent. In 14 state forest administrations of Germany, covering 10,000,000 acres, the cut during ten years is reported as 55 solid cubit feet per acre per year. On this basis the total normal wood reserves on these state forest lands is estimated at 24,750,000,000 cubit feet, the value of which is placed at $1,250,000,000. The following table shows the annual returns and expenditure from six reservations of Germany:

	Forest area, acres.	*Total expenditure.*	*Net return.*
Prussia.....	6,000,000	$8,000,000	$6,000,000
Bavaria.....	2,300,000	3,150,000	2,730,000
Wurtemberg	470,000	1,025,000	1,235,000
Saxony.....	416,000	1,040,000	1,710,500
Baden.....	235,000	404,000	686,000
City of Zurich.	2,760	14,000	12,000

—*Bradstreets.*

IN TRANSIT THROUGH CANADA.

The new Treasury regulations regarding shipments in bond through Canada are very moderate in their scope, and will not embarrass the movement of merchandise over the Canadian roads at all. In fact, goods exported to Asia or Europe by way of the Canadian railroads; and goods passing through Canada in transit from one point in the United States to another point, are not affected at all by the regulations. This is welcome news to Boston and New England, which have to depend upon the competitive routes through Canada to secure fair treatment from the trunk lines, and whose export trade in manufactured cotton is rapidly increasing.

It is the import trade by way of Vancouver and Montreal that will be affected by the new regulations. The danger has been in the substituting of merchandise subject to a higher rate of duty for the goods originally placed in the car in the consul's presence. There has been liability also that the cars would enter the United States and be unloaded at their destination without the knowledge of the local custom officers. No case of the substitution of goods has been discovered in the case of cars in transit between points in the United States. The United States officer, whose duty it is to seal the car on foreign territory, must carefully examine the contents of the car and compare it with the manifest, instead of accepting the manifest as sufficient evidence of the contents. Both the frontier custom officer and the officers at the point of destination will receive a copy of the manifest.

The basis of the entry at the border will be the manifest accompanying the car, and it will not be necessary to unload the merchandise unless the Collector has valid reasons for the inspection of the contents of the car; but if the consular seals have been tampered with before reaching the frontier the car will be detained, and entry will be required. as in the case of ordinary importations. These regulations are not oppressive.—*The Iron Age.*

KNITTING AND OTHER NEEDLES.

In connection with the Manchester Technical School, a lecture was delivered in the Peter Street school on December 5th, by Mr. Philip Ellis, F.R.G.S, of Ilkeston, his subject being "Needles Used in the Textile Trades and Their Uses." The lecturer was introduced by Mr. Lomas, who said the Council of that school desired to supplement the ordinary teaching with lectures on relative subjects from men connected with special branches of the textile trades.

Mr. Ellis referred to the free interchange of views which had taken place between the technical schools of Nottingham and Leicester, to their mutual advantage. He had come there that evening to describe the process of manufacturing needles and similar small articles used in the hosiery and lace trades. As the strength of a machine must ever be judged by the strength of its weakest part, these needles occupied a very important place in the trades named, and must be so constructed as to be well able to bear the strain which is constantly being put upon them. In machines for fine grades of fabrics, more particularly, this needed strength cannot be obtained by the use of wire of large gauge, so that very much depends upon the right tempering and careful shaping of that which can be used. The wire is received by the makers in coils in a perfectly soft state, so that it can be worked in any desired manner and bent easily or pierced. This wire is taken, and for various kinds of needles, flattened in certain parts by hammering, and the superfluous width filed away, then straightened, and where necessary, grooved, and the ends turned over to form what are termed the "beards." In many cases these processes are accomplished by machines, but the best needles are hand-made, it being held that trained human touch is the best judge of the right condition to be aimed at. The latch, or self-acting needle is in all cases made by hand, and much care is demanded in the manufacture of the finer grades. The several processes employed for the tempering of the needles were then stated. In some cases this is done by heating to redness tubes which pass through a large furnace, and then passing into these tubes others of a smaller diameter filled with needles. These are heated to redness, and while in this condition are emptied into a cistern of Gallipoli or olive oil. After leaving the oil they are as brittle as glass, and to give them the requisite elasticity they are heated in a pan of oil until the fumes of the oil fire. For this purpose an oil with a high flashing point, such as coarse Gallipoli, is chosen. The pan is then taken off the fire and allowed to stand until cool. when it will be found that the needles have received the right tempering. A better process for fine needles is to heat them in a cylinder revolving over a fire, by which means, known as dry tempering, any desired degree of elasticity can be obtained. As the temper has to be judged by the color, a light day is required for the work. Needles such as are used in French and German hosiery frames have to be re-softened and bent at the ends, this being done at one time by dipping the ends into molten lead, but now by holding the needles with the ends to be re-softened passing upwards into a gas jet. More even results are thus obtained than by the former method. Large models of hosiery needles of different kinds were exhibited by Mr. Ellis, who explained their action when at work. Samples of needles in every stage of manufacture were also shown.—*Textile Manufacturer* (England).

STEEL MAKING IN AUSTRALIA.

Some time ago the fact was reported that the Government of New South Wales had called for sealed proposals, to be opened June 21st, for the supply of 175,000 tons of steel rails, to be manufactured within the colony, with the use of raw materials mined there and delivered during five years from January 1, 1893. The total amount of steel in all forms imported by the Australian colonies is said to exceed $15,000,000 per annum in value. The only Australian colony which contains the raw materials necessary for steel making, so far as known, is New South Wales. It is with the desire of securing the establishment of works for the manufacture of steel in

this colony that the Government offers to guarantee to the builders of steel works orders for steel rails at the rate of 35,000 tons per annum, for five years. The last number of the *Engineer* gives the following account of the steps which Englishmen are taking to improve this chance for a profitable investment :—

"We learn that a syndicate is now being privately formed in this country with a view of thoroughly investigating and proving the deposits of minerals in New South Wales, which have already to some extent been examined and very favorably reported upon, and if it is found that the quantity and quality are satisfactory, then a definite company with limited liability will be formed for the purpose of opening out the mines and erecting furnaces and mills of the most modern and approved type for the manufacture of steel and iron for the supply of the colonies of Australasia and other available markets, including China, Japan, Straits Settlements, etc. Connected with this syndicate are J. C. Cuninghame, of Craigends, N.B., and John Cuninghame, of Glasgow, the well-known Scotch ironmasters, and Joseph Mitchell, a member of the New South Wales Legislature, is now over in this country with a view to advancing the formation of this syndicate, and bringing about the establishment of iron and steel works in the colony."

The New South Wales Government have evinced their desire to encourage the industry by entering into negotiations with Mr. Mitchell for the manufacture and supply, as an initial order, of the 175,000 tons of steel rails, to be delivered at the site of manufacture, over a period of five years, from January 1, 1893, at a price equal to the ruling price for the time being for British-made rails landed at Sydney. From what is already known as to the extent and quality of the deposits of iron ore, coal, etc., it is calculated that hematite pig iron suitable for conversion into steel can be made at 40s. ($9.72) per ton, and the cost of making steel rails is estimated at 90s. ($21.87) per ton ; whereas the average cost of imported steel rails, delivered at Sydney, over the past twelve years, has been £6 9s. 4d. ($31.50) per ton, or nearly £2 more.

IRON TO STEEL.

In no country has the change from iron to steel been so marked as in Great Britain. The production of puddle bar in that country in 1890 was but 1,923,221 gross tons, as compared with 2,841,534 gross tons in 1882, the year of the greatest production since 1881, when statistics first began to be kept. The smallest production was in 1886, when it was but 1,616,701 gross tons. From this date it increased until 1889, when the production was 2,253,756 gross tons, falling off in the last year to the figure given above, it still being nearly 300,000 gross tons above the lowest limit.

No other country whose statistics are available shows such a falling off. The United States produced more manufactured iron of all kinds, including rails, in 1890, than in any previous year, its production being 2,820,377 net tons for 1890, the next highest being in 1889, when the total was 2,586,385 net tons. In Germany the production in 1890 was 1,454,131 gross tons, the largest production previous to this being 1,640,800 gross tons, which was in 1889. The production in France in 1890 was 823,360 gross tons, the largest previous production being in 1882, when the total was 1,073,021 gross tons. In Belgium the production of 1889 was 506,957 gross tons. This was exceeded in 1887, '88 and '89, but only by from 30,000 to 70,000 tons. These are the five chief iron producing countries in which iron and steel are coming into competition. Sweden and Russia may be left out of the discussion, owing to the fact that high grades of iron for particular purposes are produced in these countries, the amount of which does not vary greatly from year to year.

It will thus be seen that outside of Great Britain the total production of manufactured iron in 1890 was greater than the production in any previous year, though not equal to the totals of the highest production in each country of any year prior to 1890.

It is also a fact that in each of these four countries, with the exception of the United States, the production of Bessemer steel in 1890 was not equal to the highest production in any year previous to 1890. More Bessemer steel was produced in Germany in 1887 and 1888 than 1890 ; more in France in 1882 and 1883, and more in Belgium in 1889.

These facts would seem to indicate that outside of Great Britain steel has not supplanted iron to the extent that has generally been believed. It is true that the great increase in the demand for finished product during the last ten years has been met chiefly by steel, but, on the whole, outside of Great Britain, the production of puddled iron was as great in 1890 as it has ever been in any one year.

The increase in the production of manufactured iron in the last six years in the United States is notable. The smallest production in this country since 1879 was in 1885, when but 1,804,526 net tons were produced. This has gradually increased with a slight falling off in 1888, until 1890, when, as noted above, the total production has risen to 2 820,377 net tons, the largest production in its history, and a million tons greater than in 1885. This is a most remarkable fact, and one that is not generally known or appreciated in the iron trade.

It has been supposed by those who believe that steel will in the near future very nearly supplant iron, that the occasion of this increase in production in this country in recent years has been the falling off in the supply of old iron rails. While this may account for the increase in the demand for puddled iron or muck bar, which has been so notable, especially in the last two or three years, it does not account for the increase in the production of manufactured iron of all kinds. In the statistics of production iron made from old rails is included as well as the iron made from puddle bar. It is more than probable that the quality of the iron made from old rails was such as to lead to the substitution of steel for a great deal of the iron made from this material, and when old rails began to be scarce and finished iron was made more largely from puddle bar, consumers who have abandoned the use of iron because of its inferior quality, resumed its use when the quality was improved.

At the present moment it does not look as if steel —that is, steel made by any present process and at the prices at which it can be furnished—will supplant iron. We believe that a metal similar to iron will yet be made in the open-hearth furnace, and this may drive puddled iron out of the market, but neither Bessemer nor open-hearth steel as at present made will do this.—*American Manufacturer.*

THE WORLD'S FAIR POWER PLANT.

The steam and electric plants at the Columbia Exposition will be stupendous. Some idea of their magnitude may be gathered from the fact that 24,000 horse-power will be required to drive the machinery. The power at the Centennial in Philadelphia was furnished by the Corliss engine, now at Pullman, which is 2,456 horse-power. At Paris 6,000 horse-power was found sufficient. In view of the difference in these figures some other details may be of interest. The Construction Department furnishes the following statement of the probable arrangement :

"In the Machinery Hall the machines on exhibition will be driven by six lines of shafting carrying the required pulleys, each line running lengthwise with the building, or about 800 feet. Each of these six lines will be driven into four sections of a length of 200 feet, and each section will be driven by an engine. This necessitates the use for power in Machinery Hall of twenty-four engines with a capacity of 125 to 200 horse-power. These sections of shafting will be provided with friction coupling on their ends, so that in case of accident or the disabling of any engine its section may be driven by the engine on the other side of it. Lengthwise in the Machinery Hall will travel three electric cranes of twenty tons capacity, each having a maximum of speed of 400 feet per minute. During the installation of and the removal of exhibits these cranes will be used for transporting goods, but during the exposition they will be used to carry passengers through the halls.

At the east end of the Machinery Hall will be located the exhibit of pumping and hydraulic machines in operation. These pumps will supply water for all the grand fountains on the grounds and for other purposes. Here will be a pumping plant almost equal in capacity to any of the plants of the water works of Chicago. There will be pumps working with a capacity of 40,000,000 gallons per day.

In the Machinery Annex will be located the electric energy plant, where a number of engines of various types will furnish the 16,000 horse-power necessary to operate the generators for electricity for light and power. These engines will be located so as to form a compact central station This plant is elastic in its proposed capacity, and its power can be extended indefinitely. The estimated necessary 16,000 horse-power will probably be increased rather than diminished. In the building near the annex will be located the steam plant for furnishing steam power for this electric station.

South of Machinery Hall and opposite the centre of the building will be located the boiler house supplying the steam used in the building. This plant will be a model, and will have a capacity of 8,000 horse-power. Only in Machinery Hall will steam power be used. Electric power will be used in all of the other buildings, and will be transmitted by wires from the central electric plant. It is estimated that in Machinery Hall and its annex there will be about 3½ miles of shafting.

It is not yet determined whether crude petroleum or coal will be used for fuel. To run this big plant during the exposition will require at least 75,000 tons of coal or 225,000 barrels of crude petroleum. It will require at least 250 engineers, firemen and attendants to man this plant. To keep it bright and clean during exposition will require 90,000 pounds of waste, and it is estimated that $9,000 worth of lubricating oil will be poured on its innumerable bearings.

SILK WORMS IN CANADA.

It will be interesting to Canadians to know that silk worms hatch and begin to spin in this country as early as they do in Italy. Mr. Michael Basso, an Italian resident of Toronto, last fall imported one-quarter of an ounce of silk worm eggs, one-half of which he hatched out this spring, and he has attended them through their several sleeps till now he has a great many thousand cocoons under way and thousands and thousands of worms ready to commence spinning.

The stage through which the silk worm passes are as follows :—The egg, which is about the size of a small pinhead, contains the worm, which hatches of its own accord about May 15th, after which the worm is fed for seven or eight days on the leaf of a mulberry tree, which is its natural food. At the end of that time the worm takes a sleep of twenty-fours or so and during its snooze sheds its skin, after the manner of snakes. It takes four sleeps of twenty-four hours and five times feeding for every seven or eight days, shedding its skin every time it sleeps. At the end of the fifth feeding time it has to be "bushed"—that is, given a bush or something with branches in which to begin to spin the cocoon. It spins very industriously for from eight to ten days, when the cocoon is ready for market and is sold to the manufacturer. The first thing the manufacturer does is to kill the worm inside to prevent it from eating its way way out, which would destroy the silk, as it would act on the silk very much as if one drew a sharp knife across a spool of thread. The cocoons are then placed in boiling water and stirred with a brush, to which the ends of the silk attach themselves and are then attached to a bobbin and the cocoon is then unwound as fast as the bobbin can be moved. Those cocoons which are wanted for eggs for the next crop are kept with the worm alive. At the proper time the worm, in the form of a butterfly, emerges and in a few days begins to lay the eggs, which are kept till next season.

Mr. Basso is certainly very enthusiastic about his family of worms, and says that if the people in this countay only knew it they could make more out of silk worms, in the six weeks which they require attention, than off a whole crop of oats and potatoes. He says that in three years a great industry could be worked up, which would not only save the sending of money abroad, but would cause it to be sent here for silks which now comes from Italy. Mr. Basso seems as fond of his silk worms as if they were children. He picks them up, handles them and admires the beautiful creamy yellow color, which is shown when they are ready to begin to spin. He thinks that any farmer or anyone else could make more money for less trouble than could be made from bees for the same trouble. Mr. Basso says that the industry of silk-growing has grown to large proportions in California, and he cannot see why we could not make it worth while here. It was tried once before here, but the parties failed because they tried to feed the worms on lettuce. Mr. Basso concluded : "I wonder why they did not feed them molasses."

ASBESTOS AND ITS USES.

"Here is a towel that is never washed, and yet it is always kept clean," said a chemist to a Washington *Star* reporter, handing to him, at the same time, what appeared to the eye and touch to be nothing more or less than an ordinary piece of coarse cotton towelling. "What sort of laundry do you send it to?" was the natural query. "This kind," replied the man of science, going over to the corner of his laboratory, and stuffing the towel into a small stove that was burning brightly for chemical purposes. "I understand," said the visitor, "you never use a towel more than once." "You are very much mistaken there," responded the chemist. "I use such towels almost forever, and they seldom wear out." With that, he lifted off the lid of the stove again and took out the towel with the tongs, dipping it in cold water, and then handed it once more to the newspaper man. "Why," exclaimed the latter, "it is not even injured. What is it made of?" "It is made of rock," answered the chemist ; "but a very peculiar kind of rock—so peculiar, indeed, that the ancients supposed the stuff of which this towel is woven to be of a vegetable nature. They used to wrap bodies that were to be burned in clothes of the same flax-like substance, in order to keep the ashes from being lost amongst the charred wood of the funeral pyre." "But what is it called?" "You have often heard of it under the name of 'asbestos,' though a very few persons apparently have any notion as to what it really is. Enormous deposits of it exist in Canada and elsewhere. It is a form of a very hard rock, called hornblende, and is found in strata of fibrous consistency readily devisable into silky strands resembling flax. This likeness has given it the name of 'earth-flax.' You can see for yourself from this towel how much it looks like a vegetable fabric when woven. An asbestos towel may be used for pretty nearly the same purpose as an ordinary towel, and when it is dirty all you have to do is to throw it into the fire and rake it out after a little while perfectly clean." "Is asbestos used for any other purpose in these days?" "Oh, yes. It is employed for roofing material, boiler felting, paper stock and in the mixing of fireproof paints for stage scenery. Also clothes for firemen and gloves to handle red hot iron with, are made of it. Sometimes the mineral is found in thin sheets of interlaced fibres, known as 'mountain leather.' Elsewhere it is not infrequently procured in thick sheets, and in that condition is called 'mountain cork.'"

Nearly all those interested in the reorganization of the Cape Cod Ship Canal Company are Canadians.

A seamless steel boat made from one piece of metal by hydraulic pressure is among the latest foreign products.

A tidal wave at Melbourne and the resulting floods caused destruction of property estimated at $2,500,000. Many factories were submerged.

The growth of the American Patent Office Bureau illustrates the wonderful advance of the nation in science and useful arts. In 1790 three patents were issued ; 100 years later the number was 26,292, and the application for patents were 41,048. The total number of patents granted during the hundred years is 453,944, an average of nearly thirteen patents for every day in the year.

When the steel spiral spring of an instrument gets broken, it is much more satisfactory to make one than to send the instrument off and be without it for a week or more. To make them, use the best of spring steel wire ; select a smooth iron rod the size of the spring to be made ; carefully draw the temper from the wire ; fasten the rod and one end of the wire in a bench vise. Now wind the wire evenly and closely around the rod until you get the length of the wire required for the spring. Take the rod out of the vise, fasten one end of the spring to the rod ; taking hold of the other end, draw it along the rod until the spirals are the correct distance apart. To give the amount of spring wanted, fasten it firmly to the rod ; then make spring and rod red hot, and quickly plunge them into cold water. After drying, rub them all over carefully with oil and move them about in the flame of a lamp until the oil takes fire, which will give the spring the proper temper. I know there are some who make springs direct from tempered wire ; but they are much mose durable if shaped and then tempered.

An Australian factory inspector, in his annual report, gives the following account of the method adopted by a firm of velvet manufacturers in his district for cleansing the waste waters from their dye-house : "The water, colored with aniline and different vegetable dyestuffs, is passed through three basins connected with each other, so that the water flows easily from one to the other. The dirty water runs into the first basin, in which it collects during the day, and remains there from twenty-four to thirty hours. The greater part of the impurities is deposited, and the upper layer of water becomes more or less clean. The sluice gate is then opened, and the partially cleansed liquid escapes into the second basin, and during its flow lime water is let in to precipitate the remaining impurities. The partially cleansed water then remains standing for thirty hours, during which time, by reason of the lime water, it becomes fairly clear. The connecting channel between the second and third basins is then opened and a mixture of sulphate of iron and sulphate of magnesia is permitted to flow into the escaping water which, after standing thirty hours, is then permitted to escape into the river. Dye-houses which have a grass meadow near them can advantageously make use of the irrigating system. The grass acts as a filter and retains all impurities, which conduce largely to the growth of vegetation.

With reference to the reported discovery of the very rich tin mine about fifty miles from the city of Durange, John Pershmaker, the owner, gives the following details : "The discovery of tin was accidental. He had gone to what is known as the Diabolt mine,

forty-five miles south-west of Durango, for the purpose of examining the yield of metal-bearing ores, not knowing that tin had ever been found there. He found a shaft about 300 feet deep, which had passed through two light veins of gold, iron and silver-bearing ores. In making a close examination of the sides of the shaft he noticed that the miners had passed through a large and very rich lead of oxide of tin, evidently without knowing it. After making his calculations as to the probable direction taken by the vein he ran a horizontal tunnel for a short distance, striking a vein of ore that is truly remarkable. It is over four feet wide, and is composed of a solid mass of oxide of tin, assaying from fifty to sixty per cent. of pure metal. There is no sulphur in it whatever, so that the work of reducing the ore simply amounts to the work of smelting and casting into ingots." Mr. Pershmaker adds: "I made a thorough examination of the mine and its resources, and purchased the whole thing. What surprised me more than anything else is that nobody discovered the value of the mine before my arrival. But then only a few people know tin ore when they see it. I do, because I have made mineralogy and metallurgy a life-study."—*Northwestern Financier.*

A FEW facts concerning the expense connected with using gas fuel may be of interest. The quantity of gas used varies in different stoves, according to size of the burner. In ordinary cooking stoves, from six to eight feet of gas an hour for each burner, is sufficient for the burners used for boiling, frying, etc.; from twelve to twenty feet per hour for roasting and broiling; from six to twelve feet per hour for heating. If it is desired to reduce the consumption to less than the above figures, all that is necessary is to turn the gas partly off. To arrive at the cost of the gas used in any burner, per hour, all that is needed is the price and quantity used. Example: If a two-burner stove is used just an hour and the burners using six feet of gas each, it would consume twelve feet in that time,—a fair average. Taking gas at $1.60 per thousand feet, which is also fair, as most gas companies of any size do not charge more than this, which would be sixteen cents per hundred feet or $1\frac{6}{10}$ mills per foot. If, therefore, one foot of gas cost $1\frac{6}{10}$ mills, twelve feet would cost twelve times as much, or $1\frac{92}{100}$ cents the total cost of running a stove of this size one hour. This estimate is for a two-burner, or double stove. For a single-burner stove it would be one-half the cost, or $\frac{96}{100}$ of a cent per hour. If larger burners are used than six feet, as is usually the case in heating stoves, the cost increases in the same proportion, but it should be borne in mind that the more gas used the more heat is obtained. Do not these figures prove the assertion made, that gas is the cheapest fuel used for these purposes?—*Good Housekeeping.*

ONE of the feature of the coming electrical exhibition at Frankfort on-the-Main will be the transmission of power on a scale hitherto never attempted. When it was announced some months ago that it was proposed to transmit 100-horse-power from Laufen-on-the-Neckar to Frankfort, a distance of more than 100 miles, the statement was received with smiles of incredulity, but now it seems quite probable that not only will the experiment be tried, but that it will succeed, in spite of the engineering difficulties that have to be surmounted. The Government has been asked to supply line for the purpose, and on the system used the expense will not necessarily be at all severe, for the use of very high potential alternating currents is the feature of the scheme as at present planned. The alternating generator will supply a step-up transformer that in turn will transmit its secondary current at an enormously high potential along the line, to be re-transformed by a step-down transformer at Frankfort to a potential practicable for an alternating motor. A series of experiments carried out recently at Oerlikon involve the use of pressure as high as 33,000 volts on the line. At such a potential the current transmitted becomes so small that the line is a relatively small factor in the losses incurred, even though it be of the extreme length proposed. Nothing can better illustrate the characteristic advantages of the alternating system than this beautiful process of generating and utilizing currents at a moderate potential, and transmitting them from station to station at a pressure so enormous that the losses in transit become insignificant.—*Electrical World.*

THE Mexicans spun and wove cotton, and the Peruvians both cotton and wool, into fabrics which the Spaniards found in every way equal to anything they had known at home. The Peruvians, in particular, were adepts in the art. When Pizarro made the conquest of their country in 1533, he found in the empire of the Incas four species of animals little different from each other, which he called the sheep of the country (*carneros de la terra*), because of their general resemblance to the Spanish sheep, and the similar utilization of its fibre. Two of the species, the llama and alpaca, had been in a state of domestication from time immemorial, the remaining varieties, the vicuna and the guanaca, living in a wild state in the fastnesses of the Andes. From a variety of sources we are able to obtain minute details of the importance which the Government attached to these animals, and the large part which they played in the domestic economy of the country. The Peruvian woolen fabrics were of three kinds—a coarse woolen cloth, which they called *arasca*, which formed the raiment of the common people; a finer variety, called *compi*, worn by the captains and officials; and still another, also called *compi*, but of much finer quality, reserved for the use of persons of royal blood. Specimens of this cloth, still preserved, reveal a fineness of texture and an exquisite finish which modern ingenuity rarely equals. Both sides of these cloths were woven alike. The delicacy of the texture gave it the lustre of silk, while the brilliancy of the dyes employed excited the envy and admiration of the European artisan. The Peruvians made also shawls, robes, carpets, coverlets and hangings in great varieties of patterns. They knew how to produce an article of great strength and durability, by mixing the hair of animals with the fleece of their llamas.—*The Popular Science Monthly.*

WE are not of those who believe in putting obstacles in the way of exchange; but figures refute the fallacy that commerce is reciprocal, and that countries will buy most of those to whom they sell most. We buy more of Brazil than does any other country, and yet Brazil puts a tariff on what we send her, and an export tax on what she sends us; and aside from our flour, buys but little, sending her orders to European countries. In 1888 England sold us goods to the extent of over $200,000,000, and to Russia about a sixth of that amount. According to the doctrine of reciprocity, she ought to have bought our wheat in preference to Russian wheat—but she did not. For the week ending February 21st, London's wheat and flour supply was drawn from Russia, India and Germany, in the following amounts:—Russia, 22,814 quarters; India, 1,300 quarters; Germany, 497 quarters. From Australia, the United States and France, not a quarter of wheat was imported that week. While a week is no fair indication of the tendency of trade, the week in question is noteworthy as showing that the only sellers of wheat were England's poorest customers; while her best customers sold her no wheat. However true reciprocity of commerce may be in regard to individuals, it fails when applied to nations. England buys wheat where she can buy it cheapest. The poorer the country the cheaper the wheat, and the greater the proportional supply to England. It costs only about six cents to raise a bushel of wheat in India. In wretched Russia it costs but little more. Russia has a tariff just as we have. It is not reciprocity of commerce that induces England to buy Russian and Indian wheat. It is the attractiveness of the price, pure and simple. Could we ever, under any economic condition, get the price of our wheat down to that of the Indian and Russian article? How, then, can we ever hope to largely increase our wheat trade with Great Britain?—*American Miller.*

THE wool comes into the mill dirty, greasy, burry, sometimes washed by the farmer, but generally just as it is sheared from the sheep, a filthy and unwholesome thing, giving little sign of the beautiful white and flossy substance into which it is soon converted. It must first be sorted, each fleece containing from six to eight qualities of sorts, which the careful manufacturer separates, devoting each quality to the purpose for which it is best suited. No skill in carding, spinning, weaving, or finishing can possibly produce a soft or fine piece of goods from a coarse, hard fibre. When a woollen thread is to be spun to the length of 15,360 yards to a pound, or in the case of a worsted thread to twice that number of yards to a pound, everythtng depends upon care in the selection of the fleece and in the sorting. These sorts are impregnated with a greasy substance called the yolk of suint, caused by the animal secretions and the perspiration of the skin, a compound of potash and animal fat, which must be completely eradicated. The elimination of the yolk, dirt, and foreign substances, common to all wools, results in a shrinkage of from fifty to seventy per cent. Our ancestors scoured their wool in tubs, much as our wives and daughters scour our clothes to-day. In the hand-washing of wool, a tub was filled with the suds, in which one or two men with long poles stirred the wool until clean, when they lifted it upon a travelling apron, which carried it between a pair of rollers which squeezed out the water. The same principle is applied in the automatic scouring now in vogue. Great forks or rakes seize the wool as it is carried by rollers from a feeding apron into the iron tanks, and by alternating motions of their teeth give it a thorough scouring. Thus cleansed, the wool is delivered by rollers to the drying machines, where hot air and great fans are now utilized to extract all the moisture without tearing the fibre.—*The Popular Science Monthly.*

Manufacturing.

This department of the "Canadian Manufacturer" is considered of special value to our readers because of the information contained therein. With a view to sustaining its interesting features, friends are invited to contribute any items of information coming to their knowledge regarding any Canadian manufacturing enterprises. Be concise and explicit. State facts clearly, giving correct name and address of person or firm alluded to, and nature of business. Subscription $1.

THE basket factory of Messrs. Millar & Bunting, at St. Catherines, was destroyed by fire August 6th.

FIRE in the works of the Montreal Blanket Company, Montreal, on August 17th did damage to the extent of about $5,000.

THE large saw and planing mills of Mr. John Smith, at Tilsonburg, Ont., were destroyed by fire, August 18th.

THE Toronto Carpet Manufacturing Company has been organized with a capital stock of $50,000 to manufacture carpets, etc.

THE Dominion Crystal Tablet Company, Toronto, has been organized with a capital stock of $7,000 to manufacture washing crystal, etc.

THE Beam Threshing Machine Company has been incorporated at Berlin, Ont., with a capital stock of $30,000, and have already commenced manufacturing.

MR. E. H. GROVE, of Galt, is organizing a company who will take over and operate the office furniture factory in Preston, Ont., lately run by Messrs. Guggisberg & Bro.

THE Prescott Emery Wheel Company, Prescott, Ont., has been incorporated with a capital stock of $25,000 to manufacture emery wheels machinery appertaining thereto, etc.

THE Edison General Electric Company of Canada, whose works are at Peterborough, Ont., will establish on arc and incandescent electric lighting plant in the town of Lindsay, Ont.

THE Snowball Wagon Works Company, St. George, Ont., has been organized with a capital stock of $30,000 to manufacture wagons, buggies, sleighs, cutters, hubs, spokes, etc.

THE Safety Barb Wire Company, of Toronto, is being incorporated with a capital stock of $75,000 and will engage in wire drawing, the manufacture of barb wire, wire nails, etc.

THE Gurd-Brandon Woodware Company, of Toronto, has been organized with a capital stock of $80,000 to manufacture children's carriages, velocipedes, bicycles, tricycles, woodenware, etc.

MESSRS. D. W. KARN & Co., manufacturers of pianos and organs, Woodstock, Ont., are making a large addition to their factory to meet the emergencies of their rapidly increasing business.

THE Eno Steam Generator Company, Toronto, are meeting with much success with their "Triumph of the Age" steam generator. Illustrated catalogue and full particulars sent on application.

THE Gutta Percha and Rubber Company of Toronto, have recently furnished to the fire department of New Westminster, B.C., 2,000 feet fire hose, a hose wagon and other appliances.

LA COMPANIE Manufacturiere de Valleyfield (The Valleyfield Manufacturing Company), is being organized at Valleyfield, Que., with a capital stock of $40,000 for the purpose of manufacturing lumber, woodenware, etc.

MESSRS. FROST & WOOD, manufacturers of agricultural implements, Smith's Falls, Ont., will probably manufacture in Canada the newly invented harvesting machine which binds the sheafs of grain with straw instead of with twine.

THE Brackman & Ker Milling Company has been organized at Victoria, B.C., with a capital stock of $150,000. The object is to acquire the business of Messrs. Brackman & Ker, of Victoria, and to erect and operate grist and flouring mills at that place.

THE Welland Vale Manufacturing Company, St. Catharines, Ont., are making arrangements to begin the manufacture of a full line of hammers and scythe swaths, in addition to their other products, the machinery for which has already been ordered.

THE Canadian Pacific Railway Company are building coal docks and necessary machinery at Fort William which will have a storing capacity of 100,000 tons. They are also building grain elevators at

that place, the aggregate capacity of which will be 1,350,000 bushels.

THE various fruit and vegetable canning establishments in Ontario are now in their busiest season. Messrs. W. Boulter & Co., Picton, are putting up the tomatoes from 250 acres, and would like to have more if they could obtain them. They also have contracted for 100 acres of sweet corn.

MR. RISTEEN, of Boston, has purchased two big blocks of birch land on the Miramichi—one at the Sugary and the other at the Bathurst road, near Connell's—and is negotiating for another block near the Douglastown quarries. His firm will build two or two three mills for sawing either bolts or spools.—*Chatham World.*

THE Goodyear Shoe Machinery Company of Canada, with headquarters at Montreal, will be incorporated with a capital stock of $250,000, and will own and control what are known as the Goodyear patents and others for the manufacture of rubber and other goods, and will manufacture machinery for the production of such goods.

A WEALTHY English syndicate are going largely into the fruit canning business at Chilliwhack, B.C. The company intend preparing the fruit for the European markets by putting it up in glass jars manufactured expressly for the purpose by themselves. They will locate their glass works as near as possible to the cannery. Several tons of fruit will be prepared in this way in Victoria this year as a sample of the firm's production.

IT was recently stated in these pages that the business of the Quebec Worsted Company, of the City of Quebec, would be transferred to the Paton Manufacturing Company, of Sherbrooke, Que. This has been accomplished, and a new factory building is being added to the extensive plant of the Paton Company at Sherbrooke, to accommodate the enlarged business. The city of Sherbrooke has recently paid this company a bonus of $25,000 to assist them in their new business.

THE Massey-Harris Company, with headquarters at Toronto, have been incorporated with a capital stock of $5,000,000 for the manufacture of all kinds of machinery, tools, furniture, stoves, hardware, etc. This is the consummation of the union of the Massey Manufacturing Company, of Toronto, and the A. Harris Company, of Brantford, recently alluded to in these pages. Both of these companies were engaged chiefly in the manufacture of agricultural implements, being probably the largest concern in that business in Canada

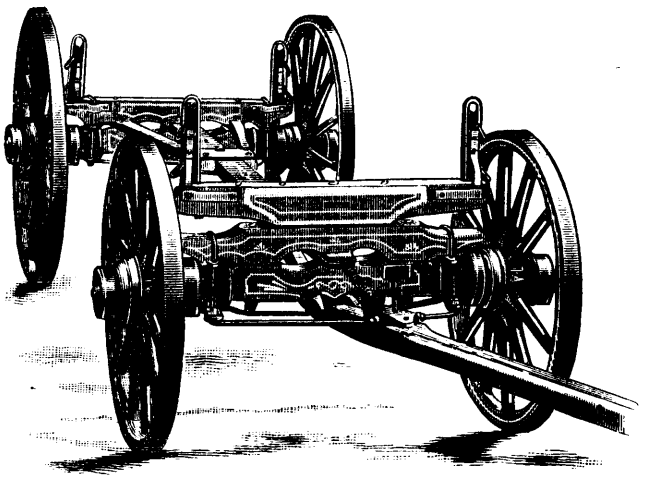
THE following is the description of a new two-spindle borer just constructed by the Cant Bros. Company, of Galt, Ont. It is designed to perform with accuracy and in one operation that class of work in which two holes can be bored at any given distance and angle, as in dowelling, chair, cabinet and other similar work, thus effecting a very great economy of time and labor. In most of those hitherto constructed, the angle has been from the horizontal to the perpendicular, one bit being thus brought exactly above the other. But in this one, the two bits are mounted in an adjustable head which swivels around one of them, so that they may be set at an angle from the horizontal line of the table. The range of adjustment is from a horizontal to a perpendicular line, and to an angle of forty-five degrees beyond the perpendicular.

WHEN cooking anything that requires a steady and even heat, one can see how finely the gas stove is adapted for this, as by turning the gas on till the required heat is obtained, it will remain at that point until changed. And, again, how many housekeepers are there who have never been through the experience of being late with meals? Many a woman can testify to the advantage derived from the use of the gas stove in such an emergency over the ordinary cooking range. Another great advantage is that of the comfort derived, especially in the summer season, when the thermometer ranges in the nineties, and when the good lady of the house is puzzled to know how to meet the oppressive heat of the atmosphere, not to mention the heat generated in the house. The gas stove at this time is really a blessing. Instead of having to endure the extreme heat of a kitchen range, combined with the atmospheric heat, the housekeeper is enabled to perform her household duties with comfort.—*Good Housekeeping.*

A PAPER was lately read at the meeting of the Shipmaster's Society, London, by Captain Carmichael, on the subject of "Liquid Fuel for Ocean Steamers." The lecturer remarked that the use of oil-fuel had not been much taken up by the owners of steamships, partly because coal was cheap, and partly because there was a timidity to adopt the liquid fuel. Tho advantages of the latter were many, the fires being completely under the control of the engineer on watch, who could regulate them so as to produce any pressure of steam required without being dependent on his firemen. But the great advantage in the use of oil was that the fuel could be carried in space that was now practically wasted—namely, the cellular bottoms of the ships or in the ballast tanks. The consumption of oil was, weight for weight, one-half that of coal; and the storage was both more compact and easier of access. Tank-steamers could always fuel a fleet of vessels even in heavy weather, and the oil is safe on board ship, and can be easily stored on shore. It greatly added to the cleanliness and the comfort of passenger ships, and it could be adapted to any existing boiler either afloat or ashore.

THE Kootenay Smelting and Trading Syndicate smelter here was the scene of considerable excitement this week. On Monday fires were started in the furnace, and for two days following the fire continued. Then the furnace was closed below, it being heated, and tons of bar lead thrown into it, and soon after the ore, charcoal, coke, limestone, sand, etc., were shovelled into the cauldron of fire. Since that time this shovelling process has been continued day and night. The air from the bellows helped the fierce fire, and on Thursday the first bullion was drawn from the big crucible. The "slag" also flowed freely, and Dr. Campbell was covered with smiles, soot and perspiration when he told a *Star* representative, with evident satisfaction, that there was the first slag from a smelter in British Columbia, an evidence that all was going well. As was stated in the *Star* last week, the ore being treated carries a high percentage of zinc, 15 per cent. more than can be safely counted on to run. Friday was looked upon as the critical time, when if the ores were not going to run freely they would "freeze," and the fires would be blown out. The ore continued to run, however, and at the time of writing smoke ascended from the smelter stack and nearly a dozen men were kept busy feeding and attending to the furnace. The smelter was thronged with visitors, and numerous pieces of bullion and slag were taken away as souvenirs of the first output of the Kootenay smelter.—Kootenay, B.C., *Star.*

NOVA SCOTIA and Prince Edward Island advices go to show that the lobster catch for the season, which closed on August 1st, has been the most successful of any season for the past ten or twelve years. Especially is this the case with the factories bordering on the Northumberland Straits. A gentleman interested in lobster canning makes the statement that these factories will, on the whole, average a net profit of about $4,000 each. Taking into consideration the fact that the season for catching lobsters is by law restricted to June and July, this profit must be regarded as enormous. The benefit of the short season is now becoming apparent in the increased catch, which is almost double that of previous years, while the lobsters are just the right size for canning purposes. Such has been the rapid spread of the canneries that every available sight along the shores of the Straits of Northumberland has been taken up and parties desirous of investing money in the business are withheld by the difficulty of procuring a favorable cove or beach. A good idea of the profits of lobster canning may be gathered from the fact that, while a pound tin is put up ready for shipment at a cost of about nine cents, they are taken from the canneries by wholesale dealers, who pay from seventeen to twenty cents per tin. An American firm, owning fourteen factories, ship their entire product to the French and English markets direct, and all their tins are labelled "Machias Bay Lobsters," notwithstanding the fact that the contents are caught in Dominion waters, put up on Canadian soil and by Nova Scotia workmen.—Moncton, N.B., *Times.*



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LEITCH & TURNBULL, Canada Elevator Works, cor. Queen and Peter Streets, Hamilton, Ont.—Patent safety Hydraulic, Hand aud Power Elevators. Telephone connection.

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

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JOHN BERTRAM & SONS, Dundas.—Machine tools and wood-working machinery, Toronto wareroom 58 Yonge St. Agents—The Polson Iron Works Co. Montreal wareroom, Craig St. Agents for Quebec—The Machinery Supply Association, Montreal.

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THEO. H. EATON & SON, Windsor, Ont.; Detroit, U.S.A.—Supply at lowest prices all chemicals used by Tanners and Wool Pullers. Special Aniline for Sheep Skin Dyers, Wool Mat Manufacturers, etc., etc. Address correspondence to Head Office, Detroit, Mich.

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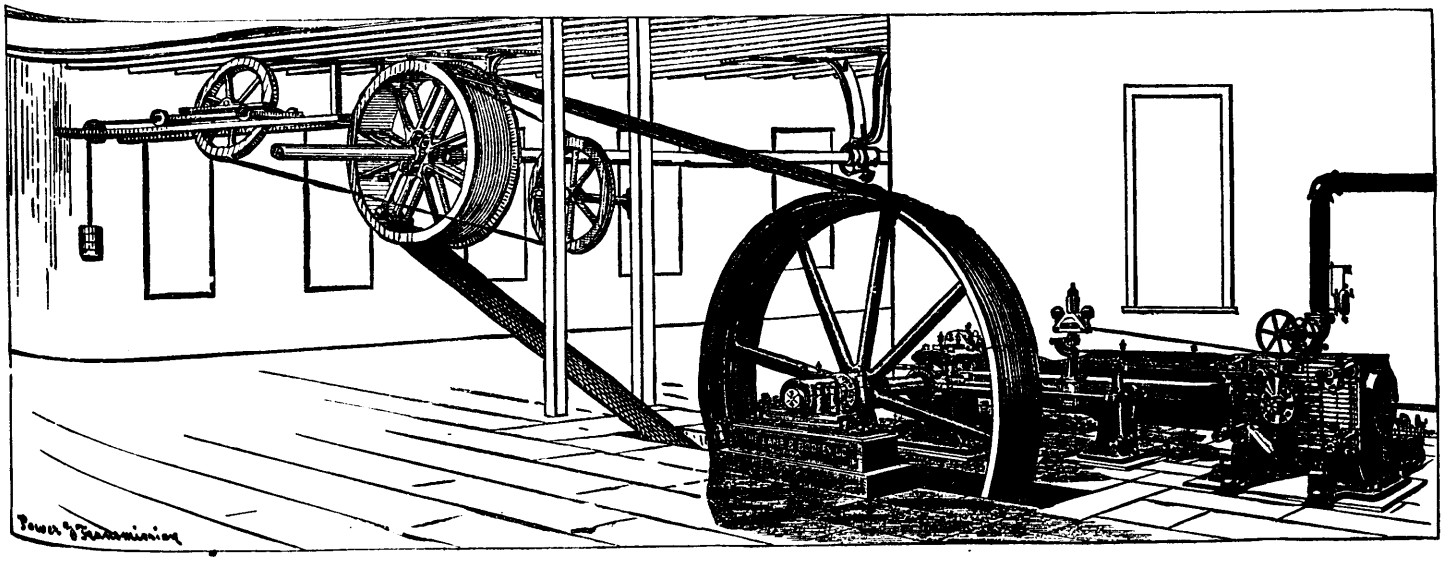
McARTHUR CORNEILLE & CO., furnish at closest prices extracts for tanning and coloring. Sumac, Gambier, etc., Sulphide of Sodium, and other chemicals, Aniline colors, etc.; also Pure Cod Oil and other oils for Curriers. Degras, etc. Sole agents in Canada for Miller Tannin Extract Co., Hemlock Extract, and Gondolo Extract Co.'s Oak Extracts.

Wire Works.

THE B. GREENING WIRE CO. Ltd., Hamilton, Ont.—Perforators of zinc, iron and steel; manufacturers of wire cloth, all grades, wire ropes, bank and office railings, etc.

TIMOTHY GREENING & SONS, Dundas, Ont.—Wire manufacturers and metal perforators, wire cloth, all grades, perforated sheet metals of every description, all kinds of special perforating and indenting done to order.



ROPE TRANSMISSION OF POWER

The above cut shows our patent system of Rope Drive from Engine Wheel to Main Line Shaft. This system is now adopted in many of the leading steam power plants in Canada, and from all of them we have letters of highest praise. The experience in its use has proved

THE ROPE DRIVE

TO BE THE MOST

ECONOMICAL AND POSITIVE

means of transmission of power yet tried.

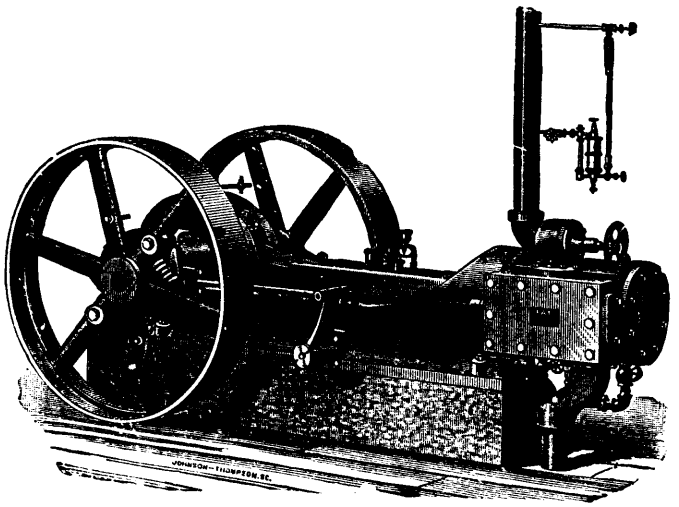
Where the engine is placed at a distance from the Line Shaft, for insurance regulations, or where it is from necessity situate very close to Line Shaft, a Rope Drive is practically indispensable.

We invite all manufacturers who are contemplating a change in their power plant, to see us and investigate the desirabilty of adopting our system before closing plans.

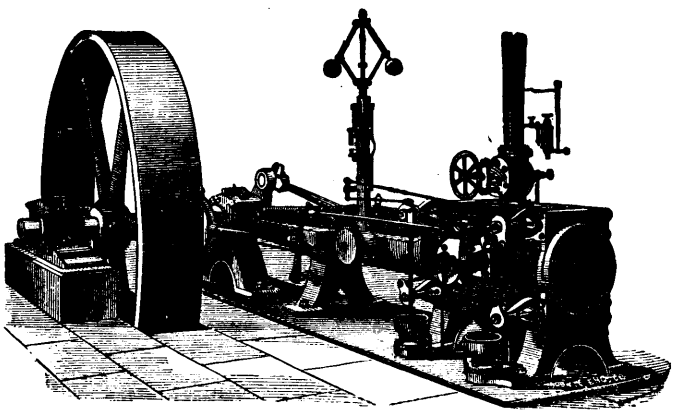
FOR ALL INFORMATION APPLY TO

DODGE WOOD SPLIT PULLEY CO.

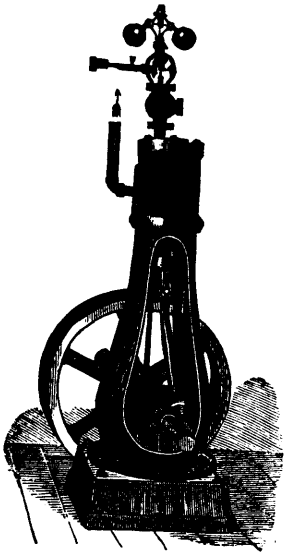
83 King St. West, - Toronto, Ont.



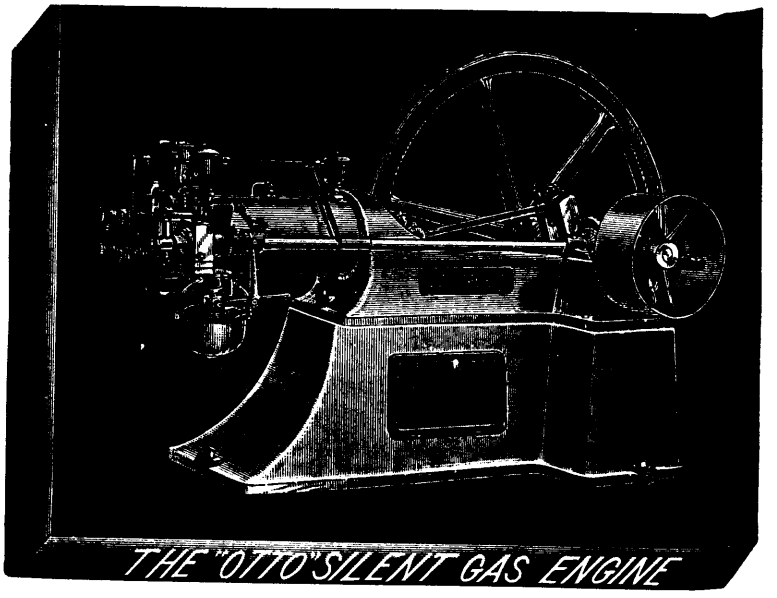
Armington & Sims Electric Light Engines.

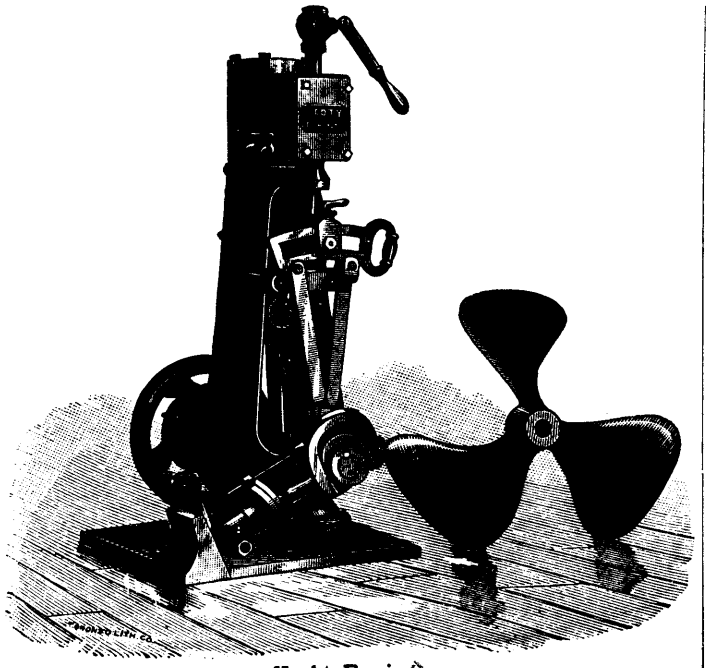


Reynolds-Corliss Engine.



Vertical Engines.





Yacht Engines

The John Doty Engine Co.

OF TORONTO, LIMITED.

TORONTO, ONT.

MANUFACTURERS OF

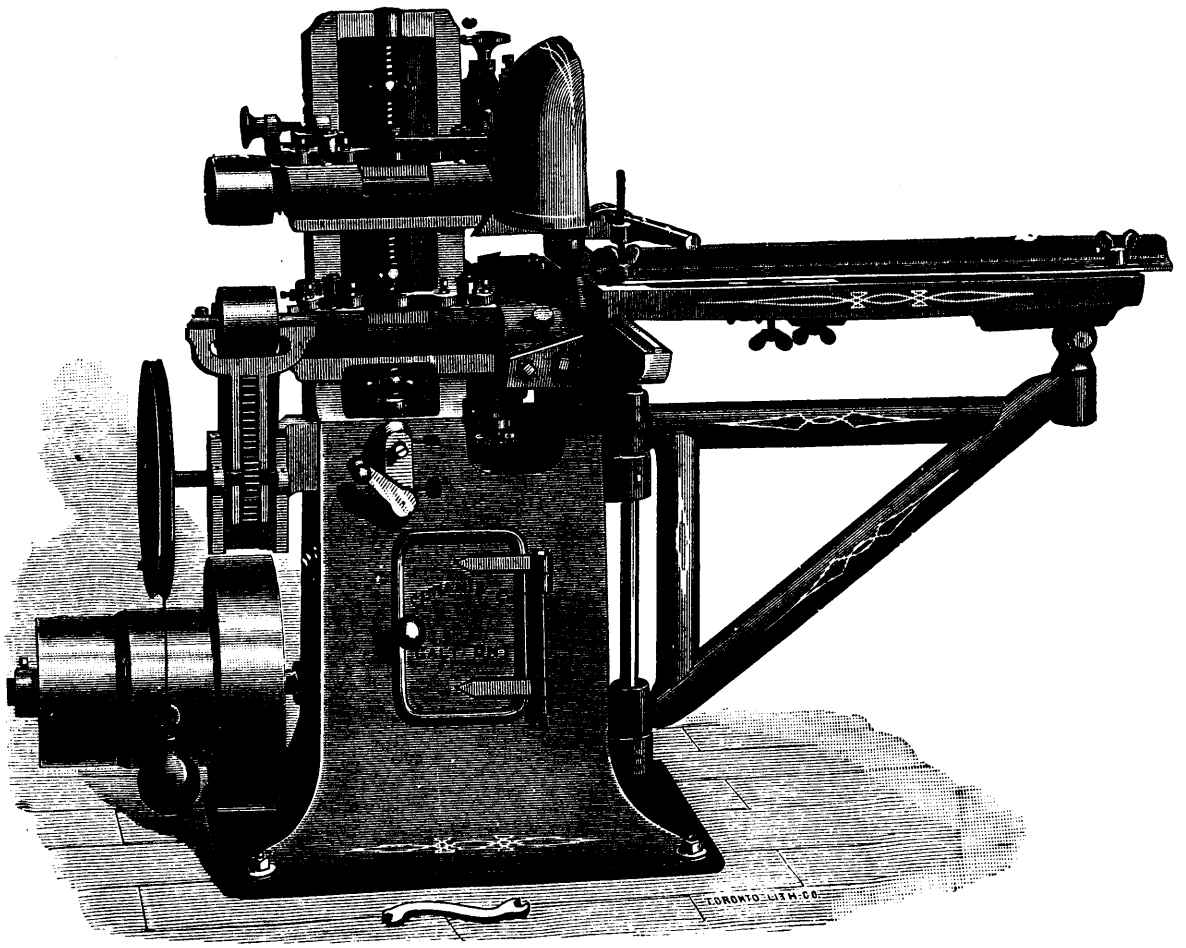
Engines & Boilers

OF EVERY DESCRIPTION.

SEND FOR CATALOGUES.

NEW AND IMPROVED

Pedestal Tenon Machine.



This is an entirely new style of Tenon Machine. The frame is cast in one piece, and the working parts stand solidly on a pedestal, avoiding all vibration.

The Cutter and Cope Heads are connected and are moved all together or separately, as required. The Upper Head and Boxes also adjust horizontally to suit shoulder of tenon, the Cope Knives moving with the Heads to prevent re-adjustment.

A special feature in this machine is the Bed, or Carriage, which is at once light and strong. The outer end works on rollers and is moved very easily.

In cutting the tenon the Bed and Carriage move entirely past the Heads and Cutters, the operator having full control of the work. It has also the advantage of leaving the Heads and Cope Knives clear, and of ready access by the operator.

The Carriage is so arranged that it cannot tip over the Slides nor be thrown into the Cutters, and is also supplied with extension bar for long stuff, as in all Tenoning Machines.

This Machine is supplied with single or double Copes, as ordered, and for furniture work it is without Copes, and with an adjustable cut-off Saw.

COWAN & CO.

"Galt Foundry" Engine and Machine Works, GALT, ONTARIO, CANADA.

Corliss and Slide Valve Engines, Boilers, and Wood-Working Machinery, all kinds, New Patterns, Highly Finished.

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